

# ENTREPRENEURIAL PROFILES OF CREATIVE DESTRUCTION

---

Courage, Imagination  
and Creativity in Action

ELIAS G. CARAYANNIS  
MCDONALD R. STEWART  
CAROLINE SIPP  
THANOS VENIERIS



# Entrepreneurial Profiles of Creative Destruction

# Entrepreneurial Profiles of Creative Destruction

## Courage, Imagination and Creativity in Action

Elias G. Carayannis

*George Washington University, Washington, DC, USA*

McDonald R. Stewart

*Independent Consultant and Entrepreneur, Colorado Springs, CO, USA*

Caroline Sipp

*Inter-American Development Bank (IADB), Washington, DC, USA*

Thanos Venieris

*Venieris Enterprises, Thessaloniki, Greece*

palgrave  
macmillan



© Elias G. Carayannis, McDonald R. Stewart, Caroline Sipp and  
Thanos Venieris 2014

Individual chapters © Respective authors 2014

Softcover reprint of the hardcover 1st edition 2014

All rights reserved. No reproduction, copy or transmission of this  
publication may be made without written permission.

No portion of this publication may be reproduced, copied or transmitted  
save with written permission or in accordance with the provisions of the  
Copyright, Designs and Patents Act 1988, or under the terms of any licence  
permitting limited copying issued by the Copyright Licensing Agency,  
Saffron House, 6–10 Kirby Street, London EC1N 8TS.

Any person who does any unauthorized act in relation to this publication  
may be liable to criminal prosecution and civil claims for damages.

The authors have asserted their rights to be identified as the authors of this  
work in accordance with the Copyright, Designs and Patents Act 1988.

First published 2014 by  
PALGRAVE MACMILLAN

Palgrave Macmillan in the UK is an imprint of Macmillan Publishers Limited,  
registered in England, company number 785998, of Houndmills, Basingstoke,  
Hampshire RG21 6XS.

Palgrave Macmillan in the US is a division of St Martin's Press LLC,  
175 Fifth Avenue, New York, NY 10010.

Palgrave Macmillan is the global academic imprint of the above companies  
and has companies and representatives throughout the world.

Palgrave® and Macmillan® are registered trademarks in the United States,  
the United Kingdom, Europe and other countries.

ISBN 978-1-349-28040-7      ISBN 978-1-137-42983-4 (eBook)  
DOI 10.1007/978-1-137-42983-4

A catalogue record for this book is available from the British Library.

A catalog record for this book is available from the Library of Congress.

Transferred to Digital Printing in 2014

# Contents

<i>List of Figures and Tables</i>	vi
1 Introduction and Definition of Terms <i>Elias G. Carayannis</i>	1
2 Theory and Literature <i>Elias G. Carayannis and McDonald R. Stewart</i>	29
3 Obsessed Maniacs and Clairvoyant Oracles: Empirically Validated Patterns of Entrepreneurial Behavior <i>Elias G. Carayannis and McDonald R. Stewart</i>	131
4 Dystechnia: A Model of Technology Deficiency and Implications for Entrepreneurial Opportunity <i>McDonald R. Stewart and Elias G. Carayannis</i>	160
5 Knowledge-Driven Creative Destruction: Strategic Knowledge Arbitrage and Serendipity <i>Elias G. Carayannis</i>	183
6 Real Technology Options and Venture Creation <i>Elias G. Carayannis and Caroline Sipp</i>	209
7 From the Zoo to the Jungle and Back in a Second: The Profile of a Serial Entrepreneur in Action <i>Thanos Venieris</i>	262
<i>Index</i>	346

# Figures and Tables

## Figures

2.1	Map of literature review and theoretical framework	30
2.2	Scott's institutional pillars and analytic levels: illustrative schools—amended with overlay of technology entrepreneurship	44
2.3	A triple-layered architecture of technological learning: the SMOTL topology	65
2.4	The cone of strategic technological hyperlearning, illustrating concentric levels of technological learning	66
2.5	Modified spiral of organizational learning, cognition and knowledge	67
2.6	The creativity-innovation-competitiveness double helix and value-added chain	68
2.7	The basic S-curve model of system productivity	81
2.8	The technology lifecycle S-curve	82
2.9	Continuous and discontinuous innovation: technology performance roadmap	86
2.10	Four modes of Schumpeterian firm evolution dynamics	87
2.11	The 21st-century fractal innovation ecosystem	89
2.12	Heterogeneity dynamics: the microlevel stages, drivers and determinants	92
2.13	Conceptual model of multidimensional sociotechnological network structure	98
2.14	Network imperfections connote dystechnic regimes	99
2.15	The clairvoyant oracle of entrepreneurship sees opportunity in dystechnic regimes	100
2.16	The obsessed maniac of entrepreneurship persistently hones the venture initiative	101
2.17	The entrepreneur's technology venture remediates the targeted dystechnic regime	101
3.1	Heterogeneity dynamics—the microlevel stages, drivers and determinants	137
3.2	Heterogeneity dynamics—co-opetition, co-evolution and co-specialization	137
5.1	The lifecycle of creative destruction: an ecosystem perspective	184
5.2	Analyzing knowledge impact on M&A benefits by timeframe	193

5.3	From one ecosystem to the next: OCS in C3	196
5.4	Pushing the performance envelop with SKARSE	205
5.5	SKARSE dimensions—place and content	205
6.1	New venture formation levels across configurations and subpopulations	217
6.2	Survival rates for new ventures, expressed as the probability of formation occurring across configurations and subpopulations	218
A.V.1	Conceptual model of heterogeneous agent landscape of simulation	248
A.V.2	System model of new venture formation simulation	253

## Tables

2.1	Stewart's reinterpretation of evolutionary relevance of Scott's institutional pillars	45
2.2	Stewart's technology entrepreneurship perspective of Scott's cultural-cognitive pillar	75
2.3	Summary of phylogenetic relationships within the innovation theoretical framework	85
2.4	Summary of classified constituents of technology entrepreneurship theoretical framework	93
3.1	Interpreted grounded theory of the entrepreneur: entrepreneurial constitution—what the entrepreneur might have	142
3.2	Interpreted grounded theory of the entrepreneur: entrepreneurial behaviors—what the entrepreneur might do	144
5.1	Knowledge dynamics	195
5.2	SKARSE™ and C3 implications for M&A	198
5.3	M&A Maturity Model: Company A is integrated	199
5.4	M&A Maturity Model: Company B is managed	201
5.5	M&A Maturity Model: Company C is integrated to self-optimizing	203
5.6	M&A Maturity Model: Company D is self-optimizing	204
6.1	Statistical difference between TD and TB for options in co-opetition	211
6.2	Statistical difference between TD and TB for options in strategic co-evolution	212
6.3	Statistical difference between TD and TB for options in non-strategic co-evolution	212
6.4	Statistical difference in options use between strategic and non-strategic investments for TD	213
6.5	Statistical difference between TD and TB for options in co-specialization	214

6.6	Characteristics of interview participants	214
6.7	ANOVA for levels of new venture formation across regions	220
6.8	ANOVA for the age of new venture formation across regions	221
6.9	ANOVA for the probability of new venture formation across regions	221
A.V.1	Demonstration of knowledge matching method for thresholds	256



# 1

## Introduction and Definition of Terms

*Elias G. Carayannis*

### Key issues

1. Most new businesses fail, all businesses ultimately fail—we will discuss meanings of “success” and “failure”—what do they mean and how do they play out?
2. We define “serious”—does it simply mean financial size or are there other measures of importance?
3. We define “entrepreneur”—are we really including new businesses established within existing corporations? If not, why not?

This work is intended to help students and practitioners of entrepreneurship alike to think about what it takes to create a significant business, not what it *will* take, because complexity, chaos and the fluidity of our changing environment dictate that the “requirements” of any particular business can, at best, be known only in part, not just at inception but at each stage as a company develops and evolves. Thus the focus here is on what it *may* take to create a successful and significant business.

Using the lamp of experience as its touchstone, this book looks to the creation and evolution of significant businesses, primarily in the United States. It will highlight past experience, best practice, and good and bad examples. The intent is to explore the analyses, assessments and decisions that the entrepreneur makes (consciously and unconsciously) and the range of questions that need to be answered when one sets out to build a significant business. The work will touch on the inadequacies of existing management training and the reality that large corporate training and skills are often poor preparation for building a business from the ground up.

What is not intended here is to provide a roadmap or guidebook, or to systematize “entrepreneurship”—the authors believe that neither is rational as an approach to constructive ways of thinking about entrepreneurial activity or as guidance for entrepreneurs. The importance of particular individuals in

## 2 Introduction and Definition of Terms

creating new businesses, the evolutionary and chaotic basis of such creation, and the fluidity of the environment in which we now live make even an attempt to identify consistent patterns, processes or principles in the evolution of new businesses suspect. What can be identified are the range of questions and challenges that the entrepreneur faces and the skills that are needed to create and sustain an enterprise.

The intent of this volume is to open up the world in which the serious entrepreneur lives and the questions that they need to ask and answer—the issues of judgment

- of themselves;
- of their companies;
- of the world around them.

Equally important, this book is predicated on the idea that at this time, in the midst of one of the great economic and social revolutions in history, no entrepreneur can ignore that revolution when creating and growing a significant company. The technologies that underpin the nascent “information age” began to be applied about a half-century ago and it is unlikely that they will be relatively fully deployed for another half-century—and it may be decades beyond that before all of their first-order effects are felt. Given that context, any significant new business will need to accommodate change generated by that revolution—changes which have already occurred, changes which are occurring and changes which will only emerge as the company evolves. In short, the serious entrepreneur needs to think about their business in the context of the revolution and the fluidity that it imposes on the human environment.

This introduction will elaborate on all of these matters, provide a brief roadmap to the contents of the book, and take one example of a serious entrepreneur as an illustration. Each of the subsequent chapters will be built around lessons from entrepreneurial successes and failures.

Many see trends and accurately predict economic change—that skill is necessary and often sufficient for the investor, who then spreads their bets across a portfolio. That skill is necessary but insufficient for the entrepreneur, who must accurately predict the general trend, then build an enterprise that takes advantage of the specifics of change to succeed.

The key themes traced through the book are:

- *the inevitability and importance of chaos*<sup>1</sup> in the creation of a successful business;
- *creative destruction*<sup>2</sup> as the essence of entrepreneurial effort (if capitalism is creative destruction, then entrepreneurial enterprise epitomizes a furious cycle of creation and destruction);

- *the evolutionary and organic nature of new business creation*<sup>3</sup> (countries and institutions are born, grow and die; few live more than a century or two, at most, and those that do transform themselves [e.g., Britain, Rome]);
- *the relatively short lifecycle of businesses*<sup>4</sup> among human endeavors (companies and business organizations have the same characteristics—only their lifecycles tend to be much shorter, particularly in times of great change [social, economic and technological]; successful companies rarely survive more than a century, and usually only decades, with exceptions usually being family firms, which are closely controlled).

In addition to these defining themes, the book will constantly weave among a number of threads, the first half of which relate primarily to personal characteristics (1–4 below) or, to use an old-fashioned word, character, and the second half of which relate primarily to analysis and judgment (5–8):

1. risk-taking—managing and calculating risk;
2. creativity, inventiveness and innovativeness;
3. persistence;
4. leadership;
5. predicting change;
6. planning change;
7. responding to unplanned change;
8. coping with institutional resistance.

In closing, this book is an effort to better understand what makes entrepreneurs and entrepreneurship in an age of profound economic/business/social changes driven by a revolution in technology, and our examples and our discussion will focus on those changes and their implications for the evolving and globalizing knowledge economy and society that we are all part of.

## **Glossary of terms**

There are no universally accepted, single definitions of many of the concepts examined in this dissertation. The following are abstracted for consistency and clarity, and presented alphabetically for ready reference.

### **Absorptive capacity**

The ability to exploit external knowledge is a critical component of innovative capabilities. The ability to evaluate and utilize outside knowledge is largely a function of the level of prior related knowledge, starting with basic skills or a shared language, then also knowledge of the most recent scientific or technological developments in a given field. Thus prior knowledge confers an ability to recognize the value of new information, assimilate it and

#### 4 Introduction and Definition of Terms

apply it to commercial ends. Collectively, these abilities constitute a firm's absorptive capacity (Cohen & Levinthal, 1990).

The notion of absorptive capacity refers to the capacity of the recipient to assimilate value and use the knowledge transferred. Similar notions of "learning" have been defined as the acquisition and use of exciting knowledge and/or creation of new knowledge with the purpose of improving economic performance (Carayannis et al., 2006).

Braun (1997) introduces a conceptual model for knowledge flows that shows how a large company with high connectivity and an integrated infrastructure for information and knowledge exchange vis-à-vis communities of practice can lead to a higher level of trust, and subsequent innovation and competitive advantage. He identifies the critical factors to consider in terms of knowledge exchange between organizations as follows:

- adequate technology (infrastructure and data exchange);
- trust and cooperative relationships;
- common interest;
- exchange of tacit and explicit company knowledge for the public good of the company.

### C3

*Co-opetition, co-evolution and co-specialization* (Carayannis, 2004, 2008a, 2008b; Carayannis & Gonzalez, 2003; Carayannis et al., 2006; Carayannis & Campbell, 2006, 2009) are constituent processes in the dynamics of strategic knowledge. Strategic knowledge co-opetition refers to the deriving of new knowledge through a healthy balance of competition and cooperation, involving employees and business partners. Strategic knowledge co-evolution is the creating of new knowledge through a series of interactions and changes at various organizational levels, spurred by the co-generation and complementary nature of that knowledge. Strategic knowledge co-specialization refers to the learning and knowledge that encourages individuals or groups to expand their roles into new areas and new domains in a complementary and mutually reinforcing way.

### Chaotic fractal

Chaotic fractal is a geometric model of a natural dynamic phenomenon involving chaos, turbulence, mixing, and similar random influences. Using computer modeling, a three-dimensional representation of a chaotic fractal possesses a mathematical quality termed "strange attractor" wherein the pattern reiterates similarly but not identically around a variable periodicity, suggesting that even random natural phenomena are constrained, and disorder is channeled into patterns with some common underlying theme (Gleick, 1987). (See also *Fractal* and *Fractal innovation ecosystem*.)

## Content analysis

Normally used by research methodologists to refer to the quantitative analysis of texts or images, content analysis is in practice often combined with qualitative thematic analysis to produce a broadly interpretive approach in which quotations as well as numerical counts are used to summarize important facets of the raw materials analyzed (Seale, 2004).

## CoP

*A community of practice* (Carayannis et al., 2006) is a persistent, sustained social network of individuals who share and develop an overlapping knowledge base, set of beliefs, values, history and experiences focused on a common practice and/or mutual enterprise (Barab & Duffy, 2000). Wenger (2004) has identified three dimensions of communities of practice:

- domain: the area of knowledge that brings the community together;
- community: the group of people for whom the domain is relevant;
- practice: the body of knowledge, methods, tools, stories, cases, documents which members share and develop together.

Nonaka & Takeuchi (1995) state the importance of tacit company knowledge as the basis for CoP and transforming it into explicit company assets. Wender & Snyder (2000) give examples of successful CoP as both internal company networking groups and with members from different companies. The other stream within the knowledge-transfer research, interorganizational transfer literature argues that the outcome of knowledge transfer is highly dependent on the absorptive capacity of the recipient (Cohen & Levinthal, 1990).

## Creative destruction

Coined by Schumpeter (1942), this is a term for the action and impact of free-market entrepreneurial innovations on the status quo of business and economic transactions:

Capitalism, then, is by nature a form or method of economic change and not only never is but never can be stationary. And this evolutionary character of the capitalist process is not merely due to the fact that economic life goes on in a social and natural environment which changes and by its change alters the data of economic action; this fact is important and these changes (wars, revolutions and so on) often condition industrial change, but they are not its prime movers. Nor is this evolutionary character due to a quasi-automatic increase in population and capital or to the vagaries of monetary systems, of which exactly the same thing holds true. The fundamental impulse that sets and keeps the capitalist engine in

motion comes from the new consumers, goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates.

As we have seen in the preceding chapter, the contents of the laborer's budget, say from 1760 to 1940, did not simply grow on unchanging lines but they underwent a process of qualitative change. Similarly, the history of the productive apparatus of a typical farm, from the beginnings of the rationalization of crop rotation, plowing and fattening to the mechanized thing of today—linking up with elevators and railroads—is a history of revolutions. So is the history of the productive apparatus of the iron and steel industry from the charcoal furnace to our own type of furnace, or the history of the apparatus of power production from the overshot water wheel to the modern power plant, or the history of transportation from the mailcoach to the airplane. The opening up of new markets, foreign or domestic, and the organizational development from the craft shop and factory to such concerns as U.S. Steel illustrate the same process of industrial mutation—if I may use that biological term—that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism. It is what capitalism consists in and what every capitalist concern has got to live in.

(Schumpeter, 1942, pp. 82–83)

Carayannis et al. (2007, p. 25) elucidate further:

Schumpeter's theory is grounded in the general equilibrium model of economics, which states that everything in the economy achieves equilibrium within the construct of the "circular flow." While Schumpeter understood that a stationary equilibrium is possible, he believed that it was unrealistic, arguing that the entrepreneur or innovator is a critical factor in the dynamic capitalistic economy (Screpanti & Zamagni, 1993, p. 243). Schumpeter's perspective highlights the entrepreneur as introducing new combinations of products, ideas, or methods into an organization's business environment. These new combinations disrupt the equilibrium condition, forcing the organization to readjust and adapt itself to the new set of dynamics (Brouwer, 1991, p. 45). The entrepreneur's income therefore arises from a departure from the traditional equilibrium: in other words, entrepreneurial profits originate from the consequences of the innovation.

### **Creativity**

Creative style is correlated with more than 30 different personality traits (Gelade, 2002). The predominant personality indicators of creative style are

conscientiousness, openness to experience, and extraversion, providing a basis for comparing the personality traits associated with creative style and occupational creativity. Innovators differ from scientists, having personality characteristics similar to those of artists, suggesting that artistic personality may be more unexpectedly common and that artistry and creativity have common factors.

Starting at the individual level, creativity may be defined as the capacity to “think out of the box,” to think laterally, to perceive, conceive and construct ideas, models and constructs that exceed or supersede established items and ways of thinking and perceiving (Carayannis & Gonzalez, 2003). Creativity is related to the capacity to imagine, since it requires the creator to perceive future potentials that are not obvious based on current conditions. From a cognitive perspective, creativity is the ability to perceive new connections among objects and concepts—in effect, reordering reality by using a novel framework for organizing perceptions.

Creative types such as artists, scientists and entrepreneurs often exhibit attributes of “obsessed maniacs” and “clairvoyant oracles” (Carayannis, 1998–2011, George Washington University Lectures on Entrepreneurship), as well as the capacity and even propensity for creative destruction that is how Joseph Schumpeter qualified innovation. Albert Szentgeorgi, a Nobel Prize laureate, defined creativity as “seeing what everyone sees and thinking what no one has thought before.”

### **Dystechnia**

This is a barrier to organizational performance—a condition of flawed or failed efficacy in the use, deployment or logistics of technology. Dystechnia occurs at every level: individual, team, firm, industry, region, nation and world. At the microlevel it is a diminished self-efficacy or technophobia personally experienced by an individual or team; at the mesolevel it is a disconnect among the critical organizational elements of people, culture and technology; and at the macrolevel it is a condition of suboptimal functioning in the sociotechnologic-economic network, where the yield from resources and the efficacy of transactional logistics are compromised by a latent demand for technological innovation (Carayannis & Stewart, 2007–2011; Stewart & Carayannis, 2011).

### **Endogenous economic growth**

This is a theory of macroeconomics focusing on the behavior of the economy as a whole, emphasizing that economic growth (e.g., per capita income) is an outcome of internal factors arising from private and public sector choices that cause the rate of growth to vary across countries, and not the result of forces that impinge from the outside (Romer, 1994, p. 3). (See also *New growth theory*.)

### **Endogenous technological change**

Romer (1986) introduced a revisionary economic model based on “endogenous technological change” wherein knowledge is recognized as the principal capital asset toward increasing economic returns and long-run economic growth. Romer (1986, p. 1003) specifies that

While exogenous technological change is ruled out, the model here can be viewed as an equilibrium model of endogenous technological change in which long-run growth is driven primarily by the accumulation of knowledge by forward-looking, profit-maximizing agents. This focus on knowledge as the basic form of capital suggests natural changes in the formulation of the standard aggregate growth model.

Casting the model that would later be termed “New growth theory” by its adherents (Warsh, 2006, pp. 20–27), Romer (1990, p. S72) sets forth three premises of endogenous technological change serving as the underlying mechanism of endogenous economic growth:

- Technological change—improvement in the instructions for mixing together raw materials—lies at the heart of economic growth. As a result, the model presented here resembles the Solow (1956) model with technological change. Technological change provides the incentive for continued capital accumulation, and together, capital accumulation and technological change account for much of the increase in output per hour worked.
- Technological change arises in large part because of intentional actions taken by people who respond to market incentives. Thus the model is one of endogenous rather than exogenous technological change.
- Instructions for working with raw materials are inherently different from other economic goods. Once the cost of creating a new set of instructions has been incurred, the instructions can be used over and over again at no additional cost. Developing new and better instructions is equivalent to incurring a fixed cost. This property is taken to be the defining characteristic of technology.

(Romer, 1990, p. S72)

### **Entrepreneur**

An entrepreneur is an agent of change: the seminal actor who conceives and implements a new business venture, impelling a new economic entity from ideation to functional reality. They assume the risks of forming a business or enterprise, organizing and managing every facet of its emergence.

Carayannis and Stewart (2011, p. 1) offer this assessment:



Diverse and complex challenges in new venture formation demand rare and exceptional entrepreneurial skills and qualities, particularly in technology-driven environments where emerging technologies disrupt markets to amplify the factors and magnitude of uncertainty and risk. The successful technology entrepreneur is extremely focused yet flexible, demonstrating a relentless intensity of purpose while adapting that purpose with nimble dexterity as events unfold and conditions change. Moreover, the distinguished entrepreneur will accurately predict events and conditions before they occur, to permit strategic positioning of the venture for optimal advantage. We find that two terse descriptors—*obsessed maniacs* and *clairvoyant oracles* (Carayannis, 1998–2011; Carayannis & Gonzalez, 2003)—encapsulate the critical attributes most conducive to superlative entrepreneurial performance. From the pre-market perspectives of R&D and innovation management through the successful marketing and commercialization of engineered innovations, technology foresight and forecasting pivot on the entrepreneur's unrelenting obsession to pursue a vision and unclouded prescience of exactly what vision to pursue.

An entrepreneur's ability to predict the future (or this individual's confident belief in possessing such ability) and inexorable, self-confident pursuit of this perception represent specialized and exceptional initiative and determination. The proposition of opposing the institution by launching a new organizational entity in the form of a fledgling business venture is innately unpredictable and precarious, especially in technology markets which are already turbulent. Yet the entrepreneur, with maverick volition, seeks to forge these new organizations (and by extension new, or at least altered, institutions) via the calculated risk-seeking and creative mettle of conformity-defying ambition (Stewart & Carayannis, 2011, p. 2).

The entrepreneur must be a business jack-of-all-trades with substantive technical savvy and a project manager extraordinaire to also integrate systems in 21st-century commercial complexity (Ástebro & Thompson, 2007).

### **Entrepreneurship**

Schumpeter (1934) defines the underpinnings of the entrepreneurial role in his definition of economic development in his work "The Fundamental Phenomenon of Economic Development"

1. The introduction of a new good—that is one with which consumers are not yet familiar—or of a new quality of a good.
2. The introduction of a new method of production, that is one not yet tested by experience in the branch of manufacture concerned, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially.

3. The opening of a new market, that is a market into which the particular branch of manufacture of the country in question has not previously entered, whether or not this market has existed before.
4. The conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it has first to be created.
5. The carrying out of the new organization of any industry, like the creation of a monopoly position (for example through trustification) or the breaking up of a monopoly position.

(Schumpeter, 1934, p. 66)

Interpreting Schumpeter (1942), entrepreneurship is the recognition and exploitation of opportunity—a recombinant or novel deployment of resources—the envisioning, planning and implementing of mechanisms to create economic opportunity. Entrepreneurship seeks to shift the established means of economic creation and control, strategically reappointing economic resources from established pathways to innovative pathways (Stewart & Carayannis, 2011, p. 2).

Drucker (1985, p. 21) underscores Say's most famously quoted adage: "The entrepreneur shifts economic resources out of an area of lower and into an area of higher productivity and greater yield."

### **Epistemology**

This is the branch of philosophy that studies the nature of knowledge, its presuppositions and foundations, and its extent and validity (*American Heritage Dictionary*, 1995).

### **Evolutionary economics**

This more recent model of political economics allows for the accumulation of knowledge and adaptation to the environment (Scott, 2001). The founders draw evolutionary analogies from biology to argue that "selection mechanisms bring to the fore techniques, organizational routines and products that are best adapted to their respective environmental contexts" (Foster & Metcalfe, 2001, p. 1). One of the founders of the field, Boulding (1991, p. 1), expounds:

In its largest sense, evolutionary economics is simply an attempt to look at an economic system, whether of the whole world or of its parts, as a continuing process in space and time. Each economy is then seen as a segment of the larger evolutionary process of the universe in space and time... The larger pattern of evolution, in this part of the universe at least, involves three stages: (1) Physical and chemical evolution produces the stars and planets, the elements, compounds, air, water, rocks, and so on. (2) Biological evolution starts with DNA, producing living species.

(3) Societal evolution starts with *Homo sapiens* and our extraordinary capacity for knowledge, for images of the world, and for producing artifacts. As human knowledge develops into know-how, in many parts of the world now the mass of human artifacts certainly exceeds the mass of biological artifacts, and the number of different human artifacts probably exceeds the number of biological species.

An economy is part of societal evolution, though it maybe affected by physical and biological evolution in some degree, through earthquakes, natural catastrophes, the geological accumulation of fossil fuels, mineral deposits, oil, erosion, deltabuilding, climate change, and the like. Soil, it should be noted, is a product both of physical and biological evolution, and it has a very significant biological component. An economy is also a product of the larger process of societal evolution and exists in an environment of political and social institutions. The boundaries between an economy and the rest of society are not wholly clear. We generally think of an economy as consisting of activities and institutions which are organized primarily through exchange, and the production and consumption of human artifacts, which enter into some sort of accounting systems and are evaluated by some measure of value, usually money.

### Fractal

This is a geometric pattern that is repeated at ever-smaller scales to produce irregular shapes and surfaces that cannot be represented by classical geometry. Fractals are used especially in the computer modeling of irregular patterns and structures in nature (*American Heritage Dictionary*, 1995). It is also defined as an irregular geometric object with an infinite nesting of structure at all scales (Vanderbilt University, 2010).

Mandelbrot (1982) pioneered the mathematics of fractal geometry, coining the term from the Latin adjective *fractus*, meaning “fragmented” or “irregular.” This appropriately serves as the etymological opposite of “algebra,” which derives from the Arabic *jabara*, meaning “to bind together.” Mandelbrot conceived and developed a new geometry of nature, to investigate the morphology of the amorphous forms that Euclidean geometry leaves aside as formless. Mandelbrot implemented the use of fractal geometry in a number of fields to mathematically describe many irregular and fragmented patterns—some variously described by scientists as “grainy, hydralike, in between, pimply, pocky, ramified, seaweedy, strange, tangled, tortuous, wiggly, wispy, wrinkled” and more, yet could “henceforth be approached in a rigorous and vigorous quantitative fashion.” He stipulates that “the most useful fractals involve chance and both their regularities and irregularities are statistical.” Fractal shapes tend to exhibit “scaling, implying that the degree of their irregularity and/or fragmentation is identical at all scales” (Mandelbrot, 1982).

As interpreted by Barnsley (1993),

The observation by Mandelbrot [1982] of the existence of a “Geometry of Nature” has led us to think in a new scientific way about the edges of clouds, the profiles of the tops of forests on the horizon, and the intricate moving arrangement of the feathers on the wings of a bird as it flies. Geometry is concerned with making our spatial intuitions objective. Classical geometry provides a first approximation to the structure of physical objects; it is the language that we use to communicate the designs of technological products and, very approximately, the forms of natural creations. Fractal geometry is an extension of classical geometry. It can be used to make precise models of physical structures from ferns to galaxies. Fractal geometry is a new language. Once you can speak it, you can describe the shape of a cloud as precisely as an architect can describe a house. [See also *Chaotic fractal* and *Fractal innovation ecosystem*]

### **Fractal innovation ecosystem**

This is a multilevel, multimodal, multinodal and multiagent system of systems. The constituent systems comprise innovation metanetworks (networks of innovation networks and knowledge clusters) and knowledge metaclusters (clusters of innovation networks and knowledge clusters) organized in a self-referential or chaotic fractal (Gleick, 1987) knowledge and innovation architecture (Carayannis, 2001). These in turn constitute agglomerations of human, social, intellectual and financial capital stocks and flows, as well as cultural and technological artifacts and modalities, continually co-evolving, co-specializing and co-opting. These innovation networks and knowledge clusters also form, re-form and dissolve within diverse institutional, political, technological and socioeconomic domains, including government, universities, industry and non-governmental organizations, and involving information and communication technologies, biotechnologies, advanced materials, nanotechnologies and next-generation energy technologies. (See also *Chaotic fractal* and *Fractal*.)

### **gloCal**

*Global/local* compares with the concept of global village. Carayannis and von Zedtwitz (2005, p. 106) coined the term in promoting “economic development, integration and convergence among developed and developing/emerging economies. The nature and dynamics of the essential drivers of local, regional and global productivity and competitiveness factors are increasingly assuming a ‘gloCalizing’ (global, regional and local) socio-economic and technological context.”

### **Grounded theory**

This provides a model or map of why the world is the way it is (Strauss, 1995). It is a simplification of the world but one that is aimed at clarifying

and explaining some aspect of how it works. A theory is a statement about what is going on with the phenomenon that you want to understand. It is not simply a framework, although it can provide that; rather it is a story about what you think is happening and why. A useful theory is one that tells an enlightening story about some phenomenon, gives you new insights and broadens your understanding of that phenomenon.

Glaser and Strauss's (1967) term "grounded theory" does not refer to any particular level of theory but to theory that is inductively developed during a study (or series of studies) and in constant interaction with the data from that study. This theory is grounded in the actual data collected, in contrast with a theory that is developed conceptually and then tested against empirical data. In qualitative research, both existing theory and grounded theory are legitimate and valuable.

### **Higher-order learning**

Espedal (2008) describes higher-order learning as an outcome of learning from the experience of others. Higher-order learning is associated with the changing of a known logic of action and experimenting with what is not known but might become known. Learning from experience is used to challenge existing perspectives, routines and practices and to develop new perspectives on the future. The essence of higher-order learning involves escaping one perspective and implementing a mindset that is different from the old one (Espedal, 2008, pp. 365–367). (See also *SMOTL*.)

### **Innovation**

Entrepreneurs innovate. Innovation is the specific instrument of entrepreneurship (Drucker, 1985, pp. 30–31):

It is the act that endows resources with a new capacity to create wealth. Innovation, indeed, creates a resource. There is no such thing as a "resource" until man finds a use for something in nature and thus endows it with economic value. Until then, every plant is a weed and every mineral just another rock. Not much more than a century ago, neither mineral oil seeping out of the ground nor bauxite, the ore of aluminum, were resources. They were nuisances; both render the soil infertile. The penicillin mold was a pest, not a resource. Bacteriologists went to great lengths to protect their bacterial cultures against contamination by it. Then in the 1920s, a London doctor, Alexander Fleming, realized that this "pest" was exactly the bacterial killer bacteriologists had been looking for—and the penicillin mold became a valuable resource.

The same holds just as true in the social and economic spheres. There is no greater resource in an economy than "purchasing power." But purchasing power is the creation of the innovating entrepreneur.

The American farmer had virtually no purchasing power in the early nineteenth century; he therefore could not buy farm machinery. There were dozens of harvesting machines on the market, but however much he might have wanted them, the farmer could not pay for them. Then one of the many harvesting-machine inventors, Cyrus McCormick, invented installment buying. This enabled the farmer to pay for a harvesting machine out of his future earnings rather than out of past savings-and suddenly the farmer had “purchasing power” to buy farm equipment.

Equally, whatever changes the wealth-producing potential of already existing resources constitutes innovation.

(Drucker, 1985, pp. 30–31)

Carayannis and Gonzalez (2003) said:

Discovery consists of looking at the same thing as everyone else and thinking something different.

(Albert Szent-Györgyi, Nobel Prize winner)

Innovation is a word derived from the Latin, meaning to introduce something new to the existing realm and order of things or to change the yield of resources as stated by J. B. Say quoted in Drucker (Drucker, 1985).

In addition, innovation is often linked with creating a sustainable market around the introduction of new and superior product or process. Specifically, in the literature on the management of technology, technological innovation is characterized as the introduction of a new technology-based product into the market:

Technological innovation is defined here as a situationally new development through which people extend their control over the environment. Essentially, technology is a tool of some kind that allows an individual to do something new. A technological innovation is basically information organized in a new way. So technology transfer amounts to the communication of information, usually from one organization to another.

(Tornatzky & Fleischer, 1990)

The broader interpretation of the term “innovation” refers to it as an “idea, practice or material artifact” (Rogers & Shoemaker, 1971, p. 19) adopted by a person or organization, where that artifact is “perceived to be new by the relevant unit of adoption” (Zaltman et al., 1973). Therefore innovation tends to change perceptions and relationships at the organizational level but its impact is not limited there. Innovation in its broader sociotechnical, economic and political context can also substantially impact, shape and

evolve the ways and means by which people live their lives, businesses form, compete, succeed and fail, and nations prosper or decline.

### **Innovation ecosystem**

This is the collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution. Enabled by information technologies that have drastically reduced the costs of coordination, innovation ecosystems have become a core element in the growth strategies of firms in a range of industries. While leading exemplars tend to come from high-tech settings, ecosystem strategies are being deployed in industries as varied as commercial printing, financial services, basic materials and logistics provision.

When they work, ecosystems allow firms to create value that no single firm could have created alone. The benefits of these systems—discussed under such headings as platform leadership, keystone strategies, open innovation, value networks and hyperlinked organizations—are real and well publicized.

For many companies, however, the attempt at ecosystem innovation has been a costly failure. This is because, along with new opportunities, innovation ecosystems also present a new set of risks—new dependencies that can brutally derail a firm's best efforts. Even if a firm develops its own innovation brilliantly, meets and exceeds its customers' needs, and successfully excludes its rivals, a market may not emerge. Whether—and when—it emerges is determined as much by the firm's partners as by its own performance (Adner, 2006, pp. 98–100).

### **Innovation networks**

These are real and virtual infrastructures and infratechnologies that serve to nurture creativity, trigger invention and catalyze innovation in a public and/or private domain context (e.g., government–university–industry, public–private research and technology development co-opetitive partnerships) (Carayannis & Alexander, 1999, 2004; Carayannis & Campbell, 2006).

### **Interpretivism**

This refers to social research approaches emphasizing the meaningful nature of people's participation in social and cultural life. The methods of natural science are seen as inappropriate for such investigation. Researchers working within this tradition analyze the meanings that people confer upon their own and others' actions (Seale, 2004).

### **Knowledge clusters**

These are agglomerations of co-specialized, mutually complementary and reinforcing knowledge assets in the form of “knowledge stocks” and

“knowledge flows” that exhibit self-organizing, learning-driven, dynamically adaptive competences and trends in the context of an open systems perspective (Carayannis & Campbell, 2006).

### **Knowledge economy**

This is a state of economic being and a process of economic becoming that intensively and extensively leverage knowledge assets and competences as well as economic learning to catalyze and accelerate sustainable and robust economic growth.

### **Knowledge fractals**

These emphasize the continuum-like bottom-up and top-down progress of complexity. Each subcomponent (subelement) of a knowledge cluster and innovation network can be displayed as a microlevel subconfiguration of knowledge clusters and innovation networks. At the same time, one can also move upward. Every knowledge cluster and innovation network can also be understood as a subcomponent (subelement) of a larger macrolevel knowledge cluster or innovation network—in other words, innovation metanetworks and knowledge metaclusters.

### **Knowledge transfer**

This is the communication of insight from one or more persons to others, by way of varying communication processes. Carayannis et al. (2006) state that knowledge transfer is viewed from an information theoretic (Shannon & Weaver, 1949) and a metacognitive (Simon, 1969; Sternberg & Frensch, 1991; Halpern, 1989) or linguistic (Chomsky, 1971) perspective as a knowledge-transfer process, where the human problem-solver and technology manager is seen as both a technician and a craftsman (Schon, 1983), a “lumper” and a “splitter” (Mintzberg, 1989).

The problem-solver typically relies on multilayered technological learning and unlearning (Carayannis, 1992, 1993, 1994a, 1994b, 1994c; Dodgson, 1991) to create, maintain and enhance the capacity of individuals, groups and organizations to transfer and absorb knowledge in the form of embodied and disembodied (von Hippel, 1988) technology in the form of artifacts, beliefs and evaluation routines (Garud & Rappa, 1994), and tacit and explicit knowledge (Polanyi, K., 1966; Polanyi, M., 1958; Nonaka, 1988, 1994).

Moreover, knowledge transfer occurs across scientific disciplines, professions, industries, economic sectors, geographic regions and societies/countries (Reisman, 1989). This motivates the linguistic view of technology-sharing and absorption in the form of a firm’s technological absorptive capacity (Cohen & Levinthal, 1990), as well as transformative capacity (Garud & Nayyar, 1994), since it requires effective communication among practitioners with often divergent technical rationalities (Schon, 1983).



### **Mode 3**

This is a knowledge-creation, diffusion and use system with a multi-lateral, multinodal, multimodal and multilevel systems approach to the conceptualization, design and management of real and virtual “knowledge-stock” and “knowledge-flow” modalities that catalyze, accelerate and support the creation, diffusion, sharing, absorption and use of co-specialized knowledge assets. Mode 3 is based on a system-theoretic perspective of socioeconomic, political, technological and cultural trends and conditions that shape the co-evolution of knowledge with the “knowledge-based and knowledge-driven, gloCal economy and society” (Carayannis & von Zedtwitz, 2005).

### **Mode 3 fractal innovation ecosystem**

This is the nexus or hub of the emerging 21st-century fractal innovation ecosystem, in which people, culture and technology (Carayannis & Gonzalez, 2003), forming the essential fractal innovation ecosystem building block or “knowledge nugget” (Carayannis, 2004), meet and interact to catalyze creativity, trigger invention and accelerate innovation across scientific and technological disciplines, public and private sectors in a top-down, policy-driven and bottom-up, entrepreneurship-empowered fashion. Mode 3 allows and emphasizes the coexistence and co-evolution of different knowledge and innovation paradigms.

### **New growth theory**

New growth theory is based on work by Stanford economist Paul Romer and others who have attempted to deal with the causes of long-term growth, something that traditional economic models have had difficulty with. Following from the work of economists such as Joseph Schumpeter, Robert Solow and others, Romer has proposed a change to the neoclassical model by seeing technology (and the knowledge on which it is based) as an intrinsic part of the economic system. Knowledge has become the third factor of production in leading economies (Romer, 1986, 1990). Technology and knowledge are now the key factors of production. Romer’s theory differs from neoclassical economic theory in several important ways:

- Knowledge is the basic form of capital. Economic growth is driven by the accumulation of knowledge.
- While any given technological breakthrough may seem to be random, Romer considers that new technological developments, rather than having a one-off impact, can create technical platforms for further innovations, and that this technical platform effect is a key driver of economic growth.
- Technology can raise the return on investment, which explains why developed countries can sustain growth and why developing economies,

even those with unlimited labour and ample capital, cannot attain growth. Traditional economics predicts that there are diminishing returns on investment. New growth theorists argue that the non-rivalry and technical platform effects of new technology can lead to increasing rather than diminishing returns on technological investment.

- Investment can make technology more valuable, and vice versa. According to Romer, the virtuous circle that results can increase a country's growth rate permanently. This goes against traditional economics.
- Romer argues that earning monopoly rents on discoveries is important in providing an incentive for companies to invest in R&D for technological innovation. Traditional economics sees "perfect competition" as the ideal.

### **Ontology**

This is the branch of philosophy that deals with the nature of being (*American Heritage Dictionary*, 1995), and the branch of metaphysics that studies the nature of existence or being as such (*Random House Webster's College Dictionary*, 2001).

### **Phenomenology**

This is the study of all possible appearances in human experience, during which considerations of objective reality and of purely subjective response are left out of account (*American Heritage Dictionary*, 1995).

The discipline of phenomenology may be defined initially as the study of structures of experience or consciousness. Literally, phenomenology is the study of "phenomena": the appearance of things, or things as they appear in our experience, or the ways in which we experience things, thus the meanings that things have in our experience. Phenomenology studies conscious experience as experienced from the subjective or first-person point of view. This field of philosophy is then to be distinguished from, and related to, the other main fields of philosophy: ontology (the study of being or what is), epistemology (the study of knowledge), logic (the study of valid reasoning), ethics (the study of right and wrong action) and so on (Smith, 2008).

### **Positivism**

This is

- a doctrine contending that sense perceptions are the only admissible basis of human knowledge and precise thought;
- the application of this doctrine in logic, epistemology and ethics;
- the system of Auguste Comte designed to supersede theology and metaphysics and depending on a hierarchy of the sciences, beginning with mathematics and culminating in sociology;

- any of several doctrines or viewpoints, often similar to Comte's, that stress attention to actual practice over consideration of what is ideal (*American Heritage Dictionary*, 1995).

In its looser sense, positivism has come to mean an approach to social enquiry that emphasizes the discovery of laws of society, often involving an empiricist commitment to naturalism and quantitative methods. The term has almost become one of abuse among social and cultural researchers, losing its philosophical connotations where its meaning is both more complex and precise (Seale, 2004).

### **Quadruple helix**

This refers to structures and processes of the gloCal knowledge economy and society. The building of the triple helix model of knowledge, developed by Etzkowitz and Leydesdorff (2000, pp. 111–112), stresses three intertwining helices that generate a national innovation system: academia/universities, industry and state/government. The “quadruple helix model” adds a fourth helix, identified as the “media-based and culture-based public,” as culture and values, and the way in which “public reality” is constructed and communicated by the media, influences every national innovation system.

### **Robust competitiveness**

This is the state of economic being and becoming that affords systematic and defensible “unfair advantages” to certain entities. It is built on mutually complementary and reinforcing low-technology, medium-technology and high-technology public-sector and private-sector organizations (government agencies, private firms, universities and non-governmental organizations).

### **RODs**

*Real options drivers* (Carayannis, 2008a) provide a methodology for assessing and maximizing the value added by creative destruction. Real options are choices (strategic or tactical) made in conditions of risk and uncertainty about tangible and intangible (knowledge-based) assets (as opposed to financial assets). These options encompass timing, selection and sequencing attributes that are significant for the individual, society or organization that must choose whether or not to exercise them. RODs are the constitutional elements of learning and knowledge that direct the decision-tree pathway of real options as they are strategized and enacted.

### **SKARSE**

*Strategic knowledge arbitrage and serendipity* (Carayannis, 2008a) are high-value-adding RODs, being key enablers of the capacity to develop strategic knowledge more accurately and more quickly, and to leverage it more effectively and efficiently. These two key competences are defined as follows.

Strategic knowledge arbitrage refers to the ability to distribute and use specific knowledge for applications other than the intended topic area. More specifically, it refers to the capacity to create, identify, reallocate and recombine knowledge assets more effectively and efficiently to derive, develop and capture non-appropriable, defensible, sustainable and scalable pecuniary benefits (Carayannis & Juneau, 2003; Carayannis & Campbell, 2006; Carayannis & Sipp, 2006; Carayannis & Alexander, 2006; Carayannis & Ziemnowicz, 2007; Carayannis & Chanaron, 2007).

Strategic knowledge serendipity refers to the unintended benefits of enabling knowledge to “spill over” between employees, groups and functional domains (“happy accidents” in learning). More specifically, it describes the capacity to identify, recognize, access and integrate knowledge assets more effectively and efficiently to derive, develop and capture non-appropriable, defensible, sustainable and scalable pecuniary benefits (Carayannis & Juneau, 2003; Carayannis & Campbell, 2006; Carayannis & Sipp, 2006; Carayannis & Alexander, 2006; Carayannis & Ziemnowicz, 2007; Carayannis & Chanaron, 2007).

## SMOTL

*Strategic management of technological learning* (Carayannis, 1992, 1994a, 1994b, 1998–2011, 2000, 2001; Carayannis & Alexander, 2002) is a triple-layered architecture of technological learning—operational, tactical and strategic:

- Operational, single-loop or first-order technological learning—on the first level we have accumulating experience and learning by doing (we learn new things).
- Tactical, double-loop, self-organizing or second-order technological learning or learning how-to-learn—on the second level we have learning of new tactics about applying the accumulating experience and the learning process (redefinition of the fundamentals [rules and contingencies] of our short-term operating universe): we build new contingency models of decision-making by changing the rules for making decisions and/or adding new ones.
- Strategic, triple-loop, self-organizing metalearning or third-order technological learning or learning to learn-how-to learn—on the third level we have development and learning (internalization and institutionalization) of new views of our operating universe or *weltanschauungen* (Hedberg, 1981), hence we learn new strategies of learning (Cole, 1989). Thus we redefine our fundamentals (our rules and contingencies) for our decision-making; or, in other words, we redefine the fundamentals of our operating universe not only in the short term but primarily in the long term.

### **Sustainable entrepreneurship**

This describes the creation of viable, profitable and scalable firms that engender the formation of self-replicating and mutually enhancing innovation networks and knowledge clusters leading toward robust competitiveness.

### **Technological learning**

This is the process by which a technology-driven firm creates, renews and upgrades its latent and enacted capabilities based on its stock of explicit and tacit resources. It combines purely technical with purely administrative learning processes (Jelinek, 1979). Learning is a process of repetition and experimentation, enabling better and faster performance of tasks and identification of new production opportunities, both individual and organizational in nature (Teece et al., 1990).

Learning occurs at both individual and organizational levels. Individual learning, however, can be leveraged into tactical and strategic benefits only if it is synthesized at the level of organizational learning.

On the operational technological learning level, we have accumulated experience and learning by doing: we learn new things (Carayannis, 1994b). This is the short-term to medium-term perspective on learning, focusing on new or improved capabilities built through the content learned by an organization.

With regard to tactical technological learning, we have the learning of new tactics in the application of accumulated experience and the learning process: we build new contingency models of decision-making by changing the rules for making decisions and/or adding new ones. This is the medium-term to long-term perspective on learning. Tactical learning enables firms to approach new organizational opportunities in a more efficient and effective manner, and to leverage or combine existing core capabilities in novel formations for greater competitive advantage.

On the strategic technological learning level, we have the development and learning (internalization and institutionalization) of new views of our operating universe. Hence we acquire new strategies of learning (Cole & Engstrom, 1993). This is the very long-term perspective on learning that focuses on reshaping, reinventing and re-engineering organizational "tools" (methods and processes).

### **Technology**

The *American Heritage Dictionary* (1995) offers several definitions:

1. a. The application of science, especially to industrial or commercial objectives.
- b. The scientific method and material used to achieve a commercial or industrial objective.

2. *Anthropology.* The body of knowledge available to a civilization that is of use in fashioning implements, practicing manual arts and skills, and extracting or collecting materials.

According to Carayannis (2000, 2001, 2009; Carayannis et al., 2003), technology is defined as that “‘which allows one to engage in a certain activity ... with consistent quality of output’, the ‘art of science and the science of art’ or ‘the science of crafts’”.

Technology embodies the cumulative totality of human learning toward the utilization of resources and manipulation of the environment. Technology is expressed intangibly through knowledge, know-how, and processes, and tangibly through materials and articles of manufacture. Technology permits and facilitates the dissemination and leveraging of constituent knowledge, know-how and processes through interpersonal and cultural exchanges, or by way of artifacts possessed of embedded technology. Technology increases the economic yield of human endeavors, which multiplies the resources and opportunities for further exploration, discovery and innovation of yet more advantageous technologies (Stewart & Carayannis, 2011).

### **Technology-based business**

In a technology-based business, the profit is enabled and supported by technology, but technology itself is not necessarily the product, service or experience being sold (Sipp, 2011). Technology-based firms depend on the adoption and use of technologies produced by other firms (demand side) (Carayannis & Formica, 2008). In this latter perspective, the term “demand side” indicates that the firm operates on the demand side of commerce—buying, adopting and utilizing technology.

### **Technology-driven business**

In technology-driven businesses, the profit is fully dependent on the creation or implementation of new technology (Sipp, 2011) or innovations in the use or deployment of existing technology. Technology-driven firms compete to produce the technologies to sustain and advance their customers (supply side) (Carayannis & Formica, 2008). In this latter perspective, the term “supply side” indicates that the firm operates on the supply side of commerce—developing, implementing and selling technology.

### **Technology entrepreneurship**

This seeks to shift economic opportunities from established firms and industries to new ventures by the strategic deployment or marketing of new technology inventions or innovations.

## Thematic analysis

This is highly inductive data analysis wherein themes emerge from the data and are not imposed by the researcher. It covers a spectrum of qualitative methodologies and analytic techniques. At one end is content analysis, in which textual data are tagged with tightly defined and largely predetermined codes, allowing statistical as well as qualitative analyses. At the other end is grounded theory, where there is no *a priori* definition of codes. Thematic analysis is known by several names, including “template analysis,” “codebook analysis” and “thematic coding” (King, 1998).

## Zero-sum game

There are two main branches of game theory: non-cooperative (or zero-sum) and cooperative (non-zero-sum). These branches share two fundamental premises: that the actors in any game are rational (reasoned, as opposed to arbitrary) and motivated by personal gain. The distinction of a zero-sum game is that every personal gain attained by one actor is at the opponent’s cost—a win–lose proposition. In a non-zero-sum game, actors can exercise strategies for personal gain that do not commensurately cost their opponents, or cost their opponents less than the full gain enjoyed by the former—a win–win proposition. The worst extreme is a negative-sum game, in which the actors exercise strategies that cost both sides—a lose–lose scenario. The best situation is a positive-sum–game, in which actors’ strategies boost favorable outcomes on both sides—a win–win scenario with synergy, such that both actors gain, even if one gains more.

## Notes

1. We mean “chaos” here in the literal (etymological) sense and not in the mathematical sense, albeit that there may well be cases where the two meanings converge, overlap and possibly become identical.
2. We understand “creative destruction” as both a “creative destruction” and a “destructive creation” process—whereby there is both an ongoing struggle between the established and alternative, potential emerging orders as well as a process of creation that in its own right may destroy both existing, established modalities and structures as well as suppress potential emerging alternatives.
3. This point goes to the heart of the philosophical foundation and intellectual motivation of this book—namely, that at the end of the day, entrepreneurship is an anthropocentric and anthropomorphic phenomenon first and foremost and then a function of market and technology dynamics and interactions. In that sense, evolution (in the Darwinian sense), where laws of variety and selection manifest themselves in a number of ways, is a natural corollary of our perspective.
4. This point is related and builds upon the prior one in that successful enterprises either evolve and metamorphose or eventually refuse or fail to do so and then are acquired, close down or emerge as some other entity (public private or a hybrid).

## References

- Adner, R. (2006). Match your innovation strategy to your innovation ecosystem. *Harvard Business Review*, 84(4), 98–107.
- The American Heritage Dictionary of the English Language*, 4th Ed. (1995). Boston: Houghton Mifflin Company.
- Åstebro, T., & Thompson, P. (2007). *Does it Pay to be a Jack of all Trades?* Unpublished manuscript, University of Toronto.
- Barab, S. A., & Duffy, T. M. (2000). From practice fields to communities of practice. In Jonassen, D. H., & Land, S. M. (Eds.). *Theoretical Foundations of Learning*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Barnsley, M. (1993). *Fractals Everywhere* (2nd Ed.) San Diego, CA: Academic Press.
- Boulding, K. (1991). What is evolutionary economics? *Journal of Evolutionary Economics*, 1, 9–17.
- Brouwer, M. (1991). *Schumpeterian Puzzles: Technological Competition and Economic Evolution*. Ann Arbor: University of Michigan Press.
- Carayannis, E. G. (1992). *An Integrative Framework of Strategic Decision Making Paradigms and their Empirical Validity: The Case for Strategic or Active Incrementalism and the Import of Tacit Technological Learning* (RPI School of Management Working Paper Series No. 131). Rensselaer Polytechnic Institute, Troy, NY.
- Carayannis, E. G. (1993). Incrementalisme Strategique. *Le Progrès Technique*, 93(2), i–vi.
- Carayannis, E. G. (1994a, June 27–29). *A multi-national, resource-based view of training and development and the strategic management of technological learning: Keys for social and corporate survival and success*. Paper presented at 39 International Council of Small Business Annual World Conference, Strasbourg, France.
- Carayannis, E. G. (1994b). The strategic management of technological learning: Transnational decision-making frameworks and their empirical effectiveness *Dissertation Abstracts International*, 55(11), 3564. (UMI No. 9511131)
- Carayannis, E. G. (1994c). Gestion Strategique de l'Acquisition des Savoir-Faire. *Le Progrès Technique*, 94(1), 37–39.
- Carayannis, E. G. (1998–2011). *Lectures in numerous courses covering topics on technology, innovation, entrepreneurship, business venturing, and project management*. Unpublished lecture notes, The George Washington University School of Business, Washington, DC.
- Carayannis, E. G. (2000). *The Strategic Management of Technological Learning*. Boca Raton, FL: CRC Press.
- Carayannis, E. G. (2001). *The Strategic Management of Technological Learning: Learning to Learn-how-to-learn in High Tech Firms and its Impact on the Strategic Management of Knowledge, Innovation and Creativity within and Across Firms*. Boca Raton, FL: CRC Press.
- Carayannis, E. G. (2004). Measuring intangibles: Managing intangibles for tangible outcomes in research and innovation. *International Journal of Nuclear Knowledge Management*, 1(1/2), 49–67.
- Carayannis, E. G. (2008a). Knowledge-driven creative destruction, or leveraging knowledge for competitive advantage: Strategic knowledge arbitrage and serendipity as real options drivers triggered by co-opetition, co-evolution and co-specialization. *Industry and Higher Education*, 22(6), 343–353.
- Carayannis, E. G. (2008b). Conceptual framework for an analysis of diversity and heterogeneity in the knowledge economy and society. In E. G. Carayannis, A. Kaloudis, & Å. Mariussen (Eds.), *Diversity in the Knowledge Economy and Society*:



- Heterogeneity, Innovation and Entrepreneurship* (Ch. 5, pp. 95–116). Cheltenham, UK: Edward Elgar.
- Carayannis, E. G. (2009). Firm evolution dynamics: Towards sustainable entrepreneurship and robust competitiveness in the knowledge economy and society. *International Journal of Innovation and Regional Development*, 1(3), 235–254.
- Carayannis, E. G. (1998–2011). *Lectures in numerous courses covering topics on technology, innovation, entrepreneurship, business venturing, and project management*. Unpublished lecture notes, The George Washington University School of Business, Washington, DC.
- Carayannis, E. G., & Alexander, J. (1999). Winning by co-opeting in strategic government-university-industry (GUI) partnerships: The power of complex, dynamic knowledge networks. *Journal of Technology Transfer*, 24(2/3), 197–210.
- Carayannis, E. G., & Alexander, J. (2002). Is technological learning a firm core competence; when, how, and why: A longitudinal, multi-industry study of firm technological learning and market performance. *Technovation*, 22(10), 625–643.
- Carayannis, E. G., & Alexander, J. (2004). Strategy, structure and performance issues of pre-competitive R&D consortia: Insights and lessons learned from SEMATECH. *IEEE Transactions of Engineering Management*, 51(2): 226–232.
- Carayannis, E. G., & Campbell, D. F. J. (Eds.). (2006). *Knowledge creation, diffusion, and use in innovation networks and knowledge clusters: A comparative systems approach across the United States, Europe, and Asia*. Westport, CT: Praeger Publishers.
- Carayannis, E. G., & Campbell, D. F. J. (2009). “Mode 3” and “Quadruple Helix”: Toward a 21st century fractal innovation ecosystem. *International Journal of Technology Management*, 46(3/4), 201–234.
- Carayannis, E. G., & Chanaron, J.-J., (Eds.). (2007). *Leading and Managing Creators, Inventors, and Innovators: The Art, Science, and Craft of Fostering Creativity, Triggering Invention, and Catalyzing Innovation*. Westport, CT: Quorum/Greenwood.
- Carayannis, E. G., Evans, D., & Hanson, M. (2003). A cross-cultural learning strategy for entrepreneurship education: Outline of key concepts and lessons learned from a comparative study of entrepreneurship students in France and the US. *Technovation*, 23(9): 757–771.
- Carayannis, E. G., & Formica, P. (Eds.). (2008). *Knowledge Matters: Technology, Innovation and Entrepreneurship in Innovation Networks and Knowledge Clusters*. London: Palgrave Macmillan.
- Carayannis, E. G., & Gonzalez, E. (2003). Creativity and innovation = competitiveness? When, how, and why. In Larisa V. Shavinina (Ed.), *International Handbook on Innovation* (Part VIII, Ch. 3, pp. 587–606). Oxford, UK: Elsevier Press.
- Carayannis, E. G., & Juneau, T. (2003). *Idea Makers and Idea Brokers in High-Technology Entrepreneurship: Fee vs. Equity Compensation for Intellectual Venture Capitalists*. Westport, CT: Praeger/Greenwood.
- Carayannis, E. G., Popescu, D., Sipp, C. M., & Stewart, M. R. (2006). Technological learning for entrepreneurial development (TL4ED) in the knowledge economy (KE): Case studies and lessons learned. *Technovation*, 26(4), 419–443.
- Carayannis, E. G., & Sipp, C. M. (2006). *e-Development towards the Knowledge Economy: Leveraging Technology, Innovation and Entrepreneurship for Smart Development*. London: Palgrave Macmillan.
- Carayannis, E. G., & Stewart, M. R. (2007–2011). *Numerous Courses Covering Topics on Technology, Innovation, Entrepreneurship, Business Venturing, Information Systems, and Project Management*. Unpublished lecture notes, The George Washington University School of Business, Washington, DC.

- Carayannis, E. G. & Stewart, M. R. (2011). *The Story of Obsessed Maniacs and Clairvoyant Oracles: Learning from Entrepreneurs and their Creations*. Manuscript in preparation, The George Washington University School of Business, Washington, DC.
- Carayannis, E. G., & von Zedtwitz, M. (2005). Architecting gloCal (global-local), real-virtual incubator networks (G-RVNs) as catalysts and accelerators of entrepreneurship in transitioning and developing economies: Lessons learned and best practices from current development and business incubation practices. *Technovation*, 25(2), 95–110.
- Carayannis, E. G., & Ziemnowicz, C. (2007). *Rediscovering Schumpeter: Creative Destruction Evolving into "Mode 3"*. Basingstoke: Palgrave Macmillan.
- Carayannis, E. G., Ziemnowicz, C., & Spillan, J. E. (2007). Economics and Joseph Schumpeter's theory of creative destruction: Definition of terms. In E. G. Carayannis & C. Ziemnowicz (Eds.), *Re-discovering Schumpeter: Creative Destruction Evolving into "Mode 3"* (pp. 23–45). London: Palgrave Macmillan.
- Chomsky, N. (1971). Deep structure, surface structure and semantic interpretation. In: Steinberg, D., & Jakobovits, L. (Eds.), *Semantics in Generative Grammar*. New York: Cambridge University Press.
- Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128–152.
- Cole, M., & Engestrom, Y. (1993). A cultural–historical approach to distributed cognition. In Salomon, G. (Ed.), *Distributed Cognitions: Psychological and Educational Considerations* (pp. 1–46). Cambridge, UK: Cambridge University Press.
- Cole, R. (1989). *Strategies for Learning: Small Group Activities in American, Japanese, and Swedish Industry, 1989*, Berkeley, CA: Berkeley University Press.
- Dodgson, M. (1991). Technology, learning, technology strategy and competitive pressures. *British Journal of Management* 2/3, 132–149.
- Drucker, P. F. (1985). *Innovation and Entrepreneurship*. New York: Harper & Row Publishers, Inc.
- Espedal, B. (2008). In the pursuit of understanding how to balance lower and higher order learning in organizations. *The Journal of Applied Behavioral Science*, 44(3), 365–390.
- Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From national systems and “mode 2” to a triple helix of university-industry-government relations. *Research Policy*, 29, 109–123.
- Foster, J., & Metcalfe, S. (Eds.). (2001). *Frontiers of Evolutionary Economics: Competition, Self-organization and Innovation Policy*. Northampton, MA: Edward Elgar Publishing, Inc.
- Garud, R., & Nayyar, P. (1994). Transformative capacity: Continual structuring by inter-temporal technology transfer. *Strategic Management Journal*, 15(5), 365–385.
- Garud, R., & Rappa, M. A. (1994). A socio-cognitive model of technology evolution: The case of cochlear implants. *Organization Science*, 5(3), 344–362.
- Glaser, B., & Strauss, A. (1967). *The Discovery of Grounded Theory*. Hawthorne, NY: Aldine.
- Gleick, J. (1987). *Chaos: Making a New Science*. New York: Viking.
- Gelade, G. A. (2002). Creative style, personality, and artistic endeavor. *Genetic, Social & General Psychology Monographs*, 128(3), 213–234.
- Halpern, D. F. (1989). The disappearance of cognitive gender differences: What you see depends on where you look. *American Psychologist*, 44(8), 1156–1158.
- Hedberg, B. (1981). How organizations learn and unlearn? In P. C. Nystrom & W. H. Starbuck (Eds.), *Handbook of Organizational Design* (pp. 8–27). London: Oxford University Press.

- Jelinek, M., (1979). *Institutionalizing Innovation: A Study of Organizational Learning System*. New York: Praeger Publishers.
- King, N. (1998). Template analysis. In Symon, G. & Cassell, C. (Eds.). (1998). *Qualitative Methods and Analysis in Organizational Research: A Practical Guide*. London: Sage Publications Ltd.
- Mandelbrot, B. (1982). *The Fractal Geometry of Nature*. New York: W. H. Freeman and Company.
- Mintzberg, H. (1989). Crafting strategy. *Harvard Business Review* 65(4), 66–75.
- Nonaka, I. (1988). Creating organizational order out of chaos: Self-renewal in Japanese Firms. *California Management Review*, 30(3), 57–73.
- Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, 5(1), 14–37.
- Nonaka, I. and Takeuchi, H. (1995). *The Knowledge Creating Company*. New York: Oxford University Press.
- Polanyi, K. (1966). *Dahomey and the Slave Trade: An Analysis of an Archaic Economy*. Seattle, WA: University of Washington Press.
- Polanyi, M. (1958). *Personal Knowledge*. Chicago: The University of Chicago Press.
- Random House Webster's Dictionary* (4th Ballantine Books ed.). (2001). New York: Ballantine Books.
- Reisman, A. (1989). Technology Transfer: A Taxonomic View. *Journal of Technology Transfer*, Summer–Fall, 31–36.
- Rogers, E. M., & Shoemaker, F. F. (1971). *Communication of Innovations: A Cross-cultural Approach* (2d ed.). New York: Free Press.
- Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94(5), 1002–1037.
- Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, 98(5/2), S71–S102.
- Romer, P. M. (1994). The origins of endogenous growth. *Journal of Economic Perspectives*, 8(1), 3–22.
- Schon, D. (1983). *The Reflective Practitioner: How Professionals Think in Action*. New York: Basic Books.
- Schumpeter, J. A. (1934). *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle* (R. Opie, Trans.). Cambridge, MA: Harvard University Press. (Original work published 1912.) (Reprinted Piscataway, NJ: Transaction Publishers, 1983.)
- Schumpeter, J. A. (1942). *Capitalism, Socialism and Democracy*. New York: Harper and Brothers (5th ed. London: George Allen and Unwin, 1976).
- Scott, W. R. (2001). *Institutions and Organizations*. Thousand Oaks, CA: Sage Publications, Inc.
- Screpanti, Ernesto & Zamagni, Stefano. (1993). *An Outline of the History of Economic Thought*. Oxford: Clarendon Press.
- Seale, C. (Ed.). (2004). *Researching Society and Culture* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc. Retrieved February 23, 2010, from <http://people.brunel.ac.uk/~hsstcfs/glossary.htm>.
- Shannon, C. E., & Weaver, W. (1949). *The Mathematical Theory of Communication*. Urbana, OH: University of Illinois Press.
- Simon, H. A. (1969). *Sciences of the Artificial*. Cambridge, MA: MIT Press.
- Sipp, C. M. (2011). *Why, When and How are Real Options used in Strategic Technology Venturing?* Dissertation manuscript in preparation, The George Washington University School of Business, Washington, DC.

- Smith, D. W. (2008). *Phenomenology*. In the Stanford Encyclopedia of Philosophy. Retrieved February 27, 2010, from <http://plato.stanford.edu/entries/phenomenology>.
- Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics*, 70(1), 65.
- Sternberg, R. J., & Frensch, P. A. (Eds.). (1991). *Complex Problem Solving: Principles and Mechanisms*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Stewart, M. R., & Carayannis, E. G. (2011). *Dys technia – A Model of Technology Rejection and Implications for Entrepreneurial Opportunity*. Manuscript in preparation, The George Washington University School of Business, Washington, DC.
- Strauss, Anselm L. 1995. *Qualitative Analysis for Social Scientists*. San Francisco: Cambridge University Press.
- Teece, D., Pisano, G., & Schuen, A. (1990). *Firm Capabilities, Resources, and the Concept of Strategy* (CCC Working Paper No. 90–8). University of Berkeley, Berkeley, CA.
- Tornatzky, L. and Fleischer, M. (1990). *The Process of Technology Innovation*. Lexington, MA: Lexington Books.
- Vanderbilt University (2010). *Fractals and the Fractal Dimension*. Retrieved January 14, 2011, from <http://www.vanderbilt.edu/AnS/psychology/cogsci/chaos/workshop/Fractals.html>.
- von Braun, C. (1997). *The Innovation War*. Upper Saddle River, NJ: Prentice Hall.
- von Hippel, E. (1988). *The Sources of Innovation*. Cambridge, MA: MIT Press.
- Warsh, D. (2006). *Knowledge and the Wealth of Nations: A Story of Economic Discovery*. New York: W. W. Norton & Company, Inc.
- Wender, E. C., & Snyder, W. M. (2000). Communities of practice: the organizational frontier. *Harvard Business Review*, 78(1), 139–145.
- Wenger, E. (2004). Knowledge management as a doughnut: Shaping your knowledge strategy through communities of practice. *Ivey Business Journal*, 68(3), 1.
- Zaltman, G., Duncan, R. & Holbek, J. (1973), *Innovations and Organizations*, New York: Wiley.

# 2

## Theory and Literature

*Elias G. Carayannis and McDonald R. Stewart*

### **Literature overview and literature map**

This research centers on technology entrepreneurship, a narrow subset of numerous academic regimes that additionally incorporates interdisciplinary elements spanning many fields of social science. At the microlevel—the level of the individual actors and the ventures that they launch—are theoretical foundations in management science, specifically entrepreneurship, management of technology and innovation, organizational behavior and development, and narrower disciplines operative within and adjunct to those fields: engineering management, information systems, network dynamics, leadership, decision science and game theory. These microcomponents operate at the meso- and macrolevels within and against an environmental backdrop of academic theory in social evolution and economics, including political economics, econometrics and evolutionary economics, all of which interplay within the overarching realm of institutional sociology. At the nexus of these academic fields emerges the theoretical construct of endogenous economic growth driven by endogenous technological change—a complex sociotechnical-economic phenomenon that is at once the province and the impact of technology entrepreneurship—the platform, fulcrum and lever whereby seminal entrepreneurial actors conceive and implement new business ventures to create economic opportunities and revise the pathways of economic control.

The literature review and theory-building presented hereunder draw from these many fields of literature to assimilate and synthesize a holistic framework toward an integrated grounded theory that enriches and illuminates technology entrepreneurship as an academic discipline. The relationship between the various foundational and supporting literatures is modeled in Figure 2.1.

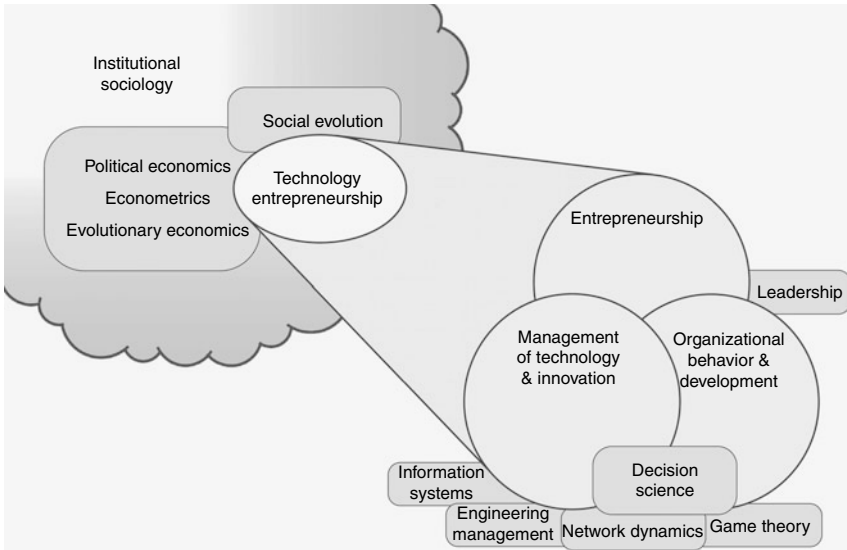


Figure 2.1 Map of literature review and theoretical framework

Source: Adapted from Stewart (2011).

## Historical perspective of entrepreneurship

Entrepreneurship has presented a long, slow emergence as an academic field in management science. An anomaly of political economics, the theoretical interpretation and definition of entrepreneurship has evolved and re-formed successively over the centuries, often and increasingly interdependent on the study of technology and innovation. This section provides a chronologically progressive synthesis of the literature on entrepreneurship, primarily in the context of political economics.

The term “entrepreneur” comes from the French verb *entreprendre*, meaning literally “to undertake.” According to Long (1983), this term has origins as far back as the 12th century, with a contextual meaning of “to do something different” in an era when socioeconomic roles were quite rigid. Hoselitz (1960) claims that the term was used as the noun *entrepreneur* as early as the 14th century. Solymossy (1998, p. 13) found that the modern form, *entrepreneur*, first appeared in Savery’s *Dictionnaire Universel de Commerce* (des Bruslons, 1723). Hunt and Murray (1999, p. 132) offer this evocative claim:

The word “entrepreneur” was borrowed from the French in the fifteenth century to describe a military commander leading troops into battle; only gradually was its meaning extended to the battlefield of business. But the

military image is an apt one, for businessmen of any age seek to command forces that are not of their own making, under conditions they cannot choose, with outcomes they cannot foresee.

### **Richard Cantillon (1680–1734)**

Cantillon was a businessman and financier whose work, *Essai sur la Nature de Commerce en General* (Cantillon, published posthumously in 1755), makes extensive use of the term *entrepreneur*, defining a person who “collects in his hands the productive forces of capital” and describing the entrepreneur as a pivotal figure operating within a set of economic markets (Hebert & Link, 1982). Cantillon is credited as the first academic theorist in entrepreneurship, characterizing the entrepreneur as a self-employed risk-taker, possessed of the foresight and willingness to undertake the necessary actions (and risks) to pursue a profit—or sustain a loss—and thereby contribute to the equilibration of a market economy (Solymossy, 1998). Although recognizing the individual role of the entrepreneur, Cantillon was interested primarily in the economic function of entrepreneurship rather than in personal attributes, seeing a separation between economic function and social standing as evidenced by characterizing chimney sweeps, water-carriers, robbers and beggars among the entrepreneurial (Hebert & Link, 1982 p. 16).

### **Jean-Baptiste Say (1767–1832)**

Extending Cantillon’s framework of entrepreneur as risk-bearer, French economist J. B. Say proposed that experimentation in introducing new commodities and entering new markets are defining characteristics of entrepreneurship (Jones & Wadhvani, 2006). According to Solymossy (1998, p. 14), Say presents industry in three distinct operations: development of specialized and conceptual (scientific) knowledge; application of this knowledge toward a useful purpose; and a production or manufacturing function. Emphasizing skills, characteristics and social interaction in this way, Say extols positive social consequences and value creation derived from a self-interested profit motive. This perspective of Say is corroborated by De Klerk and Kruger (n.d., p. 469), who point to Say’s explicit opposition of a “zero-sum game” economy.

As quoted in the original English translation of Say’s *A Treatise on Political Economy*, “They [countries of Europe and the world] all take it for granted, that what one individual gains must need be a loss to another; . . . as if the possessions of abundance of individuals and of communities could not be multiplied, without the robbery of somebody or other” (Say, 1803/1836, p. 70). Say explicates to the policy-makers of his day that “A country well stocked with intelligent merchants, manufacturers and agriculturists has more powerful means of attaining prosperity” (Say, 1803/1836, p. 82), and ultimately that wealth-building was an entrepreneurial process through “the

application of knowledge to the creation of a product for human consumption" (Say, 1803/1836, p. 330). Drucker (1986, p. 21) later underscores Say's most famously quoted adage: "The entrepreneur shifts economic resources out of an area of lower and into an area of higher productivity and greater yield."

### **Joseph Schumpeter (1883–1950)**

Schumpeter was prominent in the history of economic thought, particularly in recognizing the role of innovation and entrepreneurship in economic development. In his celebrated work *The Theory of Economic Development* (Schumpeter, 1911/1934, p. 74), Schumpeter distinguishes a "new combination of means of production" as "the fundamental phenomenon of economic development. The carrying out of new combinations we call 'enterprise'; the individuals whose function it is to carry them out we call entrepreneurs." These new combinations of enterprise include (Schumpeter, 1911/1934, p. 66):

- the introduction of a new good—that is, one with which consumers are not yet familiar—or of a new quality of a good;
- the introduction of a new method of production—that is, one not yet tested by experience in the branch of manufacture concerned, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially;
- the opening of a new market—that is, a market into which the particular branch of manufacture of the country in question has not previously entered, whether or not this market has existed before;
- the conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it has first to be created;
- the carrying out of the new organization of any industry, like the creation of a monopoly position (e.g., through trustification) or the breaking-up of a monopoly position.

Schumpeter lauds a heroic vision of the entrepreneur, suggesting motivations allusive to the original 15th-century French military usage: the "dream and the will to found a private kingdom"; the "will to conquer: the impulse to fight, to prove oneself superior to others" (*ibid.*, p. 92). Other descriptors of entrepreneurial motivation are less combative but equally romanticized, such as the "joy of creating" (*ibid.*, p. 94). Whether economic warrior or craftsman, Schumpeter's entrepreneur is a leader in creating not merely new products, processes or markets but entirely new industries. The establishment of these revolutionary industries triggers an avalanche of significant structural changes in the entire economy, disrupting supply/demand and



price equilibria, and rendering old institutions obsolete. Schumpeter terms this potent sociotechnological process “creative destruction.”

In a later crucial work, *Capitalism, Socialism, and Democracy*, Schumpeter (1942) clarifies the role and mechanisms of entrepreneurship to include technology as a key economic resource or input, a concept of importance that is commensurate with Adam Smith’s classical economic inputs of land, labor and capital. Schumpeter distinguishes technological inventions from entrepreneurs’ innovations, which require as much creativity and skill to enact, and markedly more daring. By developing new inventions, technologies, products, processes, organizations and markets—thus redirecting and recalibrating financial flows and controls—the entrepreneur himself becomes a fifth economic input. The “creative destruction” of entrepreneurial innovation makes obsolete old inventories, equipment, technologies, skills, ideas, business practices and institutional cultures. The crux of Schumpeter’s treatise denies the status quo of “how capitalism administers existing structures,” and acclaims “how it creates and destroys them.” Schumpeter’s creative destruction makes continuous economic progress possible and separates it from mere population growth, improving the effectiveness of productivity per capita and hence elevating the standards of living for everyone.

#### **Frank Knight (1885–1972)**

Also focusing on entrepreneurial roles in dynamic economy, Knight (1921, pp. 260–279) shares in, and is perhaps influenced by, Schumpeter’s contemporary heroic vision of the entrepreneur, seeing the desire to excel and to win at the biggest game invented to be a powerful motivating factor. More pragmatically, Knight views the entrepreneur as one who bears the risk of uncertainty (i.e., unmeasurable idiosyncratic risk). Under uncertainty, producers face the burden of shifting their role from routine tasks to making judgments about an incalculable future. Entrepreneurship is shaped and driven by producers during periods of uncertainty, meaning that periods of economic uncertainty necessitate entrepreneurship. The entrepreneur assumes full responsibility for decisions made, mixing the factors of production and determining remunerations, with profits tied to the accuracy of their predictions. Bearing the risk of changing markets and being held accountable for economic progress is what drives the entrepreneur’s competitive sportsmanship.

#### **Peter Drucker (1909–2005)**

Drucker (1985, pp. 21–29) assimilates Schumpeterian economics and 20th-century management science at the dawn of the post-industrial information age and emerging knowledge economy to underscore the economic potency of innovation. Innovation is the specific instrument of entrepreneurship, enabling and requiring market actualization of new economic mechanisms

for changing the value obtained from resources.<sup>1</sup> Drucker (1985) offers a plan for “systematic entrepreneurship” utilizing “purposeful innovation.” This supports Schumpeterian economics theory in that the innovating entrepreneur is the source of a healthy economy, and that innovation is not invention or technology alone. Entrepreneurship entails doing something different, not doing the same thing better, and all human activities are economic resources. Dynamic disequilibrium (creative destruction) is normal and a healthy part of human economic activity. Entrepreneurship does not apply only to new start-up businesses, nor does it apply only to small businesses, neither is it confined only to economic ventures. Not every new business is entrepreneurial; an enterprise must create something new and different, and change or transmute values. It is not entrepreneurial to form a new venture that follows business models, technical processes and pathways of transaction that are already established; entrepreneurship demands innovation.

According to Drucker (1985, pp. 30–36), innovation is the specific instrument of entrepreneurship. There is no such thing as a “resource” until humankind finds a use for something in nature and endows it with economic value. Without innovation, crude oil seeping out of the ground was a nuisance, as was penicillin mold growing on food. Farmers couldn’t buy harvesting machines on credit, and books weren’t available to permit universal education. Reminiscent of Knight’s pragmatic motivator of uncertainty, Drucker (1985, p. 35) proposes seven sources for systematic innovative opportunity:

- the unexpected—success, failure or event;
- incongruities—between reality and ideals;
- process need;
- changes in industry and market structures.

The foregoing four factors are internal to an organization, industry or institution. The last three of the seven are external:

- demographics (population changes);
- changes in perception, mood and meanings (cultural changes);
- new knowledge—scientific or otherwise.

Drucker (1985, pp. 11–17) highlights the fact that the economic growth that he observed during his career in the mid-20th century did come from new technology, meaning new applications of knowledge. He stipulates that the new knowledge is not just applied science, such as electronics or genetics, but a new technology of entrepreneurial management—a technology of attitudes, values and behaviors that applies to existing businesses as well as new

ventures, and even to the smallest enterprise and non-businesses (e.g., health care, education and government).

### **Elias Carayannis (1961–extant)**

Leveraging conceptually on the economic foundations in entrepreneurship and innovation advanced by Schumpeter, and recalling Schumpeter's prominent contribution to the expansion of Adam Smith's economic principles of "Land-Labor-Capital" into "Land-Labor-Capital-Technology-Entrepreneurship," Carayannis et al. (2007, p. 24) observe the following in the book *Rediscovering Schumpeter*:

In the late twentieth and early twenty-first century, numerous scholars and practitioners such as Peter Drucker, identified knowledge as perhaps the sixth and most important key input and output factor of economic activity. We would like to also emphasize the role and significance of technological and economic learning as a driver of productivity gains and an accelerator of economic growth and prosperity.

(Carayannis, 2000b)

Having brought this section, "Historical Perspective of Entrepreneurship," up to the present epoch in entrepreneurial theory, further discussion of these vital, latter factors of knowledge, technological learning and economic learning will be discussed in detail in subsequent sections.

## **Entrepreneurship and the emergence of new institutions**

This next section provides a logical synthesis of literature central to entrepreneurship in the context of institutional sociology. By assimilating theoretical elements from organizational behavior and development, decision science, evolutionary economics, social evolution, and the management of technology and innovation, including technological, economic and higher-order learning, knowledge management and dynamic adaptation, the argument casts a framework to evince how the conspicuous anomaly of political economics—the entrepreneur—challenges the institutional paradigm.

### **The institutional framework**

"Institution" is a term that circumscribes a complex system of social constructs—encompassing culture, customs, conventions, procedures, values, habits and language—at the very least. Hamilton (1932, p. 84) describes the concept of the institution as a "cluster of social usages" that "connotes a way of thought or action of some presence and permanence, which is embedded in the habit of a group or the customs of a people." Artifacts of human origin bear meaning from the social context imbued by values,

habits, confines and significance of “a tangled and unbroken web of institutions.” Institutional social arrangements are a composite of informal and formal structures, tangible artifacts, abstract embodiments, organizations and behaviors that impose sanctions, taboos, prohibitions, commands and penalties, or otherwise impose authority over human concerns. Some informal examples include the common law, athletics, higher learning, literary criticism, democracy, fundamentalism and “personal” moral codes. More formal examples include the government, the church, the university, the corporation, the trade union and the chain store. Institutions vary in spectra of characteristics—concrete vs. abstract, rigid vs. flexible, exacting vs. lenient—but all “constitute standards of conformity from which an individual may depart only at his peril. About every urge of mankind an institution grows up; the expression of every taste and capacity is crowded into an institutional mold.”

Institutional theory is rooted in sociology, economics and political science, much of it grounded in philosophical enlightenment and inquiry of the 18th and 19th centuries. Of pivotal significance is a body of work dating prior to 1920 (much published posthumously and later translated into English) by German political economist and sociologist Max Weber (1947), who contributed significantly to the foundations of institutional thought.

Weber (1947) is concerned with the problem of social order: why should people accept roles allocated by some external power, and why obey directives issued on authority’s behalf? Weber classifies four types of social action:

- *instrumentally rational*—determined by expectations as to the behavior of objects or human individuals in the external situation (doing something because you believe it’s expected of you);
- *value rational*—determined by a conscious belief in the absolute value of ethical, aesthetic, religious or other form of behavior (doing something because you believe it’s the right thing to do);
- *affectual* (especially emotional)—determined by the specific affects and states of feeling of the actor (doing something because you want to);
- *traditional*—determined by the habituation of long practice (doing something because it’s the way things are done).

Motives for obedience to authority can range from simple habituation to the purely rational calculation of advantage. Some commands carry an imperative of economic means, with inducements to obey or penalties for non-compliance, but economic objectives are not always at stake. There is often a voluntary element embodied in the type of social control termed “authority.” A crucial feature of all forms of authority is that when someone exercises authority over another, there is a social expectation that a

command will be followed willingly, at least to some extent. The follower recognizes and accepts the command of authority, even in the absence of strict coercion.

Weber (1947) distinguishes three pure forms of authority that theorize how authority becomes legitimized in organizations:

- *legal/rational grounds*—based on the belief in the legality of normative rules and the right of those elevated to authority under such rules to issue commands (i.e., legal authority);
- *traditional grounds*—based on an established belief in the sanctity of old traditions and the legitimacy of the status of those exercising authority under them (i.e., traditional authority);
- *charismatic grounds*—based on devotion to the specific and exceptional sanctity, heroism or exemplary characteristics of an individual person, and of the normative patterns or order revealed or ordained by them (i.e., charismatic authority).

Weber (1947) argues that the effectiveness of legal authority rests on the acceptance of the validity of mutually interdependent ideas, and legal authority justifies the right to rule by a set of fixed rules. Clearly demarcated rules and boundaries ensure consistency of treatment of everyone, governed by equality and impersonal objectivity. For Weber (1947), the term “bureaucracy” is inseparable from the term “rationality” (rational bureaucracy). He views traditional and charismatic forms as irrational, or at least non-rational, derivations of authority. In contrast, legal authority consists of a set of social actions governed by reason or reasoning, and rational pursuit of self-interest.

In Weber’s (1947) view, traditional authority claims its legitimacy in the sanctity of age-old order and powers of control. This type of authority is more personal than that of the rational bureaucracy. Authority and position are an inherited commodity vested in those who for reasons of birth or ritual selection represent the traditional customs—for example, the monarch/dynasty, the temple, the lord-knight-yeoman, the guild master. Obedience is owed not to the enacted rules but to the person who occupies a position of authority by tradition or who has been chosen for such a position on a traditional basis. Under purely traditional authority, the following features of a bureaucratic administrative staff are absent:

- a clearly defined sphere of competence subject to impersonal rules;
- a rational ordering of relations of superiority and inferiority;
- a regular system of appointment and promotion on the basis of free contract;
- technical training as a regular requirement;
- fixed salaries.

The term “charisma” refers to a certain quality of an individual personality by virtue of which they are considered extraordinary and treated as endowed with supernatural, superhuman or at least specifically exceptional powers or qualities. Weber (1947) claims that in its pure form, charismatic authority has a characteristic which cannot really last very long—it is attached to a solitary individual. Charismatic authority can radically change, however, becoming either traditionalized or rationalized in the continuation and continual reactivation by the community, administrative staff, disciples or other followers of the charismatic leader. The charismatic leader is transformed into an abstract symbol of the revised source of authority.<sup>2</sup>

### **Organizational behavior: What makes us tick together?**

Examining the roles and behaviors of humans engaged in cooperative pursuits, Selznick (1948) explains the interpersonal mechanics of hierarchy, created and coordinated through the process of delegation. According to Selznick (1948), “formal *organization* is the structural expression of rational action.” The deployment of technical and managerial skills calls for a systematic, coordinated structuring of roles and responsibilities defining a chain of command. “*Delegation* is the primordial organizational act, a precarious venture which requires the continuous elaboration of formal mechanisms of coordination and control.” Selznick (1948) posits that formal structures never fully succeed in conquering non-rational aspects of organizational behavior, because systems of rational action are institutionally embedded in two ways:

- the action system, or how things really get done;
- the formal system, of the formulaic plan for how things are supposed to get done.

An organizational system is both an economy and an adaptive social structure. There is indivisibility of control and consent within the cooperative system of an organization—more than individuals; relationships define the control and allocation of scarce resources. At the same time, relationships are mutable and negotiable due to the nature of people to resist the depersonalization of being bounded by roles, and to assert their participation as whole beings—independent of, but dependent upon, the greater structure of the organization. Individual resistance is an unpredictable anomaly within the purview of coordination and delegation as defined in a formal system of organizational behavior. In large organizations, such deviations from the formal system tend to become institutionalized—a persistent structural aspect of the formal organization—independent of individuals’ personality differences.

In his structural-functional analysis of organization, Selznick (1948) postulates the basic need of all systems to be the maintenance of the integrity and continuity of the system itself, delineating a set of five “derived imperatives”:

- security in relation to social forces in the organization's environment;
- stability of lines of authority and communication;
- stability of informal relations within the organization;
- continuity of policy and sources of its determination;
- homogeneity of outlook respective of meaning and role for the organization.<sup>3</sup>

Another significant concept advanced by Selznick (1948) is that of the adaptive mechanism of cooptation, which he defines as "the process of absorbing new elements into the leadership or policy structure as a means of averting threats to its stability or existence." Cooptation is an adaptive compromise in organizational nodes of control arising from a condition of tension between formal authority and social power.

A prominent investigator of psychological and behavioral perspectives in human organization and economics, Simon (1959) contributed much toward the advancement and refinement of utility theory and decision science, explicating the determinants and processes underpinning organizational behaviors. Of particular note is his concept of "satisficing" (presumably a compound word derived from "satisfy" and "suffice") as a determinant of economic decision-making. Simon (1959) claims that most psychological theories view individual drive as the motivation for individual action, and when the motivating drive is satisfied, action is terminated. Further, fluctuating aspiration levels make conditions of satisficing variable or inconsistent, even for the same person at different times. In other words, people often base decisions not on maximal gain or optimal benefit, but simply on attaining the "good enough." In pursuit of a goal or acquisition, when we find something that meets our minimum expectations, we often accept that outcome and turn our attention toward the next goal or acquisition.

Simon (1959) further contends that this individual behavior extends into the collective behavior of organizational context, proposing that firms try to satisfice rather than maximize profits, and he cites a body of empirical evidence that business goals are stated in satisficing terms. With regard to going concerns, there is a separation of equity ownership and active managers, and the latter are actors who may have motivations other than maximizing profits. In specific reference to entrepreneurial motivation and behavior, Simon describes "psychic income" apart from monetary rewards, which may conceptually balance the idea of utility maximizing, but not in any operational way. To wit, from business pursuits the entrepreneur gains satisfaction that cannot be measured in financial profit, so the measure of utility is not readily quantified—entrepreneurial motivation is a function of satisfying personal psychological aspirations.

Nelson and Winter (1982) indirectly echo Simon's contention that orthodox economic theorists overlook the underlying decision processes in evaluating and interpreting organizational transactions. Rather than a concerted pursuit of economic optimization or profit-maximizing, Nelson and Winter

(1982) frame the collective behavior in terms of numerous routines executed by numerous individual actors within the organizational setting. In addition to enacting the principal function or operative goals of an organization, routines serve a further purpose in the stock and flow of shared information essential to organizational coordination.<sup>4</sup> They enumerate:

- *routine as organizational memory*—in the explicit and proliferated exercise of cross-communicated skills and operational knowledge more than that based only on documentation and recorded procedures; learning by doing and remembering by doing;
- *routine as truce*—in the adaptive and flexible dynamic between organizational requirements and the needs and motivations of organizational members; a stable accommodation of behaviors other than those that serve only the organization;
- *routine as target*—for the survival of the organization as an open system requiring adaptive ad hoc problem-solving (control); for the enormous complexity embedded in that organizational system and the difficulty in transplanting tacit knowledge and cultivating repeatable collective performance (replication); and for the daunting challenge of such transfer when the original routines cannot be fully accessed (imitation)—although this latter condition provides impetus for mutations in routines—to wit: innovation.

Nelson and Winter (1982) portray organizational routines as an assemblage of skills, tasks, information and decisions, and offer a clever metaphor in support of their evolutionary perspective of economics. Routine behaviors of individual members serve as organizational genes, the continuity of which serves to channel organizational change, as biological genetic material serves to proliferate and adapt organic forms. This metaphor has merit. As with genetics, minor adjustments in the detail of encoded instructions (genes or routines) can yield substantive mutations in the overall performance of the collective (organism or organization). And at a more macrolevel of functioning, the balance and variety of genes or routines can and will drift (or sharply mutate) in response to environmental influences and pressures, resulting in adaptive speciation—or possibly extinction—of the organism or organization.

#### **The macroeconomic environment: Committed to the institution**

Zucker (1983) asserts that “Organizations are the preeminent institutional form in modern society.” The institutional quality he confers here is a conformity of social structure taken for granted as real, meaningful and permissible—developed over time, rooted in historical precedent, and primordialially founded in kin relationships. The organizational form to which he refers is the “rational hierarchical bureaucratic organization,” which



includes manufacturing firms, schools, grocery stores, churches or social movement organizations as examples thereof. Zucker's (1983) argument is that these organizational forms have attained a level of social prominence and influence as to be termed "institutionalized," which he describes as the "process by which certain social relationships and actions come to be taken for granted."

Zucker (1983) cites empirical evidence in support of his observation that people are more likely to defer to influence that is posed as organizational in nature (as opposed to personal), particularly if the stated source of influence is defined by a specific organizational position—a named office—even if that title carries no explicit authority or special knowledge. The implication of organizational members taking the central authority of their organization for granted elevates the organization to institutional status. The for-profit corporation, the government agency, the non-profit foundation—each organizational entity—becomes a unified institutional actor pursuing its collective mission amid an environmental scaffolding of larger, older, overlapping institutional platforms: interacting, transacting, cooperating and competing with countless other such entities.

In terms of economic theory, North (1990) offers a less convergent view of institutions and organizations, while agreeing that both provide structure to human interaction. In stark counterpoint to Zucker (1983), North (1990) describes institutions as the overarching rules by which all players participate, but organizations are teams of players working together trying to win the game—and not always fairly. In more staid terms, North (1990) specifies, "Institutions, together with the standard constraints of economic theory, determine the opportunities in a society. Organizations are created to take advantage of those opportunities, and, as the organizations evolve, they alter the institutions."<sup>5</sup>

Scott (2001) summarizes a neoinstitutional theory in economics, which emphasizes a new focus on processes rather than on utility maximization, and looks beyond conventional models of economic equilibria at the processes whereby such stability might have been achieved. In the neoinstitutional view, economic systems are capable of learning and adapting—economic activity is not a mere matter of market-mediated transactions but is interconnected with complexity, impacting and impacted by many other institutional structures. Within this neoinstitutional theory has emerged the field of evolutionary economics, a more recent model of political economics that allows for the accumulation of knowledge and adaptation to the environment. Scott (2001) attributes this emergent field to Nelson and Winter (1982), as founded solidly on the economic theories of Schumpeter (1934, 1942).

Writing the year prior to Nelson and Winter's *An Evolutionary Theory of Economic Change* (1982), Boulding (1981) published his own book simply titled *Evolutionary Economics*, earning him later recognition as a founder

of the field. Foster and Metcalfe (2001, p. 1) explain that “Such was the sparse and disconnected nature of the literature in this field at that time that the authors of these books do not cite each other’s work.” Apparently some disconnect persists, as Scott (2001) writing at the same time as Foster and Metcalfe (2001) 20 years later than Boulding similarly do not cite each other’s work, neither does Scott (2001) recognize Boulding’s (1981) foundational role, although Foster and Metcalfe (2001) do recognize Nelson and Winter’s (1981) contribution. Notwithstanding one institutionalist’s scholarly slight of one revolutionary economist, both Boulding (1981) and Nelson and Winter (1981) draw evolutionary analogies from biology to argue that “selection mechanisms bring to fore techniques, organizational routines and products that are best adapted to their respective environmental contexts” (Foster & Metcalfe, 2001, p. 1).<sup>6</sup>

For Scott (2001) the neoinstitutional ramifications to economic theory are not so compelling as the overarching body of institutional theory and how the entirety of scholarly institutional interpretations integrate in a unified model that he terms the “three pillars of institutions.” In this model, Scott performs a meta-analysis of the work of many different social theorists to construct a matrix of three pillars:

- regulative;
- normative;
- cultural-cognitive.

Under each of these pillars, Scott then classifies the theoretical dimensions which characterize order, the carriers of those dimensions and the levels of analysis whereunder the various theoretical paradigms reside.

#### *The regulative pillar*

In the regulative domain, institutions maintain a capacity to control and constrain behavior by defining rules, legal boundaries, and moral and cultural limits. Such mechanisms also regulate behavior by monitoring conformity and providing for sanctioning systems, which can involve both rewards and punishments. Sanctioning processes can operate informally, such as with shaming or shunning, or formally through specialized actors, as with legal enforcement by the police and courts. From the regulative viewpoint, explicit rules and the human monitors or enforcers are central to maintaining order. The primary control mechanism is coercion, although classical economics would interpret conformance to rules as the pursuit of self-interest, “behaving instrumentally and expediently.”

#### *The normative pillar*

In the normative domain, values and norms are rules viewed through prescriptive, evaluative and obligatory lenses to define goals and objectives.

Values are subjective conceptions of the “preferred” and “desirable,” which can be held up to standards for the purpose of comparison. Norms specify the appropriate ways to pursue and attain that which is valued. Not all values and norms apply equally to all actors, which gives rise to roles: “conceptions of appropriate goals and activities for particular individuals or specified social positions.” Normative systems constrain behavior through social obligation, but they also enable certain social actions, conferring rights and responsibilities, privileges, duties, licenses and mandates. From the normative viewpoint, norms and values bring stability through the collective internalization of imposed behavioral expectations.

### *The cultural-cognitive pillar*

In the cultural-cognitive domain, the institutional perspective looks more to the perceptions and actions of individual cognitive processes. Anchored more in anthropology and sociology, the focus is on internalized symbolic representations of the world, which become the lenses through which individuals decipher their environment. From the cultural-cognitive viewpoint, the actor’s subjective interpretation of institutional or environmental conditions comprises the semiotic dimension of culture—a dimension made up of symbols, signs, words and gestures. These elements give meaning to external cultural frameworks, which are experienced to shape internalized scripts or templates for defining the behavior for certain roles. There is a greater measure of free agency for the individual actors under the cultural-cognitive conception of institutions, stressing the “socially mediated construction of a common framework of meaning.”

Figure 2.2 shows Scott’s interpretation of several theoretical paradigms positioned with respect to the three pillars as delineated above, scaled according to the level of analysis wherein each “school” is concentrated. For thematic reference, the individual technology entrepreneur—the ultimate core unit of analysis for this dissertation—integrates with Scott’s theoretical model of institutional sociology at the bottom-right position indicated by the shaded inset. Technology entrepreneurship as an emergent, evolutionary process emanates upward and leftward from that origin, as indicated by the radiating shaded arrows.

### **Institutional chickens and eggs**

Recalling Zucker (1983), organizations are the new institutions conforming the behavior of member-actors to a common cause. North (1990) maintains that institutions are the overarching economic environment in which organizations maneuver for purpose and advantage. Scott carefully parcels the institutional-sociological-organizational-behavioral frameworks proposed by these and many scholars into a continuum of paradigms—ranging from the top-left imperious realm of the regulative domain at the

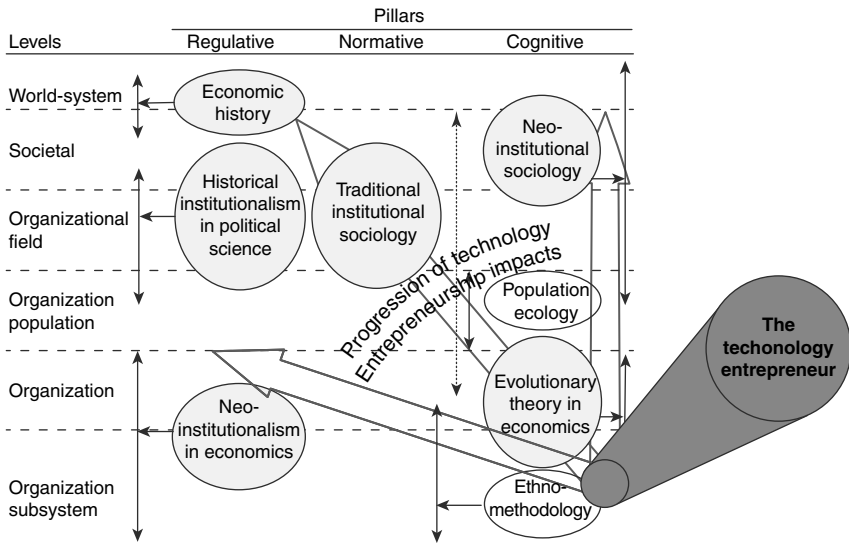


Figure 2.2 Scott’s institutional pillars and analytic levels: illustrative schools—amended with overlay of technology entrepreneurship  
 Source: Adapted from Scott (2001, p. 87).

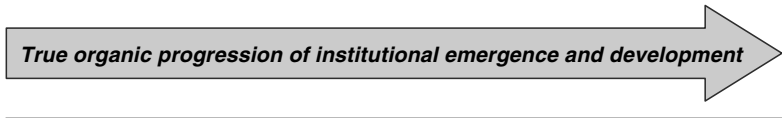
global level to the bottom-right conscientious realm of the cultural-cognitive domain at the level of the “organization subsystem.”

The terms “imperious” and “conscientious” are introduced here to call attention to the unsubtle bias in Scott’s framework that stems from positioning the regulative pillar to the left and the cultural-cognitive pillar to the right, the global level at the top and the organization subsystem at the bottom. Organizing such a presentation in a language (viz. English) that reads from left to right in increments from top to bottom implies that the regulative pillar is pre-eminent, and the other two successively subordinate. There is less room for dispute in this same interpretation of the vertical scale, with the macroglobal level at the top and the successively smaller levels of analysis below. Such a configuration is entirely logical but it connotes a measure of institutional dogma and scholarly sanctimony: the (imperious) regulative domain is somehow ideologically grander than the (compliant) normative domain, which is in turn more important than the (conscientious) cultural-cognitive pillar. The careful distillation of institutional thought reverentially places the most imposing institutional perspective in the most prominent position.

In terms of the organic origins of institutions, organizations or any social structure, all rules, roles, routines or other vectors of social exchange must have initially emerged from the level of the individual—one person’s

Table 2.1 Stewart’s reinterpretation of evolutionary relevance of Scott’s institutional pillars

	Cultural-cognitive pillar	Normative pillar	Regulative pillar
Source of behavioral conformity for individual actors within each pillar	Innate from within: want to be, want to do (conscientiousness)	Conformed from adjacent actors: should be, should do (compliance)	Invoked from above: must be, must do (imperiousness)
Source of learning whereby actors acquire corresponding behavioral traits	Born with (instinctive) and learned early at home	Learned at school and in formative social experiences	Learned at work and in adult role experiences



encounter with one other. If institutions represent the highest abstracted complexity of human social behavior, they arose from smaller structures of communication and cooperation, such as organizations of all descriptions—corporations, churches, states, kingdoms, mere tribes or even at the most genitive level, families—the kinship relationships that Zucker (1983) suggested were at the root of behavioral conformity. The gradual ascent from the least to the greatest must be the natural organic progression of order, unless one subscribes to a belief in the literal spontaneous impression of greater order onto the primitive by supernatural means.

Table 2.1 below reinterprets Scott’s pillars in terms of a more likely derivation of each within the natural evolution of human organization (N.B., the sequence of the pillars from left to right has been reversed vis-à-vis Scott, 2001).

**A closer inspection of evolutionary economics**

The premise of evolutionary economics is that an economy is

a product of the larger process of societal evolution and exists in an environment of political and social institutions. The boundaries between an economy and the rest of society are not wholly clear . . . We generally think of an economy as consisting of activities and institutions which are organized primarily through exchange, and the production and consumption of human artifacts, which enter into some sort of accounting systems and are evaluated by some measure of value, usually money.

(Boulding, 1991, p. 1)

Carayannis et al. (2007, p. 24) leverage conceptually on the economic foundations advanced by Schumpeter, and recall Schumpeter's prominent contribution to the expansion of Adam Smith's economic principles of land-labor-capital into land-labor-capital-technology-entrepreneurship with this extension:

In the late twentieth and early twenty-first century, numerous scholars and practitioners such as Peter Drucker, identified knowledge as perhaps the sixth and most important key input and output factor of economic activity. We would like to also emphasize the role and significance of technological and economic learning as a driver of productivity gains and an accelerator of economic growth and prosperity.

(Carayannis, 2000b)

In addition to Drucker referenced by Carayannis et al. (2007) in the foregoing, one of the "numerous scholars" should surely be Kenneth Boulding. Carayannis's contribution in the quote above reinforces a crucial underpinning of evolutionary economic theory that knowledge and learning are significant components in the human system of artifacts that make up the larger economy, and hold value in their stock and flow and as mechanisms of transactional exchange. Carayannis (1992, 1993, 1994a, 1994b, 1994c, 1998, 1998–2011, 1999a, 1999b, 2000a, 2000b, 2001, 2002–2009, 2004, 2008a), Carayannis and Alexander (1999, 2002, 2004), Carayannis and Campbell (2006, 2009), Carayannis and Chanaron (2007), Carayannis and Gonzalez (2003), Carayannis et al. (2006, 2007), Carayannis and Juneau (2003), Carayannis and Sipp (2006), Carayannis and Stewart (2007–2011, 2011), Carayannis and von Zedtwitz (2005) and Carayannis and Ziemnowicz (2007) all examine the various interdependent topics of knowledge and learning, knowledge management, strategic knowledge, technological learning, economic learning and more that will be examined and enlarged upon in detail in subsequent sections of this literature review.

Carayannis and his associates in their research and writings bear out—and indeed go beyond—Boulding's (1981, 1991) revisionist proposition of evolutionary economics. Boulding (1978) laid the groundwork for evolutionary economics in his treatise on social evolution that he terms "societal evolution" in the book *Ecodynamics*. In one example of significance, Boulding (1978, p. 122) ideates the parallel between biogenetics and what he comes to term "noogenetics":

Virtually all the processes that we have described in the last chapter in biological dynamics are also found in the dynamics of human artifacts. The distinction between the genotype and the phenotype is perhaps not quite as clear in social systems as it is in biological systems, because the genotypes themselves are very often human artifacts and not simply

made by other genotypes, but the distinction is nevertheless important. Just as there is the genosphere or genetic know-how in the biosphere, so there is a noosphere of human knowledge and know-how in the socio-sphere. The noosphere is the totality of the cognitive content, including values, of all human nervous systems, plus the prosthetic devices by which this system is extended and integrated in the form of libraries, computers, telephones, post offices, and so on.

Building on his biogenetic metaphor, Boulding (1978, p. 124) prosaically illustrates the vital role of knowledge in economic productivity:

living organisms originate with a fertilized egg or its asexual equivalent. This contains an enormous amount of information or know-how, which is capable of selecting and directing energy toward the selection, transportation, and transformation of materials into the improbable shapes and conformations that make up the architecture of the body of the living organism. A horse begins as the extraordinary structure of know-how in the fertilized egg of a mare; an automobile begins in an image in the mind of the human being, or perhaps in a set of related images in the minds of a group of human beings. These images are translated into drawings, blueprints, and instructions, which are the genotypes of the production of human artifacts. These produce messengers (social enzymes) in the form of instructions that can direct energy toward the selection, transportation, and transformation of materials in various shapes, conformations, transformations, and so on, until finally an automobile emerges off the assembly line from the womb of the factory. All human artifacts originate as an image in somebody's mind, even though this image may be below the level of consciousness at times. Just as in the case of biological organisms, production may be limited by the absence or scarcity of any one of the three factors—knowledge, energy, and materials. Just as the earth could not have produced a human being two million years ago because the genetic know-how was not there, so the human race could not have produced an automobile a hundred years ago<sup>7</sup> because the social knowledge was not there. Also we probably could not have produced automobiles if we had not tapped fossil fuels for energy and mines for iron, steel, and other metals. If the geological history of the earth had been such that there had not been any oil and gas, the artifacts of the last hundred years would have been very different. *Nevertheless; it is the knowledge process that dominates. It provides the adaptability that expands the niches and that finds substitute forms of energy and materials when an existing form becomes scarce. Energy and materials are very flexible limitations, because they can both be pushed out by the growth of knowledge, though sometimes this fails to happen. It is the knowledge limitation that tends to be dominant* [added emphasis].

On Boulding's foundational contributions to evolutionary economics, Dopfer (1994, p. 1202) adds:

it was not just a matter of rhetoric when [Boulding] applied the concepts of "equilibrium" and the "invisible hand" to ecology and thus addressed the principle of self-organization...he was one of the first economists to recognize the open system character of the economy and to bring intertemporal considerations into allocation and distribution theory.

Romer (1986) introduced a revisionary economic model based on "endogenous technological change" wherein knowledge is recognized as the principal capital asset toward increasing economic returns and long-run economic growth. Romer (1986, p. 1003) specifies:

While exogenous technological change is ruled out, the model here can be viewed as an equilibrium model of endogenous technological change in which long-run growth is driven primarily by the accumulation of knowledge by forward-looking, profit-maximizing agents. This focus on knowledge as the basic form of capital suggests natural changes in the formulation of the standard aggregate growth model.

Congruent with Boulding's (1981, 1991) perspective, Romer (1990, pp. S71–S73) describes economic capital inputs in terms of raw materials and instructions, instructions being the stock of accumulated knowledge that permits, for example, the claim that the "Output per hour worked in the United States today is 10 times as valuable as output per hour worked 100 years ago" (Maddison, 1982). Many economists in the 1950s had attributed the increase in worker output to technological change, but Romer (1990) looks at more than just the yield from labor. In an exquisite example of the impact of endogenous technological change on society, Romer (1990, p. S72) writes:

The raw materials that we use have not changed, but as a result of trial and error, experimentation, refinement, and scientific investigation, the instructions that we follow for combining raw materials have become vastly more sophisticated. One hundred years ago, all we could do to get visual stimulation from iron oxide was to use it as a pigment. Now we put it on plastic tape and use it to make videocassette recordings.

Casting the model that would later be termed "New Growth Theory" by its adherents (Warsh, 2006, pp. 20–27), Romer (1990, p. S72) sets forth three premises of endogenous technological change serving as the underlying mechanism of endogenous economic growth:



- Technological change—improvement in the instructions for mixing together raw materials—lies at the heart of economic growth. As a result, the model presented here resembles the Solow (1956) model with technological change. Technological change provides the incentive for continued capital accumulation, and together, capital accumulation and technological change account for much of the increase in output per hour worked.
- Technological change arises in large part because of intentional actions taken by people who respond to market incentives. Thus the model is one of endogenous rather than exogenous technological change.
- Instructions for working with raw materials are inherently different from other economic goods. Once the cost of creating a new set of instructions has been incurred, the instructions can be used over and over again at no additional cost. Developing new and better instructions is equivalent to incurring a fixed cost. This property is taken to be the defining characteristic of technology.

(Romer, 1990, p. S72)

In forming their evolutionary interpretation of economics, Nelson and Winter (1982) draw notably from foundations developed by Schumpeter, whose 1912 *The Theory of Economic Development*<sup>8</sup> presented a treatise on economic circular flow, which Schumpeter formulated as a model of mainstream economic theory in equilibrium. From a decision science perspective, the circular flow model would be termed a zero-sum game transaction economy. Though resources change hands and concentrations of surplus (or deficit) cycle and pass from one controlling interest to another, the net effect of circular flow is a static state of redistribution. According to Schumpeter (1934), this stationary mechanism cannot provide any real economic growth without the “fundamental phenomenon” impressed on the economic system in the form of innovations and innovative activities at the hand of the entrepreneur. To Schumpeter (1934), the entrepreneur is a heroic “man of action” figure, enacting technical and financial innovations against the status quo, creating competitive advantage and remedying falling profits, and thereby—when successful—spurring irregular intervals of absolute economic growth.

On the topic of entrepreneurship as an academic discipline, Schumpeter (1934) is one of the most influential—and seminal—authors in the field. His theory of entrepreneurship characterizes three typologies.

- *Behavioral*—pertaining to observable enactments, including the introduction of a new good, new method of production, opening a new market, conquering a new source of raw materials or reorganizing an industry in a new way.

- *Motivational*—pertaining to internal drives and objectives known only to the entrepreneur, underlying what Simon (1959) later terms “psychic income.” Schumpeter’s exact descriptors of entrepreneurial motivation are “dream and the will to found a private kingdom,” the “will to conquer: the impulse to fight, to prove oneself superior to others,” and the “joy of creating.”
- *Adversarial*—pertaining to factors that inhibit entrepreneurial action and the entrepreneur’s unusually strong will and great “personal weight” to prevail over such challenges. Entrepreneurial spirit deems to overcome the resistance that “lies in the psyche of the individuals themselves: the human tendency to resist change from accustomed, routine and habitual ways of acting, even if a better alternative is available.” Whereas the everyman is risk averse, Schumpeter’s entrepreneur embraces risk to navigate outside the status quo, going so far as to propose that in making assumptions or estimating future events (such as the prospects of creating a product or service or if successful, its likely market demand) that risk is calculable *a priori*, therefore to be treated as a calculable cost.

From the perspective of Scott’s institutional pillars model (see Figure 2.2), Schumpeter’s entrepreneur is a singular “organization subsystem” operating under the cultural-cognitive pillar, in willful opposition to the other domains. Where Hamilton (1932) contends that “an individual may depart only at his peril,” Schumpeter (1934) lauds that “peril” as a calculable risk with obstacles worthy of overcoming.

### **The holism of integrated organizational behaviors**

The behavioral mechanisms suggested by Selznick (1948), Simon (1959), Boulding (1978, 1981, 1991) and Nelson and Winter (1982) support the convergence of three crucial foundations of collective organizational performance, as thematically addressed and delineated in many of Carayannis’s more recent works:

- *culture*—encompassing the alliterative routines of collaboration, coordination, communication, cooperation, cooptation and control, to name a few (Carayannis, 1992, 1993, 1994a, 1994b, 1994c, 1998, 1998–2011, 1999a, 1999b, 2000a, 2000b, 2001, 2002–2009, 2004, 2008a; Carayannis & Alexander, 1999, 2002, 2004; Carayannis & Campbell, 2006, 2009; Carayannis & Chanaron, 2007; Carayannis & Gonzalez, 2003; Carayannis et al., 2003, 2006, 2007; Carayannis & Juneau, 2003; Carayannis & Sipp, 2006; Carayannis & Stewart, 2007–2011; Carayannis & von Zedtwitz, 2005; Carayannis & Ziemnowicz, 2007);
- *knowledge management*—encompassing the routines of knowledge creation (research and discovery), knowledge absorption (capture and storage), knowledge diffusion (internal sharing), knowledge reprocessing (assimilation) and knowledge transfer (external sharing) (Carayannis,

- 1992, 1993, 1994a, 1994b, 1994c, 1998, 1998–2011, 1999a, 1999b, 2000a, 2000b, 2001, 2002–2009, 2004, 2008a; Carayannis & Alexander, 1999, 2002, 2004; Carayannis & Campbell, 2006, 2009; Carayannis & Chanaron, 2007; Carayannis & Gonzalez, 2003; Carayannis et al., 2003, 2006, 2007; Carayannis & Juneau, 2003; Carayannis & Sipp, 2006; Carayannis & Stewart, 2007–2011; Carayannis & von Zedtwitz, 2005; Carayannis & Ziemnowicz, 2007);
- *dynamic adaptation*—encompassing the routines of diversity, learning, creativity, innovation, competitiveness and co-evolution (Carayannis, 1992, 1993, 1994a, 1994b, 1994c, 1998, 1998–2011, 1999a, 1999b, 2000a, 2000b, 2001, 2002–2009, 2004, 2008a; Carayannis & Alexander, 1999, 2002, 2004; Carayannis & Campbell, 2006, 2009; Carayannis & Chanaron, 2007; Carayannis & Gonzalez, 2003; Carayannis et al., 2003, 2006, 2007; Carayannis & Juneau, 2003; Carayannis & Sipp, 2006; Carayannis & Stewart, 2007–2011; Carayannis & von Zedtwitz, 2005; Carayannis & Ziemnowicz, 2007).

These three crucial foundations of collective organizational performance, organizational culture, knowledge management and dynamic adaptation are each delineated in the following sections, within concomitant enlargement and enrichment into deeper topical areas where salient to a state of the art in academic literature theory.

### *Organizational culture*

According to Edgar Schein (1990), organizational culture is the system of shared actions, values and beliefs that develops within an organization and guides the behavior of its members. Although members of an organization bring varied personal traits and influences into a working group, individual behaviors tend to normalize toward a common way of doing things. The culture of an organization is at once the instrument of organizational communication and the realm of communication barriers. Organizational culture is both shared and learned, providing a collective experience whereby the members solve two extremely important survival issues. The first issue is how to make the organization succeed in its environment, and the second is how to help the participants live and work together in the organizational mission (Schein, 1990).

Schermerhorn et al. (1982) explain that the culture within an organization is shaped by external forces of national culture, societal heritage and marketplace characteristics. Organizational leadership influences the interpretation of these external factors to form the internal culture of the business entity. The collective conscience of the organization's members reacts with external dynamics and leadership influences to determine the prevailing organizational conduct. The mechanism developed to deal with outside

influences is called “external adaptation.” The approach to interactions within the organization is termed “internal integration.” The components of external adaptation are to

- prioritize external forces;
- calibrate measurements of achievement;
- analyze failures.

The elements of internal adaptation are to

- identify membership affiliations;
- establish rules for behavior;
- differentiate friend from foe.

The training of new members entering the organization is a critical function to successful internal integration (Schermerhorn et al., 1982).

With reference to management and leadership, Schermerhorn et al. (1982) further observe that culture reflects the value system inherent in an organizational entity, and is communicated internally and externally through numerous mechanisms. A strong basis for the culture of a business organization is management philosophy, the component of organizational culture that manifests the expression of leadership, emphasizes the organizational values, and unites the functions of external adaptation and internal integration. Management philosophy is frequently documented in formal vision and mission statements, or incorporated throughout official, printed policies and procedures. However, the impact of management philosophy extends beyond the published doctrine. Perhaps unstated, yet well understood, the behavioral principles inferred by organizational members from the leadership they perceive and experience govern the true culture. If management does not practice what is preached, documented policy and mission are reduced to organizational myth (Schermerhorn et al., 1982).<sup>9</sup>

Senge et al. (1999) examine many ways in which significant cultural components impact how learning occurs within an organization. Training and indoctrination of new members may be formal or informal, theoretical or practical, or commonly some combination of all four. Organizational culture also governs the mechanisms of rewards or punishment that affect learning reinforcement. Whatever management’s intentions are, the behavior that is learned becomes the culture that perpetuates through the life of the organization. The learning that is reinforced is the ultimate expression of the prevailing management philosophy, which in turn defines the training environment experienced by newly arriving members (Senge et al., 1999).

The salience of organizational learning is illuminated in the section entitled “Dynamic adaptation”, but the derivation and dependence of learning and higher-order learning upon organizational culture is a central theme to Carayannis (Carayannis, 1994a, 1994b, 2000b, 2001, 2009; Carayannis & Gonzalez, 2003; Carayannis et al., 2003, 2006; Carayannis & Sipp, 2006). In his book *Strategic Management of Technological Learning*, Carayannis (2001, pp. 23–25) describes culture as a “medium for learning” that is “perceived as a system of three interacting layers of increasing visibility and decreasing decipherability” (Frost, 1991, pp. 21–23):

- basic assumptions that reflect the relationship of the members of the organization to the environment and the nature of humans and the contingencies surrounding them, and are invisible or taken for granted;
- values that reflect the prevailing organizational culture and are driven by the underlying basic assumptions, and are more visible than the basic assumptions;
- artifacts and creations that reflect technological and artistic organizational endowments as well as visible and audible behavior patterns, and are visible but often hard to decipher.

(Carayannis, 2001, p. 24)

Carayannis (2001, p. 24) further offers a “concept of organizational culture from three perspectives: integration, differentiation, and fragmentation”:

- *integration*—defined by “organization-wide consensus, consistency, and clarity” (Martin, 1992, p. 45), in which culture is “the pattern of shared beliefs and values” (Davis, 1984, p. 1);
- *differentiation*—defined by “inconsistency, subcultural consensus, relegation of ambiguity to the periphery of subcultures” (Martin, 1992, p. 83), in which culture is “understandings or meanings shared by a group of people; . . . largely tacit among members, are clearly relevant to a particular group, and are distinctive to the group” (Louis, 1985, p. 74);
- *fragmentation*—defined by “focus on ambiguity, complexity of relationships among manifestations, and a multiplicity of interpretations that do not coalesce into a stable consensus” (Martin, 1992, p. 130), in which culture is “a web of individuals, sporadically and loosely connected by their changing positions on a variety of issues. Their involvement, their subcultural identities, and their individual self-definitions fluctuate, depending on which issues are activated at a given moment” (Martin, 1992, p. 153).

(Carayannis, 2001, p. 24)

Carayannis (2001, p. 25) advances this system theory of culture with a “*meta-culture* perspective,” providing deeper recognition of organizational culture as both a facilitator and an inhibitor of technological learning:

From Martin’s definitions we can elicit a common underlying pattern, that of culture being a “conduit” or guide to continuous change and adaptation of members of a group or organization in a concerted manner, and in response to evolving internal or external contingencies, such as technological innovation or technology transfer. The validity and effectiveness of culture as such a guide hinges mainly on the degree to which the culture in question is focused on and facilitates learning, and in particular technological learning among the organizations in our study: “Knowledge does not grow in a linear way, through the accumulation of facts and the application of the hypothetico-deductive method, but rather resembles an upward spiral, so that each time we reevaluate a position or place we’ve been before, we do so from a new perspective”.

(Jaggar, 1983, p. 368)

Martin’s exposé of the continuum of the three perspectives on culture where each perspective dynamically exchanges the predominant position with a repressed one, with the other two perspectives brings forward the dynamics of the learning process itself: “When one perspective seems to be the ‘best’ way to regard a context, the other two, forbidden perspectives may be particularly useful sources of insight” (Martin, 1992, p. 177). The pathological, persistent predominance of one cultural perspective or worldview to the detriment of the others leads to organizational learning disabilities. Then the prevailing culture becomes a barrier to learning or an organizational learning inhibitor, a “cultural blinder,” because: “Culture is the invisible force behind the tangibles and observables in any organization, a social energy that moves the membership into action. Culture is to the organization what personality is to the individual—a hidden yet unifying theme that provides meaning, direction, and mobilization” (Kilman et al., 1985). In that sense, culture can act as a blinder or “mental restraint” affecting adversely the present and future organizational welfare with the organizational and technological momentum of the past.

(Carayannis, 2001, p. 25)

Emerging from foundations in organizational culture with a gloCal (Carayannis & Gonzalez, 2003) perspective, Carayannis et al. (2006, p. 424) describe communities of practice (CoPs) as “a persistent, sustained social network of individuals who share and develop an overlapping knowledge base, set of beliefs, values, history and experiences focused on a common practice and/or mutual enterprise” (Barab & Duffy, 2000).

Wenger (2004) has identified three dimensions of communities of practice:

- *domain*—the area of knowledge that brings the community together;
- *community*—the group of people for whom the domain is relevant;
- *practice*—the body of knowledge, methods, tools, stories, cases and documents which members share and develop together.

(Carayannis et al., 2006, p. 424)

### *Knowledge management*

Essentially synonymous with the idea of shared culture is the fundamental exchange of knowledge. Knowledge is the bridge between simple environmental information and the integrated human response to that environment. Davenport and Prusak (1998) define knowledge to be broader, deeper and richer than data or information; knowledge derives from minds at work. Knowledge is built upon the comparison of information from one situation to another, awareness of consequences for decisions and actions, connections of how one bit of knowledge relates to others, and conversation between people about given information (Davenport & Prusak, 1998).

Nelson and Winter (1982) develop a dynamic model of accumulating knowledge and capabilities that displaces the static model of orthodox economics. But mere accumulation of knowledge is scarcely the key to capability enhancement, and for substantive gains in organizational efficacy, knowledge, like any vital resource, must be managed.

Carayannis (1999b) succinctly defines knowledge management to be “the systematic, explicit and deliberate building, renewal, and application of knowledge to maximize an enterprise’s knowledge-related effectiveness and returns from its knowledge assets” (Wiig, 1993). Knowledge management is about managing information and managing people, distinguishing, capturing and applying what information is most relevant and significant to processes and missions at hand.<sup>10</sup> Carayannis is particularly centered on knowledge management as it pertains to the management of innovation, a vital component of dynamic adaptation (covered in the section entitled “Dynamic adaptation”). Knowledge management is much deeper and richer, and more challenging than ordinary record-keeping or even sophisticated information systems, especially since some knowledge is explicit, but some is tacit and therefore more difficult to observe, record and comprehend (Carayannis, 1992, 1993, 1994a, 1994b, 1994c, 1998, 1998–2011, 1999a, 1999b, 2000a, 2000b, 2001, 2002–2009, 2004, 2008a; Carayannis & Alexander, 1999, 2002, 2004; Carayannis & Campbell, 2006, 2009; Carayannis & Chanaron, 2007; Carayannis & Gonzalez, 2003; Carayannis et al., 2003, 2006, 2007; Carayannis & Juneau, 2003; Carayannis & Sipp, 2006; Carayannis & Stewart, 2007–2011; Carayannis & von Zedtwitz, 2005; Carayannis & Ziemnowicz, 2007).

In the language of the New Growth Theory of endogenous economic change, there is a distinction made between “embodied” knowledge (human capital that does not outlive the individual who knows it) and “disembodied” knowledge (knowledge that is recorded or shared to outlive the one who knows) (Warsh, 2006, p. 291).

As presented by Carayannis and Stewart (2007–2011), a knowledge management system is an integrated mechanism for supporting the creation, absorption, diffusion, reprocessing and transfer of expertise and knowledge in an organization. In physical configuration, a knowledge management system can be:

- *document-based*—including indexed paper, microfilm and page images; formatted electronic documents, such as those created by Lotus Notes, distributed databases, etc.;
- *ontology-based*—adding linkages to facilitate functionality; terminologies to summarize the documents such as author, subject, key words, etc. (as in DAML and other XML-based ontologies);
- *AI-based*—using customized schemata to represent the problem domain (still in early development).

Some benefits of knowledge management include:

- sharing valuable organizational knowledge;
- facilitating teaching and learning;
- avoiding reinventing the wheel;
- reducing redundant work;
- reducing training time for new employees;
- freeing experts for additional knowledge creation;
- freeing experts for additional knowledge reprocessing;
- retaining intellectual property after employees leave;
- safeguarding organizational memory;
- enabling organizational wisdom.

Enlarging on the knowledge management fundamentals to a gloCal (Carayannis & Gonzalez, 2003) context of entrepreneurial and economic development, Carayannis et al. (2006, p. 422) describe “knowledge economy” as “a state of economic being and a process of economic becoming that intensively and extensively leverages knowledge assets and competences as well as economic learning to catalyze and accelerate sustainable and robust economic growth.” Operating within the larger sphere of knowledge economy are “knowledge clusters” (Carayannis et al., 2006, p. 423), which are “agglomerations of co-specialized, mutually complementary and reinforcing knowledge assets in the form of ‘knowledge stocks’ and ‘knowledge



flows' that exhibit self-organizing, learning-driven, dynamically adaptive competences and trends in the context of an open systems perspective" (Carayannis & Campbell, 2006).

One of the routines of knowledge management is "knowledge transfer," which Carayannis et al. (2006, pp. 423–424) view

from an information theoretic (Shannon and Weaver, 1949) and a metacognitive (Simon, 1969; Sternberg & Frensch, 1991; Halpern, 1989)/linguistic (Chomsky, 1971) perspective as a knowledge transfer process, where the human problem solver and technology manager is seen as both a technician and a craftsman (Schon, 1983), a "lumper" and a "splitter".

(Mintzberg, 1989)

The problem solver typically relies on multi-layered technological learning and unlearning (Carayannis, 1992, 1993, 1994a, 1994b, 1994c; Dodgson, 1991) to create, maintain, and enhance the capacity of individuals, groups, and organizations to transfer and absorb knowledge in the form of embodied and disembodied (Von Hippel, 1988) technology in the form of artifacts, beliefs, and evaluation routines (Garud & Rappa, 1994) and tacit and explicit knowledge.

(Polanyi, K., 1966; Polanyi, M., 1958; Nonaka, 1988, 1994)

Moreover, knowledge transfer occurs across scientific disciplines, professions, industries, economic sectors, geographic regions, and societies/countries (Reisman, 1989, 1991). This motivates the linguistic view of technology sharing and absorption in the form of a firm's technological absorptive capacity (Cohen & Levinthal, 1990) as well as transformative capacity (Garud & Nayyar, 1994), since it requires effective communication among practitioners with often divergent technical rationalities.

(Schon, 1983) (Carayannis et al., 2006, pp. 423–424)

Another routine of knowledge management is "knowledge absorption," which reaches an upper limit in absorptive capacity. Carayannis et al. (2006, p. 424) advise that the "outcome of knowledge transfer is highly dependent on the absorptive capacity of the recipient" (Cohen & Levinthal, 1990). Carayannis et al. (2006, p. 424) specify that

The notion of absorptive capacity refers to the capacity of the recipient to assimilate value and use the knowledge transferred. Similar notions of "learning" have been defined by Marshall (1965, 4) as the acquisition and use of exiting knowledge and/or creation of new knowledge with the purpose of improving economic performance.

Braun (1997) introduces a conceptual model for knowledge flows that shows how a large company with high connectivity and an integrated infrastructure for information and knowledge exchange vis-à-vis communities of practice can lead to a higher level of trust, and subsequent innovation and competitive advantage. He identifies the critical factors to consider in terms of knowledge exchange between organizations as follows:

- adequate technology (infrastructure and data exchange);
- trust and cooperative relationships;
- common interest;
- exchange of tacit and explicit company knowledge for the public good aspect of the company.

(Carayannis et al., 2006, p. 424)

With respect to the knowledge management routine of knowledge diffusion, specifically with regard to knowledge economy and innovation, Carayannis et al. (2006, p. 422) explain that

Networking is important for understanding the dynamics of advanced and knowledge-based societies. Networking links together different modes of knowledge production and knowledge use, and also connects (subnationally, nationally, trans-nationally) different sectors or systems of society. Systems theory, as presented here, is flexible enough for integrating and reconciling systems and networks, thus creating conceptual synergies.

Carayannis et al. (2006, p. 422) proceed to describe “innovation networks” as “real and virtual infra-structures and infra-technologies that serve to nurture creativity, trigger invention and catalyze innovation in a public and/or private domain context (for instance, government–university–industry public–private research and technology development co-opetitive partnerships) (Carayannis & Alexander, 1999 & 2004; Carayannis & Campbell, 2006)”.

Brandenburger and Nalebuff (1996, p. 39) describe co-opetition as a “duality in every relationship—the simultaneous elements of cooperation and competition. War and peace. Co-opetition.” Interorganizational knowledge management and co-opetitive strategic alignments have spawned a complex interdependency in technology industries, termed an “innovation ecosystem.” Adner (2006, pp. 98–100) portrays the innovative ecosystem as

the collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution. Enabled by information technologies that have drastically reduced the costs of coordination, innovation ecosystems have become a core element in the growth strategies of firms in a wide range of industries. While leading

exemplars tend to come from high-tech settings, ecosystem strategies are being deployed in industries as varied as commercial printing, financial services, basic materials, and logistics provision.

When they work, ecosystems allow firms to create value that no single firm could have created alone. The benefits of these systems—discussed under such labels as platform leadership, keystone strategies, open innovation, value networks, and hyperlinked organizations—are real and well publicized.

For many companies, however, the attempt at ecosystem innovation has been a costly failure. This is because, along with new opportunities, innovation ecosystems also present a new set of risks—new dependencies that can brutally derail a firm's best efforts. Even if a firm develops its own innovation brilliantly, meets and exceeds its customers' needs, and successfully excludes its rivals, a market may not emerge. Whether—and when—it emerges is determined as much by the firm's partners as by its own performance.

(Adner, 2006, pp. 98–100)

### *Dynamic adaptation*

According to Waldrop (1992), “dynamic adaptation” is a term used in both biology and engineering to describe the process of self-organizing and reorganizing systems of components that interact with one another and within the backdrop of a shared but changing environment. It is the mechanism of evolution where competition for resources amid a variegated and turbulent complexity of resource niches spurs trial-and-error experimental adjustments (viz. mutations) on the part of resource contenders, which must interactively adapt or perish (Waldrop, 1992). In human organizational terms, routines must undergo collateral changes with the changing environment. For sustainable order, there must be routines for enacting changes to routines. Some of the more critical routines for mutation and adaptation are learning, creativity, innovation, competitiveness and co-evolution (Carayannis, 1992, 1993, 1994a, 1994b, 1994c, 1998, 1998–2011, 1999a, 1999b, 2000a, 2000b, 2001, 2002–2009, 2004, 2008a; Carayannis & Alexander, 1999, 2002, 2004; Carayannis & Campbell, 2006, 2009; Carayannis & Chanaron, 2007; Carayannis & Gonzalez, 2003; Carayannis et al., 2003, 2006, 2007; Carayannis & Sipp, 2006; Carayannis & Stewart, 2007–2011; Carayannis & von Zedtwitz, 2005; and Carayannis & Ziemnowicz, 2007).

*Diversity.* Attesting to regulative institutional process in action, McFarland (1998) reports that over the past half-century, the United States has increasingly adapted to an expanding and diverse population. The federal

government has enacted legislation to guarantee equal opportunity in education, employment and housing for all individuals. These efforts have been upheld in the courts, and many measures of judicial activism have enlarged the social remedies advanced by the executive and legislative branches. In the context of workforce diversity the prevailing advances are governed by regulations and guidelines prescribed under the Equal Employment Opportunity Commission, Affirmative Action and the Americans with Disabilities Act.

According to Galagan (1991), diversity describes numerous sources of human differences: most prominently skin color, gender, religion, age, race, economic class, physical ability, military experience and sexual orientation. Heretofore, workplace regulations in practice have forced a measure of assimilation and the minimization of differences between individuals. Present demographics place the white American male in a workforce minority, although white men are still disproportionately represented among management roles. American workers do not necessarily prefer to emulate the white male but would rather strive to work together while maintaining their own identity. Fraught with shortcomings, affirmative action has outlived its usefulness. Assimilation is an inadequate goal; in its place is a celebration of diversity.

Bassett-Jones (2005) expounds on the advantages (and cautions) of embracing workplace diversity, which he describes in terms beyond diverse demographic backgrounds, encompassing differences in culture and intellectual capability which result in creativity that can lead organizations to better performance. Diversity management begins with a systematic and planned commitment to recruit and retain employees of diverse backgrounds and abilities, mainly originating within the human resources training and development domains of organizations. Successful diversity management is the aggregate effect of human resources subsystems, including "recruitment, reward, performance appraisal, employee development and individual managerial behaviors in delivering competitive advantage through leadership and teamwork." The payoff is teams possessing diverse membership with a collectivist orientation that are likely to have "a deeper well of resource upon which to draw when generating ideas, combining them and subjecting them to critical evaluation" that curtails the likelihood of suboptimal performance.

The potential for dynamic adaptation is enhanced by diversity among organizational membership. Variety and alternative points of view confirm robustness in organizational performance, particularly in the face of unfamiliar challenges or pressures to innovate. If everyone has similar backgrounds and experiences, thinks alike and agrees with each other, it represents an evolutionary disadvantage to the same extent that occurs in a small homogenous gene pool. But membership diversity, like genetic diversity, only confers a *potential* for superior adaptiveness and performance.

Carayannis (2009) terms this diversity “heterogeneity”, “serving as the trigger, catalyst, and accelerator of socio-technical change that generates a positive socio-economic development...” The enactment of the potential demands effective organizational learning, creativity, innovation, competitiveness and co-evolution, (Carayannis, 1992, 1993, 1994a, 1994b, 1994c, 1998, 1998–2011, 1999a, 1999b, 2000a, 2000b, 2001, 2002–2009, 2004, 2008a; Carayannis & Alexander, 1999, 2002, 2004; Carayannis & Campbell, 2006, 2009; Carayannis & Chanaron, 2007; Carayannis & Gonzalez, 2003; Carayannis et al., 2003, 2006, 2007; Carayannis & Sipp, 2006; Carayannis & Stewart, 2007–2011; Carayannis & von Zedtwitz, 2005; and Carayannis & Ziemnowicz, 2007), which are all explored in detail in the following sections.

*Learning and higher-order learning.* Espedal (2008) describes higher-order learning as an outcome of learning from the experience of others. Higher-order learning is associated with the changing of a known logic of action and experimenting with what is not known but might become known. Learning from experience is used to challenge existing perspectives, routines and practices, and to develop new perspectives on the future. The essence of higher-order learning involves escaping one perspective and implementing a mindset different from the old one (Espedal, 2008, pp. 365–367).

On the topic of higher-order learning, specifically technological learning in an organizational (firm) context, Carayannis (2001, pp. 153–154) assembles and explains a “triple-layered organizational architecture of technological learning” that begins with “two support pillars”:

- An organizational culture of learning that fosters learning at all levels, through all functions, and by all means, creating an ambiance of total technological learning in a dynamic system approach.  
(Senge, 1990, p. 164)

The five disciplines [systems thinking, personal mastery, mental models, building shared vision, team learning], now converging, appear to comprise a critical mass. They make building learning organizations systematic undertaking, rather than a matter of happenstance, ... perhaps one or two developments emerging in seemingly unlikely places, will lead to a whole new discipline that we cannot even grasp today.

- A continuous process or multilevel cycle for creating, upgrading, and destroying *tacit* [*tacit knowledge* is defined as “practical know-how that usually is not openly expressed or stated” (Oxford English Dictionary, 1933)] *technological core competencies*, which serve at a given point in time as the firm’s competitive arsenal or dynamically evolving, firm-specific skill or resource reservoir.

(Teece et al., 1992, p. 12)

The resource-based perspective [of strategic management] focuses on strategies for exploiting firm-specific assets. However, the resource-based perspective also invites consideration of strategies for developing new capabilities. . . . It is this second dimension, encompassing skill acquisition, learning, and capability accumulation that we believe lies the greatest potential for the resource-based perspective to contribute to strategy. We will refer to this as the “dynamic capabilities approach.”

Teece et al. (1992, p. 12) write that learning engenders skills, capabilities and organizational routines with “a tacit dimension that often cannot be readily articulated. Hence, the routines themselves and the ability of management to call upon the organization to perform them, represents firm’s business capability.”

Carayannis (2001, pp. 160–162) integrates the cornerstones of strategic management and technological learning in a construct he terms the Strategic Management of Technological Learning (SMOTL). The understanding of SMOTL requires additional clarification of the learning process, with particular illumination of higher-order learning and unlearning, and strategic or active incrementalism, thus:

The strategic management of technological learning (SMOTL) concept motivates the decision-making model or style of strategic incrementalism.

(de Geus, 1991)

When people play with [mental models of the world], they are actually creating a new language among themselves that expresses the knowledge they have acquired. And here we come to the most important aspect of institutional learning, whether it be achieved through teaching or through play as we have defined it: the institutional learning process is a process of language development. As the implicit knowledge of each learner becomes explicit, his or her mental model becomes a building block of the institutional model.

The main attributes of this model are a dynamically adaptive nature and an emphasis on continuous learning and unlearning from experience, as well as a simultaneous awareness of both the short and the long term. It accounts for the weaknesses associated with incrementalism (such as short-sightedness and excessive conservatism) through its inherent dynamism and its readiness for radical change. It is inspired from the metacognitive paradigm, where technology acquires an increasingly important role in redefining at an increasing frequency the concepts of corporate strategy and the points on which competitive advantage is built.

It has thus become the cause for changes in the nature of the competition per se among companies, industries, and nations, that are more and more frequently tantamount to a paradigm shift (Kuhn, 1970). These changes in the nature of competition among firms is dealt with by D'Aveni (1994) who introduced the concept of hypercompetition and which leads to the concept of hyperlearning or higher order self-organizing learning and unlearning.

We propose defining the concept of strategic or active incrementalism as:

an incremental radical (evolutionary/revolutionary) dynamically adaptive (responsive over time, feedback driven), and multiple (triple) loop self-organized technological learning (first, second, and third order learning and unlearning), that is, a hyperlearning-driven strategic decision-making process, which manifests itself on three consecutive levels of increasing conceptual breadth and depth of the decisions involved.

Strategic incrementalism focuses heavily, albeit implicitly, on continuous feedback and learning and unlearning from experience not on one but on three levels.

Miner stressed that learning, especially what is collectively tacit learning (although he does not use the word "tacit," he in essence describes tacit learning) can have adverse effects by creating beliefs, or conceptual constraints (paradigms), that impede clairvoyance when making strategic decisions:

A primary point is that organizational learning is not necessarily adaptive or a source of wisdom and improved performance under conditions of ambiguity. This is because it is not always obvious what happened, or why it happened, or whether what happened is a good thing [emphasis added]. Given this ambiguity, learning can get far removed from what rationality would indicate.

(Miner, 2006)

Carayannis (2001, pp. 162–163) enumerates and casts the three levels of technological learning in the topology of SMOTL as operational, tactical and strategic:

- *Operational, single-loop or first-order technological learning*—on the first level we have accumulating experience and learning by doing (we learn new things).
- *Tactical, double-loop, self-organizing or second-order technological learning or learning how-to-learn level*—on the second level we have learning of

new tactics about applying the accumulating experience and the learning process (redefinition of the fundamentals [rules and contingencies] of our short-term operating universe): we build new contingency models of decision making by changing the rules for making decisions and/or adding new ones.

- *Strategic, triple-loop, self-organizing metalearning or third-order technological learning or learning to learn-how-to-learn level*—on the third level we have development and learning (internalization and institutionalization) of new views of our operating universe or *Weltanschauungen* (Hedberg, 1981), hence we learn new strategies of learning (Cole, 1989). Thus, we redefine our fundamentals (our rules and contingencies) for our decision-making; or, in other words, we redefine the fundamentals of our operating universe not only in the short term but primarily in the long term.

A *Weltanschauung* is a definition of the situation: it influences what problems are perceived, how these problems are interpreted, and what learning ultimately results.

Carayannis and Alexander (2002, p. 625) clarify that in technological learning, operational learning is basic, and tactical learning and strategic learning are higher order. Carayannis (2001, p. 162; Carayannis & Alexander, 2002, p. 629) offers a diagram of the foregoing triple-layered architecture of technological learning (Figure 2.3).

The theoretical construct of SMOTL readily serves to systematically illuminate the proposition of increasing returns that the New Growth Theory of evolutionary economics also purports. Carayannis and Alexander (2002, p. 626) succinctly state:

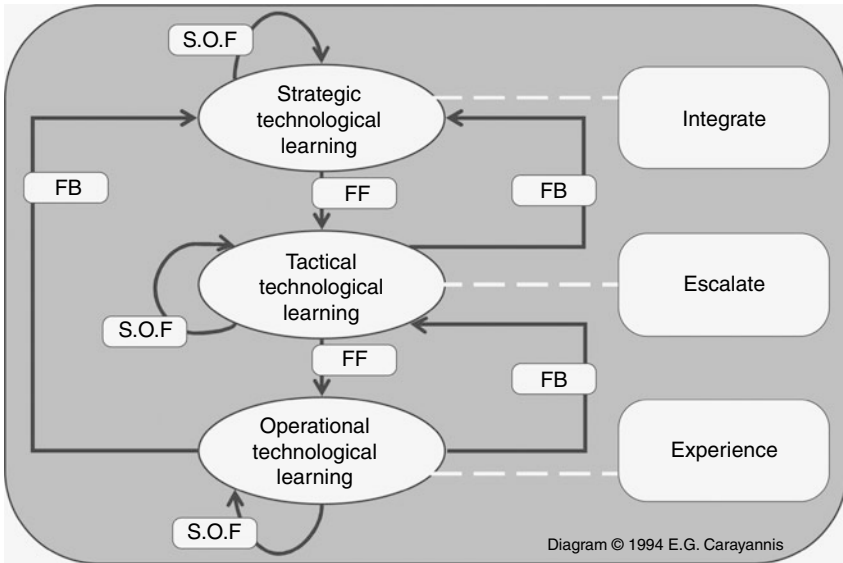
The management of technological capabilities produces increasing economic returns as they focus more narrowly on knowledge assets and processes that are non-substitutable, imperfectly imitable, rare, and valuable (Carayannis, 1994b). As the cone in Figure 2.4 indicates, the highest value is derived from the strategic management of technological learning, as these processes enable the renewal of critical capabilities and assets and the generation of new sources of competitive advantage.

(Carayannis, 1994b)

The referenced figure illustrating concentric levels of technological learning is reproduced here in Figure 2.4.

In conformance with Jaggard's (1983, p. 368) observation on the growth of knowledge as an upward spiral, Carayannis (1999b, pp. 223–229) terms this progression the Organizational Cognition Spiral (OCS), which helps to unify salient theoretical frameworks of knowledge management and higher-order





**S.O.F. = self-organizing feedback**

**FB = feedback loop**

**FF = feedforward loop**

*Figure 2.3* A triple-layered architecture of technological learning: the SMOTL topology

*Source:* Adapted from Carayannis (1994, 2001); Carayannis et al. (1994); Carayannis and Alexander (2002).

learning. In a concise interpretation, OCS comprises four iterative “knowledge states” (listed below in abbreviated form, and sequenced from bottom to top).

- ignorance of ignorance—a condition of unknown unknowns;
- awareness of ignorance—a condition of known unknowns;
- awareness of awareness—a condition of known knowns;
- ignorance of awareness—a condition of unknown knowns.

Organizations may exist in any of these states, and at intermediate levels. Presumably organizational subsystems will not always sustain commensurate levels with respect to one another, depending on the efficacy of knowledge-management routines within the organization. Carayannis (1999b) states: “Knowledge management can be viewed as the process of managing the transitions across these four states.” Tailoring the Carayannis

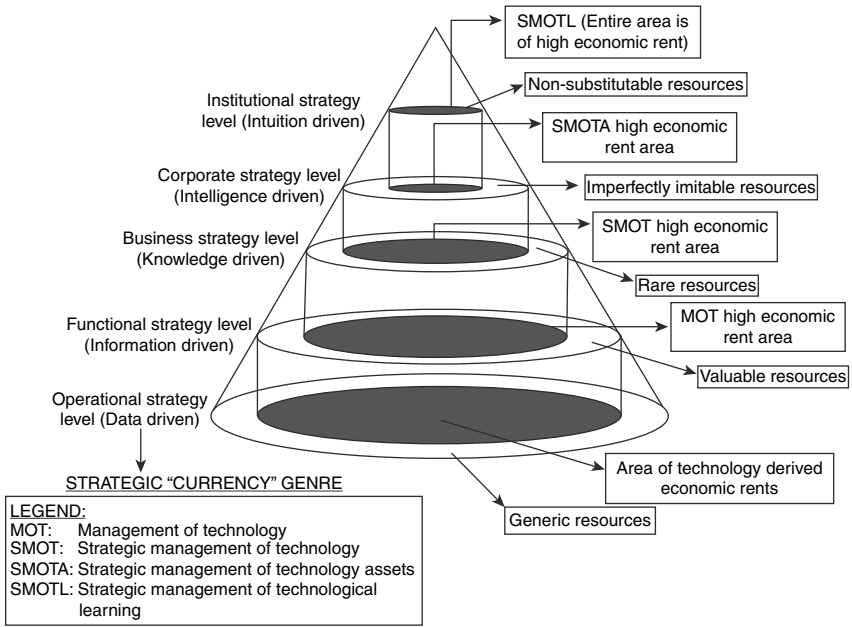


Figure 2.4 The cone of strategic technological hyperlearning, illustrating concentric levels of technological learning

Source: Adapted from Carayannis (1994b, 1999a, p. 147, 2001, p. 168); Carayannis and Alexander (2002, p. 627).

(1999b) model for practical actionability in the context of managerial roles, Carayannis and Stewart (2007–2011) restate the four levels as:

- unknown unknowns—knowledge chaos;
- known unknowns—questions seeking answers;
- known knowns—answers obtained;
- unknown knowns—tacit expertise.

Figure 2.5 depicts the simplified OCS model (Carayannis, 1999b; Carayannis & Stewart, 2007–2011):

*Creativity, innovation and competitiveness.* According to Carayannis and Gonzalez (2003), creativity is the result of inspiration and cognition—the liberation of talent in a nurturing or provocative context. Creativity is mostly an intensely private and individualistic process that operates at the micro (individual) level. Innovation is not just invention but economically viable adaptation, improvement or creation that changes the yield of resources—a new product or method that boosts supply-side productivity or increases the

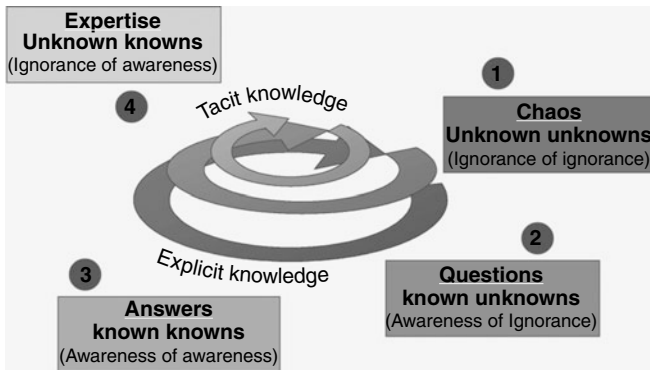


Figure 2.5 Modified spiral of organizational learning, cognition and knowledge  
Source: Adapted from Carayannis (1999b).

value obtained from resources by the consumer. Innovation operates at the meso (team/group/organizational) level. Competitiveness is the edifice resting on the pillars of creativity, invention and innovation—the capacity of a project team, organization, industry or nation to attain and sustain greater productivity than similar entities. Competitiveness operates at the macro (project/firm/industry/national/regional) level.

Deeply connected thematically to Nelson and Winter's metaphor of routine behaviors serving as organizational genes is the metaphor that Carayannis and Gonzalez (2003) ascribe to creativity, innovation and competitiveness (CIC), which they model as a double helix, akin to nature's fundamental scaffold and evolutionary competence. One strand of the double helix represents the flow and record of creativity, the other that of competitiveness. The value-adding chain of creativity, invention, innovation, productivity and competitiveness links both strands. This chain catalyzes learning and metalearning to do things better, cheaper and faster at the micro-, meso- and macrolevels. The gains are reflected in higher standards of living, an increase in the number of competitive firms, more robust economies, and accelerated and more sustainable development trends.

Figure 2.6 is adapted from Carayannis & Gonzalez (2003) in the depiction of the foregoing.

Building on the CIC double helix model (Carayannis & Gonzalez, 2003) and the system mechanism of knowledge management, knowledge economy, knowledge clusters and innovation networks reviewed in the section entitled "Knowledge management", Carayannis (2008a, p. 346) enlarges and enriches the theoretical framework of entrepreneurial complexity with the concept of a fractal innovation ecosystem.

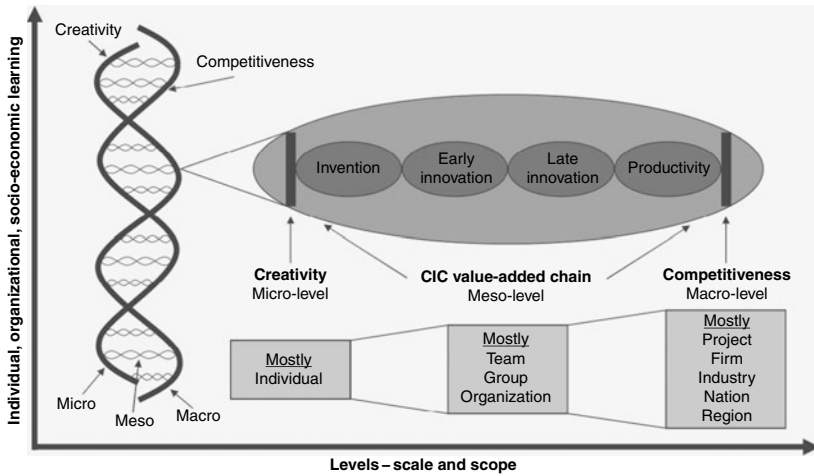


Figure 2.6 The creativity-innovation-competitiveness double helix and value-added chain

Source: Reprinted from Carayannis & Gonzalez (2003).

“Fractal” describes an irregular geometric object with an infinite nesting of structure at all scales (Vanderbilt University, 2010). Fractals are geometric patterns that repeat at ever-smaller scales to produce irregular shapes and surfaces that cannot be represented by classical geometry. Fractals are used especially in the computer modeling of irregular patterns and structures in nature (*American Heritage Dictionary*, 1995).

Mandelbrot (1982) pioneered the mathematics of fractal geometry, coining the term “fractal” from the Latin adjective *fractus*, meaning “fragmented” or “irregular.” This appropriately serves as the etymological opposite of *algebra*, which derives from the Arabic *jabara*, meaning “to bind together.” Mandelbrot conceived and developed a new geometry of nature, to investigate the morphology of the amorphous forms that Euclidean geometry leaves aside as formless. Mandelbrot implemented the use of fractal geometry in a number of fields to mathematically describe many irregular and fragmented patterns—some variously described by scientists as “grainy, hydralike, in between, pimply, pocky, ramified, seaweedy, strange, tangled, tortuous, wiggly, wispy, wrinkled,” and more, yet could “henceforth be approached in a rigorous and vigorous quantitative fashion.” He stipulates that “the most useful fractals involve chance and both their regularities and irregularities are statistical.” Fractal shapes tend to exhibit “*scaling*, implying that the degree of their irregularity and/or fragmentation is identical at all scales” (Mandelbrot, 1982).

As interpreted by Barnsley (1993),

The observation by Mandelbrot [Mandelbrot 1982] of the existence of a “Geometry of Nature” has led us to think in a new scientific way about the edges of clouds, the profiles of the tops of forests on the horizon, and the intricate moving arrangement of the feathers on the wings of a bird as it flies. Geometry is concerned with making our spatial intuitions objective. Classical geometry provides a first approximation to the structure of physical objects; it is the language that we use to communicate the designs of technological products and, very approximately, the forms of natural creations. Fractal geometry is an extension of classical geometry. It can be used to make precise models of physical structures from ferns to galaxies. Fractal geometry is a new language. Once you can speak it, you can describe the shape of a cloud as precisely as an architect can describe a house.

(Barnsley, 1993)

Carayannis (2008a, p. 346) applies the concept of fractal geometry to describe a framework for the fractal innovation ecosystem:

This is a multi-level, multi-modal, multi-nodal and multi-agent system of systems. The constituent systems comprise innovation meta-networks (networks of innovation networks and knowledge clusters) and knowledge meta-clusters (clusters of innovation networks and knowledge clusters) organized in a self-referential or chaotic fractal (Gleick, 1987) knowledge and innovation architecture (Carayannis, 2001). These in turn constitute agglomerations of human, social, intellectual and financial capital stocks and flows as well as cultural and technological artefacts [sic] and modalities, continually co-evolving, co-specializing, and co-opeting. These innovation networks and knowledge clusters also form, re-form and dissolve within diverse institutional, political, technological and socio-economic domains, including government, universities, industry and non-governmental organizations and involving information and communication technologies, biotechnologies, advanced materials, nanotechnologies and next-generation energy technologies.

(Carayannis, 2008a, p. 346)

Pertinent to the topic of the fractal innovation ecosystem is the concept of the Quadruple Helix, introduced by Carayannis and Campbell (2006, 2009, p. 207):

Quadruple helix refers to structures and processes of the gloCal knowledge economy and society. Building from the “Triple Helix” model of knowledge, developed by Etzkowitz and Leydesdorff (2000, pp. 111–112), which stresses three intertwining “helices” that generate a national innovation system: academia/universities, industry, and state/government.

The “Quadruple Helix” model adds a fourth helix identified as “media-based and culture-based public”, as culture and values, and the way in which “public reality” is constructed and communicated by the media, influence every national innovation system.

(Carayannis & Campbell, 2006a, 2009, p. 207)

Instrumental to a reconceptualization of innovation networks and knowledge clusters of increasing complexity, Carayannis and Campbell (2006a, 2009, p. 205) introduce the Mode 3 knowledge creation, diffusion and use system:

“Mode 3” a multi-lateral, multi-nodal, multi-modal, and multi-level systems approach to the conceptualization, design, and management of real and virtual, “knowledge-stock” and “knowledge-flow”, modalities that catalyse, accelerate, and support the creation, diffusion, sharing, absorption, and use of co-specialised knowledge assets. “Mode 3” is based on a system-theoretic perspective of socio-economic, political, technological, and cultural trends and conditions that shape the co-evolution of knowledge with the “knowledge-based and knowledge-driven, gloCal economy and society”.

(Carayannis & Campbell, 2006a, 2009, p. 205;  
Carayannis & von Zedtwitz, 2005)

The integration of these emerging frameworks bears out in the construct of the Mode 3 fractal innovation ecosystem (Carayannis, 2008a, p. 347):

This is the nexus or hub of the emerging 21st century Fractal Innovation Ecosystem, in which people, culture and technology (Carayannis & Gonzalez, 2003), forming the essential Fractal Innovation Ecosystem building block or “knowledge nugget” (Carayannis, 2004), meet and interact to catalyse creativity, trigger invention and accelerate innovation across scientific and technological disciplines, public and private sectors in a top-down, policy-driven and a bottom-up, entrepreneurship-empowered fashion. “Mode 3” allows and emphasizes the co-existence and co-evolution of different knowledge and innovation paradigms. In fact, a key hypothesis is:

The competitiveness and superiority of a knowledge system is greatly determined by its adaptive capacity to combine and integrate different knowledge and innovation modes via co-evolution, co-specialization and co-opetition of knowledge stock and knowledge flow dynamics (for example, Mode 1, Mode 2, Triple Helix, linear and non-linear innovation).

(Carayannis, 2008a, p. 347)

*Co-evolution.* In his book, *Complexity: The Emerging Science at the Edge of Order and Chaos*, Waldrop (1992) sums up the essence of dynamic adaptation with his explanation of co-evolution. Beyond the conventional interpretation of evolutionary processes—survival of the fittest—co-evolution is an important component in understanding the mechanics of interdependent change. Evolution doesn't occur in a static ecological niche where the "fittest" remain uncontested; there is constant interaction among all elements and occupants of every environment, and environments are inherently mutable and sometimes turbulent. As eloquently expressed by John H. Holland, technology innovator and "the father of genetic algorithms" (Waldrop, 2002, p. 259),

Organisms don't change by climbing uphill to the highest peak of some abstract fitness landscape... Real organisms constantly circle and chase one another in an infinitely complex dance of coevolution.

Far from delivering chaos, co-evolution in the natural world has produced countless creatures exquisitely adapting to one another and to the changing environment in which they live. It is by the co-evolution of groups of humans as social creatures that organization is formed and shaped. In the human world, co-evolution has produced webs of economic and political dependencies—alliances, rivalries, customer-supply relationships and such. Co-evolution is the dynamic that underlies the affairs of nations in a world that has no central authority (Waldrop, 1992).

Recalling North (1990), "Institutions, together with the standard constraints of economic theory, determine the opportunities in a society. Organizations are created to take advantage of those opportunities, and, as the organizations evolve, they alter the institutions." This assertion clearly conforms to the foregoing treatise on the holism of integrated organizational behaviors, especially with regard to the latter concepts of dynamic adaptation and co-evolution. And Waldrop's (1992) "webs of economic and political dependencies—alliances, rivalries, customer supply relationships, and such" harkens uncannily back to Hamilton's (1932) "tangled and unbroken web of institutions." The evolution of scholarly institutional thought has progressed through decades of recombinant dynamic adaptation to reinforce the concepts of evolutionary economic theory and the complexity of interdependent human social structures.

In the context of 21st-century business and economics, the co-evolution and dynamic adaptation of organizations and institutions denominate a condition of sociotechnical change, involving the interactive reciprocity of human social structures and behaviors with the artifacts of technology and technological systems.

Carayannis (2008a, p. 344) explains this significance:

At the heart of socio-technical change, as both an antecedent and a consequence, lies the phenomenon of creative destruction (Schumpeter, 1911) which illuminates the nature and dynamics of change in the context of unknown unknowns (uncertainty) and known unknowns (risk). Creative destruction drives and shapes the lifecycle of technological paradigms and trajectories (such as the Fisher-Pry or logistical S-curve—see Abernathy and Utterback, 1975) and helps to foster more sustainable entrepreneurship and robust competitiveness... Creative destruction is thus the force “which incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. The process of creative destruction is the essential fact about capitalism.” (Schumpeter, 1942, p 82.) Moreover, we see creative destruction as a fundamentally knowledge-based and knowledge-driven phenomenon, especially as it manifests itself in the knowledge economy and society.

(Carayannis, 2008a, p. 344)

Further, Carayannis (2008a, p. 344) assesses and integrates three fundamental aspects of the process of creative destruction:

- *strategic knowledge serendipity and arbitrage* as means of unlocking and capturing the value added by creative destruction;
- *real options* as a methodology to assess and maximize the value added by creative destruction;
- multi-layered, multi-modal and multi-nodal *technological learning* as a mechanism that internalizes and leverages the value added by creative destruction and, especially, by lessons from the previous stages of a technological lifecycle and from evolving, successive or overlapping technological lifecycles.<sup>11</sup>

(Carayannis, 2008a, p. 344)

Essential to the foregoing, Carayannis (2008a, p. 348) integrates three constituent processes in the dynamics of strategic knowledge that he terms “C3” for co-competition, co-evolution and co-specialization:

*Strategic knowledge co-competition* refers to the deriving of new knowledge through a healthy balance of competition and cooperation, involving employees and business partners. *Strategic knowledge co-evolution* is the creating of new knowledge through a series of interactions and changes at various organizational levels, spurred by the co-generation and complementary nature of that knowledge. *Strategic knowledge co-specialization* refers to the learning and knowledge that encourages individuals or



groups to expand their roles into new areas and new domains in a complementary and mutually-reinforcing way.

(Carayannis, 2008a, p. 348)

*Strategic knowledge arbitrage and strategic knowledge serendipity.*

Chance favors the prepared mind.

—Louis Pasteur, French chemist and parasitologist

Enlarging upon the first of the fundamental aspects of the process of creative destruction, strategic knowledge arbitrage and strategic knowledge serendipity (which he efficiently terms SKARSE), Carayannis explains that these “competences” are “high value-adding real options drivers (RODs)” (Carayannis, 2008a, p. 343), and “key enablers of [the] capacity to develop strategic knowledge more accurately and more quickly, and leverage it more effectively and efficiently” (Carayannis, 2008a, p. 345). These two key competences are defined as follows:

*Strategic knowledge serendipity* refers to the unintended benefits of enabling knowledge to “spill over” between employees, groups and functional domains (“happy accidents” in learning). More specifically, it describes the capacity to identify, recognize, access and integrate knowledge assets more effectively and efficiently to derive, develop and capture non-appropriable, defensible, sustainable and scalable pecuniary benefits (Carayannis & Juneau, 2003; Carayannis & Campbell, 2006; Carayannis & Sipp, 2006; Carayannis & Alexander, 2006; Carayannis & Ziemnowicz 2007; Carayannis & Chanaron, 2007).

*Strategic knowledge arbitrage* refers to the ability to distribute and use specific knowledge for applications other than the intended topic area. More specifically, it refers to the capacity to create, identify, reallocate and recombine knowledge assets more effectively and efficiently to derive, develop and capture nonappropriable, defensible, sustainable and scalable pecuniary benefits (Carayannis & Juneau, 2003; Carayannis & Campbell, 2006; Carayannis & Sipp, 2006; Carayannis & Alexander, 2006; Carayannis & Ziemnowicz, 2007; Carayannis & Chanaron, 2007).

(Carayannis, 2008a, p. 346)

Qualifying the significance of the SKARSE concepts in terms of real options drivers (RODs), Carayannis (2008a, p. 344) specifies: “Real options provide a methodology to assess and maximize the value added by creative destruction.”

Real options are choices (strategic or tactical) made in conditions of risk and uncertainty about tangible and intangible (knowledge-based) assets

(as opposed to financial assets). These options encompass timing, selection and sequencing attributes that are significant for the individual, society or organization that must choose whether or not to exercise them. RODs are the constitutional elements of learning and knowledge that direct the decision-tree pathway of real options as they are strategized and enacted.

(Carayannis, 2008a, p. 347)

The foregoing concepts provide a theoretical acumen in sociotechnical evolution and co-evolution that reciprocate and reinforce the conceptual construct that Carayannis terms a Mode 3 fractal innovation ecosystem, delineated in the earlier section entitled “Creativity, innovation and competitiveness.”

### **The entrepreneur as institutional maverick**

In the realm of the social sciences, the greater body of business and economic theory constructs frameworks of complex organizational systems: the firm, the industry and the institution. Underlying these interdependent and concentric layers are individuals whose behaviors exist before there is organization; individual behaviors must give rise to institutions before institutions can mold behaviors. In the purview of business and economics, the entrepreneur is the pivotal individual actor in this proposed model. Starting with a blank page, an idea and the urge to take action, individual entrepreneurial initiatives create organizations (firms) that produce industries which in turn give rise to institutions. Complex business and economic systems are evolutionarily created, revised, destroyed and replaced by the successful execution of entrepreneurial ambition.

North (1990) claims that “Technological change and institutional change are the basic keys to societal and economic evolution.” Technology is certainly a major factor in the evolution of human organization. Technology embodies the totality of human learning, and permits the dissemination and leveraging of knowledge and know-how interpersonally through cultural exchange, or organizational-memory routines in the parlance of Nelson and Winter (1982). Technology increases the economic yield of human endeavors, which multiplies the resources and opportunity for further exploration, discovery and innovation of yet more advantageous technologies.

So the springboard of evolutionary economics—under the cultural-cognitive pillar of Scott’s institutional model, at the level of the organization subsystem—becomes the field of technology entrepreneurship. Entrepreneurship seeks to shift the established means of economic creation and control; technology can enable dramatic efficiencies of scale and scope to facilitate entrepreneurial objectives. Technology entrepreneurship seeks to shift economic opportunities from established firms and industries to new

Table 2.2 Stewart's technology entrepreneurship perspective of Scott's cultural-cognitive pillar

Dimensions	Cultural-cognitive pillar	Technology entrepreneurship perspective
Basis of compliance	Taken-for-grantedness Shared understanding	Creativity: looking at what everybody else sees and perceiving something different
Basis of order	Constructive schema	Character: what we bring into the world
Mechanisms	Mimetic	Individuality: cultivating behaviors that differentiate
Logic	Orthodoxy	Innovation: making something new work better than the old
Indicators	Common beliefs Shared logics of action	Experimentation and risk taking: daring to be different, resilience to failure
Basis of legitimacy	Comprehensible Recognizable Culturally supported	Pioneering: heralding and championing new paradigms

Source: Adapted from Stewart (2011).

ventures by the introduction or modification of new technology inventions or innovations.

Table 2.2 reinterprets Scott's cultural-cognitive pillar solely from a technology entrepreneurship perspective, characterizing the several dimensions of social order through the lens of entrepreneurial motivations and behaviors in comparison with Scott's original classifications.

Carayannis and Stewart (2011, p. 1) offer this assessment:

Diverse and complex challenges in new venture formation demand rare and exceptional entrepreneurial skills and qualities, particularly in technology-driven environments where emerging technologies disrupt markets to amplify the factors and magnitude of uncertainty and risk. The successful technology entrepreneur is extremely focused yet flexible, demonstrating a relentless intensity of purpose while adapting that purpose with nimble dexterity as events unfurl and conditions change. Moreover, the distinguished entrepreneur will accurately predict events and conditions before they occur, to permit strategic positioning of the venture for optimal advantage. We find that two terse descriptors—*obsessed maniacs* and *clairvoyant oracles* (Carayannis, 1998–2011)—encapsulate the critical attributes most conducive to superlative entrepreneurial performance. From the pre-market perspectives of R&D and innovation

management through the successful marketing and commercialization of engineered innovations, technology foresight and forecasting pivot on the entrepreneur's unrelenting obsession to pursue a vision and unclouded prescience of exactly what vision to pursue.

(Carayannis & Stewart, 2011, p. 1)

An entrepreneur's ability to predict the future (or this individual's confident belief in possessing such ability) and inexorable, self-confident pursuit of this perception represent specialized and exceptional initiative and determination. The proposition of opposing the institution by launching a new organizational entity in the form of a fledgling business venture is innately unpredictable and precarious, especially in technology markets which are turbulent. Yet the entrepreneur, with maverick volition, seeks to forge these new organizations (and, by extension, new, or at least altered, institutions) via the calculated risk-seeking and creative mettle of conformity-defying ambition.

In his seminal paper originally penned in 1911, Schumpeter (1934) argued that sticking with the familiar is always easy but doing what is new is not. Specifically, "the whole difference between swimming with the stream and against the stream is to be found here."

## **The triad of technology, innovation and entrepreneurship**

### **Fundamentals of technology**

The etymology of the word "technology" derives from the Greek words *τέχνη* (*tekhnē*), meaning skill, craft or art, and *λογική* (*logikē*), meaning logic or reason. According to Carayannis (2000b, 2001, 2009; Carayannis et al., 2003), technology is defined as that " 'which allows one to engage in a certain activity ... with consistent quality of output', the 'art of science and the science of art' or 'the science of crafts' " (von Braun, 1997).

The *American Heritage Dictionary* (1995) offers multiple definitions:

1. a. The application of science, especially to industrial or commercial objectives.
- b. The scientific method and material used to achieve a commercial or industrial objective.
2. *Anthropology*. The body of knowledge available to a civilization that is of use in fashioning implements, practicing manual arts and skills, and extracting or collecting materials.

It is relevant to note the subtle distinction between definitions 1a and 1b, while at the same time the first definitions narrowed to the realm of science, commerce and industry surely emanate from the broader perspective found in definition 2.

For the purposes of this dissertation research, technology shall be defined as the embodiment of the cumulative totality of human learning toward the utilization of resources and manipulation of the environment. Technology is expressed intangibly through knowledge, know-how and processes, and tangibly through materials and articles of manufacture. Technology permits and facilitates the dissemination and leveraging of constituent knowledge, know-how and processes through interpersonal and cultural exchanges, or by way of artifacts possessed of embedded technology. Technology increases the economic yield of human endeavors, which multiplies the resources and opportunities for further exploration, discovery and innovation of yet more advantageous technologies (Stewart & Carayannis, 2011).

Diamond (1999) affords a concise history of anthropological technology in his book, *Guns, Germs and Steel: The Fates of Human Societies*. In the broadest sense, speech and ad hoc tool use could be classified as the earliest human technologies, the origins of which—at around 2.5 million years ago—are mostly untraceable. All evidence points to East Africa as the geographic locus of human emergence, with subsequent spread a million years ago or more into Southeast Asia, and half a million years or more into Europe. The remains of these populations variously include *Homo erectus*, *Homo neanderthalensis* and *Homo sapiens*. Diamond (1999) points to 50,000 years ago as “our Great Leap Forward,” with the appearance of standardized stone tools and the first known jewelry. It is unknown whether this advance was enabled biologically (e.g., development of a fully functional voicebox, or the neurological reorganization of brain functions) or culturally (Neanderthal remains indicate that they cared for their sick and buried their dead, but knew no sophisticated tool or ornament manufacture), but it heralded the rise of fully modern humans termed Cro-Magnon. Relatively quickly, the technology of these people evolved into multipiece weaponry, houses and sewn clothing.

The next macrotechnological development came in the form of sessile agriculture—which Diamond (1999) asserts is the single most crucial advancement toward civilization, predicated all others. The necessary conditions came together in greatest abundance and the most favorable ratio at the end of the last ice age—around 11,000 BC—in the Fertile Crescent of the Middle East. Other ecosystems, at later dates, fostered the emergence of pristine human civilizations<sup>12</sup> in various locales, such as China, Mesoamerica, the Andes and the Mississippi Valley. The capacity for surplus food production, whereby one farmer could feed more than just himself, freed other people to engage in non-food-related occupations, such as chief, king, bureaucrat, craftsman or soldier. Prior to agricultural production, the entire effort of a band of hunters and gatherers might just scarcely feed themselves. Specialization of tasks and social roles facilitated technological innovation, accelerating the discovery and development of new technologies.

Wright (2000) supports Diamond in the determination that agriculture is the most significant technological advance in history, as agricultural

surplus accordingly permitted the specialization in societal functions among cooperative human beings that led to the emergence of social order—higher forms of civilization. Wright (2000) states that writing was the next great technological advance, independently emerging in Mesopotamia (around 8000 BC), China (around 2000 BC) and Mesoamerica (after 1000 BC). Writing was an advance in information and communication technology (ICT) that permitted the recordation of taxes and commerce (extending the power of chiefs and kings to permit higher levels of organization for public works), and led to the codification of laws (extending the protections that civilization conferred upon the specialists who were the source of memetic mutation). The European advent of moveable type printing 500 years ago raised the technological performance per unit cost of ICT to a level of accessibility that mushroomed market adoption. This innovation lubricated the mechanisms of the Protestant Reformation, which, in turn, set the stage for the Industrial Revolution. Contemporary with the emergence of moveable type printing in Europe, advances in navigation and sailing increased the value of transportation technologies and decreased the cost of exotic imports, stimulating trade, launching the Age of Exploration and, as a direct consequence, spawning the demand for trade that afforded the First Industrial Revolution its market pull (Wright, 2000).

### **Technology lifecycle**

As evidenced by the history of civilization, societies adopt the technologies of their forebears, adding new discoveries and adjustments by accident, by cultural encounter or exchange, or through the deliberate exploration and experimentation of science and innovation.

### *Innovation*

Invention is a singular event, born of science, research, discovery, creativity and serendipity—and invention does not always impact on or influence technology. Innovation is an interactive process: the cultivation of knowledge, materials and methods into economic practice for improved competitive advantage, born of engineering, development, customization and evolution; plus science, research, discovery, creativity and serendipity. Innovation is not just invention but an economically viable adaptation, improvement or application of a technology (Carayannis, 1992, 1993, 1994a, 1994b, 1994c, 1998, 1998–2011, 1999a, 1999b, 2000a, 2000b, 2001, 2002–2009, 2004, 2008a; Carayannis & Alexander, 1999, 2002, 2004; Carayannis & Campbell, 2006, 2009; Carayannis & Chanaron, 2007; Carayannis & Gonzalez, 2003; Carayannis et al., 2003, 2006, 2007; Carayannis & Juneau, 2003; Carayannis & Sipp, 2006; Carayannis & Stewart, 2007–2011, 2011; Carayannis & von Zedtwitz, 2005; Carayannis & Ziemnowicz, 2007).

Florida and Kenney (1990) describe invention as a technical breakthrough, while innovation is a commercial actualization. Hindle and Lubar (1986) view invention as the creative origin of a new process that enables innovation. Innovation in turn has a social, economic and financial impact. Kline and Rosenberg (1986, pp. 285–287) emphasize the recursive nature of the innovative process, discounting the linear model, “one does research, research then leads to development, development to production, and production to marketing,” and amplifying the reciprocating roles of science and knowledge in the innovation process, “not only that innovation draws on science, but also that the demands of innovation often force the creation of science.” The products of scientific research in the laboratory and technological innovation in commercial markets form a feedback loop, with each driving the other, derived from each other.

Afuah (2003) confirms that invention is the creation a new possibility, but innovation develops that possibility to usefulness or marketability, “the use of new knowledge to offer a new product or service that customers want. It is invention + commercialization.”

Carayannis and Gonzalez (2003) offer this consolidated interpretation of innovation as a function of the creative collective of the market, both supply side and demand side:

Discovery consists of looking at the same thing as everyone else and thinking something different.

Albert Szent-Györgyi—Nobel Prize winner

Innovation is a word derived from the Latin, meaning to introduce something new to the existing realm and order of things or to change the yield of resources as stated by J. B. Say quoted in Drucker.

(Drucker, 1985)

In addition, innovation is often linked with creating a sustainable market around the introduction of a new and superior product or process. Specifically, in the literature on the management of technology, technological innovation is characterized as the introduction of a new technology-based product into the market:

Technological innovation is defined here as a situationally new development through which people extend their control over the environment. Essentially, technology is a tool of some kind that allows an individual to do something new. A technological innovation is basically information organized in a new way. So technology transfer amounts to the communication of information, usually from one organization to another.

(Tornatzky & Fleischer, 1990)

The broader interpretation of the term “innovation” refers to an innovation as an “idea, practice or material artifact” (Rogers & Shoemaker, 1971, p. 19) adopted by a person or organization, where that artifact is “perceived to be new by the relevant unit of adoption” (Zaltman et al., 1973). Therefore, innovation tends to change perceptions and relationships at the organizational level, but its impact is not limited there. Innovation in its broader socio-technical, economic, and political context, can also substantially impact, shape, and evolve ways and means people live their lives, businesses form, compete, succeed and fail, and nations prosper or decline.

(Carayannis & Gonzalez, 2003)

*The s-curve model of system productivity*

Most systems of growth can be modeled by an S-curve, also known as a logistic curve, sigmoidal curve or Fisher–Pry curve (von Seggern, 2007). The curve is mathematically stated as

$$y = \frac{1}{1 + e^{-x}}$$

The population of a species in its environment, growth of a business venture in its market or lifecycle of a technology in popular use—all conform to the generalized S-curve model. In its simplest form, the S-curve is a model of system productivity—the output derived being relative to the system input. The initial growth stage is exponential: as the independent (input) variable increases, the dependent (output) variable increases slowly at first, then rapidly, until reaching an inflection point at maximum growth rate. Later, growth then gradually diminishes logarithmically into a plateau. Whether applied to biology or economics, the S-curve specifically models growth under conditions possessed of a limiting factor. The limitation or constraint can be a competition for resources: growth slows as competition arises, and at maturity growth stops. There may exist other natural or physical limits on output or output efficiency as well, resulting in asymptotically bounded returns. The basic S-curve model of system productivity is illustrated in Figure 2.7.

In the context of a technology lifecycle, Sahal (1981) explains that the abscissa of the S-curve model is commonly reduced to engineering effort as the aggregate independent input, while the dependent ordinate is expressed in terms of product performance or technological performance. At the outset, the rate of improvement in performance of an emerging technology is relatively slow. As a technology becomes better understood, controlled and diffused, the rate of technological improvement increases. Approaching



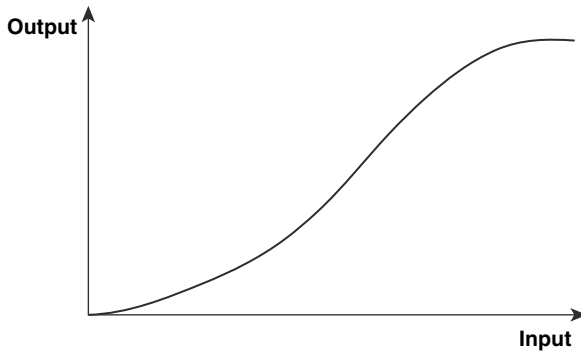


Figure 2.7 The basic S-curve model of system productivity

Source: Adapted from Carayannis (1998–2014).

maturity, increasing engineering effort is required to extract a smaller and smaller gain in technological performance.

Engineering effort in Sahal's (1981) model spans the comprehensive value-adding chain—basic research, applied research, prototyping, design, development, manufacturing, marketing, sales, service and support—each of which has associated costs of investment and operations. By reducing all constituents of engineering effort to costs accrued over time, then factoring those costs out of the abscissa, the S-curve model can be redrawn with time alone as the independent input, while the ordinate is restated to reflect technological performance per dollar as the measure of dependent output. This output dimension—technology performance per unit cost (TP/\$)—expresses in business and economic terms the value of the technology.

This topic was developed by Abernathy and Utterback (1978), who examined the definition and focus of innovation change as a company matures. Seeking to understand the variables that determine successful strategies for innovation, these authors ascribe three stages in the evolution of a successful enterprise:

- its period of flexibility, in which the enterprise seeks to capitalize on its advantages offering the greatest benefit;
- its intermediate years, in which major products are used more widely;
- its full maturity, when prosperity is assured by leadership in several principal products and technologies.

Major innovations usually pass through countless minor and systems improvements. Incremental innovations typically produce a highly

specialized system that depends upon economies of scale and mass marketing for success (Abernathy & Utterback, 1978, p. 40).

Also examining the course of time as the independent input, Rogers (1995) alternatively values the dependent output in terms of cumulative adoption, the S-curve shape of which is empirically substantiated by more than 3,000 studies in the diffusion of innovation literature. Cumulative adoption refers to the spread of practices, technologies and ideas throughout different levels of different societies around the world. From this perspective the technology S-curve reflects a societal learning curve. Rogers' societal learning curve is not purely about market demand and technology diffusion, however, as the curve embodies the collective learning of engineers and firms that produce and innovate on the supply side of technology evolution. Concomitantly, Sahal's (1981) technological performance value curve is not purely about producer supply and technology innovation either, as the curve embodies the collective purchasing and deployment by users and firms that also innovate on the demand side of the same technology evolution. The technology supply and market demand in fact work in concert to shape the aggregate S-curve of a technology lifecycle.

Synthesizing and building upon the theoretical and empirical understanding of the logistics of technology and innovation as advanced by Abernathy, Utterback, Sahal and Rogers, Figure 2.8 provides a model of the technology lifecycle S-curve as developed by and adapted from Carayannis et al. (Carayannis, 1998–2011, 2008a, 2009; Carayannis et al., 2003; Carayannis & Stewart, 2007–2011; Stewart & Carayannis, 2011).

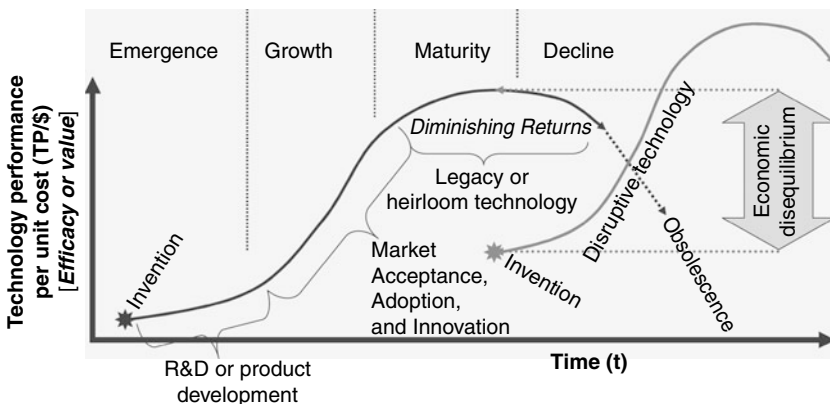


Figure 2.8 The technology lifecycle S-curve

Source: Adapted from Carayannis, 1998–2011, 2008a, 2009; Carayannis et al., 2003; Carayannis and Stewart, 2007–2011; Stewart and Carayannis, 2011.

### *Technology evolution dynamics*

The literature on innovation describes several mechanisms in multiple categories whereby the trajectory of a technology S-curve is formed. Carayannis et al. (2003) offer the most cogent presentation of the forces and influences that define and shape the evolution of technology performance.

At the beginning of an emerging technology lifecycle, there is a discovery or invention that shows promise in addressing a social need or delivering a new technological capability. Emergence and early growth accelerate from this outset, to maximum growth at inflection, which is shaped by the interplay of two forces: technology push (also called supply push) and market pull (also called demand pull). With technology push, producers devise and introduce new technology to the market, showcasing their “better mousetrap”, making a new solution available before demand is created. With market pull, consumers express unfulfilled wants and needs, urging for a better way of doing things, creating an economic incentive for suppliers to provide a new solution.

Later growth, diminishing after the maximum growth at inflection and leveling off at maturity (ultimately dwindling into obsolescence), is also shaped by the interplay of two converse forces antipodal to those in earlier operation: technology pull and market push (Carayannis, 1998–2011; Carayannis et al., 2003; Carayannis & Stewart, 2007–2011). With technology pull, producers cannibalize old technology investments to sustain their returns and suppress disruptive innovations for as long as possible, perhaps until the fundamental physics upon which the technology is built reaches its natural limit. With market push, industry or regulatory standards, market alliances and other societal constraints suppress incremental improvements. Notwithstanding the persistence of efforts to extend the plateau of technology maturity, obsolescence of the earlier technology is inevitable, effectively occurring when the technical performance per dollar (or the cumulative adoption) of the disruptive, radical newer technology exceeds the level of the older technology (i.e., the new S-curve crosses above the prior S-curve). Once these curves cross, there is a cascade of additional investment in the new technology, with resultant economies of scale and market adoption, steepening the emerging curve while hastening the decline and obsolescence of the mature technology.

The critical determinant of emergence and growth of a technology is innovation. Innovation is the cultivation of knowledge, materials and methods into economic practice for improved competitive advantage. It is the transformation of an invention generated by scientific activity into a socially usable product, changing economics from supply terms to demand terms, and increasing the value and satisfaction obtained from resources by the consumer. To wit, innovation is the market actualization of better ideas (Carayannis, 1998–2011, 2009; Carayannis et al., 2003; Carayannis & Stewart, 2007–2011, 2011; Stewart & Carayannis, 2011).

Innovators and innovative forces act in both cooperation and competition, on both the supply side and the demand side of a technology, to mold and drive the path of the evolving S-curve. Referring to both technology products and technological processes,<sup>13</sup> there are four generally recognized types of innovation:

- *Incremental* innovations exploit the potential of established designs, and often reinforce the dominance of established firms. They improve the existing functional capabilities of a technology by means of small-scale improvements in the technology's value-adding attributes, such as performance, safety, quality and cost.
- *Generational* or next-generation technology innovations are incremental innovations that lead to the creation of a new but not radically different system.
- *Radical* innovations introduce new concepts that depart significantly from past practices, help to create products or processes based on a different set of engineering or scientific principles, and often open up entirely new markets and potential applications. They provide "a brand-new functional capability which is a discontinuity in the ten-current technological capabilities."
- *Architectural* innovations serve to extend the radical-incremental classification of innovation and introduce the notion of changes in the way in which the components of a product or system are linked together.

(Carayannis et al., 2003, p. 120)

With these latter two revolutionary or discontinuous innovations (radical and architectural), the gap between adjacent S-curves represents a condition of economic disequilibrium, wherein start-up firms frequently develop and promulgate the discontinuous technology, while incumbent leading firms reinforce and refine their mature technologies via the prior two evolutionary or continuous innovations, to extend the life of their investments<sup>14</sup> (Carayannis, 1998–2011, 2009; Carayannis et al., 2003; Carayannis & Stewart, 2007–2011; Stewart & Carayannis, 2011). With emphasis, Carayannis et al. (2003, p. 121) continue:

*Not all innovations are discontinuous, and not all discontinuous innovations prove to be disruptive, and not all disruptive innovations are discontinuous.* This is determined by the scope, timing, and impact of the innovation under consideration and there are different strategies to deal with the challenges and opportunities arising from planned or serendipitous technological discontinuities and disruptions.

Table 2.3 Summary of phylogenic relationships within the innovation theoretical framework

Process	Content	Context	Impact
Evolutionary innovation	Incremental innovation	Continuous innovation	Non-disruptive or disruptive innovation
Evolutionary innovation	Generational innovation	Continuous innovation	
Revolutionary innovation	Radical innovation	Discontinuous innovation	Non-disruptive or disruptive innovation
Revolutionary innovation	Architectural innovation	Discontinuous innovation	

Source: Adapted from Carayannis, 1998–2011, 2009; Carayannis et al., 2003; Sipp, 2011.

Table 2.3 summarizes the phylogenic relationships within the innovation theoretical framework delineated by Carayannis et al. (2003) along dimensions of process (development, diffusion and adoption), content (specific nature), context (environment) and impact (resulting sociotechnological changes).

Integrating the model of creativity-innovation-competitiveness double helix and value-added chain (depicted in Figure 2.6) with the model of technology lifecycle S-curve (Figure 2.8) and the phylogenic relationships within the innovation theoretical framework (Table 2.3), Carayannis et al. (2003) compose the technology performance roadmap of continuous and discontinuous innovation, presented in Figure 2.9. The “envelope S-curve” overarches the integral of all of the constituent technology lifecycle curves at each pertinent level:

- *Microlevel*—mostly individual; the envelope S-curve signifies a personal technical learning curve.
- *Mesolevel*—team or organization; the envelope S-curve signifies a group learning curve and knowledge-management competences.
- *Macrolevel*—firm, industry, nation, region; the envelope S-curve signifies a socioeconomic learning curve of cultural diffusion and market adoption.

#### *Firm evolution dynamics and the innovation ecosystem*

Infusing the technology performance roadmap (Figure 2.9) with Schumpeter’s principle of creative destruction (detailed in the section entitled “Dynamic adaptation”) and the three chiasmic analogs of that word pair, Carayannis (2009) assimilates the four modes of Schumpeterian firm

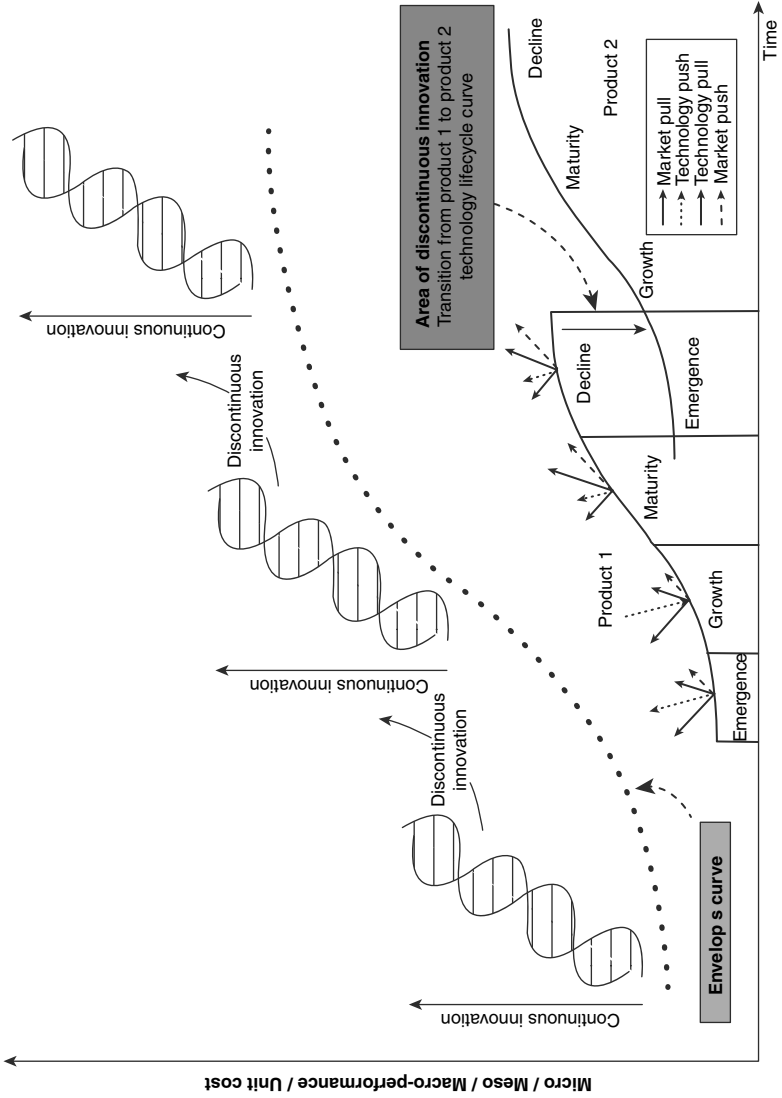


Figure 2.9 Continuous and discontinuous innovation: technology performance roadmap  
 Source: Reprinted from Carayannis et al. (2003).

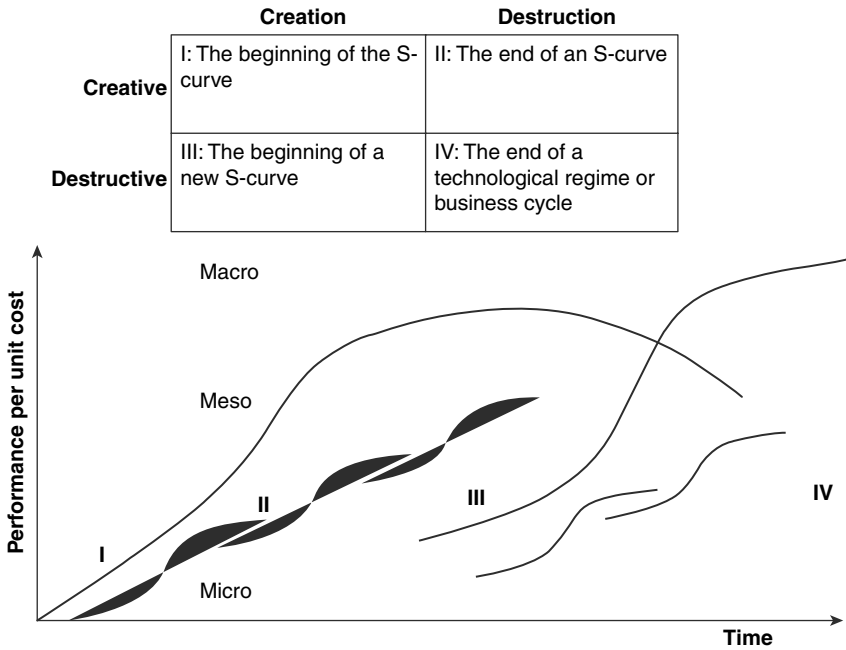


Figure 2.10 Four modes of Schumpeterian firm evolution dynamics  
 Source: Reprinted from Carayannis (2008b, 2009).

evolution dynamics depicted in Figure 2.10. Disambiguating the four modes, Carayannis clarifies thus:

- *Creative destruction*—the classic Schumpeterian conceptualization of firm birth, death and renewal.
- *Destructive creation*—implies an unsustainable mode of firm replacement.
- *Creative creation*—a very intense and, hence, short-lived and less sustainable form of firm generation.
- *Destructive destruction*—the end of a particular technological paradigm and, along with it, firms that represent and are in a sense “hostages” to it due to circumstances of switching costs, exit barriers, or the influence of powerful standards or technological legacies (cf. market *push* and technology *pull*).

(Carayannis, 2009)

Recalling the discussion of innovation networks and knowledge clusters (see the section entitled “The holism of integrated organizational

behaviors”), Carayannis (2009) underscores the meaning and role of a “knowledge nugget”:

People, culture and technology serve as the institutional, market and socio-economic “glue” that binds, catalyses and accelerates interactions and manifestations between creativity and innovation, along with public-private partnerships, international research & development (R&D) consortia, technical/business/legal standards such as intellectual property rights as well as human nature and the “creative demon”. The relationship is highly non-linear, complex and dynamic, evolving over time and driven by both external and internal stimuli and factors such as firm strategy, structure and performance as well as top-down policies and bottom-up initiatives that act as enablers, catalysts and accelerators for creativity and innovation that leads to competitiveness.

(Carayannis & Gonzalez, 2003)

Applying this “institutional, market and socio-economic ‘glue’” of people, culture and technology to the theoretical framework of the innovation ecosystem, Carayannis and Campbell (2006) also explain the concept of “knowledge fractals”:

“Knowledge fractals” emphasise the continuum-like bottom-up and top-down progress of complexity. Each subcomponent (sub-element) of a knowledge cluster and innovation network can be displayed as a micro-level sub-configuration of knowledge clusters and innovation networks (see Figure [2.11]). At the same time, one can also move upward. Every knowledge cluster and innovation network can also be understood as a subcomponent (sub-element) of a larger macro-level knowledge cluster or innovation network in other words, innovation meta-networks and knowledge meta-clusters (see again Figure [2.11]).

The construct of the fractal innovative ecosystem gives rise to Mode 3 and quadruple helix as reviewed extensively in the section entitled “Co-evolution”. Carayannis comes to term the Mode 3 innovative ecosystem “Mode 3 INNOVECO” (Carayannis et al., 2005; Carayannis & Campbell, 2006) (Figure 2.11).

#### *The central role of the technology entrepreneur in venture formation*

An entrepreneur is an agent of change: the seminal actor who conceives and implements a new business venture, impelling a new economic entity from ideation to functional reality. The entrepreneur assumes the risks of forming a business or enterprise, organizing and managing every facet of its emergence.



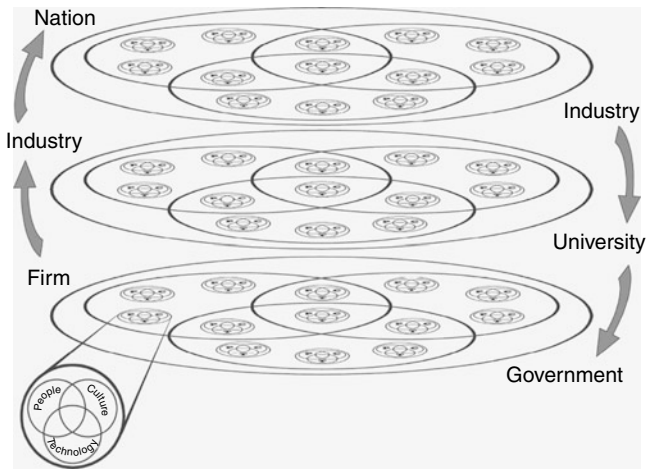


Figure 2.11 The 21st-century fractal innovation ecosystem

Source: Reprinted from Carayannis (1998–2011); Carayannis and Campbell (2006); Carayannis and Stewart (2007–2011).

Åstebro and Thompson (2007) affirm that the entrepreneur must be a business jack-of-all-trades with substantive technical savvy and a project manager extraordinaire to also integrate systems in 21st-century commercial complexity.

Interpreting Schumpeter (1942), entrepreneurship is the recognition and exploitation of opportunity—a recombinant or novel deployment of resources—the envisioning, planning and implementing of mechanisms to create economic opportunity. Entrepreneurship seeks to shift the established means of economic creation and control, strategically reappointing economic resources from established pathways to innovative pathways (Stewart & Carayannis, 2011, p. 2).

Drucker (1985, p. 21) underscores Say’s most famously quoted adage: “The entrepreneur shifts economic resources out of an area of lower and into an area of higher productivity and greater yield.” This is achieved through technological innovation, the “specific instrument of entrepreneurship” (Drucker, 1985, p. 30).

There are distinctions in the technology basis upon which a venture is structured. These distinctions apply to entire industries or the business units within them:

- Technology-driven businesses, in which the profit is fully dependent on the creation or implementation of new technology (Sipp, 2011) or innovations in the use or deployment of existing technology. Technology-driven firms compete to produce the technologies to

sustain and advance their customers (supply side) (Carayannis & Formica, 2008). In this latter perspective, the term “supply side” denotes that the firm operates on the supply side of commerce—developing, implementing and selling technology. Some examples of technology-driven businesses are manufacturers of computers, cell phones or automobiles.

- Technology-based business, in which the profit is enabled and supported by technology, but technology itself is not necessarily the product, service or experience being sold (Sipp, 2011). Technology-based firms depend on the adoption and use of technologies produced by other firms (demand side) (Carayannis & Formica, 2008). From this latter perspective, the term “demand side” denotes that the firm operates on the demand side of commerce—buying, adopting and utilizing technology. Examples of technology-based businesses include delivery and distribution companies, retailers and banks.
- Technology-neutral business, in which investments are made in technology but their business models do not rely on it (Sipp, 2011). Examples include artisans, merchants and some categories of professional practitioners, but it is becoming ever rarer to find a going concern that is technologically independent. Just throwing a clay pot and firing it in a kiln requires primitive technology, and no 21st-century enterprise will be sustained without substantial dependency on ICT, plus the likely need for trade-specific technologies to be competitive.

In the context of the Mode 3 innovation ecosystem (Carayannis & Campbell, 2006, 2009) and the C3 construct of co-opetition, co-specialization and co-evolution (Carayannis, 2004, 2008a, 2008b; Carayannis & Gonzalez, 2003; Carayannis et al., 2005; Carayannis & Campbell, 2006, 2009), Carayannis (2008b, 2009) discusses “heterogeneity dynamics”, pertaining to the diversity of factors underpinning the inputs, processes and outputs which govern innovation and adaptation. According to Carayannis (2008b, 2009),

Input, process and output heterogeneity deal with the issue of value creation in a socioeconomic context:

- *Input heterogeneity* refers to the variety and diversity of the key inputs to economic activity, namely, land, labor, capital, technology and entrepreneurship as identified by Adam Smith, Ricardo, and Joseph Schumpeter among others. Intrinsic in all these inputs is knowledge, which has been increasingly the key source of value adding of most human endeavors.
- *Process heterogeneity* reflects the variety and diversity intrinsic in the ways that the key inputs to economic activity are leveraged, allocated, re-combined and re-created as part of the processes of technology

innovation and entrepreneurship aiming at the maximization of value added.

- *Output heterogeneity* reflects the diverse ways and means that the value added of economic activity combining and leveraging the key inputs discussed earlier, is captured and exploited, namely, number and size of firms, firm performance, market concentration, number and rate of renewal of products and services, as well as public-private sector partnerships structure and performance, to name a few.

(Carayannis, 2008b, 2009)

The significance of these heterogeneity dynamics to the role of the technology entrepreneur in venture formation operates at the microlevel of socioeconomic analysis with respect to the concepts illustrated in figures 2.10 and 2.11. This leads to two additional crucial theoretical constructs: sustainable entrepreneurship and robust competitiveness (Carayannis, 2008b, 2009):

- *Sustainable entrepreneurship*: the creation of viable, profitable and scalable firms that engender the formation of self-replicating and mutually enhancing innovation networks and knowledge clusters leading towards what we call robust competitiveness.
- *Robust competitiveness*: a state of economic being and becoming that affords systematic and defensible “unfair advantages” to certain entities. It is built on mutually complementary and reinforcing low-technology, medium-technology and high-technology public-sector and private-sector organizations (government agencies, private firms, universities and non-governmental organizations).

(Carayannis, 2008b, 2009)

The key success factors for sustainable entrepreneurship—one of the major pillars of robust competitiveness—are illustrated to show the microlevel stages, drivers and determinants of heterogeneity dynamics in Figure 2.12.

### **Synthesis of literature toward a grounded theory of dystechnia, and formation of a central proposition**

The literature review on the preceding pages has delineated the history to the present on entrepreneurial thought and theory, particularly within the narrow framework of technology and innovation, and all of the supporting and emanating constructs of evolutionary economics within the 21st-century sociotechnological-economic Mode 3 fractal innovation ecosystem and quadruple helix. The literature recapitulates in abundant detail these environmental systems in which the technology entrepreneur takes action,

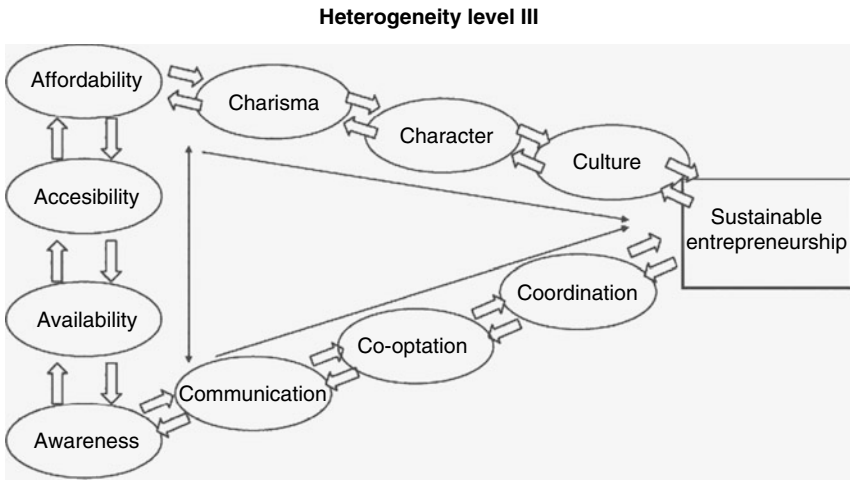


Figure 2.12 Heterogeneity dynamics: the microlevel stages, drivers and determinants  
 Source: Reprinted from Carayannis (2008b, 2009).

and the systematic processes whereby the technology entrepreneur strategically prepares and executes his craft, and the strategic tools employed in those processes. These theoretical framework constituents are summarized and classified in Table 2.4.

An entrepreneur’s ability to assess innovative economic opportunity amounts to an aptitude for predicting the future (or this person’s firm belief in possessing such ability). Relentless, self-confident pursuit of this vision represents specialized and exceptional thinking, learning and decision-making. These factors are the distinguishing qualities of entrepreneurs that Carayannis (1998–2011; Carayannis & Gonzalez, 2003; Carayannis & Stewart, 2011) terms “obsessed maniacs” and “clairvoyant oracles.”

Referencing the classified summary in Table 2.4 (from the bottom up):

- Entrepreneurs—the obsessed maniacs and clairvoyant oracles—define who the actors are.
- Essential attributes and strategic enablers are what they have.
- Systematic processes are what they do.
- Environmental systems are where they do it.

But what is the direct object of the syntactical proposition above? What do the actors act upon? The literature makes innumerable references to things like opportunities, “white space”, technology gaps, unfulfilled needs

Table 2.4 Summary of classified constituents of technology entrepreneurship theoretical framework

Dimensional perspective	Theoretical construct
Environmental systems	communities of practice evolutionary economics fractal innovation ecosystem globalization innovation ecosystem knowledge economy Mode 3 Mode 3 fractal innovation ecosystem New Growth Theory quadruple helix
Systematic processes	co-opetition, co-evolution and co-specialization creative destruction endogenous economic growth endogenous technological change entrepreneurship innovation knowledge transfer Strategic Management of Technological Learning sustainable entrepreneurship technological learning
Strategic enablers and essential attributes	absorptive capacity creativity innovation networks knowledge clusters knowledge fractals robust competitiveness real options drivers strategic knowledge arbitrage and serendipity technology technology-based business technology-driven business
Identity	entrepreneur obsessed maniacs and clairvoyant oracles

Note: Refer to “Glossary of terms” for corresponding citations to each of the above terms.

and unsatisfied or latent demand. But from the perspective and positioning of the technology entrepreneur, what is the quarry—the collective phenomenon to address?

I would like to propose a coordinating apperception in the form of a unifying vocabulary term and theoretical construct to fit the framework advanced in the narrative of this chapter on theory and literature. I proffer

the neologism “dystechnia” for introduction into the lexicon of academic literature.

### **Dystechnia**

With confirmation that the word is yet to be formally defined and accepted into common parlance, I propose the following definition:

*Dystechnia* is a barrier to organizational performance—a condition of flawed or failed efficacy in the use, deployment, or logistics of technology. *Dystechnia* occurs at every level: individual, team, firm, industry, region, nation, world. At the micro level, *dystechnia* is a diminished self-efficacy or technophobia personally experienced by an individual or team; at the meso level, *dystechnia* is a disconnect among the critical organizational elements of people, culture, and technology; and at the macro level, *dystechnia* is a condition of suboptimal functioning in the socio-technologic-economic network, where the yield from resources and the efficacy of transactional logistics are compromised by latent demand for technological innovation.

(Carayannis & Stewart, 2007–2011;  
Stewart & Carayannis, 2011)

#### *Etymological research of dystechnia*

The term “dystechnia” does not appear in any scholarly, formally reviewed dictionary that I can locate, including:

- *The American Heritage Dictionary*
- *Merriam-Webster Dictionary*
- *Merriam-Webster’s Collegiate Dictionary*
- *Cambridge Dictionaries*
- *Oxford English Dictionary*

The neologism “dystechnia” is homologous to generally recognized disorders of personal capacity, such as dyslexia, an impairment of the ability to read written words, or dyskinesia, an impairment of the ability to control movements; and other terms which are not so personal, such as dystopia, a place of fanciful horror and despair. There are many dysfunctional conditions denominated by this lexicological pattern of the prefix “dys-” formed around other Greek word roots. *Dys-* denotes abnormal, impaired, difficult, or bad, originally from the Greek *dus* (*The American Heritage Dictionary*, 1995). The Greek root *tekhnē*, meaning skill, craft or art, is of course at the core of the term technology, the systematic treatment of an art or craft in the Greek, and the locus of my academic field. The literal interpretation of the term “dystechnia” would hence be “impaired skill, craft, or art.”

A search for the term “dystechnia” returns zero hits in the following databases of catalogued academic literature:

- ABI/Inform Complete Plus—ProQuest Research Library Plus
- EBSCO
- Emerald Library
- ERIC
- Factiva
- LEXIS-NEXIS Academic Universe
- CSA Illumina—Sociological Abstracts

Whereas the term has been independently coined by a handful of authors, it is yet to occur in any peer-reviewed or otherwise qualified scholarly publication.

A search for the term “dystechnia” using Google, Yahoo, MSN and Ask.com turns up only a few dozen unique hits, several of which are unscreened “open dictionary” submittals, blogs and other forms of banter.

One link is to an email archive dated January 2010 wherein the abstract to Carayannis and Stewart (2011) was submitted to the 2010 Technology Innovation International Conference call for papers.

Google Scholar returns two links. At one link (and arguably the more scholarly document of the contenders—a working paper in economics) the author seems to have employed the term “dystechnia” only once, *ad libitum*, and perhaps naively, without realizing that it does not occur in common or formal usage (Freeman, 1999). He offers little in definitional context, and his article does not appear to have been published subsequently. Freeman (1999) writes:

However it gives some difficulty with the data. Are we to suppose that three-quarters of the world’s population, by some extraordinary coincidence that very part which arrived fifty years too late in the world market, were convulsed by some peculiar *dystechnia* at the very moment of their arrival? Or that some terrible mental affliction seized the whole Indian people in 1980 so as to double the time they needed to work from forty to eighty hours to acquire one hour’s worth of US goods?

The other link returned by a search of the term “dystechnia” in Google Scholar is a British book that seems to be a self-effacing self-help variety of exposé on psychotherapy or possibly a humorous farce, by an author who has dozens of topical “pop” books to his name, and an impressive list of scholarly articles published in the field of counseling and mental health therapy. One chapter in the book is entitled “Launching Dystechnia” (Feltham, 2004), and the author proposes the term and employs it repeatedly in an examination of his own personal experiences in struggling to

learn and master tasks of a technical nature. Feltham's neologistic coinage fairly corresponds to my definition of dystechnia operating at the microlevel, but no larger context or deeper meaning is employed in the publication in question.

Other than this one chapter in one of Feltham's popular self-help books, none of his citations in the academic literature are indexed on the term "dystechnia," suggesting that he has not fully developed (or even introduced) his concept in peer-reviewed submittals.

### *Definitional motivation of dystechnic phenomena*

Notwithstanding the research findings, the concept of dystechnia proposed herein is not about mere individual challenges to learning and adoption as described by Feltham (2004), although that aspect is certainly a core contributing cause. This thesis proposes a treatise on dystechnia in the organizational and institutional context, to examine the phenomenon of disconnect between users and technology resources, and flaws in the sociotechnological network.

"Technophobia" has been a term in common use throughout the information age, describing a condition of potential users exhibiting a willful or passive avoidance of new technology. During the 1970s, the 1980s and even into the 1990s, I frequently encountered technophobic resistance to "technological progress." This resistance took the form of skepticism or nervous reluctance in potential buyers and users, who did not, could not or would not see the benefits that new technologies could confer upon their business operations. Successively as a management analyst, an information systems designer and an information technology vendor, I repeatedly witnessed where potential for business process improvement was frustrated or thwarted by technophobia.

I view dystechnia as the ubiquitous 21st-century successor to technophobia in the impedance of IT acceptance and efficacy—a model of technology rejection due to a perceived lack of usefulness or perceived difficulty of use (E. G. Carayannis, personal communication, January 31, 2009)—in counterpoint to the Technology Acceptance Model (Davis, 1989). I see dystechnia cross-cutting all levels of organizational and institutional technology performance. Dystechnia is not neo-luddism, which connotes an active resistance to technology adoption, having dystopia-averse paranoid overtones. Dystechnia is *de facto* incompetence more than defiance, reticence more than recalcitrance, ignorance more than skepticism—a naïve concession or resignation to technology's pervasive presence, without command or mastery—or a Panglossian faith that technology will just take care of everything. My proposition is that dystechnia is rampant yet underreported, or at best scarcely yet named, representing a costly hindrance to the realization of optimal benefits to organizational and



sociotechnological network performance—a secret disgrace or resigned snafu of the technology marketplace. The nemesis-that-shall-not-be-named may be christened “dystechnia.”

### *Conceptual modeling of dystechnia*

The structure of the Mode 3 fractal innovation system (Carayannis, 2008b, 2009; Carayannis & Campbell, 2006) describes a system of nested, recursive networks, comprising the stock and flow of sociotechnological-economic resources—inputs of land, labor, capital, technology and entrepreneurship that yield outputs of goods, services and information—and the outputs of many processes define the inputs of others in turn. Through the communication of network flow, learning, higher learning and knowledge increase (in both stock and flow), which in turn yields technological advancement to further enhance the efficacy of socioeconomic network performance (Carayannis, 1992, 1993, 1994a, 1994b, 1994c, 1998, 1998–2011, 1999a, 1999b, 2000a, 2000b, 2001, 2002–2009, 2004, 2008a; Carayannis & Alexander, 1999, 2002, 2004; Carayannis & Campbell, 2006, 2009; Carayannis & Chanaron, 2007; Carayannis & Gonzalez, 2003; Carayannis et al., 2003, 2006, 2007; Carayannis & Sipp, 2006; Carayannis & Stewart, 2007–2011, 2011; Carayannis & von Zedtwitz, 2005; Carayannis & Ziemnowicz, 2007).

Network dynamics are important for understanding the complexity of advanced and knowledge-based societies. Networking links together different modes of knowledge production and knowledge use, and also connects (subnationally, nationally and transnationally) different sectors or systems of society. Systems theory, as presented here, is flexible enough to integrate and reconcile systems and networks, thus creating conceptual synergies (Carayannis & Alexander, 1999, 2004; Carayannis & Campbell, 2006).

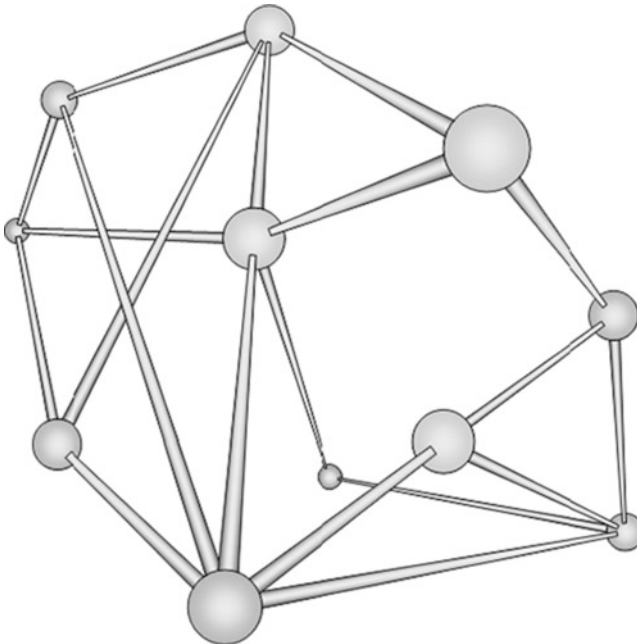
Salient to network dynamics, Routti (2003) illuminates:

The knowledge-based economy can be characterized as fractal. It is non-linear, unstable, and stochastic. Like chaos theory, simple algorithms iterated successively yield very complex patterns and interrelationships, as epitomized by the butterfly flapping its wings in the Amazon to trigger a hurricane over the Atlantic months later. The knowledge-based economy creates profit avalanches. Entrance is easy for small, intelligent companies, but there is no space for organic growth; the market is instantly global and a newcomer can attain dominance in ten years. It also differentiates itself by the convergence of technologies, which removes market sector boundaries: wireless, satellite, cable, and telecom no longer belong to discrete sectors. In a mobile information society, services as well are different, impacted by the presence of Internet, virtual organization, or network transactions. Information and Communication

Technologies (ICTs) are enablers of change; they release creative potential and knowledge and open up global markets and foster competition. Network transaction economies resemble the most complex network: the human brain.

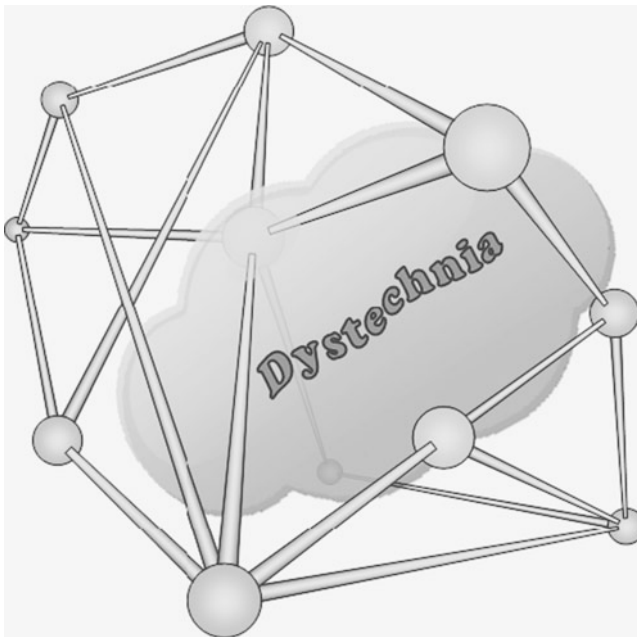
Figure 2.13 depicts a conceptual model of multidimensional sociotechnological network structure, where each node represents an economic entity. At the microlevel, this would be an individual or a team, or even a consumer household. At the mesolevel, nodes are firms or other organizations. At the macrolevel, the nodes are industries, CoPs, knowledge clusters or nations. The model is fractally recursive: the structure appears thematically the same at each level of analysis. Across the connecting “pipelines” flow all of the dynamic resources of the economic ecosystem: raw materials, goods, services, money, contracts, information, knowledge and so on.

Dystechnia is a condition of socioeconomic network imperfection wherein connections at some level are misaligned, misdirected, misallocated, obstructed, corrupted or entirely absent—resulting in the compromised coordination of technology deployments and the human processes that such



*Figure 2.13* Conceptual model of multidimensional sociotechnological network structure

*Source:* Reprinted from Stewart and Carayannis (2011).



*Figure 2.14* Network imperfections connote dystechnic regimes  
*Source:* Reprinted from Stewart and Carayannis (2011).

technology is intended to serve. The extent of compromise can range from suboptimality to error to outright failure, or entire absence of a solution that might be readily implemented but where no one has even yet noticed the void—or attempted to fill it. Figure 2.14 portrays how network imperfections connote dystechnic regimes. The cloud of dystechnia occludes potential connections in the conceptual model of multidimensional sociotechnological network structure.

The “clairvoyant oracle” (Carayannis, 1998–2011; Carayannis & Gonzalez, 2003; Carayannis & Stewart, 2011) of entrepreneurship possesses the strategic enablers and essential attributes to utilize the systematic processes recapitulated in Table 2.4, and thereby observes the “dystechnic regime” as what is missing, hidden, broken or wrong in the multidimensional sociotechnological network structure. This opportunity visualization is rendered in Figure 2.15. Examples of dystechnia are presented in the evaluation of research findings in Chapter 5.

The “obsessed maniac” (Carayannis, 1998–2011; Carayannis & Gonzalez, 2003; Carayannis & Stewart, 2011) of entrepreneurship, being the same actor, is possessed of the same strategic enablers and essential attributes whereby to utilize the systematic processes recapitulated in Table 2.4, hence



*Figure 2.15* The clairvoyant oracle of entrepreneurship sees opportunity in dystechnic regimes

*Source:* Reprinted from Stewart and Carayannis (2011).

persistently hones the venture initiative from ideation to functional reality in a concerted mission to redress the observed dystechnic regime. This venture formation is represented in Figure 2.16.

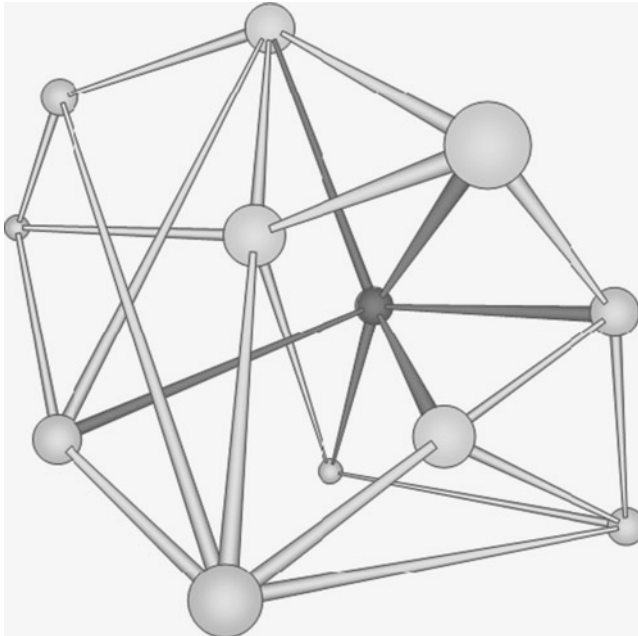
Figure 2.17 graphically renders the remedial enhancement conferred by the entrepreneur's strategically enacted technology venture. The dystechnic regime within the multidimensional sociotechnological network structure is bridged by new connections, enhancing the efficiency and effectiveness—and thereby the efficacy, or value—of the network function. Economic inputs and outputs flow more optimally, benefiting the network (or at least its local constituency) through increased economic yield. Just as significantly, these enhanced flows pass through the node of the new technology venture. The entrepreneur is rewarded for risk and initiative by shifting the established means of economic creation and control into and through the new venture's "nodal pipelines."

In the illustrations here, the emerging dark node represents the technology entrepreneur's new enterprise; a new economic entity in the market, filling a new role in an innovative capacity. The emerging dark connections are the transactional pathways that are formed as the new venture is launched and established; new supply chains; new value-adding relationships; new flows of money, information and knowledge—new efficiencies in the traffic and commerce of the sociotechnological network.



*Figure 2.16* The obsessed maniac of entrepreneurship persistently hones the venture initiative

*Source:* Reprinted from Stewart and Carayannis (2011).



*Figure 2.17* The entrepreneur's technology venture remediate the targeted dystechnic regime

*Source:* Reprinted from Stewart and Carayannis (2011).

*Formation of a central proposition of dystechnia*

The concept of dystechnia serves to explain what it is that the technology entrepreneur acts upon, proffered here as a theoretical construct emanating from the holism of theoretical framework elucidated in the foregoing literature review. The proposition is thus: dystechnia competently models real, ubiquitous defects or shortcomings in the complex model of recursive, nested, multilateral, multinodal, multimodal and multilevel sociotechnological-economic networks of the 21st-century fractal innovation ecosystem (Carayannis, 2008b, 2009; Carayannis & Campbell, 2006). Dystechnia describes the plethora of defects, gaps and shortcomings that provide innumerable yet elusive opportunities for technology entrepreneurship.

At this juncture, dystechnia is but a fancy of my thought experiment. The concept is now proposed. The next step along the path toward academic acceptance of the theory of dystechnia is grounded theory-building. Maxwell (1996, pp. 32–33) writes:

theory provides a model or map of why the world is the way it is (Strauss, 1995). It is a simplification of the world, but a simplification aimed at clarifying and explaining some aspect of how it works. Theory is a statement about what is going on with the phenomena that you want to understand. It is not simply a framework, although it can provide that; rather it is a story about what you think is happening and why. A useful theory is one that tells an enlightening story about some phenomenon, one that gives you new insights and broadens your understanding of that phenomenon.

Glaser and Strauss's (1967) term grounded theory does not refer to any particular level of theory but to theory that is inductively developed during a study (or series of studies) and in constant interaction with the data from that study. This theory is grounded in the actual data collected, in contrast to a theory that is developed conceptually and then simply tested against empirical data. In qualitative research, both existing theory and grounded theory are legitimate and valuable.

The research design and methodology delineated in Chapter 3 aim to explore some critical factors attributable to the entrepreneur as social engineer of new organizations of economic creation and control, specifically investigating what defines and distinguishes an entrepreneur and how the individual characteristics of the entrepreneur and entrepreneurial actions can be evaluated against entrepreneurial outcomes. One objective of the research is to begin to inductively develop grounded theory—through constant interaction with the data from that study, as prescribed by Maxwell (1996)—in several of the newer conceptual constructs reviewed in this

chapter. One of those newer conceptual constructs is proposed to be dystechnia.

### **Entrepreneurial mythology: Hero legends and villain lore**

Public perceptions of “famous” entrepreneurs are subject to distortion—as are the reputed lives of many celebrity figures—and mythologies arise that lionize the exploits or vilify the foibles of renowned business pioneers. Both present-day and historic biographical accounts and analyses of entrepreneurs are abundant, within the body of scholarly literature and from reliable investigative sources. These narratives often illuminate realities about their subject entrepreneurs that may refute or attenuate popular misconceptions. Conversely, reports from reliable sources sometimes substantiate the basis for a famed entrepreneur’s eminence or notoriety.

This section recounts brief biographies of ten noted entrepreneurs whose stories are salient to this dissertation on technology entrepreneurship. These subjects have been selected for their public prominence, the availability of scholarly articles and published information from reliable sources reporting on their lives and entrepreneurial ventures, their demographic diversity, and their technological diversity in a sampling of different industries and sectors. Additionally, these representative selections are drawn from entrepreneurs who have lived and worked to influence the modern sociotechnological-economic network: post Industrial Revolution, involving technological innovations in the age of emerging machine-based ICTs, the emergent predominance of urban lifestyles, and conveniences that in the contemporary developed world are mostly taken for granted but did not exist at all until the 19th or 20th centuries.

The subjects reported hereunder are subselected as a sampling of that larger pool, and these profiles are presented in alphabetical order by surname, along with the company that each is famous for founding. The sequence of their appearance is not of consequence in that the unit of analysis of this research is the individual entrepreneur, and not their specific venture, industry, sector or demographic.

#### **Mary Kay Ash, Mary Kay Cosmetics**

Mary Kay Ash (née Mary Kathlyn Wagner) was a Texas native who learned door-to-door direct selling during the Depression. She systematically sought to improve her selling skills and opportunities, and became very accomplished by the end of the 1930s with the Stanley Home Products company that engaged salespersons as independent contractors who bought the company’s merchandise and resold it at “home shows.” Modest sales commissions could be supplemented by recruiting other salespersons and receiving a small percentage of revenue from each recruit. Mary Kay was able not only

to recruit other women but also to teach them her secrets for successful selling, eventually building a group of 150 women who were also succeeding in the business throughout the Houston area. Her reward for that success was to be moved to Dallas to develop additional territory, but the company refused to let her continue to receive recruitment commissions on the sales in the Houston area. She made the move and successfully recruited a new group of women, but she resented the injustice with regard to geographical territories (ANBHF, 2004).

As a regular top-earning sales representative she was eventually promoted to manager, but she felt hemmed in by male-dominated culture despite most of the salesforce being women, selling to a mostly female customer base. She left Stanley Products in 1952 to work as the national training director for another direct-sales firm in Dallas. In little more than a decade she extended the World Gift Company's distribution into 43 states and earned a position on the board of directors. Despite her achievements, she still found gender opposition. More than once her ideas were dismissed with the comment: "Oh, Mary Kay, you're thinking just like a woman." She decided to quit after a man she had trained was promoted to become her supervisor and paid twice her salary (The Pink Producers, 1981).

For years, Ash had been buying skin softeners for personal use from the daughter of a hide tanner who had developed the formulas from tanning solutions. These potions smelled terrible but were effective in keeping skin young looking and smooth. After quitting World Gift in 1963, she used her life savings of \$5,000 to buy the recipes for the home-brewed skin softeners, furnished a storefront in Dallas, set up a small manufacturing plant, and hired a chemist to create a saleable line of basic skincare products from the tanning recipes (The Pink Producers, 1981).

Beauty by Mary Kay launched that same year with a salesforce of ten women whom Ash termed "beauty consultants"—independent contractors who followed the basic party-plan model that Ash had mastered in her 30 years of direct selling. By instituting an innovative and positively oriented policy for training, recruiting, paying commission, and awarding both monetary and non-monetary recognition, sales for Mary Kay Cosmetics grew at an average annual rate of 28% over the next 14 years (ANBHF, 2004).

A 1968 over-the-counter public stock offering enabled the firm to open a distribution center outside Dallas, and by 1970 Mary Kay Cosmetics had expanded globally. By 1976 the company was being traded on the New York Stock Exchange, and from 1973 to 1983 its stock price rose by 670%. In 1985 the company was returned to private ownership by Mary Kay Ash and her son, through a leveraged buyout, followed six years later by a \$3 million settlement to end a \$29 million claim by the Internal Revenue Service resulting from that leveraged buyout (Flynn, 2010).

As of 2011, the firm sells at wholesale prices to a worldwide network of 250,000 independent Mary Kay consultants, each of whom receives a



40–50% markup on products sold at retail prices through personal customer networks. The salesforce is educated in selling techniques by the company, stressing that each should “consider herself Mary Kay” to project the founder’s charisma and selling ability. Echoing the founder’s struggle to personal achievement, consultants are encouraged to “fake it till you make it,” with the understanding that “You are in business for yourself, but not by yourself.” Top saleswomen receive pink Cadillacs, vacations and diamond rings at annual seminars, to encourage them to set and reach personal goals. The use of Mary Kay pink extends to its fleet of 18-wheeler trucks used to transport cosmetics to Mary Kay distribution centers. Mary Kay Ash died in 2001. *Fortune* magazine recognized the company as one of the 100 Best Companies to Work for in America and also named Mary Kay Inc. one of the ten best companies for women (Flynn, 2010).

### **Clarence Birdseye, General Seafoods Company/Birds Eye (Division of General Foods)**

Birdseye (1886–1956) has been called a man of extraordinary vision, insatiable curiosity, enormous persistence, and often referred to as the father of quick-frozen foods (Follette, 2004). He was a naturalist, and his experience with the Inuit’s frozen fish during a 1912 expedition to Labrador led him to develop the concept of frozen foods and the appliances to keep them in proper cold storage (Bilstein, 1995).

He noticed that faster and harder freezing preserved excellent flavor and texture. By 1922 he was performing home experiments to perfect food-freezing methods with the objective of producing quick-frozen food in consumer packages. His first attempt to scale up failed owing to inadequate financing, but with persistence he formed the General Seafoods Company in Gloucester, Massachusetts, obtained adequate financing, and hired a few employees to help to develop a commercially practical freezer for producing quick-frozen foods. By 1926 they had a commercially viable machine, but the market lacked infrastructure to receive much product. Birdseye recognized that it would take considerable capital to develop a new frozen food industry, and in 1929 he and his partners sold their business to Frosted Foods Company, which eventually became the Birds Eye Division of General Foods Corporation. Birdseye remained with the new corporation and became director of The Birds Eye Laboratories (Follette, 2004).

In early 1930, the larger company began production of 27 quick-frozen food products with distribution among 18 stores in Springfield, Massachusetts, using their ice-cream transportation and store displays to keep things frozen. This limited the capacity and range of distribution, and there were technological problems with scaling up production capacity. The economic downturn of the Great Depression added to start-up challenges. But the excellent quality of initial products was a major driver of strong consumer acceptance. Birdseye stressed the importance of quality raw products,

proper preparation, rapid freezing and adequate protection during shipping to safeguard the reputation of the goods—not just to his employees but championing to the industry as a whole (Follette, 2004).

Birdseye also addressed the problem of production operating efficiencies by developing (and patenting) an improved system, the contact refrigerated plate freezer. He also concentrated on the need for frozen food store displays, which was enabled through an alliance with The Hussmann Company to lease affordable units to store, while the Frosted Foods Company acquired production sites and arranged for acceptable storage and distribution sources. Production capacity was enlarged through the licensing of Birdseye's patented contact plate freezer process. Through these concerted ventures, frozen food products were rapidly gaining public favor by the mid-1930s, which spurred several companies to develop alternative quick-freeze processing technologies (to avoid patent issues), and the industry mushroomed (Follette, 2004).

In just a few more years, World War II further stimulated the frozen food industry by redirecting canned foods and the tin required for their manufacture. The role of wartime electric power and mass-production techniques contributed to the new phenomenon. Homemakers prepared meals with an array of other electric appliances, retrieving fresh foods from larger and more efficient postwar refrigerators. The refrigerators themselves featured larger and larger freezer compartments, evolving into a full-size freezer, packed with all sorts of frozen fruits, vegetables, meat, juices and desserts. The freezer became a symbol of new post-war prosperity (Bilstein, 1995).

### **Rod Canion, Compaq**

Rod Canion grew up in the Houston area, attending high school and college in the 1960s. He was interested in electronics, and liked to take cars apart, try to make them run faster and race them. At the University of Houston, he majored in electrical engineering on the advice of another student, who convinced him that engineering was “where the real stuff was.” Accepting this advice and seeking the opinions of others later became a cornerstone of Canion's business philosophy: soliciting everyone, assimilating the inputs and then making the right decision. After college, he joined Texas Instruments (TI), where he rose to senior management but grew frustrated with “big-company slowness.” Canion recalls: “I was in my mid-30s. I could see that the PC industry was getting ready to take off. By the time all these factors started coming together, I had general management experience. The three founders decided we would start a company” (Thomas & Donsky, 1990).

The other two partners were Bill Mutro and Jim Harris, also with TI, and all recognized that while each was good at some disciplines, they needed to put their heads together. Canion was a good consensus manager who rather than hiring employees brought together colleagues. When the PC market

began to take off, Canion says, "VisiCalc on the Apple was the match that lit the fire, but the IBM PC created all the thunder. When that came out, the flag went down, the light bulb went off, and it was time to go off and do something in this industry." The team's original plan was to build disk drives compatible with IBM PCs, and it had obtained a tentative commitment of funding from a prominent venture capital group. In the fall of 1981 they all quit their jobs at TI, and a week later they were told that the funding decision was revoked. After several months of debate over what broader, more interesting project the founding team might pursue, in January 1982, Canion came up with an idea that would change the emergent PC industry for the better. He decided to build a portable PC, better than the pioneering product by Osborne, but more importantly it would be designed to run on IBM software (Zarley, 1997).

The concept of adhering to industry standards became Compaq's hallmark, separating it from the pack. Its strategy was to build the world's best portable, but, for it to have software without the further challenge of software developers writing unique code from scratch, its machine would have to be IBM-compatible (Zarley, 1997). Canion and his partners set up a meeting with an industrial designer at the local ComputerLand store, and went to the pie shop across the street, where they sketched on a paper placemat what they wanted their portable to look like. That drawing went into their business plan. They presented the new plan to the investment group that had rejected them and received a more interested response (Thomas & Donsky, 1990). The investors put in \$1.5 million in start-up funds, which enabled a prototype by June, which attracted another investment round of \$8.5 million (Zarley, 1997).

Canion then made another pivotal decision: to sell only through dealers and resellers, which deviated from the proprietary delivery model for the computer industry. In January 1983, Compaq shipped 200 units. In December that same year, it shipped 10,000. At \$111 million, the company logged the highest first-year sales in business history. Then, in early 1984, IBM announced that it would come out with a portable PC. For two weeks, Compaq received no orders, until the dealers and consumers had inspected the new competitive product. "A few weeks later, the orders flooded in at a higher rate than before," Canion recalls. "It could have been a bullet to the head, but it just zinged by and we barely noticed it." This incursion into Compaq's market inspired the company to reply by coming out with a desktop unit (Zarley, 1997).

When Intel introduced its new 386 processor, IBM wanted to delay its installation in their PCs, so Intel went looking for an alternative partner. Compaq willingly deployed the Deskpro 386 in September 1986, pushing that year's revenue to \$625 million. By leading in the 386 market, Compaq's revenue doubled again for 1987 to \$1.2 billion. By 1988, Canion had decided that Compaq should lead the industry, not follow IBM, which

it spearheaded by leading numerous PC-clone manufacturers to support the Extended Industry Standard Architecture (EISA) (Thomas & Donsky, 1990).

This push for EISA adoption marked the ambitious effort to supplant IBM's Micro Channel Architecture as the platform for the 1990s. In 1989, Canion affirmed his support for EISA by pulling Compaq systems from the retailer Businessland, which he felt held an unfair alliance with IBM. Businessland accounted for 7% of Compaq sales at the time, decidedly hurting in the short term, but sending a clear signal to all retailers that striking a favorable deal with IBM excluded them from Compaq sales (Honan, 1989). The EISA campaign successfully cemented open architecture, and led the way for Canion's next strategic strike at IBM, Digital Equipment Corp. and other legacy companies: to use PCs as servers in network environments. But this campaign was not to be led by Rod Canion, who was replaced by the board of directors in 1992. Canion was an entrepreneur and a visionary who was loved by many in the industry, but he was not deemed to be the right person to grow the company to \$20 billion or \$30 billion. Five years later, Canion said of his replacement, Eckhard Pfeiffer, "[He] has done a phenomenal job since 1992. History has shown that he's a big-company-type manager, where I was very entrepreneurial" (Zarley, 1997).

According to Currid (1992), Canion's greatest accomplishment was "building teams of people who had the right stuff; they had vision and were empowered. After all, Canion didn't construct all those nifty computers himself." Canion constructed a can-do corporate culture that attracted highly charged talent, with teams and management structures to foster incredible innovation. His leadership empowered people, brought them together and challenged them to deliver their best (Currid, 1992).

### **Walt Disney, Walt Disney Studios**

Walter Elias Disney was born into poverty in Chicago in 1901, the youngest son of an abusive father whose children fled him at the earliest possibility. Before leaving home at 16 to join the Red Cross Ambulance Corps during World War I, Walt discovered the escape of art classes. After leaving the service, he set himself up as a commercial artist in Kansas City, Missouri, and there discovered the new craft of animation. Animation placed a premium on technical problem-solving, and an animated cartoon constituted a little world all of its own—something that, unlike life, a man could utterly control. Alfred Hitchcock later remarked: "If [Disney] didn't like an actor, he could just tear him up" (Schickel, 1998).

This first business failed, so with \$500 from an uncle, he and brother Roy headed for Hollywood, where they started a small studio in 1923. But Universal Studios Inc. hired away their staff, and along with them stole Walt's first popular cartoon character, Oswald the Lucky Rabbit. Walt and Roy vowed to stop working for others. On a 1928 train trip from New York to Los Angeles, Walt first sketched the character Mortimer Mouse, which

would become Mickey Mouse. Mickey's success, and that of the studio, owed a lot of initial achievement to Walt Disney's technological acuity. His third film, *Steamboat Willie*, was the first cartoon to synchronize sound and motion (with Walt providing the rodent's high-pitched voice). Three years later, Disney added color to his growing menagerie, which included Minnie, Goofy and Donald Duck. And in 1937 he made Hollywood's first full-length animated film, *Snow White and the Seven Dwarfs*, a \$1 million production that nearly bankrupted the company he and his older brother Roy had established. Business-minded Roy found ways to finance Walt's creations. One method changed business history when Roy's team struck Hollywood's earliest licensing deal, selling the rights to put Mickey's image on a writing table for \$300. Soon, Ingersoll-Waterbury Co. was selling millions of Mickey Mouse watches (Grover, 2004).

When Disney risked everything on his first Technicolor feature, *Snow White and the Seven Dwarfs*, it turned out to be no risk at all, so breathlessly was his work embraced, even by the intellectual and artistic communities who saw in it a kind of populist authenticity—naïve and sentimental, courageous and life-affirming. Disney became the first Hollywood mogul to embrace television. He hosted his own show for over a decade, leveraging this profit center for his company into a promotional engine for all of its works: safe, family motion pictures, chuckleheaded live-action comedies, nature documentaries of relentlessly anthropomorphized subjects, and, of course, Disneyland. Disneyland was another bet-the-farm risk, with Disney obsessively immersed in the park's design, which anticipated many features of modern urban planning—and into the "Imagineering" by which simulacrum of exotic creatures, places and fantasies could be unthreateningly reproduced. Cinderella's castle was designed from the idealized sketches that Disney had made of those that he had seen in France during World War I. These attractions were better than any movie in his eyes. Three-dimensional and without narrative problems, they offered false but momentarily thrilling experiences in a sterile, totally controlled environment from which dirt, rudeness and mischance had been totally eliminated. When Disneyland opened in 1955, he now had his own small world, which people would pay to access and experience on his terms (Schickel, 1998).

When critics and intellectuals accused Disney's work of being unsophisticated and corny, he had the last laugh, wryly responding in defense of his heartland populism: "Maybe so. But millions of people eat corn." With the debut of Mickey Mouse in 1928, Disney had stopped drawing, realizing that he was a better salesman and promoter, and better at managing the work of others than producing it himself. At mid-career in 1941, Disney had tellingly and prophetically pronounced: "I have never had the faintest idea where this business would drag me from one year to the next." Uncomfortable with the dirt and disorder of the city, Walt responded to the complex urban problems of the 1960s with a new vision in EPCOT (the Experimental

Prototype Community Of Tomorrow). Although the project since his lifetime has remained a non-residential permanent world's fair, Disney had enthusiastic hopes for this planned utopian community to create a better life through the genius of American business and technology. Disney scrupulously cultivated a style that remained distinctly and cheerfully removed from negativity. He once made the comment that "There is enough ugliness and cynicism in the world without me adding to it." One time, Mickey's image had been licensed to smile from a bottle of milk of magnesia, but Walt invoked new corporate policy that banned marketing in association with products that children might dislike (Croce, 1991).

Walt Disney did not develop his cheerful creatures all alone, yet his organization was an extension of himself. No character came closer to expressing his personality than Mickey Mouse. In the late 1930s, as Mickey's popularity waned from its initial success, business-minded Roy suggested phasing Mickey out, and even proposed Goofy for *The Sorcerer's Apprentice* animation. Walt reacted angrily and declared Mickey's presence to the success and very life of the studio (Croce, 1991). Walt was always zealous but charismatic, demanding intimate personal control of his productions and his company. He was a tough and driven boss, with no tolerance for anything that stood in the way. Even in the depths of the Depression, he bought plenty of high-quality equipment and earned such a reputation for producing the highest-quality animations that he had his pick of hundreds of artists who were eager to work with the emerging master. Most even took cuts in pay, justifying it as tuition fees. His desire for control underpinned his ability to produce live action hits without a regular cast of famous stars. For years he even refused to allow credits to appear at the end of his animated films; everything that his studio produced bore his distinctive signature: "A Walt Disney Production" (Croce, 1991).

Though appearing avuncular to the public, Walt was a stern but benevolent and paternal dictator. Pride was a major factor in his personnel relations, but so was fear. Most of his employees reported being afraid of him. Later in his career, subordinates nicknamed him "Wounded Bear" for being so touchy about his production ideas. Even his doctors were afraid of him, which explains why his cancer went undetected until mere months before his death in 1966 (Croce, 1991). One close observer noted: "He was a master of playing people off against each other. He never praised, never made anyone feel secure" (Croce, 1991).

### **Bernie Ebbers, WorldCom**

Canadian-born Bernie Ebbers dropped out of college twice, eventually graduating with a degree in physical education on a basketball scholarship at Mississippi College. After a bout of buying and selling hotels and motels, he spotted opportunities created by the break-up of AT&T. He began buying long-distance telephone time as a commodity and reselling it through

a company that he originally called Long Distance Discount Service, but as that business prospered he renamed it WorldCom in 1995, and embarked on an acquisition spree. Readily identified by his swagger, drawl and cowboy boots, within a few years, Ebbers had acquired more than 75 companies to become a brand-new telecom giant. The fervor of corporate takeovers brought adulation from the bankers and brokers who backed Ebbers as their champion, enlarged his reputation, commanded a higher share price and leveraged his buying power. These factors enabled WorldCom's purchase of MCI, the United States' second-largest long-distance carrier, in 1998. In 2000, Ebbers tried to buy Sprint, another American rival, but was blocked by anti-trust regulators on both sides of the Atlantic, who feared that the merged company would dominate global Internet backbone services. With the buying spree over and demand for data and Internet services dropping, WorldCom had no alternative strategy ("Yesterday's Man", 2002).

Ebbers was considered difficult to work for: parochial, stubborn, preoccupied with penny-pinching but willing to splurge on himself. His answer to most problems was cost-cutting. In what quickly proved to be a dire decision, he merged UUNET (UNIX to UNIX Network) into the main business division, destroying UUNET's brand and staff morale. UUNET had been the Internet-backbone business unit that by 2001 carried 40% of all Internet traffic, running as an independent company. Ebbers' reputation was eroded with WorldCom's dwindling revenue projections, shriveling share price and the prospect of a probe by the Securities and Exchange Commission into the company's accounting practices. Further came the hair-raising discovery that Ebbers had borrowed \$366 million from the company to cover losses incurred by buying WorldCom shares ("Yesterday's Man", 2002).

By early 2002, WorldCom executives were busy trying to convince investors and scores of FORTUNE 500 customers that the company wasn't going under. "While we typically would not comment on rumors, these need to be clarified," CEO Ebbers declared during a February 7 conference call, with a tinge of frustration in his normally steady voice. In the wake of the Enron debacle—and questions about the recently bankrupted WorldCom rival, Global Crossing—investors had started to place credence in rumors that WorldCom might have worrisome off-balance-sheet accounting; that its investment-grade debt might be downgraded to "junk" status; and, worst of all, that WorldCom itself was on the verge of filing for bankruptcy. Tongues wagged, too, about Ebbers' personal finances, and whether he would have to sell WorldCom stock to repay the huge loan from the company to cover debts from his investing activities (Mehta, 2002).

On April 30, 2002, under intense pressure from the board and large shareholders, Ebbers resigned as chief executive of the company—whose market capitalization had dwindled to \$7 billion, a mere 4% of its peak value ("Yesterday's Man", 2002). By July 2002, investigators had uncovered billions of dollars in illusory revenue figures and improperly booked expenses, and

WorldCom had filed for Chapter 11 bankruptcy protection under a crushing \$41 billion debt load (Beltran, 2002).

Within a year, both criminal and civil suits were filed against Ebbers, and in March 2005 he was found guilty of fraud. Immediately prior to sentencing, the civil suit reached a settlement requiring the liquidation of nearly all of Ebbers' wealth and possessions to pay WorldCom, its investors and employees. Even Ebbers' multimillion-dollar home in Clinton, Mississippi, was to be vacated by his family and sold. Before his trial commenced, Ebbers proclaimed his innocence from the pulpit of his Brookhaven, Mississippi church (Gubbins, 2005).

In July 2005, Ebbers was sentenced to 25 years in prison for his involvement in the biggest accounting fraud in American history. The series of embezzlements, discoveries and disclosures at Enron in 2001 shook the stock market, but it was the disclosure of billions of dollars of phantom earnings at WorldCom that galvanized public support for harsh treatment of corporate crooks. The fraud at WorldCom eventually totaled \$11 billion, wiped out \$180 billion in market capitalization and resulted in 30,000 layoffs. Ebbers' lead attorney argued that the federal sentencing guidelines distorted the punitive effects of the WorldCom fraud, resulting in a much harsher sentence for Ebbers than common sense would dictate. The prosecutor pointed out that Congress had passed Sarbanes-Oxley three years earlier in direct response to the fraud at WorldCom. "This is the case that is the standard for large frauds," agreed the judge. Although guidelines called for a 30-year sentence, the judge deemed that to be "excessive" and cut the sentence to 25 years (Farrell, 2005). Ebbers was 63 at the time.

### **Andy Grove, Intel**

Andras Grof is Hungarian, born in Budapest in 1936 to a Jewish family. He escaped the Nazis in World War II and later fled the Red Army before emigrating to the United States (Nee, 1999). Andrew Steven Grove, as he was later known, graduated from City College of New York in 1960 with a bachelor of chemical engineering degree, then immediately went on to earn a PhD from the University of California, Berkeley, in 1963 (Rogowski & Reilly, 2000, p. 661). Grove had graduated first in his engineering class at City College despite having begun his coursework without knowing how to say "horizontal" or "vertical" in English (Berlin, 2010), and he completed his doctorate in chemical engineering in just three years. His professional career continued on this meteoric trajectory. Grove joined the Research and Development Laboratory of Fairchild Semiconductor and by 1967 was Assistant Director of R&D (Rogowski & Reilly, 2000, p. 661).

The co-founders of Fairchild Semiconductor, Robert Noyce and Gordon Moore, left that enterprise in 1968 to start a newer small company to build microchips. Noyce was co-inventor of the integrated circuit, and Moore is known best for his oft-quoted Moore's Law. On their impetus, Intel was born



(Nee, 1999). They decided to split power between them, but in short order brought in their third man, Andy Grove. Each brought his own complementary talent: Noyce saw the big picture; Moore could discern detail. But unlike Noyce and Moore who managed employees with a light touch, Grove was fanatical about follow-up, meticulously detail-oriented, and unsparing of any opportunity to enforce his high standards with strong words. Noyce admiringly nicknamed Grove “The Whip” (Berlin, 2010).

Grove has said: “I often describe Intel as a three-legged stool: engineering, manufacturing, and marketing. I was never an engineering whiz.” Despite his academic credentials and patent awards to the contrary, Grove’s real talent lay in business. More than anyone, he took a company with undisputed engineering prowess and turned it into one of the most profitable in the world (Nee, 1999). All three founders owned sizeable stakes in the company. Each in turn became CEO. They ran Intel more as a triumvirate, termed the Intel Office. The office is also used to groom successors. The original office had Noyce as CEO and chairman, Moore as president and Grove as executive vice president. This office lasted until 1979. Noyce knew he was not a manager, so after the company achieved a certain size and its financing was stable, he turned the CEO role over to Moore, and Grove became the president and COO. Noyce became Mr Outside—Intel’s face to the world. Attractive and articulate, he testified before Congress on the Japanese threat in semiconductors, and represented Intel to the customer and to the Semiconductor Industry Association. Moore was the long-term thinker—his “law” predicted the doubling of computing power every 18 months. Moore thought about the evolution of technology and he took care of the company’s technology and finances. He was a quiet and introverted man (O’Toole et al., 2002).

Relative to the other two, Grove was at the opposite end of the time, emotion and management spectrums. He was short term and hands on. He held people accountable; everyone had quarterly goals called Q-ones or Q-twos. He built and ran the strategic long-range planning process, the council system, the performance management process, the practice of one-on-one meetings,<sup>15</sup> the matrix organization and so on. He was the organization designer and wrote books about the *Intel Way*. While Moore and Noyce were quiet and calm, Grove was volatile. During a business review, Grove would explode: “That’s nonsense!” A heated discussion would ensue. The episode would typically end with a thoughtful summary and proposed solution from Moore. The review would then proceed until Grove erupted again. Grove would surface the issues (albeit not very diplomatically) that required discussion and could profit from the insights of Moore and Noyce. While no pushovers, Moore and Noyce’s style would not necessarily have surfaced the tough issues. Yet these opposites were able to convert their differences into complements rather than conflicts. Indeed, the group regarded conflict to be healthy (O’Toole et al., 2002).

Inside the office and Intel operations were not the only places where Grove exercised his productive belligerence. Intel's Operation Crush in 1980 is an example of the intense competitive nature of a leader manifesting themselves in a company's predatory behavior. With that program, which marked the beginning of the aggressiveness and combativeness for which the company has become noted, Intel conspired to suppress competitive nuisances interfering with its leadership in the microprocessor industry. Grove orchestrated the initiative that was directed at eliminating Motorola's presence in microprocessors. At the end of a three-day, off-site meeting, a plan emerged to offset Motorola's momentum by diverting attention away from the technical deficiencies of Intel's 8086 product and positioning Intel's device as part of an expansive, forthcoming family of advanced offerings that customers would be foolish not to bet on. To make its claims plausible, the plan called for getting 50 articles published in the trade press about Intel's processors and developing a series of benchmark tests that showed that Intel's package as a whole outperformed the Motorola solution. Intel would also abandon its rule of not announcing devices until they were in manufacturing in favor of the campaign to tell the world about the family of devices that would follow, and build expectation and anticipation on what customers could expect if they stuck with Intel. It set a goal of 2,000 design-ins by December 1980, which it helped along with a contest within its salesforce (Theodhosi, 2000).

Not only did Grove build Intel into what is arguably the world's most proficient manufacturer but he was a marketing whiz. His "Intel inside" campaign made the company a household name—he turned Intel into a consumer brand (Nee, 1999). In 1987 the Intel office rotated leadership again and Grove became CEO. Over the next ten years, Intel's profit increased to more than \$5.1 billion, dominating more than 90% of the world's microprocessor market share, turning out more than four quadrillion transistors every month (Rogowski & Reilly, 2000, p. 661). By the end of Grove's tenure as CEO (in 1998), Intel had little competition, spending in the order of \$5 billion per year on new plant and equipment with an R&D budget of more than \$2 billion. Even if another company could design a better microprocessor—and several had claimed to do so—none had the production capacity or investment resources needed to put much of a dent in Intel's market domination. While others envied Intel's position, Grove remained uneasy about the dangers of being lulled into a false sense of security. Intel had not recognized, at first, the significance of the World Wide Web, he admitted:

I saw a demo in 1993. I didn't get it at all. It didn't give me a creepy feeling, although it should have. Missing a turn is the biggest danger. I get a creepy feeling that if things can be done somebody will do them, and we are going to miss out.

(Kehoe & Lambert, 1998)

For two decades, Intel's strategy of pushing the PC market forward with ever faster and more powerful microprocessor chips had produced rapid growth. To offer new PC models based on anything but the latest chips was anathema from the company's perspective. But Grove became unsure whether lower prices would continue to increase the overall size of the industry or simply cut into profit margins, and the late 1990s marked a downturn in overall PC sales. "We believe in this industry, so we make long-term investments in its future," Grove said, putting on his rosiest CEO face. "You would have a hard time finding other investors willing to do what we do. We invest \$5 billion a year in factories to build a product that is non-existent for a non-existent market. This is the stuff of junk bond funds!" (Kehoe & Lambert, 1998).

Close to retirement, the 62-year-old CEO was the opposite of the status-conscious corporate leaders. Wearing an open-necked shirt and a short-sleeved pullover, his workspace was a cubicle surrounded by shoulder-height dividers; smaller than the space given to administrative assistants in most corporate offices, although, unlike many others in the room, Grove's cubicle had a window view. Grove's determination was that Intel should never become "fat and happy" or "let inertia set in," he insisted (Kehoe & Lambert, 1998). In his book entitled *High Output Management*, he offers this stark advice on how to turn subordinates into members of a productive team, and how to attain peak performance:

When a person is not doing his job, there can only be two reasons for it. The person either can't do it or won't do it; he is either not capable or not motivated. To determine which, we can employ a simple mental test: if the person's life depended on doing the work, could he do it? If the answer is yes, that person is not motivated; if the answer is no, he is not capable.

("Turn the Telescope Within", 2002)

Grove's later book on identifying and exploiting crisis points in business development succinctly encapsulates his management philosophy in its title, *Only the Paranoid Survive*.

For his efforts and in recognition of the overwhelming contribution made by the microprocessor to the world's economy, *Time* magazine chose Andrew Grove as its 1997 Man of the Year. *Time* called him "the person most responsible for the amazing growth in the power and innovative potential of microchips." Grove relinquished his CEO post in 1998 but stayed on as chairman of the board (Rogowski & Reilly, 2000, p. 661).

### **Henry G. Parks, Jr., Parks Sausage**

Henry G. Parks, Jr. was born in Atlanta in 1916 and raised in Ohio. After public schools, he earned a bachelor of science degree in marketing from the College of Commerce at the Ohio State University, graduating in 1939.

Parks's leadership qualities were evident in college—he served as president of the Interracial Society, Inter-fraternity Society and Alpha Phi Alpha. Despite graduating with honors, the educated young African-American man found no job opportunities. A university placement officer suggested that he should head for South America, change his name, learn Spanish, return to the United States and re-enter the job market pretending to be Latino. Parks ignored this advice. He remained at the university for graduate work, but his thesis proposal, "The Growing Importance of the Negro Market," was rejected by his advisor and Parks never completed his master's degree (Wright, 1972).

He persisted in the field of marketing and found work as a salesman for Pabst Brewing Company. He was soon advanced to national sales representative for market development among African-Americans. More than a star salesman, Parks proved to be a superb trainer, and he rapidly introduced predominantly black communities to Pabst products. But he found that advancement to general management positions seemed to be blocked. Leaving this job sparked Parks's most outstanding characteristic—his entrepreneurial drive. He started several small enterprises in various sectors: real estate, advertising, retailing and manufacturing building materials. None was successful owing to a lack of capital and economic viability. In 1945, Parks moved to Baltimore and took a government job (Wright, 1972).

In 1951, Parks rekindled his entrepreneurial spark and founded H. G. Parks, Inc., funded with \$60,000 borrowed against his home and life insurance. With two employees, his new business made sausage in the mornings and sold it to Baltimore stores in the afternoons. Initial sales were directed at the inner city, and the African-American market was captured through aggressive promotion. Parks innovated voluntary product code dating before such controls were required for sausage, and federal inspection of the plant was invited when state control was all that was required. These stringent quality controls helped to secure the company's reputation and contributed to its success. Parks knew that a broader market would be needed for his company to thrive, and a quality reputation was vital to that plan. Once distribution had been secured in the "ghetto," he embarked on what he termed "reverse marketing" by moving the product into the general market by means of its acceptance in the African-American community. H. G. Parks, Inc. became an enterprise attempting to tap an entire market regardless of its racial characteristics, prior to the Civil Rights Movement. Proof of success came in the form of a \$25,000 loan from a Baltimore bank, at a time when no such financing was possible for Negro businesses (Wright, 1972).

Over the next 20 years, an integrated workforce supervised by an integrated management team manufactured Parks sausage and scrapple for distribution through more than 10,000 food stores, by means of the company's

own refrigerated trucks. Sales in 1972 are reported at \$12 million, with 10–12% annual growth. Another important factor in the company's success was a well-known radio campaign featuring a small child stridently requesting, "More Parks Sausage, Mom!" With more than 75% of his company's products consumed by whites, Henry Parks became "a success as a businessman who happens to be black, not as a black businessman." His achievements should be an inspiration to anyone (Wright, 1972).

### **"Madame" C. J. Walker, Madame C. J. Walker Manufacturing**

Born to former slaves on a Louisiana plantation in 1867, Sarah Breedlove would go on to become known as Madame C. J. Walker, transforming herself from an uneducated laborer into a successful entrepreneur. She was orphaned at age 7 and married by age 14. Walker was the name of her third husband (Rowley, 2007).

Walker at first made a living as a laundress, but attended night school seeking to elevate her standing. She has been quoted as saying: "I got my start by giving myself a start" (Dingle, 2005). Without much training, she just had an instinct for selling. Even as a washerwoman, she was a businesswoman with customers, and she needed to compete for their work and hold her services to standards of quality (Valentine, 2001).

In the 1890s, Walker developed scalp ailments and started to lose her hair. She experimented with various homemade remedies and store-bought products, including some made by another African-American businesswoman named Annie Malone. Walker took a job with Malone for a while, then founded her own business and began selling Madame Walker's Wonderful Hair Grower. She claimed its formula for scalp conditioning and healing was revealed to her in a dream (Rowley, 2007).

Her most important product was an ointment she called Wonderful Hair Grower, made with sulfur. In an era when women washed their hair only once a month and sometimes not at all during the winter, they would develop horrible scalp disease. Walker encouraged women to wash their hair more frequently, and applying the sulfurous ointment to clean scalps would allow their hair to grow back (Valentine, 2001).

Over the next 14 years, Walker built a fully integrated enterprise, employing innovative business practices. The Madame C. J. Walker Manufacturing Co. created its hair and scalp treatments in its own plants and owned the beauty shops that used and promoted them. Walker expanded her empire by deploying a nationwide sales force known as "Walker Agents"—impeccably dressed representatives who demonstrated and sold products door to door, providing customers with grooming techniques (Dingle, 2005).

Many people believe she went on to invent the straightening comb, but that has been found to be untrue (Rowley, 2007). The Walker Agents did use the hot comb, so using the comb became associated with the Walker treatments, but she got her combs from suppliers. Madame Walker died in 1919,

and the man who held the patent must have died a year or two later; in 1922 his widow sold the patent for his comb to the Walker Company. Through the years, employees must have begun saying: "We own the patent." Therefore Madame Walker inventing the straightening comb just grew as a myth (Valentine, 2001).

Madame C. J. Walker has been reputed to be the first American businesswoman to make \$1 million; the first black person to make \$1 million; and the first black woman to make \$1 million. When she died, world headlines labeled her a millionaire. She lived like a millionaire, but her personal net worth when she died—based on estimates for homes, cars, jewelry, furniture and so on—was somewhere between \$600,000 and \$700,000 (which is equivalent to \$6 million or \$7 million in 2001 dollars). This was quite wealthy, especially during a time when the average male, white non-farm worker earned less than \$1,200 a year. During the last year of her life, company sales were about \$500,000, so her company's worth, had she sold it, might have been somewhere between \$500,000 and \$2 million. Adding that to her net worth, one could say that she was in the millionaire category (Valentine, 2001).

### **Sam Walton, Wal-Mart**

Samuel Moore Walton was born in Kingfisher, Oklahoma, in 1918 and raised in Missouri, where he competed in high-school football and earned a business degree in 1940 at the University of Missouri. He worked with diligence at a succession of menial jobs, earning more than \$4,000 a year (double the median income). He contemplated business school but assessed that he couldn't afford it. He stumbled into retailing when he took an offer to become a management trainee with J. C. Penney Co. Energetic and driven, Walton was ready to start his own retail operation as a Ben Franklin variety store franchisee in 1945. He borrowed \$20,000 from his father-in-law, but Walton's wife, Helen, refused to move to any town with more than 10,000 people. They landed in tiny Newport, Arkansas, causing Helen to become responsible for one Walton strategy that later fueled Wal-Mart's success. Wal-Mart's early focus on small towns forced Walton to build his own distribution and communications systems, which led to gathering and analyzing the data that Wal-Mart uses to push suppliers for everything from lower prices to better packaging (Zellner, 2004).

Walton sensed that his variety store franchises were in jeopardy from the powerful new concept of discounting, so he launched his first Wal-Mart Discount City in Rogers, Arkansas in 1962—the same year that rivals Kmart and Target started. He studied his competitors and borrowed liberally (Zellner, 2004), but he further discovered a thriving retail market in rural America, particularly the small towns previously ignored by big business. Walton recognized that out in the hinterland, consumers would travel farther for one-stop shopping; he could draw people not just from one small town

but from the entire county. And his low-cost, customer-friendly philosophy helped to popularize the chain (Keeney, 2002).

Walton took his 32-store chain public in 1970 (Zellner, 2004). Enabled by staying current with evolving technologies in computers, telecommunications, optical coding and radio frequency ID tracking, Wal-Mart has persisted with the gathering and analysis of data from manufacture to supply chain, distribution to warehouses and stores, inventory and point of sale, customer-buying habits, and all other measurable aspects of retail management. Walton's innovations gained enormous operating efficiencies and purchasing power.

Walton's business formula made Wal-Mart Stores the largest American retailer and helped the company to develop brands like Wal-Mart Supercenters and Sam's Clubs, surpassing their competitors, Kmart and Target (Keeney, 2002). By 2003, Wal-Mart topped a once unthinkable \$250 billion in sales with over \$9 billion in profits, from more than 4,900 stores around the world. Its dominance has created a backlash from unions, anti-sprawl activists, anti-sweatshop watchdogs and plaintiffs' lawyers. Before his death at 74 in 1992, the visionary Walton was already pondering some of the issues still critical to his company, concerning efficiency and abuse of power. But, for better or worse, his mission to serve consumers has changed retailing forever. With astounding vision and energy, he built Wal-Mart Stores into the hottest stock of the era, becoming at one point the richest man in the United States and making many small investors millionaires: \$1,000 invested when the company went public in 1970 would have grown to \$1.7 million in just a little over 20 years ("Secret of Wal-Mart's Success", 1992). Wal-Mart's discount chain has grown into the world's largest company. Walton's simple business model changed the way Americans shop. With its unparalleled size and efficiency, Wal-Mart Stores Inc. has dampened inflation and driven productivity gains throughout retailing and manufacturing. It has also been attacked for holding down wages, hastening the shift of production jobs overseas and decimating small-town merchants (Zellner, 2004).

In his autobiography, *Made in America*, Walton tells how an early decision to parcel out stock to everyone who worked for him (his "associates") was what made Wal-Mart a Wall Street miracle. He discounts the more obvious elements of Wal-Mart's success—merchandising, distribution, technology, market saturation and real-estate strategy—and claims that what carried his company so far so fast is the relationship that managers have been able to enjoy with the hourly wage employees. In Walton's own words,

The more you share profits with your associates—whether it's in salaries or incentives or bonuses or stock discounts—the more profit will accrue to the company. Why? Because the way management treats the associates is exactly how the associates will then treat the customers. And if the

associates treat the customers well, the customers will return again and again, and that is where the real profit in this business lies, not in trying to drag strangers into your stores for onetime purchases based on splashy sales or expensive advertising.

(“Secret of Wal-Mart’s Success”, 1992)

### **George Westinghouse, Westinghouse**

Born in 1846 to a machinist, George Westinghouse became one of the greatest engineers of the 19th century, and, moreover, a great entrepreneur and industrial manager. He had 361 patents issued to him, and hundreds more bore the names of engineers who worked for him. He surrounded himself with good people, including meritorious engineers who were loyal to him and got credit for their work. Westinghouse founded, organized, acquired and ran 34 separate companies at the same time, totaling some 50,000 employees in the United States, Canada, France, Italy and Russia, at a time when transportation was limited to trains and ships. Although attaining significant wealth, greed and money were not his motives—he was driven by a strong personal belief that his efforts, successes and accomplishments would benefit mankind (Reis, 2008).

Westinghouse saw the potential in ideas, such as using air to stop a train. Trains were longer, heavier and yet much safer with his air brakes. He also saw potential in people, and was willing to purchase patents of others if he believed in their potential. He purchased the patent rights from Nikola Tesla for the Serbian inventor’s alternating current induction motor and polyphase system of alternating current. These solutions contributed directly to harnessing the power of Niagara Falls using Westinghouse alternating current power plants. He eventually controlled over 15,000 patents, but if a Westinghouse engineer developed a new product, it was the inventor’s name that went on the patent, not George Westinghouse. His own first patent was granted at age 19 for a rotary steam engine that he had started working on as a 15-year-old, interrupted by two years of service in the Civil War. This rotary engine was never developed into a commercial success but it served as a precursor to many high-speed rotating devices in the Westinghouse portfolio. Later in life, Westinghouse said that his greatest educational experience was the mechanical skills learned in his father’s shop. He had no formal education beyond age 16 (Reis, 2008).

Andrew Carnegie, a high-powered contemporary, said that “George Westinghouse could have made a lot more money during his lifetime if he hadn’t treated his workers so well.” There was never a strike at any of the Westinghouse companies while he controlled them, during an era of numerous and often violent industrial labor/management clashes. Westinghouse articulated his own management philosophy thus: “If you treat your workers



well, if you treat them with respect, give them a nice place to work, with the best of tools, then your company will be successful.” He offered pension plans, and doctors and nurses in plants to treat injured workers, with small hospitals open to not only employees but to their families. He built two towns in western Pennsylvania and offered homes to his workers via payroll deductions. And he offered home insurance, so if the worker died his wife and children had a home that was paid off. The standard practice in neighboring coal-mining towns was to evict the widow and children within days of the death of a coal miner (Reis, 2008).

It was Westinghouse’s refusal to become a robber baron that was his ironic undoing. The wealthy and powerful New York banker, J. P. Morgan, had contrived with others to limit competition by forming trusts. When the General Electric trust was formed, Westinghouse considered it unethical and refused to participate. When the Westinghouse companies later ran short of cash during an economic downturn in 1906, Morgan pressured lenders to withhold cash and used this leverage to wrest control of the companies from Westinghouse. This loss was a shocking blow to him, and though he still had considerable wealth and retained a few companies, it was said that Westinghouse was never the same man again. He died in 1914 (Reis, 2008).

The prominent manufacturing company bearing his name, founded by George Westinghouse in Pittsburgh in 1886, lays claim to a string of the technological marvels on which the advances of the “American Century” (the 1900s) were based. These include the electrical transformers that made possible the large-scale electrification of American cities and the development of nuclear-powered ships. It was the Westinghouse company’s radar that detected swarms of Japanese planes converging on Pearl Harbor. It was George Westinghouse’s company that made the world’s first commercial radio broadcast, in Pittsburgh in 1920. But, as of 1997, the company officially cut its ties with the past and also ended its association with Pittsburgh. The Westinghouse name lives on, in connection with its power-generation operations, and as a brand name on refrigerators and other kitchen appliances—though this business for which the company was best known had already been sold off in the 1970s (Waters, 1997).

## Notes

1. Curiously, Joseph Schumpeter was a regular guest of the Drucker family household in Austria where young Peter Drucker grew up (Brem, n.d.). Later, Drucker’s popular publications, such as the 1985 *Innovation and Entrepreneurship* referenced herein, helped to make Schumpeter’s arcane and unorthodox principles more accessible and salient to mainstream Western management experts—essentially attaining market actualization of this vital thread of economic theory.

2. Weber's conception of charismatic authority conforms compellingly with the characteristics of entrepreneurship as delineated in the section entitled "The central role of the technology entrepreneur in venture formation", particularly the discussion about sustainable entrepreneurship (Carayannis, 2008b, 2009) as illustrated in Figure 2.12.
3. The "imperative" of homogeneity is persuasively contradicted by the radical revision toward heterogeneity and cultural diversity within organizations as enablers of dynamic adaptation, discussed in section "Diversity". See also the discussion about heterogeneity dynamics (Carayannis, 2008b) in the section entitled "The central role of the technology entrepreneur in venture formation".
4. The "routines" modeled by Nelson and Winter (1982) illuminate Selznick's (1948) "action system" of how things really get done.
5. North's (1990) incisive observation is seminal to the perspective of entrepreneurship discussed in the section entitled "The central role of the technology entrepreneur in venture formation", and substantively undergirds the conception of evolutionary economics introduced forthwith.
6. The topic of evolutionary economics is discussed in continuing detail in the section entitled "A closer inspection of evolutionary economics", after a deeper examination of institutional theory is addressed.
7. Written in the 1970s, this was conjecturally true at the time.
8. R. Opie's 1934 translation, as cited in Nelson and Winter and throughout this dissertation.
9. The impact of charismatic leadership (or lack thereof) on the attitudes and motivations of organizational members and correspondingly the extent to which such leadership (or void) influences variances between official policies and actual operating procedures cannot be disregarded (cf. Weber, 1947 on charismatic authority and Selznick, 1948 on systems of rational action).
10. Carayannis's (1999b) perspective on knowledge management dovetails effectively with the concepts of routines (Nelson & Winter, 1982) and noogenetics (Boulding, 1978) cited earlier as foundational to evolutionary economics (in the section entitled "A closer inspection of evolutionary economics").
11. This latter component signifies the construct of the Mode 3 fractal innovation ecosystem (Carayannis, 2008, p. 347) introduced in the earlier section entitled "Creativity, innovation and competitiveness". Technological lifecycles are detailed in the section entitled "Technology lifecycle".
12. Pristine human civilizations refer to archaeologists' term for spontaneous and unaided emergent societies, without influence from immigrating peoples already possessing agricultural or technological know-how (Diamond, 1999).
13. "Process innovation refers to change in the methods employed by a firm in delivering products or services . . . Product innovations reflect change in the end product or service of the firm" (Carayannis et al., 2003, p. 120).
14. In evolutionary innovations, "technological change appears to follow a process of 'natural selection . . . survival of the fittest.'" In revolutionary innovations, "the change appears as a break or non-continuous change in the course of the technology. These two approaches to envisioning innovation are not mutually exclusive, however" (Carayannis et al., 2003, p. 120).
15. At Intel, a one-on-one is a meeting between a supervisor and a subordinate, and it is the principal way in which their business relationship is maintained. Its main purpose is mutual teaching and exchange of information ("Turn the Telescope Within", 2002).

## References

- Abernathy, W., & Utterback, J. (1978). Patterns of industrial innovation *Technology Review*, 80(7), 40.
- Adner, R. (2006). Match your innovation strategy to your innovation ecosystem. *Harvard Business Review*, 84(4), 98–107.
- Afuah, A. (2003). *Innovation Management; Strategies, Implementation, and Profits*. New York: Oxford University Press.
- The American Heritage Dictionary of the English Language*, 4th Ed. (1995). Boston: Houghton Mifflin Company.
- American National Business Hall of Fame, ANBHF (2004). Mary Kay Ash – Mary Kay Cosmetics. Retrieved July 26, 2010, from <http://www.anbhf.org/pdf/mkash.pdf>
- Åstebro, T., & Thompson, P. (2007). *Does it pay to be a jack of all trades?* Unpublished manuscript, University of Toronto.
- Barab, S. A., & Duffy, T. M. (2000). From practice fields to communities of practice. In Jonassen, D. H., & Land, S. M. (Eds.). *Theoretical Foundations of Learning*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Barnsley, M. (1993). *Fractals Everywhere* (2nd Ed). San Diego, CA: Academic Press.
- Bassett-Jones, N. (2005). The paradox of diversity management, creativity and innovation. *Diversity Management, Creativity and Innovation*, 14(2), 169–175.
- Beltran, L. (2002, July 22). WorldCom files largest bankruptcy ever. *CNN/Money*. Retrieved January 20, 2008, from [http://money.cnn.com/2002/07/19/news/worldcom\\_bankruptcy/](http://money.cnn.com/2002/07/19/news/worldcom_bankruptcy/).
- Berlin, L. (2010, January). Robert Noyce, Silicon Valley, and the teamwork behind the high-technology revolution. *Organization of American Historians – OAH Magazine of History*, 24(1), 33–36.
- Bilstein, R. (1995). On gas turbines, nuclear physics, and Mr. Birdseye. *National Forum*, 75(4), 37.
- Boulding, K. (1978). *Ecodynamics*. Beverly Hills, CA: Sage Publications, Inc.
- Boulding, K. (1981). *Evolutionary Economics*. Beverly Hills, CA: Sage Publications, Inc.
- Boulding, K. (1991). What is evolutionary economics? *Journal of Evolutionary Economics*, 1, 9–17.
- Brandenburger, A., & Nalebuff, J. (1996). *Co-opetition*. New York: Currency Doubleday.
- Cantillon, R. (1755). *Essai sur la nature du commerce en général traduit de l'anglois*. Londres: Gyles.
- Carayannis, E. G. (1992). *An integrative framework of strategic decision making paradigms and their empirical validity: The case for strategic or active incrementalism and the import of tacit technological learning* (RPI School of Management Working Paper Series No. 131). Rensselaer Polytechnic Institute, Troy, NY.
- Carayannis, E. G. (1993). Incrementalisme Strategique. *Le Progrès Technique*, 93(2), i–vi.
- Carayannis, E. G. (1994a, June 27–29). *A multi-national, resource-based view of training and development and the strategic management of technological learning: Keys for social and corporate survival and success*. Paper presented at 39 International Council of Small Business Annual World Conference, Strasbourg, France.
- Carayannis, E. G. (1994b). The strategic management of technological learning: Transnational decision-making frameworks and their empirical effectiveness *Dissertation Abstracts International*, 55(11), p. 3564 (UMI No. 9511131).
- Carayannis, E. G. (1994c). Gestion Strategique de l'Acquisition des Savoir-Faire. *Le Progrès Technique*, 94(1), 37–39.
- Carayannis, E. G. (1998). Higher order technological learning as determinant of market success in the multimedia arena; a success story, a failure, and a question

- mark: Agfa/Bayer AG, Enable Software, and Sun Microsystems. *Technovation*, 18(10), 639–653.
- Carayannis, E. G. (1999a). Knowledge transfer through technological hyperlearning in five industries. *Technovation*, 19(3), 141–161.
- Carayannis, E. G. (1999b). Fostering synergies between information technology and managerial and organizational cognition: the role of knowledge management. *Technovation*, 19(4), 219–231.
- Carayannis, E. G. (2000a). Investigation and validation of technological learning versus market performance. *Technovation*, 20(7), 389–400.
- Carayannis, E. G. (2000b). *The Strategic Management of Technological Learning*. Boca Raton, FL: CRC Press.
- Carayannis, E. G. (1998–2014). *Lectures in numerous courses covering topics on technology, innovation, entrepreneurship, business venturing, and project management*. Unpublished lecture notes, The George Washington University School of Business, Washington, DC.
- Carayannis, E. G. (2001). *The strategic management of technological learning: Learning to learn-how-to-learn in high tech firms and its impact on the strategic management of knowledge, innovation and creativity within and across firms*. Boca Raton, FL: CRC Press.
- Carayannis, E. G. (2002–2009). *Doctoral seminar in the Management of Science, Technology and Innovation (MSTI)*. Unpublished lecture notes, The George Washington University School of Business, Washington, DC.
- Carayannis, E. G. (2004). Measuring intangibles: Managing intangibles for tangible outcomes in research and innovation. *International Journal of Nuclear Knowledge Management*, 1(1/2), 49–67.
- Carayannis, E. G. (2008a). Knowledge-driven creative destruction, or leveraging knowledge for competitive advantage: Strategic knowledge arbitrage and serendipity as real options drivers triggered by co-opetition, co-evolution and co-specialization. *Industry and Higher Education*, 22(6), 343–353.
- Carayannis, E. G. (2008b). Conceptual framework for an analysis of diversity and heterogeneity in the knowledge economy and society. In E. G. Carayannis, A. Kaloudis, & Å. Mariussen (Eds.), *Diversity in the Knowledge Economy and Society: Heterogeneity, Innovation and Entrepreneurship* (Ch. 5, pp. 95–116). Cheltenham, UK: Edward Elgar.
- Carayannis, E. G. (2009). Firm evolution dynamics: Towards sustainable entrepreneurship and robust competitiveness in the knowledge economy and society. *International Journal of Innovation and Regional Development*, 1(3), 235–254.
- Carayannis, E. G., & Alexander, J. (1999). Winning by co-opeting in strategic government-university-industry (GUI) partnerships: The power of complex, dynamic knowledge networks. *Journal of Technology Transfer*, 24(2/3), 197–210.
- Carayannis, E. G., & Alexander, J. (2002). Is technological learning a firm core competence; when, how, and why: A longitudinal, multi-industry study of firm technological learning and market performance. *Technovation*, 22(10), 625–643.
- Carayannis, E. G., & Alexander, J. (2004). Strategy, structure and performance issues of pre-competitive R&D consortia: Insights and lessons learned from SEMATECH. *IEEE Transactions of Engineering Management*, 51(2): 226–232.
- Carayannis, E. G., & Campbell, D. F. J. (Eds.). (2006). *Knowledge Creation, Diffusion, and use in Innovation Networks and Knowledge Clusters: A Comparative Systems Approach across the United States, Europe, and Asia*. Westport, CT: Praeger Publishers.
- Carayannis, E. G., & Campbell, D. F. J. (2009). “Mode 3” and “Quadruple Helix”: Toward a 21st century fractal innovation ecosystem. *International Journal of Technology Management*, 46(3/4), 201–234.

- Carayannis, E. G., & Chanaron, J.-J., (Eds.). (2007). *Leading and Managing Creators, Inventors, and Innovators: The Art, Science, and Craft of Fostering Creativity, Triggering Invention, and Catalyzing Innovation*. Westport, CT: Quorum/Greenwood.
- Carayannis, E. G., Evans, D., & Hanson, M. (2003). A cross-cultural learning strategy for entrepreneurship education: Outline of key concepts and lessons learned from a comparative study of entrepreneurship students in France and the US. *Technovation*, 23(9): 757–771.
- Carayannis, E. G., & Formica, P. (Eds.). (2008). *Knowledge Matters: Technology, Innovation and Entrepreneurship in Innovation Networks and Knowledge Clusters*. London: Palgrave Macmillan.
- Carayannis, E. G., & Gonzalez, E. (2003). Creativity and innovation = competitiveness? When, how, and why. In Larisa V. Shavinina (Ed.), *International Handbook on Innovation* (Part VIII, Ch. 3, pp. 587–606). Oxford, UK: Elsevier Press.
- Carayannis, E. G., & Juneau, T. (2003). *Idea Makers and Idea Brokers in High-Technology Entrepreneurship: Fee vs. Equity Compensation for Intellectual Venture Capitalists*. Westport, CT: Praeger/Greenwood.
- Carayannis, E. G., Popescu, D., Sipp, C. M., & Stewart, M. R. (2006). Technological learning for entrepreneurial development (TL4ED) in the knowledge economy (KE): Case studies and lessons learned. *Technovation*, 26(4), 419–443.
- Carayannis, E. G., & Sipp, C. M. (2006), *e-Development Towards the Knowledge Economy: Leveraging Technology, Innovation and Entrepreneurship for smart Development*. London: Palgrave Macmillan.
- Carayannis, E. G., & Stewart, M. R. (2007–2011). *Numerous Courses Covering Topics on Technology, Innovation, Entrepreneurship, Business Venturing, Information Systems, and Project Management*. Unpublished lecture notes, The George Washington University School of Business, Washington, DC.
- Carayannis, E. G. & Stewart, M. R. (2011). *The Story of Obsessed Maniacs and Clairvoyant Oracles: Learning from Entrepreneurs and their Creations*. Manuscript in preparation, The George Washington University School of Business, Washington, DC.
- Carayannis, E. G., & von Zedtwitz, M. (2005). Architecting gloCal (global-local), real-virtual incubator networks (G-RVIn) as catalysts and accelerators of entrepreneurship in transitioning and developing economies: Lessons learned and best practices from current development and business incubation practices. *Technovation*, 25(2), 95–110.
- Carayannis, E. G., & Ziemnowicz, C. (2007). *Rediscovering Schumpeter: Creative Destruction Evolving into "Mode 3"*. Basingstoke: Palgrave Macmillan.
- Carayannis, E. G., Ziemnowicz, C., & Spillan, J. E. (2007). Economics and Joseph Schumpeter's theory of creative destruction: Definition of terms. In E. G. Carayannis & C. Ziemnowicz (Eds.), *Re-discovering Schumpeter: Creative Destruction Evolving into "Mode 3"* (pp. 23–45). London: Palgrave Macmillan.
- Cantillon, R. (1755). *Essai sur la nature du commerce en général traduit de l'anglais*. Londres: Gyles.
- Chomsky, N. (1971). Deep structure, surface structure and semantic interpretation. In: D. Steinberg, & L. Jakobovits (Eds.), *Semantics in Generative Grammar*. New York: Cambridge University Press.
- Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128–152.
- Cole, M., & Engestrom, Y. (1993). A cultural–historical approach to distributed cognition. In G. Salomon (Ed.), *Distributed Cognitions: Psychological and Educational Considerations* (pp. 1–46). Cambridge, UK: Cambridge University Press.

- Croce, P. J. (1991). A clean and separate space: Walt Disney in person and production. *Journal of Popular Culture*, 25(3), 91–103.
- Currid, C. (1992, November 30). The man who built Compaq applies his skills to IS management. *InfoWorld*, 14(48), 55.
- Davenport, T. H., & Prusak, L. (1998). *Working Knowledge: How Organizations Manage What they Know*. Boston: Harvard Business School Press.
- D'Aveni, R. A. (1994). *Hypercompetition: Managing the Dynamics of Strategic Maneuvering*. Free Press: New York.
- Davis, E. (1984). *Strategy of Decision*. Wiley: New York.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–339.
- De Klerk, G. J., & Kruger, S. (n.d.). *The driving force behind entrepreneurship: An exploratory perspective*. Unpublished manuscript. Retrieved February 20, 2010, from [http://www.kmu.unisg.ch/rencontres/band2002/F\\_04\\_deKlerk.pdf](http://www.kmu.unisg.ch/rencontres/band2002/F_04_deKlerk.pdf)
- des Bruslons, J. S. (1723). *Dictionnaire universel de commerce*. Paris: France.
- Diamond, J. (1999). *Guns, Germs and Steel: The Fates of Human Societies*. New York: W.W. Norton & Co.
- Dingle, D. T. (2005, February). Ultimate wealth builders – Madame C. J. Walker: Breaking new ground. *Black Enterprise*, 35(7), 20.
- Dopfer, K. (1994). Kenneth Boulding: A founder of evolutionary economics. *Journal of Economic Issues*, 28(4), 1201–1203.
- Dodgson, M. (1991). Technology, learning, technology strategy and competitive pressures. *British Journal of Management*, 2(3), 132–149.
- Drucker, P. F. (1985). *Innovation and Entrepreneurship*. New York: Harper & Row Publishers, Inc.
- Drucker, Peter (1986). The changed world economy. *Foreign Affairs* (Spring), 3–17.
- Espedal, B. (2008). In the pursuit of understanding how to balance lower and higher order learning in organizations. *The Journal of Applied Behavioral Science*, 44(3), 365–390.
- Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From national systems and 'mode 2' to a triple helix of university-industry-government relations. *Research Policy*, 29, 109–123.
- Farrell, G. (2005, July 14). Ebberts gets 25 years for fraud at WorldCom. *USA Today*, p. 1B.
- Feltham, C. (2004). Problems are us: Or is it just me? Suffolk, UK: Braiswick. Retrieved February 27, 2010, from <http://books.google.com/books?hl=en&lr=&id=2DVbpvid56wC&oi=fnd&pg=PA1&dq=dystechnia&ots=qjXjCIURMF&sig=U4pDzcGPK-CSGfo6reTDIGmO2Hk#v=onepage&q=dystechnia&f=false>.
- Florida, R. L., & Kenney, M. (1990). *The Breakthrough Illusion: Corporate America's Failure to Move from Innovation to Mass Production*. New York: Basic Books.
- Freeman, A. (1999). 'New paradigm' or New World Order? *The Return of Classical Imperialism and the Dynamics of the US Boom*. Working paper of the International Working Group on Value Theory. University of Greenwich, London, UK. Retrieved February 27, 2010, from <http://www.iwgv.org/files/00freeman.rtf>
- Flynn, K. (2010). Mary Kay Cosmetics. In *The Handbook of Texas Online*. Retrieved July 26, 2010, from Texas State Historical Association Website <http://www.tshaonline.org/handbook/online/articles/dhm01>.
- Follette, G. (2004, November). The formative years: Frozen foods. *ASHRAE Journal*, 46(11), S35–S41.
- Frost, R. L. (1991). *Alternating Currents: Nationalized Power in France, 1946–1970*. Ithaca, NY: Cornell University Press.

- Foster, J., & Metcalfe, S. (Eds.). (2001). *Frontiers of Evolutionary Economics: Competition, Self-organization and Innovation Policy*. Northampton, MA: Edward Elgar Publishing, Inc.
- Galagan, P. A. (1991). Tapping the power of a diverse work force. *Training and Development Journal*, 45(3), 38–44.
- Garud, R., & Rappa, M. A. (1994). A socio-cognitive model of technology evolution: The case of cochlear implants. *Organization Science*, 5(3), 344–362.
- Garud, R., & Nayyar, P. (1994). Transformative capacity: Continual structuring by inter-temporal technology transfer. *Strategic Management Journal*, 15(5), 365–385.
- Glaser, B., & Strauss, A. (1967). *The Discovery of Grounded Theory*. Hawthorne, NY: Aldine.
- Gleick, J. (1987). *Chaos: Making a New Science*. New York: Viking.
- Grover, R. (2004, May 17). He built a better mouse. *Business Week*, (3883), 20.
- Gubbins, E. (2005, July 11). Truth & punishment. *Telephony*, 246(14), 17.
- Halpern, D. F. (1989). The disappearance of cognitive gender differences: What you see depends on where you look. *American Psychologist*, 44(8), 1156–1158.
- Hamilton, W. H. (1932). Institution. In E. R. A Seligman & A. Johnson (Eds.), *Encyclopaedia of the Social Sciences* 8 (pp. 84–89). (Reprinted in G. Hodgson (Ed.) (1993) *Economics of Institutions. The International Library of Critical Writings in Economics* 33. Aldershot, UK: Edward Elgar Publishing.)
- Hedberg, B. (1981). How organizations learn and unlearn? In P. C. Nystrom & W. H. Starbuck (Eds.), *Handbook of Organizational Design* (pp. 8–27). London: Oxford University Press.
- Herbert, R. F. & Link, A. N. (1982). *The Entrepreneur*. New York: Praeger Publishers.
- Hindle, B., & Lubar, S. D. (1986). *Engines of Change: The American Industrial Revolution, 1790–1860*. Washington, DC: Smithsonian Institution Press.
- Honan, P. (1989, July). The power brokers: Stepping out from IBM's shadow—Rod Canion. *Personal Computing*, 12(7), 79.
- Hoselitz, B. F. (1960). *Sociological Aspects of Economic Growth*. Glencoe, IL: Free Press.
- Hunt, E. S., & Murray, J. M. (1999). *A History of Business in Medieval Europe, 1200–1550*. New York: Cambridge University Press.
- Jagger, A. M. (1983). *Feminist Politics and Human Nature*. Totowa, NJ: Rowman & Allanheld.
- Jones, G. G., & Wadhvani, D. (2006). *Schumpeter's Plea: Rediscovering History and Relevance in the Study of Entrepreneurship* (HBS Working Paper Number 06-036). Harvard Business School, Boston, MA.
- Kehoe, L., & Lambert, R. (1998, March 6). That creepy feeling: FT Interview Andy Grove: The chairman and chief executive of Intel, the world's biggest chipmaker, talks to Louise Kehoe and Richard Lambert about the dangers of "missing a turn" [London edition]. *Financial Times*, 17.
- Keeney, J. (2002, October). Innovators hall of fame. *Fortune Small Business*, 12(8), 112.
- Kilmann, R. H., Saxton, M. J., & Serpa, R. (1985). *Gaining Control of the Corporate Culture*. San Francisco: Jossey-Bass.
- Kline, S. J., & Rosenberg, N. (1986). An overview of innovation. In R. Landau & N. Rosenberg (Eds.), *The Positive-Sum Strategy* (pp. 275–305). Washington, DC: The National Academy Press.
- Knight, F. H. (1921). *Risk, Uncertainty and Profit*. Boston: Houghton Mifflin Company.
- Kuhn, T. S. (1970). *The Structure of Scientific Revolutions* (2nd ed.). Chicago: University of Chicago Press.
- Long, W. (1983). The meaning of entrepreneurship. *American Journal of Small Business*, 8(2), 47–59.

- Louis, M. (1985). An investigator's guide to work place culture. In P. Frost, L. Moore, M. Louis, C. Lundberg & J. Martin (Eds) *Organisational Culture*, Beverly Hills: Sage Publications.
- Maddison, A. 1982. *Phases of Capitalist Development*. New York: Oxford University Press.
- Mandelbrot, B. (1982). *The Fractal Geometry of Nature*. New York: W. H. Freeman and Company.
- Martin, J. (1992). *Cultures in Organizations: Three Perspectives*. New York: Oxford University Press.
- Maxwell, J. A., (1996). *Qualitative Research Design: An Interactive Approach*. Thousand Oaks, CA: Sage Publications, Inc.
- McFarland, L. (1998). Chapter 1, Shared visions: European and American interests in education and training for an innovative work force – A synthesis of conference themes and papers. *New Visions: Education and Training for an Innovative Workforce* (National Center for Research in Vocational Education MDS-1073, University of California at Berkeley). Retrieved February 23, 2010, from <http://ncrve.berkeley.edu/Abstracts/MDS-1073/MDS-1073-CHAPTER.html>.
- Mehta, S. N. (2002, March 4). Worldcom's bad trip. *Fortune*, 145(5), 91–94.
- Miner, J. B. (2006). *Organizational Behavior 2*. Armonk, NY: M.E. Sharpe.
- Mintzberg, H. (1989). Crafting strategy. *Harvard Business Review* 65(4), 66–75.
- Nee, E. (1999, November). The geek elite. *Fortune*, 140(9), 220–223.
- Nelson, R. R., & Winter, S. G. (1982). *An Evolutionary Theory of Economic Change*. Cambridge, MA: Harvard University Press.
- Nonaka, I. (1988). Creating organizational order out of chaos: Self-renewal in Japanese Firms. *California Management Review*, 30(3), 57–73.
- Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, 5(1), 14–37.
- North, D. C. (1990). *Institutions, Institutional Change, and Economic Performance: Political Economy of Institutions and Decisions*. Cambridge: Cambridge University Press.
- O'Toole, J., Galbraith, J., & Lawler III, E. E. (2002). When two (or more) heads are better than one: The promise and pitfalls of shared leadership. *California Management Review*, 44(4), 65–83.
- The Oxford English Dictionary* (1933). First edition, J. A. H. Murray, Oxford: Clarendon Press.
- The Pink Producers (1981). Who is Mary Kay Ash? Retrieved July 26, 2010, from <http://pinkproducers.com/wp-content/uploads/2010/01/Who-is-Mary-Kay-Ash.pdf>
- Polanyi, K. (1966). *Dahomey and the Slave Trade: An Analysis of an Archaic Economy*. Seattle, WA: University of Washington Press.
- Polanyi, M. (1958). *Personal Knowledge*. Chicago: The University of Chicago Press.
- Reis, E. (2008, October). A man for his people. *Mechanical Engineering*, 130(10), 32–35.
- Reisman, A. (1989). Technology Transfer: A Taxonomic View. *Journal of Technology Transfer*, Summer–Fall, 31–36.
- Rogers, E. M. (1995). *Diffusion of Innovations* (4th ed.). New York: Free Press.
- Rogers, E. M., & Shoemaker, F. F. (1971). *Communication of Innovations: A Cross-cultural Approach* (2nd ed.). New York: Free Press.
- Rogowski, S. J. & Reilly, E. D. (2000). *Encyclopedia of Computer Science* (4th ed.). Chichester: John Wiley and Sons Ltd.
- Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94(5), 1002–1037.
- Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, 98(5/2), S71–S102.



- Routti, J. (2003, June 2). Research and Innovation in Finland – Transformation into a Knowledge Economy. In *Competitiveness and the Knowledge Economy Research and Innovation Strategies: Cases of Chile and Finland*. Paper presented at the Inter-American Development Bank, Washington, DC.
- Rowley, D. (2007, February 3–9). Black history reveals pioneering entrepreneurs. *Afro-American Red Star*, 115(25), A6–A7.
- Sahal, D. (1981). *Patterns of Technological Innovation*. London: Addison-Wesley.
- Say, J. B. (1836). *A Treatise on Political Economy; or the Production, Distribution, and Consumption of Wealth* (C. R. Prinsep & C. C. Biddle, Trans.). Philadelphia: Grigg & Elliot. (Original work published 1803.)
- Schein, E. (1990). Organizational culture. *American Psychologist*, 45, 109–119.
- Schermerhorn, J. R. Jr., Hunt, J. G., & Osbourn, R. N. (1982). *Organizational Behavior*. New York: John Wiley & Sons, Inc.
- Schickel, R. (1998, December 7). Walt Disney: Ruler of the Magic Kingdom. *Time*, 152(23), 124–126.
- Schon, D. (1983). *The Reflective Practitioner: How Professionals Think in Action*. New York: Basic Books.
- Schumpeter, J. (1911/1934). *The Theory of Economic Development*. Cambridge, MA: Harvard University Press.
- Schumpeter, J. A. (1934). *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle* (R. Opie, Trans.). Cambridge, MA: Harvard University Press. (Original work published 1912.) (Reprinted Piscataway, NJ: Transaction Publishers, 1983.)
- Schumpeter, J. A. (1942). *Capitalism, Socialism and Democracy*. New York: Harper and Brothers. (5th ed. London: George Allen and Unwin, 1976).
- Scott, W. R. (2001). *Institutions and Organizations*. Thousand Oaks, CA: Sage Publications, Inc.
- The Secret of Wal-Mart's Success. (1992, July). *Money*, 21(7), 24.
- Selznick, P. (1948). Foundations of the theory of organization. *American Sociological Review*, 13(1), 25–35.
- Senge, P., Kleiner, A., Roberts, C., Ross, R. Roth, G., & Smith, B. (1999). *The Dance of Change*. New York: Doubleday.
- Senge, P. M. (1990). *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday/Currency.
- Shannon, C. E., & Weaver, W. (1949). *The Mathematical Theory of Communication*. Urbana, OH: University of Illinois Press.
- Simon, H. A. (1959). Theories of decision-making in economics and behavioral science. *American Economic Review*, 49(3), 253–283.
- Simon, H. A. (1969). *Sciences of the Artificial*. Cambridge, MA: MIT Press.
- Sipp, C. M. (2011). Why, when and how are real options used in strategic technology venturing? Dissertation manuscript in preparation, The George Washington University School of Business, Washington, DC.
- Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics*, 70(1), 65.
- Solymossy, E. (1998). Entrepreneurial dimensions: The relationship of individual, venture, and environmental factors to success. *Dissertation Abstracts International*, 59(05), 1667 (UMI No. 9833914).
- Sternberg, R. J., & Frensch, P. A. (Eds.). (1991). *Complex Problem Solving: Principles and Mechanisms*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Stewart, M. R. (2011). Technology entrepreneurship: A deliberation on success and failure in technology venturing toward a grounded theory of dystechnia.

- Dissertation manuscript, The George Washington University School of Business, Washington, DC.
- Strauss, Anselm L. 1995. *Qualitative Analysis for Social Scientists*. San Francisco: Cambridge University Press.
- Teece, D. J., Pisano, G. and Schuen, A. (1992). Dynamic capabilities and strategic management. Mimeo, Haas School of Business, University of California, Berkeley, CA.
- Theodhosi, A. S. (2000). May the worst man win. *Strategy & Leadership*, 28(3), 28–31.
- Thomas, L. & Donsky, M. (1990, June). Selling, rather than sitting. *Southern Living*, 25(6), 96–101.
- Tornatzky, L. and Fleischer, M. (1990). *The Process of Technology Innovation*. Lexington, MA: Lexington Books.
- Turn the telescope within. (2002, December 9). *Chennai*, p. 1.
- Valentine, V. (2001, May/June). A'Lelia Bundles on the legacy of Madame C.J. Walker. *The New Crisis*, 108(3), 52–53.
- Vanderbilt University (2010). *Fractals and the Fractal Dimension*. Retrieved January 14, 2011, from <http://www.vanderbilt.edu/AnS/psychology/cogsci/chaos/workshop/Fractals.html>.
- von Braun, C. (1997). *The Innovation War*. Upper Saddle River, NJ: Prentice Hall.
- von Hippel, E. (1988). *The Sources of Innovation*. Cambridge, MA: MIT Press.
- von Seggern, D. (2007). *CRC Standard Curves and Surfaces with Mathematics* (2nd ed.). Boca Raton, FL: CRC Press.
- Waldrop, M. M. (1992). *Complexity: The Emerging Science at the Edge of Order and Chaos*. New York: Simon & Schuster, Inc.
- Warsh, D. (2006). *Knowledge and the Wealth of Nations: A Story of Economic Discovery*. New York: W. W. Norton & Company, Inc.
- Waters, R. (1997, December 2). Westinghouse name passes into history. *Financial Times [London Edition]*, 29.
- Weber, K. E. M. (1947). *The Theory of Social and Economic Organizations* (A. M. Henderson & T. Parsons, Trans.). New York: Free Press.
- Wenger, E. (2004). Knowledge management as a doughnut: Shaping your knowledge strategy through communities of practice. *Ivey Business Journal*, 68(3), 1.
- Wiig, K. (1993). *Knowledge Management Foundation*. Arlington, TX: Schema Press.
- Wright, J. S. (1972). Leaders in marketing: Henry G. Parks, Jr. *Journal of Marketing*, 36(3), 70–71.
- Yesterday's Man. (2002, May 4). *Economist*, 363(8271), 64.
- Zaltman, G., Duncan, R. & Holbek, J. (1973), *Innovations and Organizations*, New York: Wiley.
- Zarley, C. (1997, November 16). Rod Canion. *Computer Reseller News*, (763), 25–26.
- Zellner, W. (2004, August 9). Sam Walton: King of the discounters. *Business Week*, (3895), 12.
- Zucker, L. G. (1983). Organizations as institutions. In S. B. Bacharach (Ed.). *Research in the Sociology of Organizations* [Vol. 2]. Greenwich, CT: JAI Press, Inc.

# 3

## Obsessed Maniacs and Clairvoyant Oracles: Empirically Validated Patterns of Entrepreneurial Behavior

*Elias G. Carayannis and McDonald R. Stewart*

### **Introduction**

In the realm of the social sciences, much business and economic theory is devoted to the construction of frameworks that describe complex organizational systems: the group, the firm, the industry and the institution. Underlying these interdependent and concentric layers of business structure are individuals whose actions antecede and propel the formation of new business organizations. The precursive enactor is termed the “entrepreneur”. Each starts with a blank page, an idea and the urge to proceed, and individual entrepreneurial initiatives create organizations (firms) that spawn industries, which in turn give rise to institutions. Complex business and economic systems are created, revised, destroyed and replaced by the successive and evolutionary execution of entrepreneurial ambition.

Entrepreneurship encompasses a unique place in the spectrum of business management: maneuvering from zero to something—intentionally a functioning and preferably economically viable organization, and ideally one that can sustainably perform and thrive, even in the later absence of the founding entrepreneur after they have moved on. Multifaceted challenges in new venture formation demand rare and exceptional skills and qualities of an entrepreneur, particularly in technology-driven environments where the forecasting and management of R&D and innovation amplify the factors and magnitude of uncertainty and risk. An entrepreneur’s ability to predict the future or in fact to anticipate and shape via strategic knowledge arbitrage (“enlightened insights”) and serendipity (“happy accidents”) (SKARSE™) competences (Carayannis, 2008a, 2008b; Carayannis et al., 2011)—or a relentless pursuit of such a self-assured vision—demands thinking and learning. Indeed, it requires higher-order learning and, more specifically, learning-to-learn and learning-to-learn-how-to-learn (Carayannis, 2000a, 2000b, 2002, 2008a, 2008b, 2009, 2011, 2012; Carayannis & Sipp 2010;

Carayannis et al., 2006), which is highly specialized and to a great extent aberrant because of the unpredictable and precarious proposition of starting a new business venture, which is particularly tenuous in technology markets, where competitive and environmental forces are markedly turbulent and stochastic. The successful technology entrepreneur acts as firebrand of cultural and sociotechnical evolution in identifying and unlocking economic opportunities embedded in emerging technologies and kindling the markets in which these technologies commercially proliferate. In short, the technology entrepreneur in our emerging and empirically grounded theory behaves as a SKARSE™ enactor.

Of necessity, the entrepreneur is extremely focused yet flexible, demonstrating a relentless intensity of purpose while adapting that purpose with nimble dexterity as events unfurl and conditions change. Moreover, the distinguished entrepreneur will accurately predict events and conditions before they occur, to permit the strategic positioning of the venture for optimal advantage. We find that two terse descriptors—“obsessed maniacs” and “clairvoyant oracles” (OMCO)—encapsulate the critical attributes that are most conducive to superior entrepreneurial performance. This chapter examines the OMCO factors that contribute to the new venture’s fate, attributable to the entrepreneur as the enactor of endogenous economic change and hopefully growth, independent of or in spite of myriad market challenges.

## **Theoretical background**

### **The drive for innovation**

Invention is a singular event, born of science, research, discovery, creativity and serendipity—and invention does not always impact on or influence technology. Innovation is an interactive process: the cultivation of knowledge, materials and methods into economic practice for improved competitive advantage, born of engineering, development, customization and evolution; plus science, research, discovery, creativity and serendipity. Innovation is not just invention, but an economically viable adaptation, improvement or application of a technology via the exploration and exploitation (March, 1998) of “happy accidents” and “enlightened insights” (SKARSE™ in action) (Carayannis, 1992, 1993, 1994a, 1994b, 1994c, 1998, 1998–2011, 1999a, 1999b, 2000a, 2000b, 2001, 2002–2009, 2004, 2008a; Carayannis & Alexander, 1999, 2002, 2004; Carayannis & Campbell, 2006, 2009; Carayannis & Chanaron, 2007; Carayannis & Gonzalez, 2003; Carayannis et al., 2003, 2006, 2007; Carayannis & Juneau, 2003; Carayannis & Sipp, 2006; Carayannis & Stewart, 2007–2011; Carayannis & von Zedtwitz, 2005).

Florida and Kenney (1990) describe invention as a technical breakthrough, while innovation is a commercial actualization. Hindle and Lubar (1986) view invention as the creative origin of a new process that enables

innovation. Innovation in turn has a social, economic and financial impact. Kline and Rosenberg (1986, pp. 285–287) emphasize the recursive nature of the innovative process, discounting the linear model, “one does research, research then leads to development, development to production, and production to marketing,” and amplifying the reciprocating roles of science and knowledge in the innovation process, “not only that innovation draws on science, but also that the demands of innovation often force the creation of science.” The products of scientific research in the laboratory and technological innovation in commercial markets form a feedback loop, with each driving the other, derived from each other.

Afuah (2003) confirms that invention is the creation of a new possibility, but innovation develops that possibility to usefulness or marketability, “the use of new knowledge to offer a new product or service that customers want. It is invention + commercialization.”

Carayannis and Gonzalez (2003) offer this consolidated interpretation of innovation as a function of the creative collective of the market, both supply side and demand side:

Innovation is a word derived from the Latin, meaning to introduce something new to the existing realm and order of things or to change the yield of resources as stated by J. B. Say, quoted in Drucker.

(Drucker, 1985)

In addition, innovation is often linked with creating a sustainable market around the introduction of new and superior product or process. Specifically, in the literature on the management of technology, technological innovation is characterized as the introduction of a new technology-based product into the market:

Technological innovation is defined here as a situationally new development through which people extend their control over the environment. Essentially, technology is a tool of some kind that allows an individual to do something new. A technological innovation is basically information organized in a new way. So technology transfer amounts to the communication of information, usually from one organization to another.

(Tornazky & Fleischer, 1990)

The broader interpretation of the term “innovation” refers to an innovation as an “idea, practice or material artifact” (Rogers & Shoemaker, 1971, p. 19) adopted by a person or organization, where that artifact is “perceived to be new by the relevant unit of adoption” (Zaltman et al., 1973). Therefore, innovation tends to change perceptions and relationships at the organizational level, but its impact is not limited there. Innovation in its broader socio-technical, economic, and political context, can also

substantially impact, shape, and evolve ways and means people live their lives, businesses form, compete, succeed and fail, and nations prosper or decline.

(Carayannis & Gonzalez, 2003)

### **Dynamics of technology evolution**

The literature on innovation describes several mechanisms in multiple categories whereby the trajectory of a technology S-curve is formed. Carayannis et al. (2003) offer a useful presentation of the forces and influences that define and shape the evolution of technology performance.

At the beginning of an emerging technology lifecycle, there is a discovery or invention that shows promise in addressing a social need or delivering a new technological capability. Emergence and early growth accelerate from this outset, to maximum growth at inflection, which is shaped by the interplay of two forces: “technology push” (also called “supply push”) and “market pull” (also called “demand pull”). With technology push, producers devise and introduce new technology to the market, showcasing their “better mousetrap,” making a new solution available before demand is created. With market pull, consumers express unfulfilled wants and needs, urging for a better way of doing things, creating economic incentive for suppliers to provide a new solution.

Later growth, diminishing after the maximum growth at inflection and leveling off at maturity (ultimately dwindling into obsolescence), is also shaped by the interplay of two converse forces that are antipodal to those in earlier operation: “technology pull” and “market push” (Carayannis, 1998–2011; Carayannis et al., 2003; Carayannis & Stewart, 2007–2011). With technology pull, producers cannibalize old technology investments to sustain their returns and suppress disruptive innovations for as long as possible, perhaps until the fundamental physics upon which the technology is built reaches its natural limit. With market push, industry or regulatory standards, market alliances and other societal constraints suppress incremental improvements. Notwithstanding the persistence of efforts to extend the plateau of technology maturity, obsolescence of the earlier technology is inevitable, effectively occurring when the technical performance per dollar (or the cumulative adoption) of the disruptive, radical newer technology exceeds the level of the older technology (i.e., the new S-curve crosses above the prior S-curve). Once these curves cross, there is a cascade of additional investment in the new technology, with resultant economies of scale and market adoption, steepening the emerging curve while hastening the decline and obsolescence of the mature technology.

The critical determinant of the emergence and growth of a technology is innovation. Innovation is the cultivation of knowledge, materials and methods into economic practice for improved competitive advantage. It is

the transformation of an invention generated by scientific activity into a socially usable product, changing economics from supply terms to demand terms, and increasing the value and satisfaction obtained from resources by the consumer. To wit, innovation is the market actualization of better ideas (Carayannis, 1998–2011, 2009; Carayannis et al., 2003; Carayannis & Stewart, 2007–2011; Stewart & Carayannis, 2011).

### **The role of the entrepreneur in technology venture formation**

An entrepreneur is an agent of change: the seminal actor who conceives and implements a new business venture, impelling a new economic entity from ideation to functional reality. The entrepreneur assumes the risks of forming a business or enterprise, organizing and managing every facet of its emergence.

Åstebro and Thompson (2007) affirm that the entrepreneur must be a business jack-of-all-trades with substantive technical savvy and a project manager extraordinaire to also integrate systems in 21st-century commercial complexity.

Interpreting Schumpeter (1942), entrepreneurship is the recognition and exploitation of opportunity—a recombinant or novel deployment of resources—the envisioning, planning and implementing of mechanisms to create economic opportunity. Entrepreneurship seeks to shift the established means of economic creation and control, strategically reappointing economic resources from established pathways to innovative pathways (Stewart & Carayannis, 2011, p. 2).

Drucker (1985, p. 21) underscores Say's most famously quoted adage: "The entrepreneur shifts economic resources out of an area of lower and into an area of higher productivity and greater yield." This is achieved through technological innovation, the "specific instrument of entrepreneurship" (Drucker, 1985, p. 30).

In the context of the Mode 3 innovation ecosystem (Carayannis & Campbell, 2006, 2009) and the C3 construct of co-opetition, co-specialization and co-evolution (Carayannis, 2004, 2008a, 2008b; Carayannis & Gonzalez, 2003; Carayannis & Campbell, 2006, 2009; Carayannis & von Zedtwitz, 2005), Carayannis (2008b, 2009) discusses heterogeneity dynamics, pertaining to the diversity of factors underpinning the inputs, processes and outputs which govern innovation and adaptation. According to Carayannis (2008b, 2009) (Figure 3.1),

Input, process and output heterogeneity deals with the issue of value creation in a socioeconomic context:

- *Input heterogeneity* refers to the variety and diversity of the key inputs to economic activity, namely, land, labor, capital, technology and entrepreneurship as identified by Adam Smith, Ricardo, and Joseph

Schumpeter among others. Intrinsic in all these inputs is knowledge, which has been increasingly the key source of value adding of most human endeavors.

- *Process heterogeneity* reflects the variety and diversity intrinsic in the ways that the key inputs to economic activity are leveraged, allocated, re-combined and re-created as part of the processes of technology innovation and entrepreneurship aiming at the maximization of value added.
- *Output heterogeneity* reflects the diverse ways and means that the value added of economic activity combining and leveraging the key inputs discussed earlier, is captured and exploited, namely, number and size of firms, firm performance, market concentration, number and rate of renewal of products and services, as well as public-private sector partnerships structure and performance, to name a few.

(Carayannis, 2008b, 2009)

The significance of these heterogeneity dynamics to the role of the technology entrepreneur in venture formation operates at the microlevel of socio-economic analysis with respect to the concepts illustrated in figures 2.10 and 2.11. This leads to two additional crucial theoretical constructs: sustainable entrepreneurship and robust competitiveness (Carayannis, 2008b, 2009):

- *Sustainable entrepreneurship*—the creation of viable, profitable and scalable firms that engender the formation of self-replicating and mutually enhancing innovation networks and knowledge clusters, leading towards what we call robust competitiveness.
- *Robust competitiveness*—a state of economic being and becoming that affords systematic and defensible “unfair advantages” to certain entities. It is built on mutually complementary and reinforcing low-technology, medium-technology and high-technology public-sector and private-sector organizations (government agencies, private firms, universities and non-governmental organizations).

(Carayannis, 2008b, 2009)

The key success factors for sustainable entrepreneurship—one of the major pillars of robust competitiveness—are illustrated (Figure 3.2) to show the microlevel stages, drivers and determinants of heterogeneity dynamics.

An entrepreneur’s ability to assess innovative economic opportunity amounts to an aptitude for predicting the future (or this person’s firm belief in possessing such ability). Relentless, self-confident pursuit of this vision represents specialized and exceptional thinking, learning and decision-making. These factors are the distinguishing qualities of entrepreneurs that Carayannis (1998–2011; Carayannis & Gonzalez, 2003) terms “obsessed maniacs” and “clairvoyant oracles.”



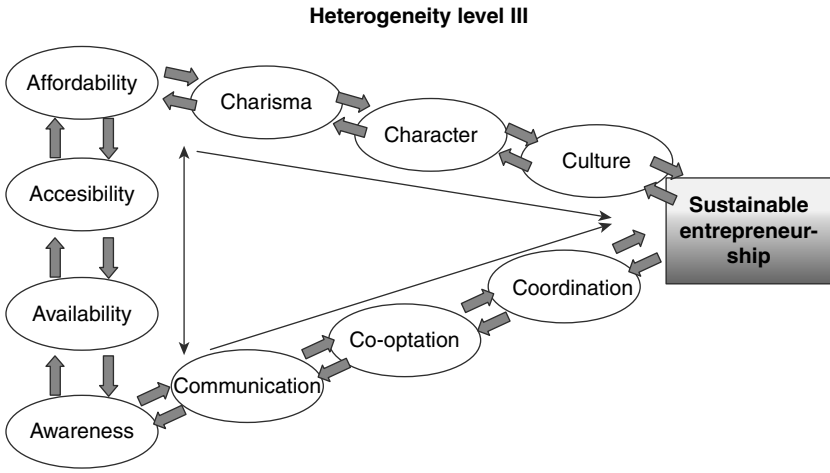


Figure 3.1 Heterogeneity dynamics—the microlevel stages, drivers and determinants  
 Source: Reprinted from Carayannis (2008b, 2009).

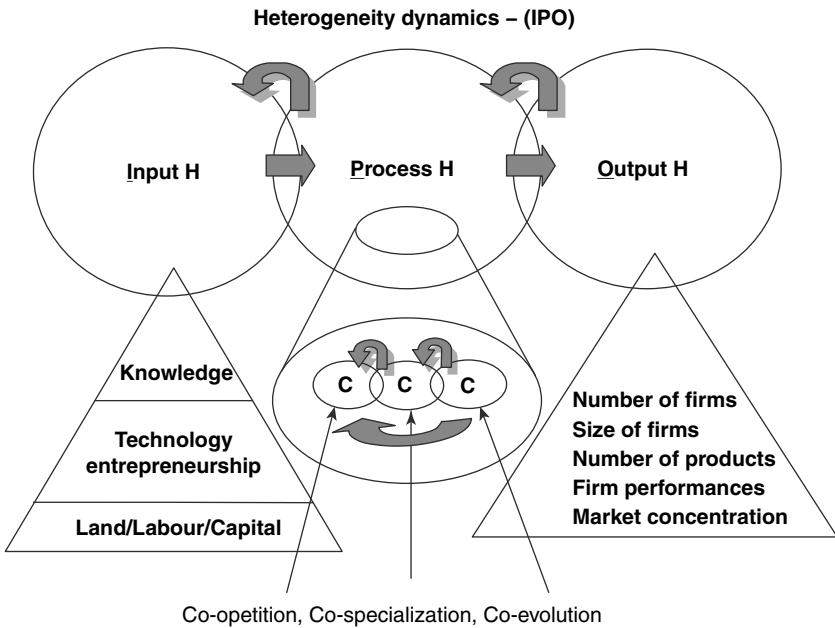


Figure 3.2 Heterogeneity dynamics—co-opetition, co-evolution and co-specialization  
 Source: Reprinted from Carayannis (2008b, 2009).

### **Purpose of this research**

This research is part of a larger qualitative study in grounded theory-building. The explicit objective of this component is to identify and illuminate the intrinsic characteristics of entrepreneurial actors and their actions, building and enriching a common vocabulary within the specifically narrow emerging field of technology entrepreneurship, and informing the scholarly framework of technology entrepreneurship toward a unifying grounded theory.

### **Method**

#### **Triangulation of complementary data sources**

Primary data were collected from surveys and interviews with a specifically targeted subject pool of technology entrepreneurs. Supporting data were drawn from a collection of entrepreneurial profiles and interview reports prepared by graduate students in business venturing and entrepreneurship classes, following open-ended templates of suggested interview topics. Literature review data were drawn from published sources: biographical and historical accounts of publicly known entrepreneurial individuals obtained by extensive library research.

#### **Data-inclusion criteria**

In each of the three data sources, data records have been compiled to represent some aspect(s) of the nature, actions or experiences of a subject technology entrepreneur, the entrepreneur reflecting the unit of analysis of this study. Only data records that meet the following inclusion criteria were retained:

- Subject must be or must have been a technology entrepreneur. For the purpose of this study, technology entrepreneur is defined as a principal actor in the founding of at least one technology-driven or technology-based business venture, whether or not the venture(s) persisted as (a) going concern(s).
- For the definition of this research, technology venturing involves the creation or implementation of new technology-driven or technology-based for-profit business organizations.
  - In technology-driven businesses, the profit is fully dependent on the creation or implementation of new technology (Sipp, 2011) or innovations in the use or deployment of existing technology. Technology-driven firms compete to produce the technologies to sustain and advance their customers (supply side) (Carayannis & Formica, 2008). From this latter perspective, the term “supply side” denotes

that the firm operates on the supply side of commerce—developing, implementing and selling technology.

- In a technology-based business, the profit is enabled and supported by technology, but technology itself is not necessarily the product, service or experience being sold (Sipp, 2011). Technology-based firms depend on the adoption and use of technologies produced by other firms (demand side) (Carayannis & Formica, 2008). From this latter perspective, the term “demand side” denotes that the firm operates on the demand side of commerce—buying, adopting and utilizing technology.
- For the definition of this research, entrepreneurship entails all phases of conception, planning, implementation and start-up.

### **Data-exclusion criteria**

Data records that meet the following exclusion criteria were rejected as null:

- franchisees, who are not really entrepreneurs but contract to an existing business formula;
- entrepreneurs who have launched start-ups based on non-technological goods or services or pre-established technology-neutral markets and technology-neutral deployments and delivery mechanisms;
- inventors and self-employed operators who have not founded a formal business entity and attempted to bring a venture conception to market;
- self-employed professional practitioners (e.g., doctors, dentists, management consultants, caterers and decorators) unless they have established their enterprise with a competitively differentiating technological innovation.

### **Data-collection procedure**

Open-ended interviews were conducted under confidentiality agreements with 33 technology entrepreneurs vetted against the above criteria. Four of the subjects were serial entrepreneurs who reported multiple ventures, for a total of 38 ventures. Of this primary subject pool, interview questions (a)–(j) were asked as follows.

- (a) Would you be willing to describe in depth your experiences that led you to give your answers to question(s) asked in the foregoing EPS Form (1)–(15)?
- (b) With respect to your reported experiences, how do you define success and failure? What are the characteristics of outcomes that you see as unacceptable in terms of what you originally set out to accomplish vs. what really unfolded?

- (c) Can you recall examples of intentional strategic preparation and planning and in terms of people, connections, knowledge, processes or any other factors that impacted the course of your business venturing?
- (d) Can you recall examples of unexpected “happy accidents” in terms of people, connections, knowledge, processes or any other factors that impacted on the course of your business venturing?
- (e) How much of your specific experience in this venture seemed as if it was excessively beyond your control? Which parts and in what ways?
- (f) Were there instances when, try as you might, you simply could not make things happen the way you thought they should?
- (g) Were you ever driven to drastically alter or compromise your plans, your perspective, your standards or your commitments in the name of the larger mission and would you be willing to share examples? Anything illegal/unethical/or that even just bothered your conscience? How were you cheated?
- (h) Are you willing to relate the gaps or “white space” in your target market and comment on the validity of your expectations, and elaborate on how the venture development played out, with what adjustments?
- (i) In terms of both your positive motivations and determination to surmount obstacles, could you elaborate on your persistence and drive? Were there personal sacrifices and, if so, of what nature? Were you able to accomplish what you set out to do? Any damaged relationships, personal regrets or health problems?
- (j) What do you recall most favorably about your entrepreneurial experience? Was it worth it? Would you do it again?

On the whole, subjects were very willing to candidly discuss their experiences. Although no subjects dropped out mid-interview, a very small number simply declined to respond to certain lines of inquiry, but it was much more often the case that a subject would spontaneously reveal private facts without prompting. All interviews were transcribed to word-processed files as originally recorded, then verified by a separate proofreader.

The contributed reports from graduate students covered 26 technology entrepreneurs, vetted against the same criteria for inclusion or exclusion, containing narrative responses to elements of this template:

- (a) Historical background of founding entrepreneur and of entrepreneurial venture—what were the overarching motivations and trigger events along with any long-term planning—what were the facilitating and the impeding elements?
- (b) Business plan development, idea screening and opportunity recognition, including evaluation of alternative ventures and business ventures.
- (c) Analysis of sources of venture financing (personal/family funds—friends, family and fools, angels, venture capital, strategic alliances,

Small Business Innovation Research/Small Business Development Center funds, other private/public funds)—what worked for the entrepreneur or not, why, how and when?

- (d) Analysis of essential venture business functions—marketing, finance, manufacturing, brand management, fund-raising, customer management, employee recruitment, training and retention, competitive intelligence, strategic alliances and so on.
- (e) Lessons learned and critical success/failure factors in venture initiation and development—would the entrepreneur do it again and in the same way or differently—when, how, why, with whom and for whom?
- (f) Other pertinent venture lifecycle issues from the entrepreneur's perspective.
- (g) Other issues at the heart of the matter—what insights does the entrepreneur volunteer unasked—what might be considered surprising?

The biographical data consisted of 64 compact published articles from library sources covering 20 technology entrepreneurs, vetted against the same criteria for inclusion or exclusion.

### **Data-processing methodology**

The specific methodology for processing the data from this point was as follows:

- The researcher visually parsed each word-processed interview transcript, narrative report and biographical article to flag key points of data and information, and to develop categorical codes from the words and concepts found within the data text (thematic coding).
- The researcher interpreted the flagged findings to develop a code book of the terms that emerged from the patterns and themes found in the data text, handling words and passages carefully to organize the data into conceptual categories, not to impose categorical expectations on the data. Ely (as cited in Langton, 2005, p. 103) defines themes to be one of these two instances:
  - a statement of meaning that runs through all or most pertinent data;
  - one in the minority that carries heavy emotional or factual impact.
- Working back and forth between the coded text excerpts and the concept dictionary, the researcher consolidated thematically comparable passages from the data into the resultant categories, grouping the excerpts to produce tables of evidentiary text in a data book that supports the thematic categorizations (thematic analysis).
- The researcher performed cognitive, interpretive assessment and evaluation of findings to formulate inductively interpreted insights by

comparing and contrasting the multidimensional factors of the 33 different primary subject profiles, 26 supporting subject profiles and 20 biographical subject profiles (grounded theory-building).

## Results

### Assimilating a grounded theory of the technology entrepreneur

This research attempts to establish some critical factors attributable to the entrepreneur as the originator of new organizations of economic creation and control, specifically investigating what defines and distinguishes an entrepreneur. The analysis and findings from the data-processing methodology permits the remolding of the data into an interpreted grounded theory of the entrepreneur, as summarized in Tables 3.1 and 3.2.

### Evaluation of the findings

By the qualitative nature of the origin of the grounded theoretical framework, none of the theme components are afforded any quantitative value—neither relative nor absolute. The grounded theory shows that the reported elements are observed and interpreted to be factors that are salient to the nature of entrepreneurs. No determination can be made of the degree to which each factor operates in modeling the mechanisms of technology entrepreneurship. This is a limitation of this research, but deeper qualitative interpretation is feasible:

*Table 3.1* Interpreted grounded theory of the entrepreneur: entrepreneurial constitution—what the entrepreneur might have

Thematic dimension	Thematic code category	Theme component
Constitution: What the technology entrepreneur might have	Personal characteristics	Knowledge, experience Creativity, innovativeness Natural salesmanship, ability to sell idea, persuasiveness Exceptional credibility, reputability Intelligence, analytical ability Knowledge of what they don't know Knowledge of what is outside personal span of control Egocentrism Aggressiveness
	Actively positioning for opportunity	Resourcefulness Vision, seeing what others don't see Innate entrepreneurial personality, intuition Idealism, entrepreneurial upbringing Adaptability, versatility

Experiencing good fortune	Happy accidents
Drive and perseverance	Workaholism Personal ambition Perfectionism, control issues Exaggerated optimism, passion, excitement, loving what they do
Risk orientation	Risk affinity
Ethics	Integrity

---

Source: Adapted from Stewart (2011).

## Discussion

### Assessment of the intrinsic characteristics of entrepreneurial actors and actions

Applying the grounded theory against the research objective, we pose two questions about the intrinsic characteristics of entrepreneurial actors and actions, as shown below:

*What are the qualities and attributes that characterize an entrepreneur in terms of technology venturing?*

The answer to this research question is drawn from the theme components from the first two dimensions presented in Table 3.2. These 46 themes emerged from the aggregated data analysis to denominate the spectrum of qualities and attributes of technology entrepreneurs that could be observed or reported in the findings from their profile and interview data. One limitation to this research is that data saturation cannot be affirmed; it is unknowable how many additional qualities and attributes might be ascribed given additional data, but this research supports these 46.

*When, how and why are the specific attributes of “obsessed maniac” and “clairvoyant oracle” (Carayannis, 1998–2011; Carayannis & Gonzalez, 2003) observed?*

To address this inquiry requires the construction of a linkage between the grounded theory interpreted from the findings and the meanings ascribed to the terms drawn from the literature, “obsessed maniac” and “clairvoyant oracle.” Beginning with an abundance of dictionaries, and looking to each word alone, the researcher must impose interpretations on these resources as well. Assimilating several sources, the term “obsessed” might be best described as “possessing a compulsive preoccupation with a fixed idea.” This researcher suggests that a concise connotation of “maniac” is “one possessed of an excessively intense enthusiasm, interest, or desire.” “Clairvoyant” distills to

*Table 3.2* Interpreted grounded theory of the entrepreneur: entrepreneurial behaviors—what the entrepreneur might do

<b>Thematic dimension</b>	<b>Thematic code category</b>	<b>Theme component</b>
Behaviors: What the technology entrepreneur might do	Personal characteristics	Makes something Knows what isn't known and does something about it Learns to be an entrepreneur
	Actively positioning for opportunity	Lives in the present but dreams of the future Strategically networks and makes alliances Pursues merger, acquisition or venture partnering Invests in strategic plans, market-targeting goal-setting Invests personal resources in business idea Accepts change Makes the best of a bad situation
	Experiencing good fortune	Discovers talent Finds unexpected market opportunity Wings it without a plan Gains windfalls Makes their own luck scenarios and goes after them aggressively Was rejected or underappreciated by former employer
	Drive and perseverance	Always moves ahead Never gives up Is willing to make sacrifices and endures hardship
	Risk orientation	Practices risk management and risk reduction
	Fairness, sense of justice, civility	Believes it's business, not personal Cultivates healthy relationships within business
	Personal health and well-being, relationships—positive impacts	Maintains a healthy balance Finds family support



“having acute intuitive insight or perceptiveness.” An “oracle” in its most generic connotation is a person who can offer wise counsel or prophetic opinions.

These terms do not seem to apply in their entirety to the majority of research subjects in this study. Themes are found that correspond to varying degrees to the theoretical constructs of obsessed maniac or clairvoyant oracle, but very infrequently are these attributes all found in the same entrepreneur. Of these suggestive themes, there is also a spectrum of manifestations, such that one entrepreneur’s data qualitatively indicate a more extreme degree of one attribute than another, but assessing the degree of thematic factors is beyond the limits of this study.

The themes from the code book developed in this research that most closely evoke obsession are:

- *drive and perseverance*—workaholism;
- *drive and perseverance*—perfectionism, control issues;
- *drive and perseverance*—difficulty accepting rejection of ideas, stubborn, never giving up;
- *personal health and well-being, relationships*—negative impacts; neglect of personal friendships/relationships/leisure.

The themes that most closely evoke mania are:

- *personal characteristics*—aggressiveness;
- *experiencing good fortune*—“happy accidents”; winging it without a plan;
- *drive and perseverance*—personal ambition, restless, always moving ahead;
- *drive and perseverance*—exaggerated optimism, passion, excitement, loving what they do;
- *personal health and well-being, relationships*—negative impacts; symptoms of anxiety, stress and pressure as part of the job.

The terms “clairvoyant” and “oracle” are so similar in connotation that they are indistinguishable within the resolution of the thematic findings. The themes that most closely evoke “clairvoyant oracle” are:

- *personal characteristics*—natural salesperson, ability to sell idea, persuasiveness;
- *actively positioning for opportunity*—vision, seeing what others don’t see;
- *actively positioning for opportunity*—investing personal resources in business idea;
- *experiencing good fortune*—make your own luck scenarios and go after them aggressively.

### **Exemplars from the data book to illustrate obsessed maniacs and clairvoyant oracles**

Selecting passages from the foregoing evocative themes within the data book developed in this research, the following interpretive analysis and illustrative quotations provide evidence to support the entrepreneurial descriptors “obsessed maniac” and “clairvoyant oracle”.

#### *Drive and perseverance—workaholism*

One theme related to both drive and perseverance and prevalent among all the data sets is workaholism. The entrepreneur who has contracted with themselves to make good on countless promises by positioning for the best opportunities is very likely consigned to fulfill many functional roles in an emerging venture, and at the same be possessed of the motivation to perform multiple full-time and part-time jobs in parallel, since once the enterprise is put in motion the rewards for its success are presumably ample, and the penalties for its failure abhorrent. Such is the obsessed conviction of the entrepreneurial workaholic. Examples include:

To get as far as we did, I spent a great deal of time and energy, traveling, days away from home, 60-hour work weeks from Sunday evening to Friday night.

It's so all-consuming—you're spread so thin. At the outset you literally are always working on it, substituting human capital for the thin financial capital—that's why it's called sweat equity. The mind is focused on this one thing. Friends who have not participated in starting a business won't understand and think you are obsessed. You have to be obsessed to build it—you have to be!

McGowan returned home in May, barely a month after the surgery. By July, he was at work half-days. Last month, he returned to his desk full time—“a normal full day,” he says, “not those crazy full days” of the past. His energy now is much greater than before his heart attack, his wife reports. In fact, when a physician told her that McGowan probably had a “silent” heart attack years ago and had been working at only about half capacity ever since, she said to herself, “Oh, my God, doctor, if you only knew!”

(Cook, 1987)

#### *Drive and perseverance—Perfectionism, control issues*

The theme of perfectionism and control issues surfaced in many instances among the data sets, concentrating and extending the driven persistence of some entrepreneurial subjects onto those around them, sometimes to an obsessive degree. Some excerpts that exhibit this are as follows:

I tend to be a perfectionist and probably should have released the product sooner.

I always got everything to go the way I thought they should.

This is the most difficult time of my life—I am a doer and I can make people do things, but if I can't I feel I have failed.

Because quality and cleanliness were near obsessions with Kroc (his oft-quoted motto: "If you have time to lean, you have time to clean"), he automated as many operations as possible and instituted rigid training programs at "Hamburger University" for franchise owners, whom he required to manage their own stores. Many who came in contact with Kroc over the years complained of his abrasive manner and large ego, but his insistence on absolute conformity to his ideas was largely the reason for the chain's success.

(Davids, 1999)

*Drive and perseverance—Difficulty accepting rejection of ideas, stubborn and immobile*

Difficulty accepting rejection of ideas, stubbornness and immobility forge another prevalent theme—a sense of single-minded purpose—akin to egocentrism but imposed obsessively on the venture and the others engaged in its formation and operation. The following instances evince the interpretation of this theme:

On day one I had no clue where I was going with this, but I just did not want to quit. I had been in another golf equipment company that went broke, but I couldn't bear to walk away.

It wasn't easy to test ideas dealing with hardware—I went too much on "gut" about what the market wanted and what we could do technically. Perhaps more market research for real testing would have made sense, but ego is a massive fuel and a real bad drug. The market can call your baby ugly but you don't want to hear it, and then you react like you've picked the wrong customers before admitting that you've built the wrong product.

*Personal health and well-being, relationships—Negative impacts: neglect of personal friendships/relationships/leisure*

A relatively minor but frequent theme describes the personal toll that entrepreneurial obsession can take, such as in this example:

Personal sacrifice? Just to put it in perspective, I have no life. On Facebook I'm engaged to my company. No health problems, but I've gained

about 40 lbs. It's difficult to talk about anything outside the company. No strained relationships because there aren't any.

During Subject G23's "most" entrepreneurial days (first venture), the time and personal commitment required for the business put such a huge strain on his personal relationship (his marriage) that it resulted in a divorce. It also permanently destroyed his relationship with his first partner (his best friend).

*Personal characteristics—Aggressiveness*

Aggressiveness here is beyond assertive, ambitious self-confidence; it's a conspicuous or even brazen public display of dominant posturing—acts of competitive, territorial cocksureness; possibly blatant threats; or conversely, provocative but productive cage-rattling—acts suggestive of mania as portrayed in the excerpts below:

Subject G2 learned three very important lessons from this episode. Lesson number one was that regulators are concerned with only two things, keeping their files straight and keeping their jobs. The only way to get their attention is to threaten one or the other.

Scott McNealy encountered heavy criticism during the economic downturn, forcing him to justify his research and development spending as Sun lost market share and prestige. "People have been calling us irrelevant, dead, a zombie, a takeover target, not worth taking over. We've been insulted about every way you can imagine," he said. "All of sudden, we are relevant, we're growing, making money, gaining share." Sun has introduced new products and strategies this year that have generated buzz for a company many thought was on the decline. The resurgence shows why it's best to spend money to develop new products, and why Dell and H-P aren't serious competitive threats, Mr. McNealy said in an interview. Dell has simply proved it knows how to sell computers, he said, and H-P hasn't done enough to innovate. "Everybody who's doing PCs is not in the computer business. They're PC distributors," he said. "The only two computer companies in the PC business are Intel and Microsoft."

(Crayton, 2004)

While Moore and Noyce were quiet and calm, Grove was volatile. During a business review, Grove would explode, "That's nonsense!" A heated discussion would ensue. The episode would typically end with a thoughtful summary and proposed solution from Moore. The review would then proceed until Grove erupted again. Grove would surface the issues (albeit not very diplomatically) that required discussion and could profit from the insights of Moore and Noyce. While no pushovers, Moore and Noyce's style would not necessarily have surfaced the tough issues. The three

members of the Office were opposites. Yet they were able to convert their differences into compliments rather than conflicts. Indeed the group regarded conflict to be healthy Grove wrote about “constructive confrontation” as a means to surface tough issues and discuss them from all sides.

(O’Toole et al., 2002, pp. 70–71)

*Experiencing good fortune—Happy accidents: winging it without a plan*

This theme of happy accidents pertains to “seat-of-the-pants” opportunism when unplanned avenues of commerce just unfold in a surprising sequence of good fortune or less-than-judicious, perhaps slightly manic, impulse, as exemplified in the following instances from the data:

My team was part of a smaller subcontractor hired to build hardware. After the original contract ended, I left with the intent to start a company and hire another CEO because I did not have any specific business experience, but I was appointed CEO by the founding team.

Subject G11 reported, “Plans? We started off as a software company and now we build flying cars, equipment boxes for Humvees and diagnostic tools for the B2 bomber. I would say that we adjusted regularly. As we started getting contracts to develop things, customers would come back to us and ask us, ‘do you think that you can do this?’ and a new business opportunity would be created.” “We try to never say ‘no’ to anyone when they ask us about a project. At the same time we try and capitalize on everything we discover as well. Our proprietary wafers are the result of trying to come up with a lightweight material to build Skyrider with, but it has also become ballistics armour and high strength tool boxes. We also try and capitalize on relationships we already have.”

*Drive and perseverance—Personal ambition, restless, always moving ahead*

The theme of drive and perseverance also encompasses personal ambition, which may indeed serve as the underlying motivator for the entrepreneurial workaholic. Ambition may be about money, pride, ego, fame and other contributing factors that inspire a subject to foray into entrepreneurship, at times exhibiting a degree of mania. Examples include:

Opportunity comes from a whim or a notion of, “Hey! I’d like to be able to do this.” But does anybody else want it, do you care about it enough to make it happen—and make it last? Do you have the passion and the commitment? A startup is like having a child.

Subject G2’s old company [that he had been squeezed out of by the VC’s board of directors] had gone bankrupt and all of its assets had been sold

at auction. An attorney who had done business with that prior company while Subject G2 was still at the helm who knew him personally purchased the name and intellectual property of the firm. He then offered to revive the company, provide it with financing, and give Subject G2 a 51% ownership stake if he would come back and retake the helm. Although flattered by the offer, Subject declined. “It was everything an entrepreneur could ever hope to ask for, but I had moved on from where I was before and that company was in my past.”

Imbued with a perception of his own importance on a stage where everything from telephony to music distribution to consumers’ relationships with technology is being disrupted, [Steve] Jobs felt there was simply no time to lose. This understanding has fueled the rapid-fire pace of his actions and his obsession with “what’s next?” in products (although he would never rush to market a product he thought imperfect). It may have also fed his often harsh, dictatorial, and somehow still-inspiring management style.

(Koehn, 2009)

Once her revenues reached \$10 a week, her husband tried to persuade her to slow down. But Madame Walker, as she became known, had bigger ambitions. She set up an office in Pittsburgh, a factory in Indianapolis, and a salon in New York City. She built a sales force of 2,000 mainly black women who were trained in hairdressing and in sales techniques at company-run schools.

(Nulty, 1992, p. 116)

*Drive and perseverance—Exaggerated optimism, passion, excitement and loving what they do*

A sense of exaggerated optimism, passion and excitement for what they do was expressed by many subjects among the data sets, demonstrating an enthusiasm beyond what most people would muster for a work-related proposition, and sometimes exhibiting an appetite for their craft bordering on mania. The following instances evince the interpretation of this theme:

An obvious thing to say would be that my best moment was the sale of the company. That was nice, but the best thing was between flop 1 and flop 2—we were going to partner with another group. I had \$20k left and \$20k payroll coming up and then the teaming partner sent a letter backing out. My stomach dropped. This was the death knell. I drove home and cried and told no one. After a sleepless night I called a big competitor and their CEO asked how soon could I make a proposal to his Board? I went to California on no sleep for days, but then landed a \$6M licensing deal

which changed everything back to right again. This was the crowning glory—to be out on the edge of the cliff, even to fall—but then I caught a branch on the way down!

He reports that everyone wants to “fly with their own wings” but most people choose not to start a new business because they see obstacles as disadvantages rather than challenges. G12 states that his entrepreneurial spirit is a disease that does not allow him to see the bad side of starting a business. In his own words, “the best way is always the hardest anyway.”

Kroc’s intense personality and his vision of a national fast-food chain dominated McDonald’s from Day One. He was short-tempered, politically conservative, tireless and perpetually optimistic. An extraordinary motivator, Kroc fired up his troops with maxim that adorn company bulletin boards to this day. “Free enterprise will work if you will,” was a favorite.

(Carlson, 1989)

All of this has made the industry buzz with speculation that Sun, one of the vendors hardest hit by the dot-com and telecom blowouts, might not make it through the economic downturn. The company’s stock price sunk lower and lower, trading below \$3 last month. But through it all, the irrepressible McNealy has remained confident, and his company has continued to launch new products . . . an always-confident McNealy continues to see Sun’s cup as half full.

(Montalbano, 2002)

*Personal health and well-being, relationships—Negative impacts: symptoms of anxiety, stress and pressure as part of the job*

All data sources confirm the ubiquity of anxiety, stress and pressure as part of the entrepreneur’s job, sometimes taking on manic proportions as evinced in this sampling of incidences:

The contract laws that ultimately resulted in my forced sale and all that was involved was debilitatingly stressful. I don’t care to relive the details.

As far back as anyone can remember, Bill McGowan was a workaholic. His workweek was usually seven days, his workday 12 to 15 hours. “I wasn’t asleep,” he explains now. “What else would I do?” He never exercised. He drank cup after cup of coffee and smoked three packs of Larks a day.

(Cook, 1987)

*Personal characteristics—Natural salesperson, ability to sell idea, persuasiveness*

Many subjects exhibit a flair for communicating with enthusiasm their beliefs in their venture propositions, and intrinsically recognize the

imperative for coalition-building, team-building and strategic alliances as prelude to and in parallel with selling their products or services. The interpretation of this theme is that the entrepreneur foremost is selling themselves, then in succession selling the venture concept, the business relationships, and then finally the business deliverables. Entrepreneurship involves making countless promises: promises to make things happen, promises that plans can be made to work out, promises to solve technical problems, and promises to pay or repay quantities of cash in exchange for the faith in the entrepreneur's ability to deliver on all of these simultaneous promises. Often the ability to deliver on any one promise is a function of being able to deliver on them all. The venture initiation becomes real when these promises become binding contracts. The system of interdependencies that the entrepreneur constructs is also dynamic, comprising many other actors and factors over which they may have little control beyond the power of persuasion—to persuade others to make things go, or conversely perhaps to persuade them to sit still and not run off until other things can be made to happen.

Sometimes not only do these circumstances reflect entrepreneurial obsession and mania, but the champion must be as convincing as a clairvoyant oracle. On the subject of salesmanship and the art of persuasion, the data book offers a few examples:

Strategy is selling from optimistic truth; with leadership like a con man—selling the employees, selling the investors, selling the customer—but from the heart like a white knight.

The message is: whatever business you're in, you are selling a service—otherwise it's just another product.

By 1995, Jobs was back in the news with a renewed relationship with Apple. Apple's very existence was in doubt until he persuaded Apple's long-time adversary, Microsoft, and its chairman, Bill Gates, to invest \$150 million in Apple.

(Rogowski & Reilly, 2000, p. 662)

In the same way that Henry Ford realized that by keeping selections limited (e.g., color choice: black) he could mass-produce economical cars, Kroc kept the menu simple and the standardization high, to mass-produce economical meals. Each patty, for example, had to weigh exactly 1.6 ounces and be exactly 0.221 inches thick. Manuals documented to the second how to make a shake. Then, through massive advertising, Kroc enticed Americans to recognize their need for his product. As Kroc once cleverly said, "The definition of salesmanship is the gentle art of letting the customer have it your way."

(Davids, 1999, p. 35)



*Actively positioning for opportunity—Vision, seeing what others don't see*

Vision is a multidimensional theme that encompasses foresight and inspiration, an extrasensory quality that empowers the entrepreneur to perceive deficiencies in technical capabilities, market needs or possibly both, and formulate new arrangements of matter, energy and information—molded and enacted via human behaviors and relationships that are not yet scripted—to satisfy the void or simply improve the way in which the human world works. For many, vision is capricious and arbitrary, a tacit and elusive phenomenon. Others report cultivating and honing a willful prescience through practice. By whichever vision emanates, it impresses a weighty impact on the movements of entrepreneurship, and undergirds the notion of clairvoyant oracle. Instances are abundant in all three data sets:

I've always had the opinion that advertising is not the only revenue source on-line. Inspiration came from when I used to be a photographer and couldn't believe how little my work was worth as stock photos. Then at National Geographic I built an extranet and international licensing people started using it for distribution of content to affiliates. But video multimedia starting around 2008, made it crash and there was no system available to solve this problem. No system could handle the streaming and the massive content and the various formats all at once. So I quit that company and set out to build such a system. I spent the next six months getting a team together and started to strategize on how to make it go.

My system was designed to permit project managers in the construction trade to track their field workers' hours and work performance by the workers using their cell phones as mobile data terminals. This was in an era when all the construction workers had begun using cell phones, but there was not a lot of Internet familiarity in the trade, and construction managers were not big on computers. This absence of technology seemed particularly prevalent in the niche craft where I started. My system let the field guys punch in a few codes and the office received a consolidated report of everybody's time allocations by jobsite and task.

I had thought that I was selling a product, but when I switched over to a custom service I made an unsalable product worth \$1000 per custom set!

Growing up in communist regime, Subject G3 longed for being able to practice journalism in a censorship-free environment. This aspiration became possible when he relocated to North America. While screening opportunities, he took notice of the emerging Internet and clearly saw the full potential of this new communication tool. According to G3, the majority of media professionals in mid-1990s considered the Internet

“fourth medium”, inferior to TV, radio, and newspaper. G3 on the contrary, regarded the Internet as “first medium”. The reasons are twofold. First, the Internet not only has the individual power of newspaper, radio, and TV but it also can combine their individual effects—prints, sound and vision—in a single platform. Second, the Internet is superior to these media because it can reach far greater number of people at a relatively low cost . . . One critical factor contributing to G3’s company’s success is its strategy to preempt and dominate the Internet news service before its competitors. The timing was perfect. When the company was founded, most of its target customers had noticed English on-line news but could not find comparable service in Chinese version.

When McGowan looked at the problem his way—from more than one direction—he noticed two things. First, no one could explain to his satisfaction why AT&T deserved its long-distance monopoly. “People said AT&T is so smart and so loved and so big,” he recalls. “Or they said that’s just the way it is. But I once worked for a railroad that had its own phone system, switchboards and all, so I knew better.” Second, he could see that a lean competitor with lower overhead could underprice the giant.

(Nulty, 1992, p. 112)

But Jobs, the co-founder of Apple Computer Inc., saw with startling clarity something few people realized: Computers would not be confined to the laboratories of government and industry; rather, they would become the stuff of everyday life. He forced this development relentlessly—sometimes using his boyish charm and sometimes his fury—by developing “friendly” computers that were small, attractive, inexpensive, and easy to use.

(Nulty, 1992, p. 114)

As one of the most remarkable pioneers in chip technology, Moore has been in the unusual position of defining a law and then making sure it applies. The diminishing size and increasing speed of chips are the driving forces of technological advancement, and Intel, under the leadership of Moore, Robert Noyce and CEO Andy Grove, has changed the focus of buyers from the machine itself to the chip inside. Moore has been at the heart of the new alchemy of computer science for almost four decades, happily admitting he’s been at the right place at the right time on more than a few occasions. Moore’s progress has been prescient to an uncanny degree.

(Edwards, 1994)

*Actively positioning for opportunity—Investing personal resources in business idea*

This theme describes the commitment that the entrepreneur is willing to make in terms of personal finances or other resources—to get a concept

off the ground, to nourish and nurture a fledgling enterprise, or perhaps to prove dedicated “skin in the game” as an appeal to other investors. The illustrative excerpts from the data demonstrate these entrepreneurs’ faith in their own sense of clairvoyant oracle:

We had lots of cash flow problems beyond our control, and I had to keep personally investing out of pocket to pay bills.

During expansion phases—hiring and buying stuff before money comes in—it is a little hairy. We have been self-capitalized and bootstrapped, and I’ve put more in from myself if there were shortfalls. I’ve taken no outside sources of capital.

The only advice Subject G24 could give to an aspiring entrepreneur about financing is that you will “mind the store” a whole lot better if it is your own money at risk—and not someone else’s.

McGowan took control of MCI after paying off its debt himself, and for the next two decades he chipped away at AT&T, first at its control of long-distance service and, when that cracked, at its customer base. He moved MCI to Washington, D.C., all the better to lobby in the halls of government and attack in the federal courts.

(Nulty, 1992, p. 112)

*Experiencing good fortune—Make your own luck: go after it aggressively*

Several subjects recounted more methodical means of encouraging good fortune, whether happy accidents of any description came their way. Rather than wait for some elusive convergence of coincidence and circumstance, which no subjects outwardly advocated, the savvy approach is to plan for potential opportunities and maneuver into position to elevate the chance of beneficial returns—a calculated gamble, on the hunch of a clairvoyant oracle. Several instances are found in the data:

The closest thing to strategic planning we had was that we were opportunistically prepared—we would specifically invest in software or skills for staff even if only vaguely related to things we thought we might like to be able to do—up to a reasonable level—simply so if an opportunity presented itself, someone on staff would know something about that application. We called it “popcorn software”. It was our primary source of organic growth.

One time I gave my crew a two-day free-for-all to come up with new ideas and recommend changes while the executives were at a conference. This led to the cell phone interface that made the Singapore contract possible. I wish the engineers could often be given more time to just explore, with less pressure to deliver a product and curb costs.

I am a synergist entrepreneur; I don't go into the lab and invent a new widget. I look for the trends and try to see where there will be a convergence—to look for multiple non-linear advantages and opportunities—that's where you want to be, to make your entrance.

## Conclusion

This research constructs a thematic grounded theory of the technology entrepreneur, specifically looking for—and finding—evidence of the descriptors “obsessed maniac” and “clairvoyant oracle.”

To investigate our premise, we conducted comprehensive surveys and interviews with 33 founding entrepreneurs, comparatively analyzing their experiences against complementary data sources to develop personal profiles of critical attributes and behavioral characteristics. Employing qualitative analytic techniques, we find the data rich in empirical evidence to support a perspective of the entrepreneur as an obsessed maniac and a clairvoyant oracle, plus many other intrinsic characteristics of personality, motivation, intention and action that constitute the entrepreneurial actor.

This research has provided an emerging and empirically validated conceptual platform for envisioning and then enacting key constructs of what triggers, catalyzes and sustains entrepreneurial thought, choice and action. These constructs are built around the key concepts of strategic knowledge serendipity and arbitrage (SKARSE™), higher-order technological learning, fractal Mode 3 innovation ecosystems and as well as co-opetition, co-evolution and co-specialization processes, all helping to profile, diagnose and predict the behavioral attributes of the technology entrepreneur as an obsessed maniac and a clairvoyant oracle.

## References

- Afuah, A. (2003). *Innovation Management; Strategies, Implementation, and Profits*. New York: Oxford University Press.
- Åstebro, T., & Thompson, P. (2007). *Does it Pay to be a Jack of all Trades?* Unpublished manuscript, University of Toronto.
- Carayannis, E. G. (1992). *An Integrative Framework of Strategic Decision Making Paradigms and their Empirical Validity: The Case for Strategic or Active Incrementalism and the Import of Tacit Technological Learning* (RPI School of Management Working Paper Series No. 131). Rensselaer Polytechnic Institute, Troy, NY.
- Carayannis, E. G. (1993). Incrementalisme Strategique. *Le Progrès Technique*, 93(2), i–vi.
- Carayannis, E. G. (1994a, June 27–29). *A Multi-national, Resource-Based View of Training and Development and the Strategic Management of Technological Learning: Keys for Social and Corporate Survival and Success*. Paper presented at 39 International Council of Small Business Annual World Conference, Strasbourg, France.
- Carayannis, E. G. (1994b). The strategic management of technological learning: Transnational decision-making frameworks and their empirical effectiveness. *Dissertation Abstracts International*, 55(11), 3564 (UMI No. 9511131).

- Carayannis, E. G. (1994c). Gestion Strategique de l'Acquisition des Savoir-Faire. *Le Progrès Technique*, 94(1), 37–39.
- Carayannis, E. G. (1998). Higher order technological learning as determinant of market success in the multimedia arena; a success story, a failure, and a question mark: Agfa/Bayer AG, Enable Software, and Sun Microsystems. *Technovation*, 18(10), 639–653.
- Carayannis, E. G. (1998–2011). *Lectures in Numerous Courses Covering Topics on Technology, Innovation, Entrepreneurship, Business Venturing, and Project Management*. Unpublished lecture notes, The George Washington University School of Business, Washington, DC.
- Carayannis, E. G. (1999a). Knowledge transfer through technological hyperlearning in five industries. *Technovation*, 19(3), 141–161.
- Carayannis, E. G. (1999b). Fostering synergies between information technology and managerial and organizational cognition: The role of knowledge management. *Technovation*, 19(4), 219–231.
- Carayannis, E. G. (2000a). Investigation and validation of technological learning versus market performance. *Technovation*, 20(7), 389–400.
- Carayannis, E. G. (2000b). *The Strategic Management of Technological Learning*. Boca Raton, FL: CRC Press.
- Carayannis, E. G. (2001). *The Strategic Management of Technological Learning: Learning to Learn-how-to-learn in High Tech Firms and its Impact on the Strategic Management of Knowledge, Innovation and Creativity within and across Firms*. Boca Raton, FL: CRC Press.
- Carayannis, E. G. (2002–2009). Doctoral seminar in the management of science, technology and innovation (MSTI). Unpublished lecture notes, The George Washington University School of Business, Washington, DC.
- Carayannis, E. G. (2004). Measuring intangibles: Managing intangibles for tangible outcomes in research and innovation. *International Journal of Nuclear Knowledge Management*, 1(1/2), 49–67.
- Carayannis, E. G. (2008a). Knowledge-driven creative destruction, or leveraging knowledge for competitive advantage: Strategic knowledge arbitrage and serendipity as real options drivers triggered by co-opetition, co-evolution and co-specialization. *Industry and Higher Education*, 22(6), 343–353.
- Carayannis, E. G. (2008b). Conceptual framework for an analysis of diversity and heterogeneity in the knowledge economy and society. In E. G. Carayannis, A. Kaloudis, & Å. Mariussen (Eds.), *Diversity in the Knowledge Economy and Society: Heterogeneity, Innovation and Entrepreneurship* (Ch. 5, pp. 95–116). Cheltenham, UK: Edward Elgar.
- Carayannis, E. G. (2009). Firm evolution dynamics: Towards sustainable entrepreneurship and robust competitiveness in the knowledge economy and society. *International Journal of Innovation and Regional Development*, 1(3), 235–254.
- Carayannis, E. G. (2012). SKARSE in action. *NVTC Magazine*, December.
- Carayannis, E. G., & Alexander, J. (1999). Winning by co-opeting in strategic government-university-industry (GUI) partnerships: The power of complex, dynamic knowledge networks. *Journal of Technology Transfer*, 24(2/3), 197–210.
- Carayannis, E. G., & Alexander, J. (2002). Is technological learning a firm core competence; when, how, and why? A longitudinal, multi-industry study of firm technological learning and market performance. *Technovation*, 22(10), 625–643.

- Carayannis, E. G., & Alexander, J. (2004). Strategy, structure and performance issues of pre-competitive R&D consortia: Insights and lessons learned from SEMATECH. *IEEE Transactions of Engineering Management*, 51(2), 226–232.
- Carayannis, E. G., & Campbell, D. F. J. (Eds.). (2006). *Knowledge Creation, Diffusion, and Use in Innovation Networks and Knowledge Clusters: A Comparative Systems Approach across the United States, Europe, and Asia*. Westport, CT: Praeger Publishers.
- Carayannis, E. G., & Campbell, D. F. J. (2009). “Mode 3” and “Quadruple Helix”: Toward a 21st century fractal innovation ecosystem. *International Journal of Technology Management*, 46(3/4), 201–234.
- Carayannis, E. G., & Chanaron, J.-J. (Eds.) (2007). *Leading and Managing Creators, Inventors, and Innovators: The Art, Science, and Craft of Fostering Creativity, Triggering Invention, and Catalyzing Innovation*. Westport, CT: Quorum/Greenwood.
- Carayannis, E. G., Evans, D., & Hanson, M. (2003). A cross-cultural learning strategy for entrepreneurship education: Outline of key concepts and lessons learned from a comparative study of entrepreneurship students in France and the US. *Technovation*, 23(9), 757–771.
- Carayannis, E. G., & Formica, P. (Eds.) (2008). *Knowledge Matters: Technology, Innovation and Entrepreneurship in Innovation Networks and Knowledge Clusters*. London: Palgrave Macmillan.
- Carayannis, E. G., & Gonzalez, E. (2003). Creativity and innovation = competitiveness? When, how, and why. In L. V. Shavinina (Ed.), *International Handbook on Innovation* (Part VIII, Ch. 3, pp. 587–606). Oxford, UK: Elsevier Press.
- Carayannis, E. G., & Juneau, T. (2003). *Idea Makers and Idea Brokers in High-Technology Entrepreneurship: Fee vs. Equity Compensation for Intellectual Venture Capitalists*. Westport, CT: Praeger/Greenwood.
- Carayannis, E. G., Popescu, D., Sipp, C. M., & Stewart, M. R. (2006). Technological learning for entrepreneurial development (TL4ED) in the knowledge economy (KE): Case studies and lessons learned. *Technovation*, 26(4), 419–443.
- Carayannis, E. G., Provance, M., & Givens, N. (2011). Knowledge arbitrage, serendipity and acquisition formality: Their effects on sustainable entrepreneurial activity in regions. *IEEE Transactions in Engineering Management*, 58(3), 564–577.
- Carayannis, E. G., & Sipp, C. M. (2006). *e-Development Towards the Knowledge Economy: Leveraging Technology, Innovation and Entrepreneurship for Smart Development*. London: Palgrave Macmillan.
- Carayannis, E. G., & Caroline Sipp (2010). Why, When, and How are Real Options used in Strategic Technology Venturing? *Journal of the Knowledge Economy*, 1(2): 70–85.
- Carayannis, E. G., & Stewart, M. R. (2007–2011). *Numerous Courses Covering Topics on Technology, Innovation, Entrepreneurship, Business Venturing, Information Systems, and Project Management*. Unpublished lecture notes, The George Washington University School of Business, Washington, DC.
- Carayannis, E. G., & von Zedtwitz, M. (2005). Architecting gloCal (global-local), real-virtual incubator networks (G-RVNs) as catalysts and accelerators of entrepreneurship in transitioning and developing economies: Lessons learned and best practices from current development and business incubation practices. *Technovation*, 25(2), 95–110.
- Carayannis, E. G., Ziemnowicz, C., & Spillan, J. E. (2007). Economics and Joseph Schumpeter’s theory of creative destruction: Definition of terms. In E. G. Carayannis & C. Ziemnowicz (Eds.), *Re-discovering Schumpeter: Creative Destruction Evolving into “Mode 3”* (pp. 23–45). London: Palgrave Macmillan.

- Carlson, E. (1989, May 23). American entrepreneurs: McDonald's Kroc bloomed late but brilliantly. *Wall Street Journal (Eastern edition)*, 10, p. 1.
- Cook, W. J. (1987, October 19). The CEO who got a new heart. *U.S. News & World Report*, 103(16), 60.
- Crayton, H. (2004, October 7). Sun Microsystems CEO says rivals are merely distributors. *The Dallas Morning News*, 5 p. 1.
- Davids, M. (1999). Ray Kroc (1902–1984): Flipping over efficiency. *The Journal of Business Strategy*, 20(5), 34–35.
- Drucker, P. F. (1985). *Innovation and Entrepreneurship*. New York: Harper & Row Publishers, Inc.
- Edwards, O. (1994, December 5). Gordon Moore. *Forbes*, 12 158–159.
- Florida, R. L., & Kenney, M. (1990). *The Breakthrough Illusion: Corporate America's Failure to Move from Innovation to Mass Production*. New York: Basic Books.
- Hindle, B., & Lubar, S. D. (1986). *Engines of Change: The American Industrial Revolution, 1790–1860*. Washington, DC: Smithsonian Institution Press.
- Kline, S. J., & Rosenberg, N. (1986). An overview of innovation. In R. Landau & N. Rosenberg (Eds.), *The Positive-Sum Strategy* (pp. 275–305). Washington, DC: The National Academy Press.
- Koehn, N. (2009, November 23). His legacy. *Fortune*, 160(10), 110.
- Langton, P & Kammerer, D. (2005). *Practicing sociology in the community: A student's guide*. Pearson: Upper Saddle River, NJ.
- Montalbano, E. (2002, November 18). 2002 top 25 executives: Scott McNealy. *CRN*, (1021), 11 104–105.
- Nulty, P. (1992, March 23). The national business hall of fame. *Fortune*, 125(6), 112–118.
- O'Toole, J., Galbraith, J., & Lawler III, E. E. (2002). When two (or more) heads are better than one: The promise and pitfalls of shared leadership. *California Management Review*, 44(4), 65–83.
- Rogowski, S. J., & Reilly, E. D. (2000). *Encyclopedia of Computer Science* (4th ed.). Chichester, UK: John Wiley and Sons Ltd.
- Schumpeter, J. A. (1942). *Capitalism, Socialism and Democracy*. New York: Harper and Brothers (5th ed. London: George Allen and Unwin, 1976).
- Sipp, C. M. (2011). *Why, When and How are Real Options used in Strategic Technology Venturing?* Dissertation manuscript in preparation, The George Washington University School of Business, Washington, DC.
- Stewart, M. R., & Carayannis, E. G. (2011). *Dystechnia—A Model of Technology Rejection and Implications for Entrepreneurial Opportunity*. Manuscript in preparation, The George Washington University School of Business, Washington, DC.
- Stewart, M. R. (2011). *Technology entrepreneurship: A deliberation on success and failure in technology venturing toward a grounded theory of dystechnia*. Dissertation manuscript, The George Washington University School of Business, Washington, DC.
- Tornatzky, L. G., Fleischer, M., & Chakrabarti, A. K. (1990). *The Processes of Technological Innovation*. Lexington, Mass.: Lexington Books.

# 4

## Dystechnia: A Model of Technology Deficiency and Implications for Entrepreneurial Opportunity

*McDonald R. Stewart and Elias G. Carayannis*

### **Introduction**

Technology is a major factor in the evolution of human organization. Technology embodies the cumulative totality of human learning, and it permits the dissemination and leveraging of knowledge and know-how interpersonally through cultural exchange, or remotely by way of artifacts possessed of embedded technology. Technology increases the economic yield of human endeavors, which multiplies the resources and opportunity for further exploration, discovery and innovation of yet more advantageous technologies.

This chapter examines dystechnia as a driver of technology entrepreneurship: entrepreneurship seeks to shift the established means of economic creation and control; technology can enable dramatic efficiencies of scale and scope to facilitate entrepreneurial objectives. Technology entrepreneurship seeks to shift economic opportunities from established firms and industries to new ventures by the introduction or modification of new technology inventions or innovations.

An entrepreneur's ability to predict the future (or this individual's confident belief in possessing such ability) and relentless, self-confident pursuit of this vision represent specialized and exceptional thinking, learning and decision-making because of the innately unpredictable and precarious proposition of launching a new business venture, especially in technology markets which are turbulent.

Many behavioral attributes, thought processes and decision strategies of entrepreneurs may seem markedly radical or aberrant if benchmarked against managerial best practices at the level of the firm, industry or



institution. It poses a very different set of challenges to advance a business from concept to start-up than to sustain or grow a going concern. But what are the salient traits or behaviors that spell success, and how might they be codified and measured? And how is success or failure evaluated?

This research attempts to establish some critical factors attributable to the entrepreneur as the originator of new organizations of economic creation and control—independent of market challenges—specifically investigating what defines and distinguishes an entrepreneur and how the individual characteristics of the entrepreneur can be evaluated against entrepreneurial outcomes.

An interdisciplinary theory base draws from literature and vocabulary in the fields of entrepreneurship, management science, organizational theory, economics, philosophy, psychology and sociology. The research focuses on the following topical areas of inquiry:

- *Intrinsic characteristics of entrepreneurial actors and actions*, including,
  - “When, how and why are the specific attributes of ‘obsessed maniac’ and ‘clairvoyant oracle’ (Carayannis, 1998–2011) observed?”
- *Actionable benchmarks for practitioners and stakeholders*, including:
  - “What strategies can an entrepreneur or venture partner employ to recognize and remedy dystechia (Stewart & Carayannis, 2011) to create opportunities for advantage?”
  - “When, how and why are higher order learning (Carayannis, 1993, 1994b, 1994c, 1998, 1999a, 1999b, 2000a, 2000b, 2008a; Carayannis & Alexander, 2002) competences and capabilities observed and enacted?”
  - “When, how and why should ‘Strategic Knowledge Serendipity’ and ‘Strategic Knowledge Arbitrage’ (Carayannis, 1998–2011, 2002–2009, 2008a) be leveraged and deployed?”
- *Potential metrics for conducting future parametric analyses*, including:
  - “How is success or failure defined and evaluated in the outcomes of Technology Entrepreneurship?”
  - “Can a finite set of significant variables be defined for the intrinsic characteristics of individual entrepreneurs and the outcomes of their technology venturing that could permit meaningful parametric modeling?”

Employing qualitative analytic techniques triangulated across three complementary data sources, this exploratory and descriptive study intends

to inform the scholarly framework of technology entrepreneurship and contribute to the understanding of what factors might be teachable or reinforceable via educational programs for academics or actionable managerial strategies for practitioners.

### **Scholarly objectives and research rationale**

Good scholarship entails the integration of connections among ideas, theories and experience (Hart, 1998, p. 8).

The scholarly objective of this dissertation is to demonstrate a clear and cogent integration of a substantive body of relevant theory from academic literature and reliable empirical data from validated sources, rigorously assimilated together with a significant sampling of business-life experiences into a meaningful qualitative deliberation on critical success and failure factors in technology entrepreneurship. This exploratory and descriptive study is designed to identify and illuminate the characteristics of entrepreneurial actors and their actions, building and enriching a common vocabulary within the field of technology entrepreneurship, and informing the scholarly framework of technology entrepreneurship toward a grounded theory in a phenomenon that we discern and denominate as “dystechnia”<sup>1</sup> (Stewart & Carayannis, 2011).

Within the ontological domain of entrepreneurship there is an absence of unifying theory, and an abundance of disputes over frameworks and definitions. Numerous researchers have reported this and similar observations (Solymosy, 1998; Reynolds et al., 2005). Entrepreneurial agents are almost invisible in standard economic theories embedded in the mainstream neoclassical paradigm (Grebel et al., 2003, p. 493), yet considerable empirical economic research has been conducted in the name of entrepreneurial activity without an underlying agreement regarding how to qualify entrepreneurship. Oyama (2008, p. 4) points to econometric research that commingles entrepreneurs and the self-employed or independent business owners in empirical data sets (e.g., Hamilton, 2000; Moskowitz & Vissing-Jørgensen, 2002), and to other econometric studies that have classified “entrepreneurial” activities based on factors that are non-monetary, psychological or stereotypical in association, such as “super optimism,” “being one’s own boss,” “preference for a variety of tasks” or “being an inventor” (e.g., de Meza & Southey, 1996; Åstebro & Thompson, 2007). The common conclusion of these avenues of quantitative econometric analysis is that “entrepreneurs” exhibit a negative economic premium. To wit, the implication is that entrepreneurship on average diminishes economic yields from economic resources.<sup>2</sup>

Notwithstanding the impressive formality and precision of the empirical econometric research in question, such a conclusion is untenable with

the phylogeny of evolutionary economic theory that underpins the field of technology entrepreneurship.

Misapprehensions concerning entrepreneurs and entrepreneurship in the field of economics date back to the beginning with Adam Smith's seminal treatise on political economics, *The Wealth of Nations*. The word "entrepreneur" does not appear in all 1,200+ pages, although the term was used a generation earlier by Cantillon, who is referenced by name in Smith's book. Smith used "undertaker" to mean respectable business venturer as today would be termed "entrepreneur", but he also used two disparaging French terms meaning "adventurer" and "projector," which carried connotations of recklessness and excessive moral flexibility (Hébert & Link, 2006, pp. 37–40).

Much more recently, but already more than a generation ago on the topic of the overlooked importance of entrepreneurs in economic theory, the prominent economist Baumol (as cited in Oyama, 2008, p. 1) offers this eloquent barb:

Look for [the entrepreneur] in the index of some of the most noted recent writings on value theory, in neoclassical or activity analysis models of the firm. The references are scanty and more often they are totally absent. The theoretical firm is entrepreneurless—the Prince of Denmark has been expunged from the discussion of *Hamlet*.

Writing about Baumol in 2008, Oyama (2008) observes that despite progress in the intervening 40 years, "there seems to be a consensus among economists that a formal analysis of entrepreneurship has not yet been adequately incorporated into economics." The implication is that econometric tools are yet lacking to incorporate entrepreneurial functions into the mathematical models of economic calculation.

The discrepancy between the econometric research and the theoretical framework of evolutionary economics derives from the casual and arbitrary classification of data sets into the entrepreneurial pool. The lack of strictly defined and standardized parameters for classifying entrepreneurial entities and actions invalidates a comparison between econometric studies, and misdirects otherwise rigorous research away from relevant economic regimes in 21st-century knowledge society.

Reporting on Baumol in *The Economist* ("Searching", 2006), we learn that

Mr Baumol's work in turn pays homage to the insights of Joseph Schumpeter, for whom the settled equilibria and smooth adjustments of microeconomics held little interest.

Schumpeter wanted to dislodge the price mechanism from its "dominant position" in "the sacred precincts of theory". In the real world, he said,

the competitive weapon that counts is not lower prices, but new commodities and techniques. These weapons are much deadlier, striking “not at the margins of . . . the existing firms but at their foundations and their very lives.”

If innovation threatens companies with obsolescence and extinction, they cannot afford to leave it to chance. Rather than waiting for flashes of inspiration, they set up research-and-development (R&D) departments and commit an annual budget to the pursuit of new products and processes. In this way, invention becomes routine.

This domestication of wildcat entrepreneurialism is good news for economists. Once research and innovation are reduced to a regular outlay and a steady stream of results, they become amenable to economists’ analytical techniques. “We can far more easily subject such a customary, regular and predictable activity to systematic analysis than the erratic, unpredictable ‘Eureka! I have found it!’ kind of discovery,” Mr Baumol writes. R&D can be modelled much like any other investment decision, different only in degree from building factories or advertising.

The dilemma perpetuates even among the latter champions of entrepreneurship in the apparently incompatible field of formulaic economic modeling. The sociotechnological system of technology innovation and entrepreneurship is complex, where reality is punctuated by the economic disequilibrium of the birth and death of products, technologies, businesses and industries, yet the absence of unifying theory inhibits effective modeling of the turbulence at stake.

### ***Personal characteristics* creativity, making something, innovation**

Many subjects presented a facility for creativity in various manifestations, which are perhaps best characterized as a sense of:

- *The entrepreneur as artist*—the lack of a basic resource, product or service engages the entrepreneurial character in intensely creative periods of innovation that very often result in the resolution of a quandary.
- *Intense reflection, brainstorming, and explosive bouts of productivity*—these are very often undertaken in the face of urgency.
- *An almost counterintuitive enthusiasm sparked by uncertainty*—instead of finding the unanswered question too daunting to approach, the entrepreneur relishes the challenge that each problem represents.

To illustrate from our empirical findings:

My biggest strength was being a creative person. I love to be presented with a problem and then brainstorm to solve it. The structure of a lot of

our products came from brainstorming; bringing together an assortment of very smart people as different from me and each other as possible to argue about what can be done and how to do it.

It's all about building something and not about the money. I have plenty of money and it comes and goes, but to create a culture and opportunities for talent, and an enterprise of lasting usefulness and value is what it is all about.

I have an amazing ability to visualize mapping networks. I love troubleshooting and love to teach it. One of my favorite things I tell customers and staff technicians when I'm engaged in troubleshooting—and they'll ask me what is wrong with the system—"If I knew what was wrong, it would be because I had fixed it."

The theme of creativity and innovation is well corroborated in many exemplars to be found in our empirical findings:

Scott McNealy stated, "When we started Sun, I knew there was no way—if we were to adopt Microsoft's operating system—that we could survive long-term. Adopting Unix was our only chance. Going in with our own microprocessor was the only chance we were going to get out from under the chip monopolies. If it flamed out, we could always fall back on the monopolists. But if we did win, we had huge things to gain."

(Kelleher et al., 1992, p. 36)

Disneyland was another bet-the-farm risk, and Disney threw himself obsessively into the park's design, which anticipated many of the best features of modern urban planning, and into the "Imagineering" by which the simulacrum of exotic, even dangerous creatures, places, fantasies could be unthreateningly reproduced. These attractions were better than any movie in his eyes—three dimensional and without narrative problems. They were, indeed, better than life, for they offered false but momentarily thrilling experiences in a sterile, totally controlled environment from which dirt, rudeness, mischance (and anything approaching authentic emotion) had been totally eliminated.

(Schickel, 1998, p. 126)

George Westinghouse saw the potential in ideas. Ideas like using air to stop a train. He also saw potential in people. He was quite willing to purchase the patents of others if he thought they had potential. The best example perhaps is the case where he purchased the patent rights to Nikola Tesla's alternating current induction motor and polyphase system of alternating current. Westinghouse had been working on alternating current for four years before he purchased these patents from the great

Serbian inventor. The Tesla patents were an important part of the alternating current puzzle that George Westinghouse had painstakingly been putting together. He bought plenty of ideas and rights, and eventually controlled over 15,000 patents. Westinghouse was also a great engineer. From early childhood he loved all things mechanical. In his father's shops he tinkered continuously. As a young boy, he made a working model of a water wheel. He made a working model of a steamboat at age 14. He made a violin. His first patent was for a rotary steam engine. He started to work on it at age 15 and the patent was granted to him at age 19 . . . He was never able to make this rotary engine a commercial success, but it's interesting to see the role of high-speed rotating generators, turbines, and electrical motors in the overall success of electrical power.

(Reis, 2008, pp. 33–34)

One secondary subject communicates an explicit glimpse into a personal perspective of entrepreneurial creativity:

Subject G8 describes his routine as going through “cycles of creativity”:

- *Obsession*—he becomes so engrossed in a new endeavor that his energy level gets really high and he can't think about anything else. This is the most productive phase and much work, but little eating or sleeping, gets done during this time.
- *Dwell*—this phase is a more paced level of production in which he moves forward, but his mind begins to wander and bottlenecks or product difficulties begin to hamper progress slightly.
- *Overwhelmed*—a single particularly difficult problem or a flood of hassles and complications can lead to intense frustration and mental blocks.
- *Shut Down*—at this point, further work is unproductive and it only compounds his frustration and stress level. Experience has helped G8 to recognize this phase much sooner than when he started the business. Once recognized, he quickly moves to the final phase.
- *Recharge*—this usually involves a plane trip or just immersion in something not related to work, such as a weekend out at the airplane hanger (subject is a recreational aviator). Work completely lapses from his consciousness. After enough stress has escaped, an idea will pop into his head on how to “build a better mousetrap” and he will come back to the office “obsessed” with his new idea.

**Personal characteristics—Natural salesperson, ability to sell idea, persuasiveness**

One area where I did very well was in attracting beta customers—getting real companies to try my software, taking a risk with my product

without knowing who I was—but my value proposition was attractive to prospects.

The theme of personal selling power and persuasiveness occurs throughout our empirical findings:

Subject G1 began by selling or auctioning his products on eBay, but once the products garnered more interest, he developed his own web site to better meet demand. The web site currently offers more than 80 product models, each with several customization options, keeping in line with commitment to customer service. Additionally, G1 offers a quality assurance guarantee to ship, for free, a replacement product should any of his products fail owing to normal usage. . . . In addition to the effort that goes into updating the website and fabricating products for orders, G1 spends a great deal of time and energy pursuing direct selling opportunities. He frequently attends competitions which afford him greater visibility via networking to obtain sponsorship arrangements and by obtaining booth space to sell products to spectators.

By 1995, Jobs was back in the news with a renewed relationship with Apple. Apple's very existence was in doubt until he persuaded Apple's long-time adversary, Microsoft, and its chairman, Bill Gates, to invest \$150 million in Apple.

(Rogowski & Reilly, 2000, p. 662)

In the same way that Henry Ford realized that by keeping selections limited (e.g., color choice: black) he could mass-produce economical cars, Kroc kept the menu simple and the standardization high, to mass-produce economical meals. Each patty, for example, had to weigh exactly 1.6 ounces and be exactly 0.221 inches thick. Manuals documented to the second how to make a shake. Then, through massive advertising, Kroc enticed Americans to recognize their need for his product. As Kroc once cleverly said, "The definition of salesmanship is the gentle art of letting the customer have it your way."

(Davids, 1999, p. 35)

***Personal characteristics—intelligence, analytical ability—know what you don't know and do something about it***

This theme spans both cognitive processing and practical self-awareness, permitting the entrepreneur the facility for drawing valid inferences from partial information, assimilating learning between disparate experiences, and possessing the wisdom to recognize what information, skills or knowledge are lacking. Intelligence in this context is about learning, self-teaching, recognizing personal gaps in understanding, and seeking and absorbing new

knowledge to strengthen one's capacity and competence. We find in our empirical findings many instances—for example:

Sometimes I bit off more than I could chew and had to bring in specialized subcontractors, but only once did things deteriorate to that point where I really didn't want to do this anymore. So I gave the contract entirely to a qualified collaborator.

It's a failure if company founders don't understand their own levels or areas of expertise—such as when two engineers hire a V.P. of sales but try to tell him how to sell and manage sales.

This theme is also echoed in our supplemental data sources.

In an interview, Bill Gates advises, "I watch the competitive landscape carefully. Microsoft is always searching for the new thing that is coming along, whether it is in a research lab or at another company. We try to understand what other people are doing, even if their apparent mission is so distant that it is not obvious competition."

(Gates, 1997)

In the same interview, Mr. Gates continues, "I don't settle for platitudes when discussing management challenges. A well-chosen platitude can get people thinking in an appropriate framework. What annoys me is the manager whose only contribution is spouting platitudes such as 'We should only do what the customer wants.' This is a poor substitute for thoughtfulness. Of course you want to please customers, but how? What trade-offs are involved?"

(Gates, 1997)

[Mary Kay Ash] thought she might stay at home and write a career guide that would help other women avoid the pitfalls that had marred her working life. She began making notes of all her negative experiences in business and then made extensive lists of positive experiences that might result in better productivity and happier, more confident employees. What began as an outlet for personal frustration became, in a period of weeks, a blueprint for a workable direct-sales company—the dream company for which Ash herself would love to work. Then an idea occurred to her: perhaps she should start such a company herself. All she needed was a product—something that could be used up and re-ordered again and again. For nearly a decade Ash had been buying skin softeners from the daughter of a hide tanner who had developed the formulas from tanning solutions. The potions smelled terrible but were very effective in keeping her skin young looking and smooth. Recalling her use of the home brewed skin tonics, Ash told People: They were dark orange and smelled



like a skunk, but they made my skin so soft. I'd be giving a Stanley demonstration, and a client would say, "We know about that bowl cleaner, tell us what you've done to your face." Ash had discovered her product. Using her life savings of \$5,000, she bought the recipes for the skin softeners, furnished a modest storefront in Dallas, and set up a small manufacturing plant. Her first employees included her husband, who handled the legal and financial matters relating to the business; a chemist to create a line of basic skin care products; and a sales force of nine of her friends.

(*"The Pink Producers"*, 1981)

***Actively positioning for opportunity—Vision, seeing what others don't see***

How to go from an idea and a blank sheet of paper to an actual operation on the ground is a hard question to answer because after you've done this a few times, it's so ingrained that it's hard to conjure up a conscious awareness of how a business plan comes to me. I come up with a new business idea every day. But there's an auto-filtration to reject the personal brainstorm—try not to get distracted from all the many things that are going on [at about this time we were interrupted by a call from one of the top venture capitalists in the United States.]

***Personal characteristics—vision—innateness of entrepreneurial personality, intuition***

Some aspects of vision seem to come innately to some entrepreneurs. This is not universally evident but examples can be found:

I never knew I was an entrepreneur until I was called one. I came up with ideas for better mousetraps and followed my passion.

But the amazing thing about the 44-year-old Gates is that he's been more or less like this since he was 13. That's when, as a raw eighth grader, he started his first company. Traf-O-Data harnessed a computer-like device to track and analyze traffic at busy Seattle intersections. To this day, Gates rues the fact that Traf-O-Data never made a profit—even back then he expected to make money. Indeed, Gates was the kind of kid who would abscond with his dad's copy of *FORTUNE* and read it in bed late at night with a flashlight.

(Stewart et al., 1999)

***Actively positioning for opportunity strategic networking and alliances***

The theme of strategic networking and forming alliances runs through many entrepreneurial stories. The message of the entrepreneur's vision and venture action is multiplied and amplified through the relationships and connections forged along the way. The cliché of it being not what you know but

who you know that matters bears more than a modicum of merit here, as does the tired saw that no man is an island. Here are a few illustrative instances from the data:

Networking is extremely important. There was this business brunch—the first one I attended, and I still have clients I met through that group. It's almost like a “family tree” of clientele, spun off from that one brunch.

One colleague ran into a fellow at a national lab who sits on the board of an industry association, who is well connected at the top of the industry and served as a champion of our concept.

And it turns out that the most innovative (electrical distribution) utility in the world has a COO whom I went to school with!

After about a year into it, I met “Radio Joe” who was big in sales and needed technical support and consulting, so we teamed in a fairly exclusive reciprocating agreement contract which really boosted business volume.

[Henry Ford] was teamed, by accident, with James Couzens, later a Detroit mayor and U.S. senator, who contributed as much as Ford to the Ford Motor Co.'s early success.

(Lewis, 1999)

Then Canion made another pivotal decision that would propel Compaq into becoming the fastest-growing company in the history of American business: He chose to sell the new Compaq portables only through dealers. “It was a selling point for us to sell only through dealers, and it was a basic premise to sell only through resellers,” he says. In January 1983, Compaq shipped 200 portables. In December 1983, it shipped 10,000. First-year sales were \$111 million, the largest first-year sales in business history.

(Zarley, 1997, p. 26)

**Experiencing good fortune—“Happy accidents” (Carayannis, 2008a)—finding unexpected market opportunity**

Another thread of lucky themes entails the unintended encounter with market opportunity; an avenue of sales potential that was not originally visualized but just pops up on the radar when the time is right. Some examples from the data follow:

In India I got two contracts. One, they found us by Internet and sent an email saying they want the product in India. My colleague went to south India and obtained [authorized] a reseller's contract for \$1.5M for the first year. That customer was a university professor, not an engineer

for using our software. My colleague stopped in Singapore to meet the Korean reseller, and the next day met another Indian person who was very interested but we had just signed the contract for India. But this man had an office in Dubai, so we let a reseller's contract for Dubai. Later this same fellow developed at his own expense a plan to localize the Indian contract and enlarge coverage.

We fell into claims processing based on our reputation in an esoteric database software. Someone needed claims processing modification from the prosecution to the defense side of the legal trade, and the original developer stalled the client for six months, and said it would take them six months beyond that to make the conversion. We went in and finished the job within one-and-a-half months. They asked us then to team on a major project.

Kroc was a 52 year-old Dixie Cup salesman when he learned of a new product called the Multimixer, which mixed several milkshakes at once. When Kroc quit his paper-cup job to sell Multimixers, he became acquainted with Mac and Dick McDonald in San Bernardino, California. He observed their fast-food operation firsthand in 1954 and was amazed at the assemblyline production. All the operation needed, he thought, was his Multimixers. Working out a deal with the brothers for the name, Kroc opened his first location in Des Plaines, Illinois, and after more than a year, he had enough money to open other locations. Within five years Kroc, well past the mid-century mark, had 200 restaurants. Within another seven years the company would open 100 new stores per year.

(Schweikart, 2003, p. 47)

### **The meaning of success—technical success**

To the entrepreneurial subjects in this research, the meaning of success is a rich and diverse panoply of themes, and it is through the emergence of these themes from the data that considerable depth can be gauged of the varied character of entrepreneurs, and several subpopulations start to stand out. Numerous subjects of a more technically oriented background are not surprisingly related to success factors revolving around the technical performance of their ventures' products or the solutions that were engineered in their entrepreneurial endeavors. For example:

An early technical success was when we hacked a patch into Novell for a major client to bypass value added third-party software (that checked the print queue and often hung, requiring needless service calls) when IBM had said such a patch couldn't be done and Novell said they simply wouldn't do it. This gained us goodwill and credibility with that large client, whose contract later grew to become 65% of our business.

We did a live demo at a conference of every chief firefighter from around the country—it was an all-or-nothing proposition to demo successfully at this exposition. We killed ourselves to get ready—and even up to and including the night before, we tested and adjusted, and tested—and things were not working. But the day of the demo the team made it go, and the fire chiefs returned a standing ovation—where a major competitor had bombed the year before!

In counterpoint, the following example highlights the downside of fixating on technical success:

Subject G10 asserted, “The main lesson is that you need to stay customer focused. Never think that you know better than the customer does. The technology has to meet the needs of the customer. You can’t just focus on developing to develop.”

**The meaning of success creates or revolutionizes an entire industry and revises traditional modes of economic livelihoods**

This more dramatic theme did not surface explicitly in the code book based on input from the primary subjects, although several of them hinted that they played pivotal roles in the emergence of the Internet and the concepts behind some prominent technological applications that are now taken for granted. From the supplemental data the magnitude of entrepreneurial impact with respect to the theme of creating or revolutionizing an entire industry or traditional modes of economic livelihood becomes prominent, as illustrated in these excerpts:

Henry Ford (1863–1946) didn’t invent the automobile, but he invented the automobile business. When he founded the Ford Motor Co. in 1903, cars were fussy, unreliable, costly novelties. Ford’s genius was to make them simple, solid, and inexpensive necessities. In so doing, he built the largest industrial organization of the early 20th century and amassed a personal fortune of \$1 billion (\$36 billion in today’s dollars), but he also placed himself at the forefront of a social revolution that had an immeasurable impact on American life. When he got his Model T rolling in 1908, the horse disappeared so fast that the conversion of acreage from hay to other crops is said to have caused an agricultural revolution. And that was only the beginning.

(Stewart et al., 1999)

Before the Model T, manufacturing was done by craftsmen who made things one at a time. But as Ford adapted the emerging principles of mass production to the automobile and hired tens of thousands of workers to put those principles into practice, he gave rise to an entirely new

phenomenon: the blue-collar middle class. Because the jobs were simple and repetitive, he could employ farmers, immigrants, and others who previously had done only manual labor. The five-dollar day gave them the income they needed to afford a home and support a family—and to buy the cars they were making. In creating a huge body of people who shared not only their work but many social and economic interests, Ford, to his lasting regret, spurred the development of industrial labor unions.

(Stewart et al., 1999)

But if you stop and really think about it, Microsoft the company is probably more of a marvel of human creativity and ingenuity than any of its products. Before Gates and Allen started Microsoft, pure software companies didn't exist. Gates identified a business opportunity in what most computer companies saw as a necessary but nettlesome accoutrement to the hardware that pulled in the big bucks. In the end he created a masterpiece.

(Stewart et al., 1999)

Some 13,700 U.S. restaurants later, the same notion of trust embraced by [Ray Kroc, McDonald's founder] in those early years remains a tangible and deeply rooted ideal evident in daily interactions within every aspect of the operation. "McDonald's has revolutionized not only the restaurant industry—and mean the entire restaurant industry but how Americans eat. They really are the leader," comments Steven Anderson, chief executive officer of the Washington, DC-based National Restaurant Association (NRA). "They have a tendency to look at things a little differently than others, but at the same time, people realize that what they are doing is good for the industry overall." McDonald's also has affected the way foods are grown, manufactured, and distributed. In the farm-to-fork chain, the McDonald's imprint is evident in almost every link: the humane treatment of animals, the development of high-tech processing equipment, ground-breaking food safety initiatives, the latest packaging materials, state-of-the-art distribution and storage capabilities, cutting-edge cooking techniques, and extensive employee training, to name a few advances.

(Petрак, 2005)

"One of the most significant accomplishments of our system has remained relatively unknown—that we have changed the nature not only of the food industry but of the food processing industry as well," points out J. C. Gonzalez-Mendez, vice president, supply chain, McDonald's USA. Of course, leadership, as it has been said, does not occur in a vacuum. All of the suppliers with whom Kroc and his successors have partnered with during the past 50 years have had a literal hand in transforming the business from a roadside hamburger stand to one of the

country's most trusted brands with restaurants in every state—and in nearly every town—in the country.

(Petрак, 2005)

Silicon Valley garnered a reputation as the last bastion of creativity, world leadership, and up-by-the-bootstraps success in a nation coping with spiraling inflation, trade deficits, and a menacing Cold War. During this time, Noyce and other Silicon Valley entrepreneurs cast themselves (and were portrayed by others in books, interviews, and congressional testimony) as winning combinations of Thomas Edison, John Wayne, and Horatio Alger. The sterling image of Silicon Valley influenced the direction and trajectory of the region's economic growth. Engineers, inspired by the example of Noyce and others, set up shop in the proverbial garage instead of going to work for someone else; a plethora of start-up consulting services emerged; and Silicon Valley came to operate in some sense as a self-fulfilling prophecy, a self-perpetuating cycle of entrepreneurship and wealth.

(Berlin, 2003, p. 589)

**The meaning of success—altruism, idealism, sense of mission, serving the greater good, heroism**

Very significant emphasis recurred in all of the data sources evincing and underscoring the theme of altruism, idealism, sense of mission, serving the greater good and heroism. Subjects reported about themselves a strong sense of mission, and, in the secondary and tertiary sources, other contributors reported the same perspective for the subjects about whom they wrote. Examples are abundant from all sources, such as those that follow:

The thing that was greatest in my career was in one of my prior ventures, involving global telecommunications. It was not just the realization that we had fully finalized a satellite-launch enterprise, but in so doing we changed the world's international telecom forever. We broke up a system of government sanctioned monopolies, to make the market more open and liberate the economic dynamic and the service dynamic. There wouldn't be 300 television channels if not for that change. Since age 21, I didn't want to see change "at the point of a gun". I instead did good work, changed things for the better, employed a lot of people. Makes you feel good to do this stuff.

Seeing this one specific project from quiet research to live installation has been the most rewarding—working a lot in the field to do something that has never happened before.

The more we learn about this brilliant, dogged, at times merciless, and yet supple entrepreneur, the more we realize that he believes he is out

to change the world. And that's what seems to motivate him. He shows almost no need to display his financial worth and power. (Jobs does have a Gulfstream V, but there are few other trappings of great wealth around him or his family.) No, the revolution of which Jobs is so much a part is unfolding by virtue of the products he makes and how consumers use them. It is a mostly peaceful revolution that will, in Steve Jobs' eyes, liberate men and women around the world.

(Koehn, 2009)

In counterpoint to McGowan's modest self-assessment, industry observers described his role as "historic" and said he was "a vital catalyst." Some argued that without McGowan's persistent, 16-year pursuit of AT&T, the 1984 breakup of "Ma Bell" might not have occurred for decades—if at all. Behind that 16-year fight was McGowan's belief that "it was immoral and undemocratic that one company should have sole access to that market," said Daniel Reingold, a telecommunications analyst at Morgan Stanley & Co. in New York who worked at MCI for six years. "It's not clear to me that without Bill McGowan there would have been a divestiture," said Glenn Pafumi, now an independent options trader who had covered MCI extensively as a Merrill Lynch & Co. analyst. The most obvious result of McGowan's push for divestiture was competition in the long-distance marketplace and better rates for customers. MCI certainly profited, growing from \$100,000 in revenue in 1978 to \$9.5 billion [in 1991].

(Booker, 1992)

### **Obstacles—regulatory barriers, institutional and cultural obstacles**

No venturing entrepreneur could claim credible understanding of the meaning of success in the foregoing passages without presumably encountering—and working through or around—any of myriad obstacles. The data evince one such category of challenges to be regulatory barriers, institutional and cultural obstacles. This theme delineates resistance to new venture progress arising from existing laws, policies, traditions, practices, conventions and limits of human understanding or imagination with regard to business processes and technology—in brief, factors embedded in the sociotechnological-economic environment. Some instances of these obstacles are presented below:

Existing customers with the incumbent were locked-in through on-net plans in lieu of paying the interconnects that any potential new venture was facing.

You can't shut down a well without huge fixed costs to start it up again, and an idle well loses the lease—it's the way it's regulated.

Our failure was due to a Board of Directors we naively assumed were capable. They were a bunch of mergers-and-acquisitions retirees from Goldman Sachs or Merrill Lynch—places like that. At the time they seemed like the perfect people for a board, but their specialization was how to merge industrial firms—they could buy and sell steel mills and oil refineries—but they were not savvy to the theme of marketing in the new era.

According to Bill Gates, “... in relation to its development costs, [OS/2] is the biggest disaster the software industry has ever seen. Between IBM and Microsoft, we lost more money on that than any software project I’ve ever heard of. The whole feature set was driven by IBM wanting to have its Extended Edition—very SAA mainframish things instead of things for desktop users. Joint development with IBM was full of challenges. [I learned that] to get features into the marketplace, you can’t have these huge leaps where you have to buy a very big system and do new things. Evolution is more appropriate. Also, we believed that working with IBM would make the thing a success no matter what. We’ve certainly come away from that view”

(Kelleher et al., 1992).

In 1968, McGowan was invited to help rescue Microwave Communications Inc., a struggling startup in Chicago that planned to offer radio-telephone service to trucks traveling between Chicago and St. Louis. But the company needed FCC approval to establish its microwave system, and mighty AT&T, which had a near monopoly on long-distance service, was opposed.

(Nulty, 1992, p. 112)

### **Obstacles—attaining market credibility, adoption**

Even if the environment is free and fully supportive, finances are adequate for progress, and competition is not steep, there is an inherent hurdle for a new venture to attain market credibility, particularly if imposed with new technology-seeking market adoption. The societal learning curve is not always steep, particularly if the new technology represents a radical departure from the familiar or is not yet embedded with the self-explanatory feature termed “user-friendliness.” Informing the market about a new alternative can be very costly, and training the market why to select and how to use the new alternative costlier still. And foremost the new venture will probably need to garner positive attention and recognition just to start those larger wheels turning. The primary data sources offer some instances:

We tried to overcome their objection by showing how our product saves lives. But the investors said simply that there won’t be another earthquake!



Right now I have 3,000 fans and followers but only 100 have voted positively for me in my own space. Most connections are for spamming and marketing, which is what we are trying eliminate for our target customers.

I'm not very happy with the pace of progress compared with our plan—we're a little light, and we'll be at a competitive disadvantage as competitors will have more time to get ahead of the market curve. There are high barriers to entry; it is hard to get in. But once there, it is hard for competitors to get in too.

Here is an example from the Data Validation and Exception Matrix that enlarges and illuminates this thematic code:

Subject G21 confirms that having a client is more demanding than working for a boss. The client practically owns you, and that having a bad client can destroy a business. Also his most important insight about clients and business is that, it might not be enough to have value in a business, but what counts most is whether customers perceives value in your business.

### **In conclusion: What strategies can an entrepreneur or venture partner employ to recognize and remedy dystechnia to create opportunities for advantage?**

Notwithstanding the research findings, the concept of dystechnia proposed herein is not about mere individual challenges to learning and adoption as described by Feltham (2004), although that aspect is certainly a core contributing cause. This thesis proposes a treatise on dystechnia in the organizational and institutional context, to examine the phenomenon of disconnect between users and technology resources, and flaws in the sociotechnological network.

Owing to the resolution of findings and the non-specific lack of framing that is critical in valid ground theory-building, there are but a few thematic codes that evoke the recognition and remedy of dystechnia.

These are:

- *personal characteristics*—creativity, innovativeness;
- *actively positioning for opportunity*—vision, seeing what others don't see.

Some illustrative incidences from the data are as follows:

This was my second venture. The first was a bill presentation and payment system on the Internet partnered with Lockheed and one of the big, early

Internet applications providers. It was the first project to put bills on the Web for payment. One day, my wife received a package she had ordered from eBay. She explained to me how she had had to send them a check, which had to clear before shipping—two weeks later. So using the transaction model I had developed in the prior company, we went to work to put together Internet payments by email. This was before eBay had become a premier entity—there was a whole host of on-line auction sites, 20 or 30 at the time. Within a year all had disappeared except eBay. My best moment was the first transaction from a client on eBay; after that it all just became work. The realization when I understood what the problem was and that I had the solution—when it came to me, “You’re kidding! That’s how they’re doing this?” Sending checks around the country and waiting weeks for them to clear? Yeah, sure . . . I have the knowledge to do it right, it was gratifying—until PayPal changed all that.

I’ve always had the opinion that advertising is not the only revenue source on-line. Inspiration came from when I used to be a photographer and couldn’t believe how little my work was worth as stock photos. Then at National Geographic I built an extranet and international licensing people started using it for distribution of content to affiliates. But video multimedia starting around 2008, made it crash and there was no system available to solve this problem. No system could handle the streaming and the massive content and the various formats all at once. So I quit that company and set out to build such a system.

My system was designed to permit project managers in the construction trade to track their field workers’ hours and work performance by the workers using their cell phones as mobile data terminals. This was in an era when all the construction workers had begun using cell phones, but there was not a lot of Internet familiarity in the trade, and construction managers were not big on computers. This absence of technology seemed particularly prevalent in the niche craft where I started. My system let the field guys punch in a few codes and the office received a consolidated report of everybody’s time allocations by jobsite and task.

The data are in fact rich with many more examples of the entrepreneurial process whereby an individual actor recognizes two critical conditions:

- *A problem*—A situation involving social exchange—whether at home, at work, out in society, in business, in government, at any level of interface—where the way in which things are done is less efficient or less effective or more cumbersome or more unpleasant than the way they “ought” to be, or the way that they can be.
- *A solution*—The conception of a potential revision in the process whereby the social exchange is transacted, by the introduction of new or altered

relationships, lines of communication, or mechanisms of exchange; enabled by the deployment of new technology or innovative enhancements to existing technology.

The problem as stated in the foregoing is a condition of dystechnia. It takes the makings of a technology entrepreneur to recognize the problem and to interpret it as an opportunity, then to visualize and conceive of a solution to the perceived condition of dystechnia. Recognition of a problem and conception of a solution are not enough, however, as the entrepreneurial phenomenon demands that action is taken to bring resources to bear on the implementation of the conceived solution.

## Notes

1. A proposed definition for the neologism “dystechnia” is concisely presented in the Glossary of terms in Chapter 1 and articulated in depth in Chapter 2 in the section entitled “Dystechnia.”
2. On the whole, this conclusion derives from aggregating “failed” entrepreneurial attempts with the “successful,” and by counting self-employed professionals who may be underemployed or at best receive competitive wages for their services even without an intermediary employer, and by counting tinkerers or even qualified inventors who fall short of market realization of their inventive aspirations.

## References

- Adner, R. (2006). Match your innovation strategy to your innovation ecosystem. *Harvard Business Review*, 84(4), 98–107.
- American Heritage Dictionary of the English Language* (3rd ed.). (1994). Boston: Houghton Mifflin Company.
- Barnsley, M. (1993). *Fractals Everywhere* (2nd ed.). San Diego, CA: Academic Press.
- Berlin, L. (2003, December). Entrepreneurship and the rise of Silicon Valley: The career of Robert Noyce, 1956–1990. *Enterprise & Society*, 4(4), 586–591.
- Booker, E. (1992, June 15). McGowan credited with breakup of AT&T monopoly. *Computerworld*, 26(24), 22.
- Carayannis, E. G. (1992). *An Integrative Framework of Strategic Decision Making Paradigms and their Empirical Validity: The Case for Strategic or Active Incrementalism and the Import of Tacit Technological Learning* (RPI School of Management Working Paper Series No. 131). Rensselaer Polytechnic Institute, Troy, NY.
- Carayannis, E. G. (1993). Incrementalisme Strategique. *Le Progrès Technique*, 93(2), i–vi.
- Carayannis, E. G. (1994a, June 27–29). *A Multi-national, Resource-based View of Training and Development and the Strategic Management of Technological Learning: Keys for Social and Corporate Survival and Success*. Paper presented at 39 International Council of Small Business Annual World Conference, Strasbourg, France.
- Carayannis, E. G. (1994b). The strategic management of technological learning: Transnational decision-making frameworks and their empirical effectiveness. *Dissertation Abstracts International*, 55(11), 3564. (UMI No. 9511131)
- Carayannis, E. G. (1994c). Gestion Strategique de l'Acquisition des Savoir-Faire. *Le Progrès Technique*, 94(1), 37–39.

- Carayannis, E. G. (1998). Higher order technological learning as determinant of market success in the multimedia arena; a success story, a failure, and a question mark: Agfa/Bayer AG, Enable Software, and Sun Microsystems. *Technovation*, 18(10), 639–653.
- Carayannis, E. G. (1998–2011). *Lectures in Numerous Courses Covering Topics on Technology, Innovation, Entrepreneurship, Business Venturing, and Project Management*. Unpublished lecture notes, The George Washington University School of Business, Washington, DC.
- Carayannis, E. G. (1999a). Knowledge transfer through technological hyperlearning in five industries. *Technovation*, 19(3), 141–161.
- Carayannis, E. G. (1999b). Fostering synergies between information technology and managerial and organizational cognition: The role of knowledge management. *Technovation*, 19(4), 219–231.
- Carayannis, E. G. (2000a). Investigation and validation of technological learning versus market performance. *Technovation*, 20(7), 389–400.
- Carayannis, E. G. (2000b). *The Strategic Management of Technological Learning*. Boca Raton, FL: CRC Press.
- Carayannis, E. G. (2002–2009). *Doctoral Seminar in the Management of Science, Technology and Innovation (MSTI)*. Unpublished lecture notes, The George Washington University School of Business, Washington, DC.
- Carayannis, E. G. (2008a). Knowledge-driven creative destruction, or leveraging knowledge for competitive advantage: Strategic knowledge arbitrage and serendipity as real options drivers triggered by co-opetition, co-evolution and co-specialization. *Industry and Higher Education*, 22(6), 343–353.
- Carayannis, E. G. (2008b). Conceptual framework for an analysis of diversity and heterogeneity in the knowledge economy and society. In E. G. Carayannis, A. Kaloudis, & Å. Mariussen (Eds.), *Diversity in the Knowledge Economy and Society: Heterogeneity, Innovation and Entrepreneurship* (Ch. 5, pp. 95–116). Cheltenham, UK: Edward Elgar.
- Carayannis, E. G., & Alexander, J. (2002). Is technological learning a firm core competence; when, how, and why: A longitudinal, multi-industry study of firm technological learning and market performance. *Technovation*, 22(10), 625–643.
- Dauids, M. (1999). Ray Kroc (1902–1984): Flipping over efficiency. *The Journal of Business Strategy*, 20(5), 34–35.
- de Meza, D., & Southey, C. (1996). The borrower's curse: Optimism, finance and entrepreneurship. *The Economic Journal*, 106(435), 375–386.
- Drucker, P. F. (1985). *Innovation and Entrepreneurship*. New York: Harper & Row Publishers, Inc.
- Edwards, O. (1994, December 5). Gordon Moore. *Forbes*, 12, 158–159.
- Feltham, C. (2004). *Problems Are Us: Or is it Just Me?* Suffolk, UK: Braiswick. Retrieved February 27, 2010, from <http://books.google.com/books?hl=en&lr=&id=2DVbpvid56wC&oi=fnd&pg=PA1&dq=dystechmia&ots=qjXjCIURMF&sig=U4pDzcGPK-CSGf06reTDlGmO2Hk#v=onepage&q=dystechmia&f=false>.
- Foster, J., & Metcalfe, S. (Eds.) (2001). *Frontiers of Evolutionary Economics: Competition, Self-organization and Innovation Policy*. Northampton, MA: Edward Elgar Publishing, Inc.
- Gates, B (1997). Virtual bill. *Profit*, 16(5), 76.
- Glaser, B., & Strauss, A. (1967). *The Discovery of Grounded Theory*. Hawthorne, NY: Aldine.
- Gleick, J. (1987). *Chaos: Making a New Science*. New York: Viking.

- Grebel, T., Pyka, A., & Hanusch, H. (2003). An evolutionary approach to the theory of entrepreneurship. *Industry and Innovation*, 10(4), 493–514.
- Grover, R. (2004, May 16). He built a better mouse. *Business Week*, (3883), 6, 20.
- Hamilton, B. H. (2000). Does entrepreneurship pay? An empirical analysis of the returns to self-employment. *The Journal of Political Economy*, 108(3), 604–631.
- Hart, C. (1998). *Doing a Literature Review: Releasing the Social Science Research Imagination*. London: SAGE Publications.
- Hébert, R. F., & Link, A. N. (2006). Historical perspectives on the entrepreneur. *Foundations and Trends in Entrepreneurship*, 2(4), 1–152.
- Information Technology Advisory Group (1999). What is the knowledge economy? In *The Knowledge Economy: A Submission to the New Zealand Government by the Minister for Information Technology's IT Advisory Group* (Ch. 2, p. 4). Retrieved February 26, 2010, from [http://www.med.govt.nz/pbt/infotech/knowledge\\_economy/knowledge\\_economy-04.html](http://www.med.govt.nz/pbt/infotech/knowledge_economy/knowledge_economy-04.html).
- Kelleher, J., Gillin, P., Booker, E., Johnson, M., & Anthes, G. H. (1992, June). Twenty-five people who changed the world: Alan Kay; Bill Gates; Bill McGowan; Scott McNealy; Seymour Cray. *Computerworld*, 26(25), S30–S38.
- Koehn, N. (2009, November 23). His legacy. *Fortune*, 160(10), 110.
- Lewis, D. L. (1999, December 27). Man of the century—Henry Ford. *Automotive News*, 74(5854), 34–35.
- Mandelbrot, B. (1982). *The Fractal Geometry of Nature*. New York: W. H. Freeman and Company.
- Maxwell, J. A. (1996). *Qualitative Research Design: An Interactive Approach*. Thousand Oaks, CA: Sage Publications, Inc.
- Moskowitz, T. J., & Vissing-Jørgensen, A. (2002). The returns to entrepreneurial investment: A private equity premium puzzle? *American Economic Review*, 92(4), 745–778.
- Nulty, P. (1992, March 23). The national business hall of fame. *Fortune*, 125(6), 112–118.
- Oyama, A. (2008). Entrepreneurial function and its rewards. *Dissertation Abstracts International*, A 69(04). (AAT No. 3307597)
- Petrak, L. (2005). Built on a handshake. *National Provisioner*, 6, 7–10.
- Reis, E. (2008, October). A man for his people. *Mechanical Engineering*, 130(10), 32–35.
- Reynolds, P., Bosma, N., Autio, E., Hunt, S. (2005). Global entrepreneurship monitor: Data collection design and implementation 1998–2003. *Small Business Economics*, 24(3), 205–231.
- Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94(5), 1002–1037.
- Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, 98(5/2), S71–S102.
- Routti, J. (2003, June 2). Research and innovation in Finland—Transformation into a knowledge economy. In *Competitiveness and the Knowledge Economy Research and Innovation Strategies: Cases of Chile and Finland*. Paper presented at the Inter-American Development Bank, Washington, DC.
- Schumpeter, J. A. (1934). *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle* (R. Opie, Trans.). Cambridge, MA: Harvard University Press. (Original work published 1912.) (Reprinted Piscataway, NJ: Transaction Publishers, 1983.)
- Schumpeter, J. A. (1942). *Capitalism, Socialism and Democracy*. New York: Harper and Brothers. (5th ed. London: George Allen and Unwin, 1976.)

- Schweikart, L. (2003, February). Opportunity knocks late. *Ideas on Liberty*, 53(2), 46–48.
- Scott, W. R. (2001). *Institutions and Organizations*. Thousand Oaks, CA: Sage Publications, Inc.
- Searching for the invisible man. (2006, March 11). *The Economist*, 67–68.
- Solyomossy, E. (1998). Entrepreneurial dimensions: The relationship of individual, venture, and environmental factors to success. *Dissertation Abstracts International*, 59(05), 1667. (UMI No. 9833914)
- Stewart, M. R., & Carayannis, E. G. (2011). *Dystechmia—A Model of Technology Rejection and Implications for Entrepreneurial Opportunity*. Manuscript in preparation, The George Washington University School of Business, Washington, DC.
- Stewart, T. A., Taylor III, A., Petre, P., & Schlender, B. (1999, November 22). Henry Ford, Alfred P. Sloan, Tom Watson Jr., Bill Gates: The businessman of the century. *Fortune*, 140(10), 108–118.
- The Pink Producers (1981). *Who is Mary Kay Ash?* Retrieved July 26, 2010, from <http://pinkproducers.com/wp-content/uploads/2010/01/Who-is-Mary-Kay-Ash.pdf>
- Vanderbilt University (2010). *Fractals and the Fractal Dimension*. Retrieved January 14, 2011, from <http://www.vanderbilt.edu/AnS/psychology/cogsci/chaos/workshop/Fractals.html>.
- Zarley, C. (1997, November 16). Rod Canion. *Computer Reseller News*, 11(763), 25–26.

# 5

## Knowledge-Driven Creative Destruction: Strategic Knowledge Arbitrage and Serendipity

*Elias G. Carayannis*

### Introduction

Heracleitus stated that “everything flows” in life—that is, change is the only constant. Herodotus stated that “war is the father of everything” in life, in a sense anticipating Schumpeter’s work on creative destruction, and the nature and dynamics of the lifecycle of the firm that we discuss later on. We witness these phenomena daily in the context of sociotechnical change that gives birth to substantial challenges and opportunities for individuals, societies and companies.

At the heart of sociotechnical change, as both an antecedent and a consequence, lies the phenomenon of “creative destruction” (Schumpeter, 1942), which illuminates the nature and dynamics of change in the context of unknown unknowns (uncertainty) and known unknowns (risk). Creative destruction drives and shapes the lifecycle of technological paradigms and trajectories (such as the Fisher–Pry or logistical S-curve) (Utterback & Abernathy, 1975), and helps to foster more sustainable entrepreneurship and robust competitiveness (see definitions below). Creative destruction is thus the force “which incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. The process of Creative Destruction is the essential fact about capitalism” (Schumpeter, 1942, p. 82). Moreover, we see creative destruction as a fundamentally knowledge-based and knowledge-driven phenomenon, especially as it manifests itself in the knowledge economy and society.

In this chapter, I try to conceptually assess and empirically integrate three fundamental aspects of the process of creative destruction:

- *strategic knowledge serendipity and arbitrage* as means to unlock and capture the value added by creative destruction;
- *real options* (ROs) as a methodology to assess and maximize the value added by creative destruction;

- multilayered, multimodal and multinodal *technological learning* as a mechanism that internalizes and leverages the value added by creative destruction, and especially lessons learned from earlier stages of a given technological lifecycle as well as evolving successive or overlapping technological lifecycles.

We consider entrepreneurial initiative—that is, forming, assessing and exercising ROs under conditions of risk and uncertainty—as one of the main, if not the main, ways to drive technological change and catalyze and accelerate sustainable growth, hence our motivation to better learn from past entrepreneurial initiatives aimed at fostering economic development (Figure 5.1).

Entrepreneurship and innovation are essential components of economic development. The survival and prosperity of nations and societies alike is increasingly becoming dependent on the quality, scope, nature, dynamics and adaptability of local and global concentrations and combinations of knowledge, and the way in which these are interconnected and leveraged in the form of new and sustainable technology ventures. The American

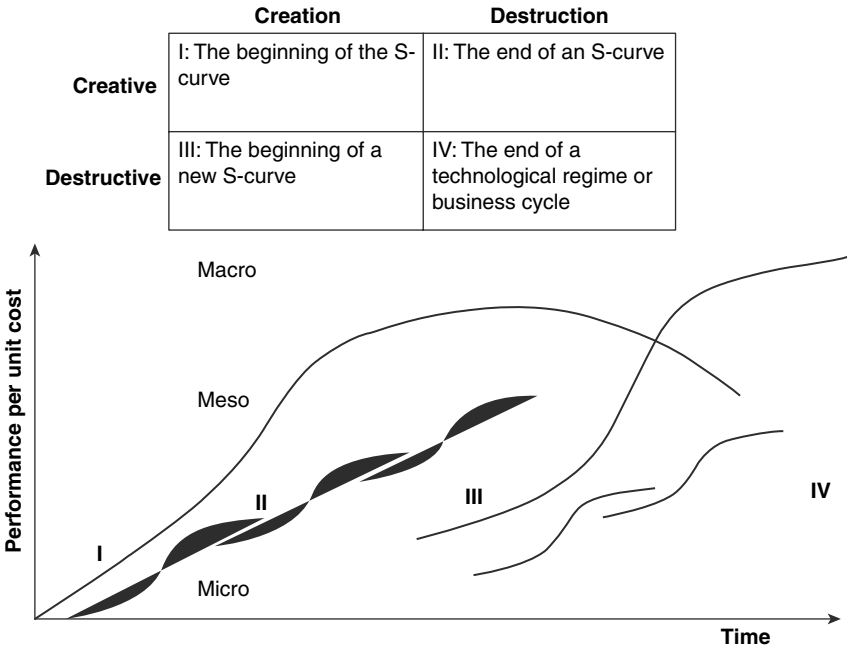


Figure 5.1 The lifecycle of creative destruction: an ecosystem perspective  
 Source: Adapted from Carayannis (2008).



national system of innovation—still the world’s top benchmark—resembles more an archipelago of islands of excellence and less of a strategically integrated, multilayered, multimodal and multinodal knowledge grid. This fragmentation results in substantial added value that is not being captured and value-adding potential not being realized in the context of the national science, innovation and technology enterprise (Carayannis & Gonzalez, 2003; Carayannis & Juneau, 2003).

This is further exacerbated by the nature of research being highly interconnected and non-linear, as well as increasingly cross-disciplinary. Private and public sector competitiveness and regional economic development strategies have increasingly focused on issues under the classification of innovation networks and knowledge clusters, and the building of stronger resources, linkages and networks frequently themed as public–private partnerships. Such innovation modalities consist of a critical mass of local knowledge, expertise, personnel and resources grouped together by related technologies and may include researchers, collaborators, competitors, partners and other supply-chain members within related technologies.

Strategic knowledge arbitrage and strategic knowledge serendipity (SKARSE™) and ROs are at the heart of the design, implementation and leveraging of such initiatives. In this context, and to remain competitive and sustain regional technology synergies, the technology community of entrepreneurs and their public and private sector partners must not only define the existing conditions but also create a framework for assessing the robustness and adaptability of a future strategic position—in other words, they must be able to respond with agility to uncertain future conditions. Key enablers of this capacity to better and faster develop more accurate strategic knowledge and leverage it more effectively and efficiently are the two key competences we define below, namely SKARSE™ (Carayannis in Carayannis & Chanaron, 2007). These competences foster the creation of higher value-added public and private knowledge goods that benefit the local, regional and national economy in a more sustainable manner, empowering companies to become more profitable and sustainable, and potentially to dominate their competitive space for longer periods of time by endowing them with “unfair,” knowledge-based competitive advantages.

The convergence of transformations and discontinuities in both the means of production and the nature of the outcomes of economic activity (products and services) and the pronounced shift from product-focused, tangibles-based economies to service-focused, intangibles-relying ones, necessitate rethinking and possibly reinventing ways and means to support the mission (as well as the business) of global, regional and national policies, and practices of economic development.

In this context, the validity of Joseph Schumpeter’s and the Austrian School of Economics’ principle of creative destruction is further corroborated. This principle underscores the importance as both a challenge and

an opportunity of the continual replacement, renewal and reinvention of socioeconomic, technological and political institutions, practices and infrastructures. Hence the role of private and financial sector development as an enabler, catalyst and accelerator of bottom-up, entrepreneurial initiatives coupled with top-down creative and realistic innovation policies in developed, developing and transitioning economies becomes increasingly central. At the core of our proposed domain of intellectual discourse, and especially using a systems approach, lie the processes of higher-order economic and technological learning (Carayannis, 2000b; Dyker, 2000; Matthews, 1998).

“The concept of economic learning captures the notion that some economies seem to be able to accommodate changes (e.g. products, technologies, markets) better than others. They do so partly through the flexibility of their firms themselves, but also through their capacities to promote inter-organizational linkages and collaboration and, above all, through the capacity of public institutions to imbibe and develop innovations, and then disseminate those innovations in various forms to firms, thus accelerating the process of adaptation... Matthew makes a useful distinction between first-, second-, and third-order economic learning. First-order learning takes place within firms (organizations). Second-order learning takes place between firms through arrangements like sub-contracting, licensing, consortia, equity partnerships or joint ventures. Third-order economic learning takes place both outside and within firms but in such a way that their operating conditions are changed. It is “meta-learning”, or learning how to learn; it takes place at the level of the economic system as a whole.”

(Dyker, 2000).

Companies compete in a given space. Critical to their developing a competitive advantage is the development of SKARSE™. Learning, especially higher-order learning, is the basis for developing these competencies. They will allow the companies to more successfully and more consistently develop a competitive advantage, which in turn will allow them to modify the rules of their competitive space to their advantage.

The greater and deeper their social networks, the easier and longer-lasting the acceptance of their advantage will be. Firms do not exist in a vacuum but rather coexist, co-optete, co-evolve and co-specialize in the presence of other public and private sector entities in what we call a “fractal innovation ecosystem” (Carayannis and Campbell in Carayannis & Ziemnowicz, 2007; see also definition below) and by leveraging the presence of innovation networks and knowledge clusters (ibid.).

For them to entertain sustainable growth, they need to develop a temporary “unfair” competitive advantage (e.g., temporarily privileged/restricted access to knowledge encompassed in a patent). This can be achieved through

innovation, resulting from a better use of less common knowledge. The less common knowledge can be gained by strategic knowledge serendipity, while better use of this knowledge can be achieved by arbitrage and may involve both tacit and explicit knowledge, locally, regionally and globally.

## Definition of terms

We provide below definitions of the concepts that constitute key building blocks of our work:

- *Strategic knowledge serendipity*—This is the unintended benefits of enabling knowledge to “spill over” between employees, groups and functional domains (“happy accidents” in learning) or, more specifically, the capacity to uniquely identify, recognize, access and integrate knowledge assets better and/or faster to derive, develop and capture non-appropriable, defensible, sustainable and scalable pecuniary benefits (Carayannis, GWU Lectures, 2000–2005; Carayannis et al., 2003a; Carayannis et al., 2005; Carayannis et al., 2005a, 2005b; Carayannis et al., 2006a, 2006b, 2006c).
- *Strategic knowledge arbitrage*—This is the ability to distribute and repurpose specific knowledge for applications other than the intended topic area for that knowledge or, more specifically, the capacity to uniquely create, identify, reallocate and recombine knowledge assets better and/or faster to derive, develop and capture non-appropriable, defensible, sustainable and scalable pecuniary benefits (Carayannis, GWU Lectures, 2000–2005; Carayannis et al., 2003a; Carayannis et al., 2005; Carayannis et al., 2005a, 2005b; Carayannis et al., 2006a, 2006b, 2006c).
- *A fractal innovation ecosystem*—This is a multilevel, multimodal, multinodal and multiagent system of systems. The constituent systems consist of innovation metanetworks (networks of innovation networks and knowledge clusters) and knowledge metaclusters (clusters of innovation networks and knowledge clusters) as building blocks, organized in a self-referential or chaotic<sup>1</sup> fractal<sup>2</sup> (Gleick, 1987) knowledge and innovation architecture (Carayannis, 2001), which in turn constitute agglomerations of human, social, intellectual and financial capital stocks and flows as well as cultural and technological artifacts and modalities, continually co-evolving, co-specializing and co-opeting. These innovation networks and knowledge clusters also form, re-form and dissolve within diverse institutional, political, technological and socioeconomic domains, including government, university, industry, non-governmental organizations, and they involve information and communication technologies, biotechnologies, advanced materials, nanotechnologies and next-generation energy technologies.
- *Innovation networks*<sup>3</sup>—These are real and virtual infrastructures and infratechnologies that serve to nurture creativity, trigger invention and catalyze

innovation in a public and/or private domain context (e.g., government-university-industry, public-private research and technology development co-opetitive partnerships<sup>4,5</sup>).

- *Knowledge clusters*—These are agglomerations of co-specialized, mutually complementary and reinforcing knowledge assets in the form of “knowledge stocks” and “knowledge flows” that exhibit self-organizing, learning-driven, dynamically adaptive competences and trends in the context of an open systems perspective.
- The *Mode 3 Fractal Innovation Ecosystem*—This, in short, is the nexus or hub of the emerging 21st-century fractal innovation ecosystem,<sup>6</sup> where people, culture<sup>7</sup> and technology<sup>8,9</sup> (Carayannis & Gonzalez, 2003)—forming the essential fractal innovation ecosystem building block or “knowledge nugget” (Carayannis, 2004)—meet and interact to catalyze creativity, trigger invention and accelerate innovation across scientific and technological disciplines, public and private sectors (government, university, industry and non-governmental knowledge production, utilization and renewal entities) and in a top-down, policy-driven as well as bottom-up, entrepreneurship-empowered fashion. Mode 3 allows and emphasizes the coexistence and co-evolution of different knowledge and innovation paradigms. In fact, a key hypothesis is:
  - The competitiveness and superiority of a knowledge system is highly determined by its adaptive capacity to combine and integrate different knowledge and innovation modes via co-evolution, co-specialization and co-opetition of knowledge stock and flow dynamics (e.g. Mode 1, Mode 2, triple helix, linear and non-linear innovation).
  - The specific context (circumstances, demands, configurations and cases) determines which knowledge and innovation mode (multimodal), at which level (multilevel), involving what parties or agents (multilateral), and with what knowledge nodes or knowledge clusters (multinodal) will be appropriate. What results is an emerging fractal knowledge and innovation ecosystem (MODE 3), well-configured for the knowledge economy and society challenges and opportunities of the 21st century by being endowed with mutually complementary and reinforcing as well as dynamically co-evolving, co-specializing and co-opeting, diverse and heterogeneous configurations of knowledge creation, diffusion and use.
  - The intrinsic litmus test of the capacity of such an ecosystem to survive and prosper in the context of continually glocalizing and intensifying competition represents the ultimate competitiveness benchmark with regard to the robustness and quality of the ecosystem’s knowledge and innovation architecture and topology.
- *Real options*—These represent choices (strategic or tactical) under conditions of risk and uncertainty about tangible and intangible (knowledge-based) assets (as compared and contrasted with financial

assets) that encompass timing, selection and sequencing attributes of significance for the entity that may choose to exercise those options or not (individual, society or company).

Black & Scholes (1973) developed a model for evaluating financial options. Options valuation differs from the valuation of other assets in that uncertainty is a key factor. Both volatility and time to expiration greatly impact the value of an option. It is how uncertainty is captured and included in the valuation model that has since then interested managers, since only some projects with very specific characteristics (e.g. asset-in-place investments) fit traditional and mainly linear valuation methodologies. Translating options into the physical world leads to the development of ROs.

Contrary to standard valuation methodologies (e.g. discounted cash flows), and as supported by Day and Shoemaker (2000), ROs are not static; they're dynamic. Real options valuation is not a snapshot in time; rather, the process needs to be managed. Day and Shoemaker showed that the process can be decomposed into nine phases:

- *Adopting a RO perspective*—Real options are not yet part of mainstream thinking. It therefore needs some adaptation to systematically look at business and recognize opportunities through an options perspective. To some extent, this justifies current practice—all decisions can be seen as options decisions since all projects inherently leave room for managerial discretion in their implementation.
- *Creating and structuring ROs*—Although project managers should be able to make the necessary decisions to ensure the success of their projects, it is important to think about this aspect beforehand and formally structure decisions to create future managerial flexibility. Moreover, most projects involve multiple or a sequence of decisions. Thus, one should look for opportunities to un-bundle these decisions, so each represents one option. For the option to be most useful, all possible alternatives should be taken into account. One should therefore expand his consideration of additional possibilities for future action.
- *Valuing ROs*—The valuation of ROs integrates various aspects: financial returns, but also strategic positioning and knowledge gained. The financial aspect probably receives the most attention. It can be assessed in various forms: using financial models (essentially Black-Scholes using a replicating portfolio), decision analysis (decision trees) or threshold assessment (combination of quantitative analysis and managerial judgment). It is in the valuation of ROs that one probably best notices that ROs are a systematic way of making explicit what could be considered a “gut feeling” on part of managers when they decide to go ahead with a project that has a negative net present value because additional value could be derived in form of knowledge or strategic positioning.

- *Implementing a ROs approach*—Because ROs (and therefore their value) are dynamic, their implementation must be systematic. Assessing the value of the project only at one point in time defeats the superiority of the ROs approach. One needs to carefully monitor the progress of the projects, regularly test and updates his assumptions and based on this knowledge decide whether to exercise the option.
- *Portfolio of ROs*—Luehrman (1998) showed that business strategies can be seen as a portfolio of ROs. As he explains it, “a strategy defines the path a company wants to take from where it currently stands to where it wants to be” (ibid.). This involves choices, learning and a sequence of major decisions. Analyzing projects from a ROs perspective not only forces managers to think several moves ahead (which is nothing new to them), but the option-pricing quantifies the value of follow-on opportunities better than standard discounted cash flow. This RO-based approach to conceiving strategy is congruent with another perspective on strategy as “the competence to discern the non-obvious faster, more clearly and more accurately” (Carayannis, GWU SB Lectures, 2000–2007), and it further highlights the role and influence of SKARSE™ and learning. Luehrman also recommends that for project valuation, option-pricing techniques should be used as complements to existing techniques, not as replacements. In doing so, he emphasizes the creative aspect of finance instead of the more traditional due diligence. If used early on and given adequate freedom, finance can be more creative and play a more important part in the strategy design—that is, it can “contribute insightful interpretive analyses of sequences of decisions that are purely hypothetical—that is, while they are still mere possibilities.” Gaining this knowledge and knowing how, why and when to use it is akin to a knowledge-based RO. It requires a mind shift that allows managers to consistently identify ROs in their business and proactively manage them. Knowledge serendipity provides them with the necessary knowledge to define the terms of the ROs, and knowledge arbitrage allows them to decide if, when and how best to execute them. The creation and growth of a new venture can be seen as a portfolio of ROs, whether embedded, serial or parallel. This portfolio of ROs can be envisioned in a Mode 3 context (multinodal, multimodal, multilayer), in which ROs could be multinodal depending on where the entity is situated on the path of ROs, multimodal depending on which kind of RO is considered (embedded, serial, parallel), and multilayer depending on the level of synthesis one is considering (firm-, industry-, national-level).
- *Technological Learning*—(Carayannis, 1994, 2000a) Learning occurs at both the individual and the organizational level. Individual learning, however, can only be leveraged into tactical and strategic benefits if it is synthesized to the level of organizational learning.

- *Operational technological learning*—On the operational learning level, we have accumulated experience and learning by doing: we learn new things (Carayannis, 1994). This is the short- to medium-term perspective on learning, focusing on new or improved capabilities built through the content learned by an organization.
  - *Tactical technological learning*—On the tactical learning level, we have learning of new tactics about applying the accumulating experience and the learning process: we build new contingency models of decision-making by changing the rules for making decisions and/or adding new ones (Carayannis, 1994). This is the medium- to long-term perspective on learning. Tactical learning enables firms to approach new organizational opportunities in a more efficient and more effective manner, and to leverage or combine existing core capabilities in novel formations for greater competitive advantage.
  - *Strategic technological learning*—On the strategic learning level, we have development and learning (internalization and institutionalization) of new views of our operating universe; hence we learn new strategies of learning (Cole, 1989). This is the very long-term perspective on learning that focuses on reshaping, reinventing and re-engineering organizational “tools” (methods and processes).
- *Co-opetition, co-evolution and co-specialization (C3)*(Carayannis, 2008; Carayannis & Chanaron, 2007)
    - *Strategic knowledge co-opetition*—This is deriving new knowledge through the healthy balance between competition and cooperation, involving employees and business partners.
    - *Strategic knowledge co-evolution*—This is creating new knowledge through a series of interactions and changes at various levels of the organization, spurred by the co-generation and complementary nature of that knowledge.
    - *Strategic knowledge co-specialization*—This is learning and knowledge which encourages individuals or groups to expand their roles into new areas and new domains, in a complementary and mutually reinforcing fashion.
  - *Robust competitiveness*—(Carayannis 2009) This is a state of economic being and becoming that avails systematic and defensible “unfair advantages” to the entities that are part of the economy and is built on mutually complementary and reinforcing low-, medium- and high-technology, public and private sector entities (government agencies, private firms, universities and non-governmental organizations).
  - *Sustainable entrepreneurship*—(Carayannis 2009) This is the creation of viable, profitable and scalable firms that engender the formation of

self-replicating and mutually enhancing innovation networks and knowledge clusters, leading toward what we call robust competitiveness.

## **The lifecycle of a firm**

### **From formation to initial public offering or liquidation via merger and acquisition and strategic partnering—Empirical cases-in-point focusing on mergers and acquisitions**

Entrepreneurship and innovation represent phenomena that in effect encompass and leverage SKARSE™ and ROs, as well as C3. In that manner, entrepreneurship and innovation result in the creation, coexistence, co-opetition, co-evolution and co-specialization of ecosystem entities (or firms), which are manifested in the following firm transformation modes:

- venture creation;
- bootstrapping (organic growth);
- angel financing and venture capital;
- merger and acquisition (M&A);
- initial public offering;
- termination of venture.

Entities collaborate and compete in the same ecosystem. Through learning, especially higher-order learning, they change and evolve together (co-evolution). If the co-evolution is successful, they eventually reach a state of co-specialization, contributing to a more stable, more optimized ecosystem, at least for a period of time. The exercise or non-exercise of ROs allows entities of the ecosystem to co-opete. These ROs rely heavily on SKARSE™ for their definition and management (when, how and why to exercise them or not). Strategic knowledge serendipity provides the terms of the option, while strategic knowledge arbitrage impacts the decision-making. The creation and growth of a new venture is an example of a RO. New ventures and their lifecycle can be seen as a series of ROs, shaped by SKARSE™.

Learning and higher-order learning more specifically allow managers to learn better and faster, and therefore make a more effective and more efficient use of knowledge serendipity and knowledge arbitrage, so as to consistently develop a longer-lasting “unfair” competitive advantage, the basis of robust competitiveness and sustainable entrepreneurship. By developing an “unfair” advantage, the entity effectively changes the rules of the ecosystem. The longer-lasting and the more sustainable the “unfair” advantage, the more likely the entity is to not only change the rules of the ecosystem but, in effect, create a new ecosystem. The greater and more effective the learning, the more and better “unfair” advantage the entity will be creating. This would be similar to recasting the dice over and over, and, as you recast the dice, you improve your likelihood of getting your desired outcome.



We should note that this also ties into social networks (Cross & Parker, 2004) insofar as the broader and the deeper the social network connections are, the more ROs can be identified, and the greater the likelihood of exercising them and reaping their full benefits.

Change is the essence of life—in both business and society and at the heart of change is creative destruction as coined by Schumpeter (1943). Merger and Acquisition (M&A) processes and events are thus at the heart of evolutionary and sometimes revolutionary change in business in that they constitute a value-maximizing adaptation triggered by both entrepreneurial clairvoyance and systemic economic or technological imperatives.

The M&A process is essential in enabling and streamlining the recombination and reallocation of strategic tangible and intangible assets, and in this sense it is a central value adding process for firms and entire economies alike. At the heart of a successful M&A activity is a resident—and continually enhanced through learning—capacity to possess, manage and leverage SKARSE™ (Carayannis & Juneau, 2003; Carayannis & Campbell, 2006).

- *recombination*—creating new configurations and new forms;
- *reallocation*—distribution of resources to their most efficient and/or effective uses.

Learning broadens the potential of the firm, giving it new strategic options to pursue and gaining more operational flexibility than its rivals (Figure 5.2). As stated by the management theorist Peter Huber, “An entity learns if,

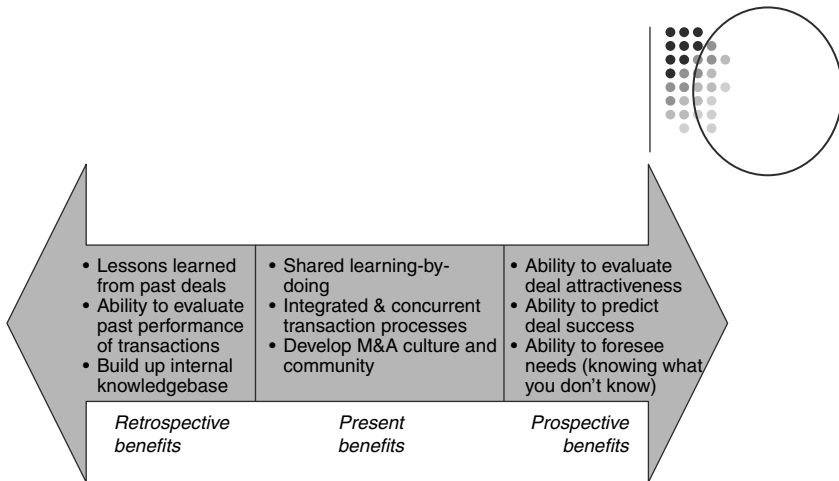


Figure 5.2 Analyzing knowledge impact on M&A benefits by timeframe  
 Source: Adapted from Carayannis, Chapter 1 in Carayannis and Chanaron (2007).

through its processing of information, the range of its potential behaviors is increased." I deal here with three fundamental, mutually complementary and reinforcing types of learning that I define below:

- *Operational learning* in M&A refers to task-specific improvements in M&A activities (within due diligence and within post-merger integration [PMI]). This is an organizational-level improvement in how such tasks are conducted—for example, achieving more accurate firm valuation to achieve better deal pricing, or better human resources management during PMI.
- *Tactical learning* in M&A refers to improvements across the entire M&A lifecycle, such as better overall management of the due-diligence process or the PMI process. This requires improvements in the integration and coordination of tasks, so that the M&A process is more efficient across all future M&A transactions.
- *Strategic learning* in M&A refers to improvements which yield improved corporate performance after M&As. This level of learning requires that the firm gains a better understanding of synergies and how to produce them, or shows superior judgment in selecting M&A targets which will provide sustainable increases in competitive advantage (Table 5.1).

As shown in Figure 5.3, both new (N) and existing companies (O) compete in a given ecosystem (Ecosystem 1) while going through the organizational cognition spiral (OCS) (Carayannis, 1998) that impacts both the behavior of the company and one of its competitors. Each learning order is a cycle of ignorance of ignorance (I/I), awareness of ignorance (A/I), awareness of awareness (A/A) and ignorance of awareness (I/A). As companies go through the first order of learning (learn: develop operational knowledge), then the second order of learning (learning how to learn: develop tactical knowledge) and finally the third order of learning (learning to learn how to learn: develop strategic knowledge), they derive new knowledge from competition and cooperation, and they reach a co-opetition stage (C1). As they grow (G), merge (M) or fail (F) and experience the OCS again, they create new knowledge based on complementary knowledge derived from interactions at various levels of the organization and reach a stage of co-evolution (C2). As they go through a third OCS, they allow groups and individuals to develop knowledge in new areas and they grow into a co-specialization stage (C3).

At this stage, companies reached a state of robust competitiveness. All of the companies are robust or competitive enough to survive and prosper in the ecosystem, the weaker ones having improved or disappeared. In the state of robust competitiveness, there is an optimal number of

Table 5.1 Knowledge dynamics

	Learning	Operational	Tactical	Strategic
Knowledge dynamics				
<b>Arbitrage</b>		Ability to enable learning across functional activities	Ability to enable learning from one situation to another	Ability to improve processes for deriving and implementing lessons learned
<b>Serendipity</b>		Ability to take advantage of new knowledge as it becomes available	Ability to leverage new knowledge across multiple situations or business events	Ability to leverage new knowledge to reshape corporate strategy
<b>Co-opetition</b>		Ability to balance competition and cooperation between departments or groups	Ability to balance competition and cooperation across the entire organization	Ability to balance competition and cooperation to identify and exploit competitive advantage
<b>Co-specialization</b>		Ability to enable cross-functional cooperation	Ability to enable shared learning across groups within the organization	Ability to formulate an integrated strategy that includes all stakeholders in the organization
<b>Co-evolution</b>		Ability to socialize new staff into knowledge-sharing and transfer activities	Ability to integrate new groups into knowledge-sharing and transfer	Ability to enable the organization to grow through shared experience

Source: Adapted from Carayannis and Chanaron (2007).

companies leading a relatively stable ecosystem (for some period of time) in the direction they want. This is, however, not an oligopoly. Robust competitiveness is open to innovation and new entrants, leading to sustainable entrepreneurship.

These happy accidents and spontaneous events, as well as the natural development and change, both absolute and relative, of existing ventures and companies (including the end of a technology or the decline of a

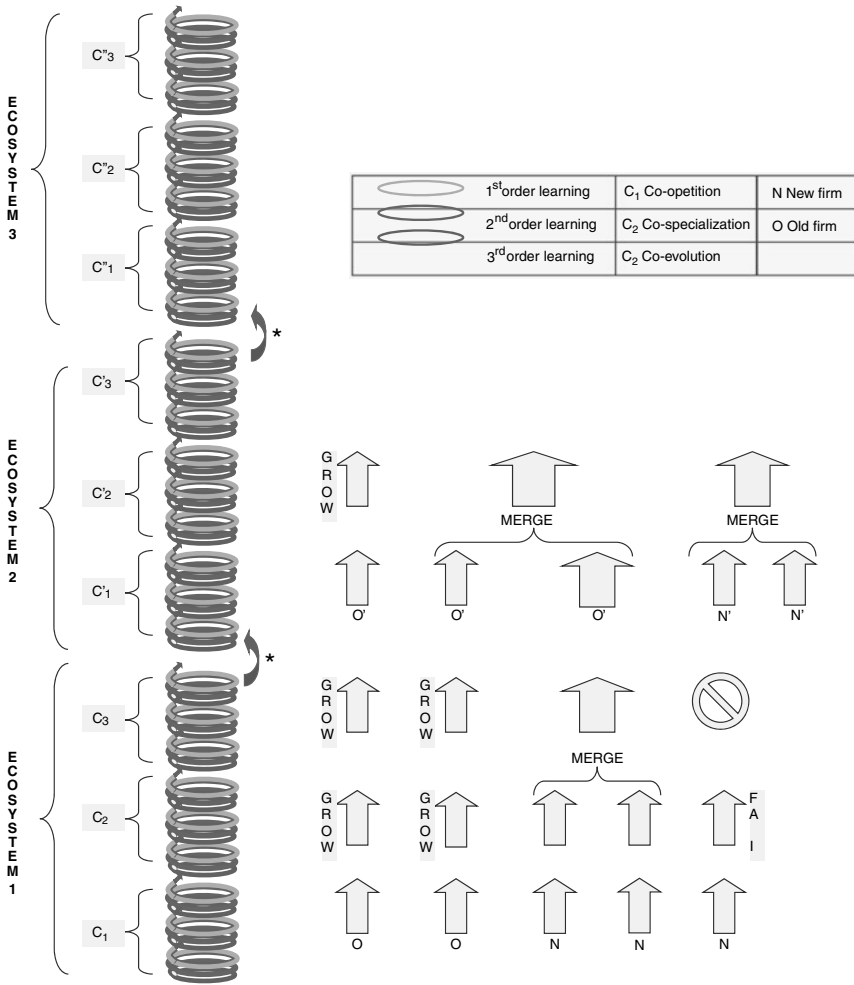


Figure 5.3 From one ecosystem to the next: OCS in C3

\*A critical mass of learning and knowledge enables the transition from one ecosystem to another.

market), lead to a critical mass of instability. While in a co-specialization state, the companies have roughly equivalent competencies; the ecosystem is fairly stable. Now that changes have been introduced, there is enough heterogeneity to destroy this “balance of power”. Enough heterogeneity generates a need for change resulting in a new balance of power. Heterogeneity leads back to co-opetition. It is worth noting, though, that these processes have memory. Following Schumpeter’s principle of creative destruction

(1911/1934), both are new (N') and existing (O') and are back to a stage of co-opetition (C'1), but in a new ecosystem (Ecosystem 2) (see figure 5.5).

Co-opetition, co-evolution and co-specialization are dynamic processes describing both phenomena of stasis (more or less stable ecosystems) and change (resulting in the creation of new ecosystems).

### **Cases-in-point**

Of the six modes of a firm's C3 type of transformation during its lifecycle, we will here focus on M&As and their management in three different companies. The M&A itself is very similar to a RO. It represents for a company an actual form of growth in which the company may decide to enter or not. The M&A process is, as ROs analysis, a process that needs to be looked at from a holistic perspective (from pre-merger planning through PMI). It needs careful identification, constant monitoring and careful decision-making as to whether to enter the transaction or not based on (maybe superior) knowledge. The following cases (Table 5.2) will show that the companies with a superior understanding of how they learn yielded superior results for the M&A transactions they undertook.

### **Introduction to maturity model and maturity model matrix**

#### **Company A (DOW)**

Company A is one of the leading chemical manufacturers in the world and one of the top companies in innovation and R&D. As a serial acquirer, the negotiation side of the deals was very structured and all of the processes were documented. In preparation for a mega-acquisition in the late 1990s, Company A decided to create a PMI office to handle this particular deal. The PMI phase went much smoother than previous ones and Company C decided to keep its PMI group and to institutionalize it.

Both Company A's pre-merger due-diligence group and a PMI group are involved in deal negotiations and due diligence. As such, Company A fosters serendipity by mixing staff with different skill sets to work on common tasks. Another knowledge serendipity enabler is the fact that the pre-merger and PMI teams work together on negotiations and due diligence. Not only does the pre-merger team ensure a thorough due diligence but the PMI team also knows what to look or negotiate for to ensure a smoother PMI. In addition, the PMI team reports to the VP Operations, but also has strong ties links to the CEO, CFO, CIO and other management executives. This cross-functional integration provides better and clearer problem definition as well as more creative and innovative problem-solving.

Company A also developed a database with process checklists, templates and lessons learned from all of the previous deals and conducts after action reviews. If something did not work, lessons are immediately embedded in

Table 5.2 SKARSE™ and C3 implications for M&amp;A

<b>Knowledge dynamics</b>	<b>Operational</b>	<b>Tactical</b>	<b>Strategic</b>
Arbitrage	Cross-reference and leverage information and knowledge from one phase of a deal to another	Cross-referencing, benchmarking and leveraging competences and processes as best practices from one deal for future deals	Utilizing learning-how-to-learn to synthesize and integrate unique insights and experiences from multiple deals to create new competences and processes for the company as a whole
Serendipity	Members of the deal team discover experiences and information in one phase that can impact other phases	Experiences in one transaction are discovered to have implications and advantages for future transactions	Experiences in a transaction help to shape the corporate strategic posture
Co-opetition	Competitively collaborate behavior within the M&A team and with advisors and partners to identify the best approach and processes for a given transaction (creative tension among members)	Competitively collaborative interactions across simultaneous transactions where key developments in each deal provide learning-based improvements in the M&A process	Competitive collaboration between the firm and its value chain partners over time to develop new strategies based on M&A activity
Co-evolution	Cross-functional teams are used in a transaction	Functional team members are well-versed in M&A processes and practices	Functional staff throughout the firm can become involved in an M&A team seamlessly
Co-specialization	The M&A team "bonds" to become a coherent group	A "core" group of executives becomes a recurring M&A team	M&A becomes a core competence, tool and methodology for triggering and facilitating strategic organizational change

Note: Adapted from Carayannis, Chapter 1 in Carayannis and Chanaron (2007).

the process. As such, actionable knowledge is directly put to work to improve the process and increase the likelihood of a positive outcome.

By using technology and systematizing both pre-merger due diligence and PMI, Company A considerably reduced the deal lifecycle. As such, Company A can make deals under better conditions; the time-to-expiration problem or the likelihood of deal conditions changing to less-than-optimal because of time passing are reduced. Company A can also reap faster and more fully the benefits of the deal in a more consistent manner.

Company A has used strategic knowledge serendipity and arbitrage mainly on the operational and tactical level. Were it to capitalize more on this and extend its cross-functional team further—for example, to include members from strategic planning—it might more easily start to leverage knowledge at a more strategic level, which would help it to reach a state of co-specialization (Table 5.3).

Table 5.3 M&A Maturity Model: Company A is integrated

Knowledge dynamics	Operational	Tactical	Strategic
Arbitrage	Company A created a database with checklists, document-sharing, lessons learned and templates.	Company A created a database with lessons learned and after-action reviews. If something went wrong, lessons learned are immediately embedded in the process.	
Serendipity	Both members from the pre-merger due-diligence group and the PMI group work jointly on deal negotiations and due diligence.		
Co-opetition			
Co-evolution	Pre-merger and PMI teams are composed of staff with different skill sets. The PMI team reports to a cross-functional group of executives.	Both the corporate pre-merger team and the PMI team are “institutionalized”.	
Co-specialization			

### **Company B (UPS)**

Company B is one of the world's largest package-delivery companies. It had gone through several acquisitions and its due-diligence process ran smoothly. It was, however, very time- and people-intensive. Company B decided to review its processes and consider the use of technology to alleviate the processes, as it felt this could be a deterrent to a selling company, considering the selling company wants to get the maximum price for the deal, but not at all costs—that is, when the due diligence disrupts its work.

Company B's due-diligence team now uses electronic rooms, where the team and its external advisors store all of their documents and facilitate knowledge exchange. To Company B, the use of technology is strategic and is currently going through a top-down initiative to leverage its existing technology to improve the quality of learning and to improve accountability.

Beyond the due-diligence process, the existing processes are more fragmented. Company B's due-diligence team passes on lessons learned to the PMI team; it makes sure that all of its findings are transmitted to the PMI team and that the PMI team understands their full meaning. They are, however, no more connected than that, neither through technology nor processes built upon cross-functional and “cross-phase” teams.

Company B has not shown that it arbitrages its strategic knowledge. There is no sign of recombination or reallocation of knowledge to develop a sustainable, defensible, scalable and non-appropriable benefit.

I see, however, more possibilities for Company B to leverage its strategic knowledge serendipity:

- Company B's due-diligence team is stable while the PMI team is ad hoc. As a stable group, the due-diligence team can learn from previous experience more easily and start drawing lessons from series of deals. Since the PMI team changes on every deal, it can only rely on documented knowledge and hardly on the memory of the team.
- The due-diligence process is clearly separate from the PMI process. The due-diligence team hands over its findings to the PMI team, but it also finds itself doing a lot of hand-holding. This may not only not be an optimal use of its time, but it also puts it at risk of focusing more on hand-holding than learning from possible issues arising during PMI and that may be useful to integrate in the upfront analysis. Neither team fully benefits from the experience of the other as they would if they were working in a fully cross-functional M&A team.
- Company B has advisors and internal experts who “know what issues to expect”. It is unclear whether these advisors and experts are cross-functional and it does not appear that they are involved in the



PMI process. We can thus question to what extent “they know what issues to expect”; better and more systematic knowledge-sharing practices could help to ensure that they do.

By improving these aspects of the M&A process and capitalizing on knowledge serendipity, Company B would have a better view of the whole process, and drive current knowledge serendipity and developed arbitrage to a more tactical and ultimately strategic level (Table 5.4).

**Company C (Leggett & Platt)**

Company C is a Fortune 500 diversified manufacturing company. It has been a serial acquirer for about a decade, yet only the due-diligence part of the M&A process was systematic and well documented. The integration process, however, was performed by executives and professionals in each of the functional areas, with each following its own process and documenting it to varying extents. To improve its PMI process, Company C decided to also standardize and document its integration process.

The systematized and repeatable process, along with the use of technology, allowed for a seamless handoff from one functional silo to another.

Table 5.4 M&A Maturity Model: Company B is managed

Knowledge dynamics	Operational	Tactical	Strategic
Arbitrage	The due-diligence team transfers all of its findings to the PMI team and makes sure it fully understands their implications.	Lessons learned are documented on every deal and available to all deal teams. The ad hoc PMI teams may not allow full leverage of the acquired knowledge.	
Serendipity	Only to the extent that the due-diligence team transfers its findings to the PMI team. The PMI team is not involved in pre-deal activities.		
Co-opetition	Advisers and internal experts are involved in the due-diligence process.		
Co-evolution			
Co-specialization			

Company C was also able to reduce the time required to integrate acquired companies, avoiding things falling through the cracks, and became quicker at identifying and resolving sticky issues that would hamper reaching the end of the deal.

Company C also started to define more specific integration plans, especially in terms of expected synergies and targets, but it also implemented close monitoring of the expected synergies. As such, Company C could leverage its knowledge to detect problems early and adapt the integration plan so as to optimize the benefits of the acquisition. It also leveraged this knowledge to set more realistic expectations for future deals.

Company C is now more consistent in documenting and identifying mistakes that should be avoided in the future. One instance that caused it to pay for something that was already accounted for in the purchase price was documented, and corresponding processes and templates were modified accordingly to price deals more adequately and avoid implementation bottlenecks down the road.

Company C leveraged its knowledge issued from previous deals and the use of technology to modify its processes and streamline future deals, especially PMI, to pay more attention to crucial issues and speed up things where possible, thereby optimizing the benefits of its acquisition.

Company C's practice of knowledge serendipity and arbitrage has mainly been on the operational and tactical levels, yet it is moving toward a more strategic use. It has therefore been able to co-opete well in its ecosystem and to co-evolve with other ecosystem entities. By capitalizing on this and pushing the knowledge dynamics even further, Company C is well on its way to the co-specialization state (Table 5.5).

### **Company D (e-Funds)**

Company D is an industry leader with numerous years of experience in financial risk management. After a slowdown in revenues, it made the strategic choice to divest from one of its business lines and acquire a number of other businesses, transforming Company D from an occasional into a serial acquirer. Expecting an increase in deal volume, its management decided to create and document a repeatable M&A process.

Company D created a central repository that documents the M&A process and includes past lessons learned after each deal. Making the process repeatable facilitated the identification of similarities across a series of deals, extraction of lessons learned and leveraging that knowledge to improve future deals.

With its systematized M&A process, Company D also increased the coordination and collaboration between siloed functions. This led to a reduced number of issues dropped during the hand-off between the negotiation and PMI teams, but it also gave the integration team the

Table 5.5 M&amp;A Maturity Model: Company C is integrated to self-optimizing

Knowledge dynamics	Operational	Tactical	Strategic
Arbitrage	Unclear but likely.	Unclear but likely.	
Serendipity	Unclear but likely.	Expected synergies are closely monitored and serve to set more realistic expectations for future deals.	Systematization of documentation, monitoring and processes extends to future possible deals.
Co-opetition	Unclear but likely.	Unclear but likely.	
Co-evolution	This aspect is unclear on the due-diligence side of the deal, but the M&A office as well as operational functions and back-office functions are part of the PMI process.	The M&A function is institutionalized, the office works with all involved functional staff on a regular basis, since the company can be considered a serial acquirer.	The PMI process is pushed to the lowest organizational level possible, involving actors as needed, seamlessly.
Co-specialization			

opportunity to view and flag potential issues or things to watch out for before the deal was closed.

An unexpected benefit of this repeatable process, combined with the use of technology, was to improve the focus of the deal team. Because the team knows exactly when to do what and how, and where to look for information, the risk of distraction is decreased. A more focused team is more likely to work more efficiently. Improved focus also reduced the cycle time, contributing to making team participation easier.

To facilitate timely and relevant knowledge-sharing across the company and more especially to higher levels of management, Company D is developing a high-level acquisition landscape for senior management, which will allow them to better shape their M&A strategy and the company's strategic posture.

Company D has been quite successful at creating knowledge serendipity and arbitrage across operational, tactical and strategic levels. It has leveraged knowledge serendipity and arbitrage to move from co-opetition to co-evolution in its ecosystem and is moving toward a co-specialization state (Table 5.6).

Table 5.6 M&amp;A Maturity Model: Company D is self-optimizing

Knowledge dynamics	Operational	Tactical	Strategic
Arbitrage	Company D has a central repository to document the M&A process and lessons learned.	Lessons learned are continuously captured to improve the M&A process, templates updated and used for future deal.	
Serendipity	Company's D integration team has the opportunity to flag potential issues before the deal is closed.	Unclear but likely.	Company D is adding a high-level acquisition landscape module for its senior management. Company D is also testing the application of its systematic process for divestiture.
Co-competition Co-evolution	Unclear but likely. Company D invested in technology to help manage the M&A process to improve coordination and collaboration between siloed cross-functional teams.	Unclear but likely.	
Co-specialization		Unclear but likely.	Company D made the strategic decision to become a serial acquirer.

## Conclusions

This chapter introduces several concepts, including multilayered technological learning, strategic knowledge serendipity and arbitrage (SKARSE™), real options drivers and C3, and it tries to motivate and operationalize them in the context of empirical M&A case studies. The motivation and objective of this is to achieve higher levels of sustainable performance (in the context

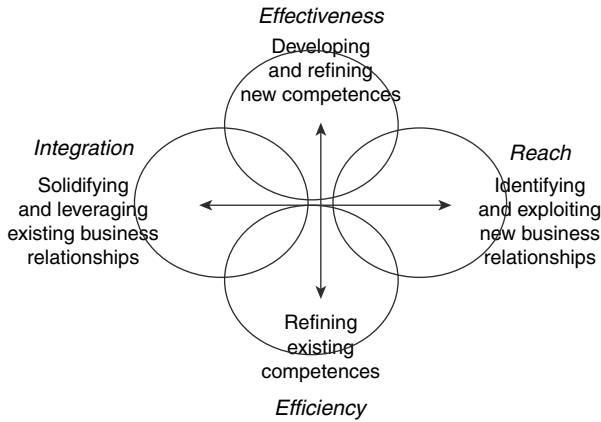


Figure 5.4 Pushing the performance envelop with SKARSE

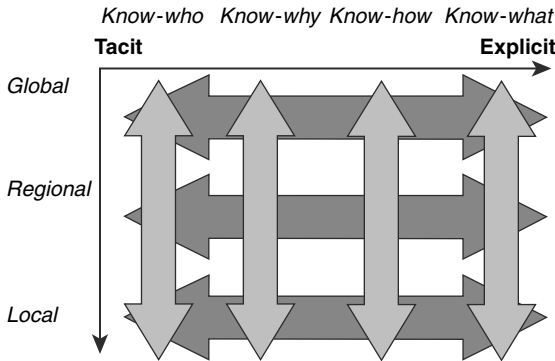


Figure 5.5 SKARSE dimensions—place and content

of robust competitiveness and sustainable entrepreneurship—see definitions above) as well as effectiveness and efficiency (see Figures 5.4 and 5.5).

Our findings provide some rationale and foundation for the presence and role of strategic knowledge serendipity and arbitrage, as well as the presence and impact of the dynamic processes of co-opetition, co-evolution and co-specialization.

## Notes

1. Carayannis (2001, pp. 169–170) discusses chaos theory and fractals in connection to technological learning and knowledge, and innovation system architectures:

Chaos theory is a close relative of catastrophe theory, but has shown more potential in both explaining and predicting unstable non-linearities, thanks

to the concept of self-similarity or fractals [patterns within patterns] and the chaotic behavior of attractors (Mandelbrot) as well as the significance assigned to the role that initial conditions play as determinants of the future evolution of a non-linear system (Gleick, 1987). There is a strong affinity with strategic incrementalism, viewed as a third-order (triple-layered), feedback-driven system that can exhibit instability in any given state as a result of the operational, tactical, and strategic technological learning... that takes place within the organization in question.

2. "A fractal is a *geometric* object which is rough or irregular on all scales of length, and so which appears to be 'broken up' in a radical way. Some of the best examples can be divided into parts, each of which is similar to the original object. Fractals are said to possess infinite detail, and some of them have a *self-similar* structure that occurs at different levels of magnification. In many cases, a fractal can be generated by a repeating pattern, in a typically *recursive* or *iterative* process. The term *fractal* was coined in 1975 by *Benoît Mandelbrot*, from the Latin *fractus* or 'broken'. Before Mandelbrot coined his term, the common name for such structures (the *Koch snowflake*, for example) was *monster curve*. Fractals of many kinds were originally studied as *mathematical* objects. *Fractal geometry* is the branch of mathematics which studies the properties and behaviour of fractals. It describes many situations which cannot be explained easily by classical geometry, and has often been applied in *science*, *technology*, and *computer-generated art*. The conceptual roots of fractals can be traced to attempts to measure the size of objects for which traditional definitions based on *Euclidean geometry* or *calculus* fail" (Fractal, 2014).
3. Networking is important to understanding the dynamics of advanced and knowledge-based societies. Networking links together different modes of knowledge production and knowledge use, and also connects (subnationally, nationally, transnationally) different sectors or systems of society. Systems theory, as presented here, is flexible enough for integrating and reconciling systems and networks, thus creating conceptual synergies.
4. Carayannis and Alexander (2004).
5. Carayannis and Alexander (1999a).
6. See, furthermore, Milbergs (2005).
7. "Culture is the invisible force behind the tangibles and observables in any organization, a social energy that moves people to act. Culture is to the organization what personality is to the individual—a hidden, yet unifying theme that provides meaning, direction, and mobilization" (Killman R., *Gaining Control of the Corporate Culture*, 1985).
8. Technology is defined as that "which allows one to engage in a certain activity... with consistent quality of output", the "*art of science and the science of art*" (Carayannis, 2001) or "*the science of crafts*" (von Braun, 1997).
9. We consider the following quote useful to elucidate the meaning and role of a "knowledge nugget" as a building block of the Mode 3 fractal innovation ecosystem:

People, culture, and technology serve as the institutional, market, and socio-economic "glue" that binds, catalyzes, and accelerates interactions and manifestations between creativity and innovation as shown in Figure 3, along with public-private partnerships, international Research & Development (R&D) consortia, technical/business/legal standards such as intellectual property rights as

well as human nature and the “creative demon”. The relationship is highly non-linear, complex and dynamic, evolving over time and driven by both external and internal stimuli and factors such as firm strategy, structure, and performance as well as top-down policies and bottom-up initiatives that act as enablers, catalysts, and accelerators for creativity and innovation that leads to competitiveness. (Carayannis & Gonzalez, 2003, p. 593)

## References

- Black, F. & Scholes, M. (1973). The pricing of options and corporate liabilities. *Journal of Political Economy*, 81, 637–659.
- Braun, C. (1997). *The Innovation War*. Upper Saddle River, NJ: Prentice Hall.
- Carayannis, E. G. (1994). The strategic management of technological learning: Transnational decision-making frameworks and their empirical effectiveness. *Dissertation Abstracts International*, 55(11), 3564.
- Carayannis, E. G. (2000a). Investigation and validation of technological learning versus market performance. *Technovation*, 20(7), 389–400.
- Carayannis, E. G. (2000b). *Strategic Management of Technological Learning*. Boca Raton, FL: CRC Press.
- Carayannis, E. G. (2008). Conceptual framework for an analysis of diversity and heterogeneity in the knowledge economy and society. In E. G. Carayannis, A. Kaloudis, & Å. Mariussen (Eds.), *Diversity in the Knowledge Economy and Society: Heterogeneity, Innovation and Entrepreneurship* (Ch. 5, pp. 95–116). Cheltenham, UK: Edward Elgar.
- Carayannis, E. G. (2009). Firm evolution dynamics: Towards sustainable entrepreneurship and robust competitiveness in the knowledge economy and society. *International Journal of Innovation and Regional Development*, 1(3), 235–254.
- Carayannis, E. G., & Chanaron, J.-J., (Eds.). (2007). *Leading and Managing Creators, Inventors, and Innovators: The Art, Science, and Craft of Fostering Creativity, Triggering Invention, and Catalyzing Innovation*. Westport, CT: Quorum/Greenwood.
- Carayannis, E. G., & Gonzalez, E. (2003). Creativity and innovation = competitiveness? When, how, and why. In Larisa V. Shavinina (Ed.), *International Handbook on Innovation* (Part VIII, Ch. 3, pp. 587–606). Oxford: Elsevier Press.
- Carayannis, E. G., & Juneau, T. (2003). *Idea Makers and Idea Brokers in High-Technology Entrepreneurship: Fee vs. Equity Compensation for Intellectual Venture Capitalists*. Westport, CT: Praeger/Greenwood.
- Carayannis, E. G., Popescu, D., Sipp, C. M., & Stewart, M. R. (2006). Technological learning for entrepreneurial development (TL4ED) in the knowledge economy (KE): Case studies and lessons learned. *Technovation*, 26(4), 419–443.
- Cole, R. E. (1989). *Strategies for Learning: Small-group Activities in American, Japanese, and Swedish Industry*. Berkeley: University of California Press.
- Cross, R. L., & Parker, A. (2004). *The Hidden Power of Social Networks: Understanding How Work Really Gets Done in Organizations*. Boston, Mass.: Harvard Business School Press.
- Cunha, Miguel Pina E., Serendipity: Why Some Organizations are Luckier than Others (2005). FEUNL Working Paper No.472.
- Day, G. S., & Schoemaker, P. J. H. (2000). Avoiding the pitfalls of emerging technologies. *California Management Review*, 42(2), 8–33.

- Dyker, D. & Radosevic, S. (2000). Building the knowledge-based economy in countries in transition—from concepts to policies. *Journal of Interdisciplinary Economics*, 12 (1) 41–70.
- Fractal. (2014, May 19). In *Wikipedia, The Free Encyclopedia*. Retrieved 2014, from <http://en.wikipedia.org/w/index.php?title=Fractal&oldid=609269034>.
- Gleick, J. (1987). *Chaos: Making a New Science*. New York: Viking.
- Luhmann, N. (1998). *Observations on Modernity*. Stanford, CA: Stanford University Press.
- Mathews, J. (1998). Organizational foundations of the knowledge-based economy. In D. Neef (ed.) *The Knowledge Economy*. Boston: Butterworth-Heinemann.
- Milbergs, E. (2005). Innovation ecosystems and prosperity. Center for Accelerating Innovation <http://www.innovationecosystems.com>.
- Schumpeter, J. (1911/1934). *The Theory of Economic Development*. Cambridge, MA: Harvard University Press.
- Schumpeter, J. A. (1942). *Capitalism, Socialism and Democracy*. New York: Harper and Brothers. (5th ed. London: George Allen and Unwin, 1976).
- Utterback, J. M. & Abernathy, W. J. (1975). A dynamic model of process and product innovation. *Omega*, 3(6), 639–656.
- von Braun, C. (1997). *The Innovation War*. Upper Saddle River, NJ: Prentice Hall.



# 6

## Real Technology Options and Venture Creation

*Elias G. Carayannis and Caroline Sipp*

### **Survey analysis**

The following analysis is based on 61 completed surveys (92.42% completion rate as 66 surveys were viewed and started).

The respondents were to be classified into three subpopulations (technology-driven, TD; technology-based, TB; and technology-neutral, TN). As described in Chapter 3, TD firms could be identified from the North American Industry Classification System codes, but TN and TB could not be accurately identified before launching the survey. To identify which respondent corresponded to which subpopulation, I used a filter (self-identification) question (see question 2 of the survey in ANNEX I). The answers to this question were used for post-stratification. Post-stratification is defined as an “approach [that] is typically implemented due to a lack of prior knowledge of an appropriate stratifying variable or when the experimenter lacks the necessary information to create a stratifying variable during the sampling phase” (Pedhazur & Schmelkin, 1991).

### **Overview of the survey respondents**

Of the 61 respondents, 24 belonged to TD, 31 to TB, 2 to TN and 4 refused to answer. Given the under-representation of TN, from this point forward, all of the survey analysis is based on the TD and TB responses. TB was generally more inclined toward low-risk projects and a balance of low- and high-risk projects. TD was more inclined toward companies with a greater number of employees. Information technology services was the most represented industry, but with only 13% of all respondents, respondents were spread across various industries. Some 89% of all respondents’ companies were headquartered in the United States, mostly in the Washington DC metropolitan area. See ANNEX II for graphical illustrations of TD and TB profiles.

### **Hypotheses analysis**

This research envisioned comparing and contrasting the results gathered across three subpopulations. Given the respondents’ profile (only two

companies in TN), I was only able to compare results between the TD and TB subpopulations.

It should be noted that the Likert scale used in the survey was coded as follows, with "1" corresponding to a higher degree of importance and "5" to a lower degree of importance:

- very important: "1";
- important: "2";
- neutral: "3";
- unimportant: "4";
- not important at all: "5";
- N/A: "6".

**Primary hypothesis:**

H<sub>0</sub>: A real options approach drives strategic decision-making in technology venturing.

**Secondary hypotheses:**

H<sub>1</sub>: The use of real options in decision-making for technology investments increases in a co-opetitive environment.

H<sub>1A</sub>: The use of real options in decision-making for technology investments is greater in TD than in TB in a co-opetitive environment.

H<sub>1</sub> expected results: The use of real options in decision-making to increase in a co-opetitive environment.

I used the Wilcoxon rank-sum (Mann–Whitney) test on the following null hypothesis:

Null hypothesis: The use of real options in decision-making for technology investments is equal in TD and in TB in a co-opetitive environment.

The use of real options was operationalized through the perceived importance of the following attributes of flexibility: abandonment, postponement, rescaling and growth. The data for these attributes were also aggregated into "flexibility." The null hypothesis was tested for each of these attributes. See ANNEX III for the results of all of the tests.

As shown in Table 6.1, the results suggest that there is a statistically significant difference between the underlying distributions in the cases marked with an asterisk. The null hypothesis can be rejected for the option to abandon, to grow incrementally or to rescale and grow at a later time. It can be determined which group has the higher rank by looking at how the actual rank sums compare with the expected rank sums under the null hypothesis. TD has a lower rank, showing a greater degree of importance attributed to the options presented.

Table 6.1 Statistical difference between TD and TB for options in co-opetition

	C1 postpone	C1 abandon	C1 rescale	C1 growth	C1 flex
p-value	0.1844	0.0386*	0.1055	0.0011*	0.0149*
	C1 postpone 2008	C1 abandon 2008	C1 rescale 2008	C1 growth 2008	C1 flex 2008
p-value	0.6426	0.5428	0.0794**	0.0492*	0.4203

Notes: \*Significant at  $\alpha = 5\%$ ; \*\*significant at  $\alpha = 10\%$ .

Source: Adapted from Sipp (2011).

H<sub>2</sub>: The use of real options in decision-making for strategic and non-strategic technology investments increases with risk and uncertainty.

H<sub>2A</sub>: The use of real options in decision-making for strategic technology investments increases with risk and uncertainty.

H<sub>2A1</sub>: The use of real options in decision-making for strategic technology investments is higher in TD than in TB with risk and uncertainty.

H<sub>2A</sub> expected results: The use of real options in decision-making for strategic technology investment to increase with risk and uncertainty.

I used the Wilcoxon rank-sum (Mann–Whitney) test on the following null hypothesis:

Null hypothesis: The use of real options in decision-making for strategic technology investments is equal in TD and in TB with risk and uncertainty.

As shown in Table 6.2, the results suggest that there is a statistically significant difference between the underlying distribution in the cases marked with an asterisk. The null hypothesis can be rejected for the option to rescale and grow today, and for the option to grow in 2008. It can be determined which group has the higher rank by looking at how the actual rank sums compare with the expected rank sums under the null hypothesis. TD has a lower rank, showing a greater degree of importance attributed to the options presented.

H<sub>2B</sub>: The use of real options in decision-making for non-strategic technology investments increases with risk and uncertainty.

H<sub>2B1</sub>: The use of real options in decision-making for non-strategic technology investments is higher in TD than in TB with risk and uncertainty.

H<sub>2B</sub> expected results: The use of real options in decision-making for non-strategic technology investment to increase with risk and uncertainty.

*Table 6.2* Statistical difference between TD and TB for options in strategic co-evolution

	C2S postpone	C2S abandon	C2S rescale	C2S growth	C2S flex
p-value	0.4627	0.6617	0.0939**	0.0034*	0.1652
	C2S postpone 2008	C2S abandon 2008	C2S rescale 2008	C2S growth 2008	C2S flex 2008
p-value	0.4844	0.872	0.5903	0.0064*	0.4006

Notes: \*Significant at  $\alpha = 5\%$ ; \*\*significant at  $\alpha = 10\%$ .

Source: Adapted from Sipp (2011).

I used the Wilcoxon rank-sum (Mann–Whitney) test on the following null hypothesis:

Null hypothesis: The use of real options in decision-making for non-strategic technology investments is equal in TD and in TB with risk and uncertainty.

As shown in Table 6.3 below, the results suggest that there is no statistically significant difference between the underlying distributions in any of the cases presented. The null hypothesis cannot be rejected for any options for non-strategic investments, neither today nor in 2008.

$H_{2C}$ : The use of real options in decision-making applies more often for strategic than non-strategic technology investments in TD and TB.

$H_{2C}$  expected results: The use of real options in decision-making for strategic technology investment to be more frequent than for non-strategic investments.

Null hypothesis: The use of real options in decision-making is the same for strategic as non-strategic technology investments in TD and TB.

*Table 6.3* Statistical difference between TD and TB for options in non-strategic co-evolution

	C2 postpone	C2 abandon	C2 rescale	C2 growth	C2 flex
p-value	0.2691	0.748	0.9388	0.3802	0.6633
	C2 postpone 2008	C2 abandon 2008	C2 rescale 2008	C2 growth 2008	C2 flex 2008
p-value	0.5488	0.3843	0.9172	0.3656	0.8025

Source: Adapted from Sipp (2011).

To test for this hypothesis, the data have to be manipulated. I created a variable “flex” appending the flexibility data from the non-strategic investment question to the data of the strategic investment question. Each of these data points was matched to a “strat” variable that took a value of one when the data point was from the strategic question and 0 when the data point was from the non-strategic question. This “strat” variable became the grouping variable so as to compare ranks for strat = 1 data points to ranks for strat = 0 data points.

Since this hypothesis-testing involved testing within the same sample and not two independent samples, I did not use the Wilcoxon rank-sum (Mann–Whitney) but rather the Kruskal–Wallis test (non-parametric analogue to the ANOVA).

As shown in Table 6.4, the difference in sum of ranks of flexibility is statistically significant between strategic and non-strategic technology investments in TD, leading to the rejection of the null hypothesis. The same test run for TB showed no statistical significance and I, thus, cannot reject the null hypothesis for TB.

H<sub>3</sub>: The use of real options in decision-making increases when the technology investment under consideration leads to new business areas (product, services and/or processes).

H<sub>3A</sub>: The use of real options in decision-making is greater in TD than in TB when the technology investment under consideration leads to new business areas (product, services and/or processes).

H<sub>3</sub> expected results: The use of real options in decision-making to increase when investments under consideration lead to new business areas.

I used the Wilcoxon rank-sum (Mann–Whitney) test on the following null hypothesis:

Null hypothesis: The use of real options in decision-making is equal in TD than in TB when the technology investment under consideration leads to new business areas (product, services and/or processes).

*Table 6.4* Statistical difference in options use between strategic and non-strategic investments for TD

Strat	Obs	Rank sum
0	24	689.50
1	24	486.50

*Notes:* chi-squared = 4.380 with 1 d.f.

*Source:* Adapted from Sipp (2011).

probability = 0.0364.

chi-squared with ties = 4.436 with 1 d.f.

probability = 0.0352.

Table 6.5 Statistical difference between TD and TB for options in co-specialization

	<b>C3 postpone</b>	<b>C3 abandon</b>	<b>C3 rescale</b>	<b>C3 growth</b>	<b>C3 flex</b>
p-value	0.2892	0.7681	0.0058*	0.0004*	0.0514**
	<b>C3 postpone 2008</b>	<b>C3 abandon 2008</b>	<b>C3 rescale 2008</b>	<b>C3 growth 2008</b>	<b>C3 flex 2008</b>
p-value	0.1131	0.5188	0.0016*	0.0037*	0.0283*

Notes: \*Significant at  $\alpha = 5\%$ ; \*\*significant at  $\alpha = 10\%$ .

Source: Adapted from Sipp (2011).

As shown in Table 6.5, the results suggest that there is a statistically significant difference between the underlying distributions in the cases marked with an asterisk. The null hypothesis can be rejected for the option to abandon, to grow incrementally or to rescale and grow at a later time. Which group has the higher rank by looking at how the actual rank sums compare to the expected rank sums under the null hypothesis. TD has a lower rank, showing a greater degree of importance attributed to the options presented.

## Interview analysis

From the 61 survey respondents, 16 indicated their contact information for a possible follow-up interview, of which 7 actually participated in the interview. The profile of interview participants and findings from the interviews are presented below.

### Interview participants' profile

The characteristics of the firms participating in the interviews are summarized in Table 6.6.

Table 6.6 Characteristics of interview participants

<b>Interview #</b>	<b>Industry</b>	<b>Size</b>	<b>Location</b>
1	Aviation and aerospace	More than 5,000	n/a*
2	Financial services	1,001–5,000	USA, DC
3	Financial services	501–1,000	USA, DC
4	Computer software	Less than 50	USA, TX
5	Newspapers	501–1,000	UK
6	Renewable and environment	Less than 50	USA, MA
7	Banking	More than 5,000	USA, CA

Notes: \*Given the few numbers of actors in this industry, the location of the company is not to be disclosed.

Interview #	Suppliers' location	Clients' location	Competitors' location	Regulators' location
1	International	International	International	International
2	Local; regional	International	International	International
3	National	National	National; international	National; international
4	National	National	National; international	National
5	International	Print: 90% national Online: 1/3 National; 2/3 international	Print: national Online: international	National
6	International	n/a*	National; international	National; international
7	International	Local; regional; national; international	Local; regional; national; international	National; international

Notes: \*This firm is in its infancy and does not have clients yet.

Source: Adapted from Sipp (2011).

### Interview findings

- *Suppliers influence on decision-making for technology investments.* For the firm's interviewed, suppliers influence their choice in technology when the firm is a producer of technology. For firms providing services, suppliers appear to have little impact. It should be noted that none of the interview participants operated in a manufacturing industry, which may see an increasing impact of the suppliers on their technology choices.
- *Clients influence on decision-making for technology investments.* For the firm's interviewed, clients influence their choice in technology. When the firm is a producer of technology, the firm is either technologically ahead of its client and pushes the technology or the firm's products are clearly client-driven. For firms providing services, clients have an impact to the extent that the firms want to meet their requirements, but not beyond. Again, it should be noted that none of the interview participants operated in a manufacturing industry, which may see an increasing impact of the clients on their technology choices.
- *Competitors influence on decision-making for technology investments.* For the firms interviewed, competitors influence their choice in technology to the extent that firms want to keep up with their competition. In the case of firms producing technology and of a small size, competitors can drive them out of a product line and they are therefore constantly looking for the next market niche. It should be noted that none of

the interview participants operated in a manufacturing industry, which may see an increasing impact of the competitors on their technology choices.

- *Regulators influence on decision-making for technology investments.* For the firms interviewed, regulators influence their choice in technology because of the standards that they set for their respective industries, whether in terms of safety or reporting requirements. In the case of technology producers whose products are client-driven, regulators influencing the industries of their client also influence where their business is headed. In addition, for international technology-producing firms, if regulators in different countries set different standards, they introduce unfair competition among the international firms, favoring the ones in their domestic market or the ones meeting most closely the requirements of a given market. Similar findings could be expected in the manufacturing industries.

## **Simulation analysis**

The simulation was run three times on each of two configurations, generating a data set in excess of 70,000 agent observations, which is reduced to 1,536 observations at a lattice point (or subpopulation) level of analysis.<sup>1</sup> Running repeated trials of the same configuration reduces any bias issues and provides a statistically significant sample for analysis. Analysis consists of two stages: graphical analysis and pattern analysis at the lattice point data.

### **Graphical analysis**

Two simulation variables provide insights into the effects of subpopulation: the new venture formation level and the probability of new venture formation. The new venture formation level provides data on historic performance, while the probability of new venture formation offers insight regarding future system behaviors. To make visual analysis of these outputs easier, the levels of new venture formation and probabilities of new venture formation in Figures 6.1 and 6.2, respectively, have been tiered using a modified Pareto distribution. The darkest regions represent lattice points where results are 80% or more of the maximum value of the measure on the lattice. The next darkest regions show lattice points where the values are greater than the mean of the measure across lattice points, and the lighter gray indicates lattice points at the 20% (of maximum value) mark. White lattice points represent the lowest performance (< 20%). The results presented here are captured at the conclusion of the simulation running for 50 periods.<sup>2</sup>



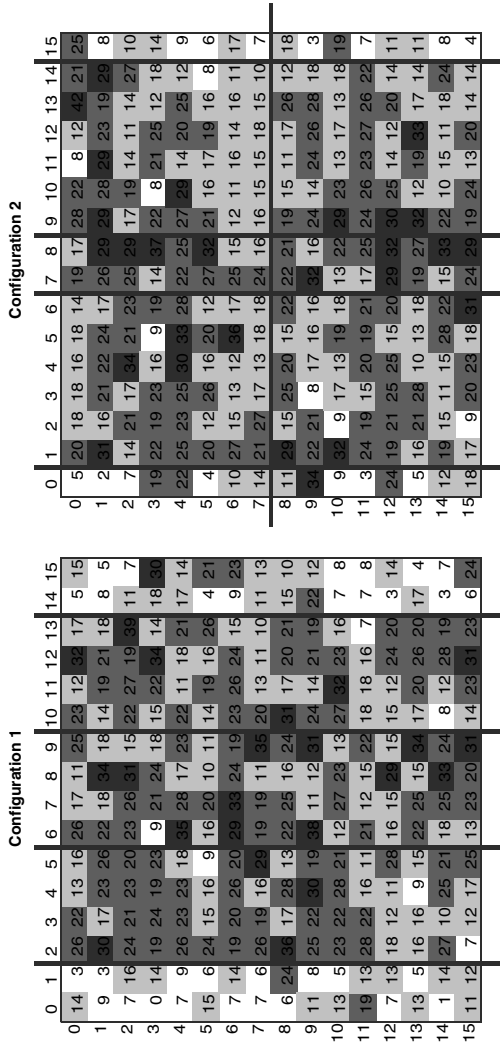


Figure 6.1 New venture formation levels across configurations and subpopulations

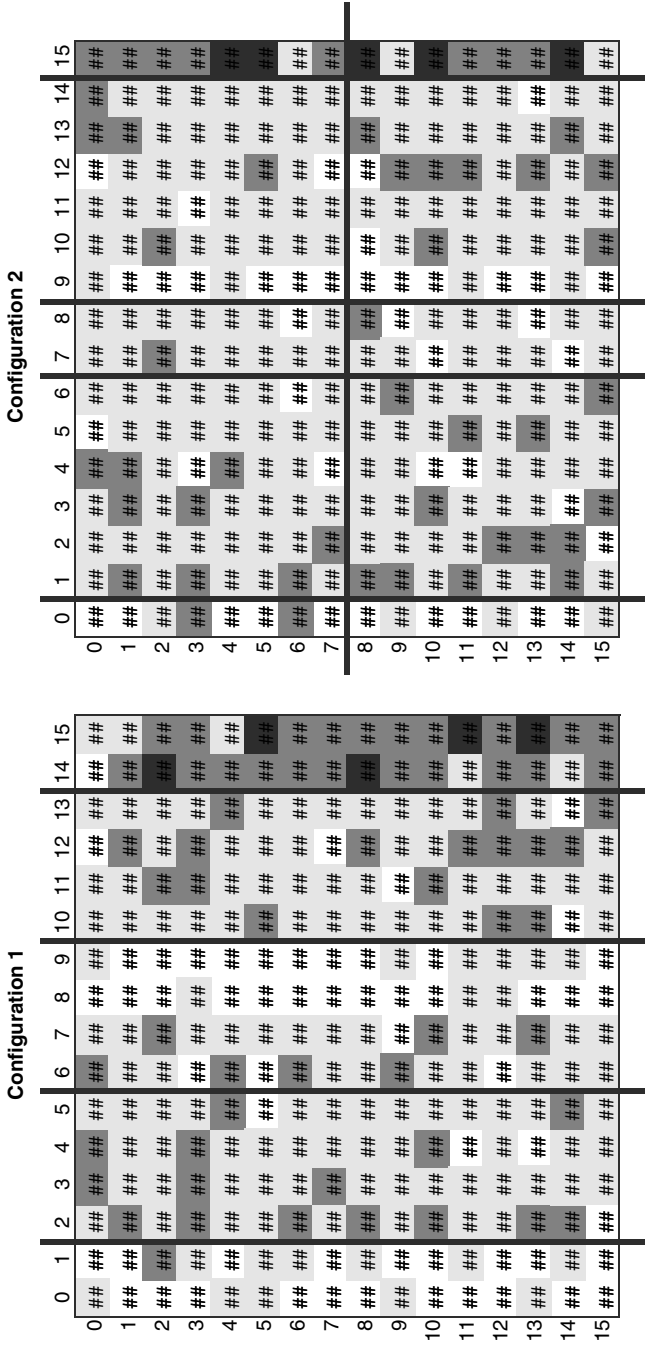


Figure 6.2 Survival rates for new ventures, expressed as the probability of formation occurring across configurations and subpopulations

The new venture formation level identifies the number of ventures that are created and survive to reach the incumbent status in a given lattice point. Figure 6.1 shows one of the three runs for each of the two configurations. Other runs within each configuration displayed similar results. The vertical bars separate firms from the three subpopulations.

Figure 6.1 Venture Run Configurations.

- Configuration 1:
  - Columns 0,1, 14 and 15: TN
  - Columns 2–5 and 10–13: TB
  - Columns 6–9: TD
- Configuration 2:
  - Columns 0 and 15: TN
  - Columns 1–6 and 9–14: TB
  - Columns 7–8: TD

*Source:* Adapted from Sipp (2011).

From the graphical analysis, it appears that the level of new venture formation is higher in TD than in TB and higher in TB than in TN. This seems to be consistent for both configurations and for both the top and bottom halves of the landscapes in Configuration 2. However, analyzing the bottom half of Configuration 2, in which the early adoption rate has been increased for firms with increased dependence on technology, it does not appear that this factor has an impact on the level of new venture formation. These observations gain additional support from a graphic analysis of the probabilities of new venture formation across the lattice structure presented in Figure 6.2.

Figure 6.2 depicts the probability of new venture formation by lattice point. The results are consistent with those presented for the new venture formation level. Furthermore, there does not seem to be a difference in the level of new venture formation in the two areas representing TN, but Figure 6.2 shows that the probability of survival seems higher in the region represented on the right of the landscapes. This shows in both configurations.

### Statistical analysis

Since Configuration 1 was meant to test the validity of the conceptual model, the statistical analysis focused on Configuration 2, which was designed to more closely reflect reality. The statistical analysis corroborated the general findings of the statistical analysis and allowed for more specific conclusions. The analysis concentrated on identifying variation in patterns across the regions based on the simulation parameters. It used the level of new venture formation (*nvsurv*), the probability of new venture formation (*cp\_nvsurv*) and the age of new venture formed (*age\_form*) as the outcome measure, along with assignments of an observation to a particular run and region on the lattice structure (*group*). ANOVA was used to isolate the regions exhibiting significant differences in performance from the rest of the

simulation landscape. Results were consistent across runs and significant at the 0.05 level for the level of new venture formation and the probability of new venture formation. Results were not significant for the age of the new venture formed. Tables 6.7, 6.8 and 6.9 present ANOVA results when testing the aggregate level of new venture formation (nvsurvive), the probability of formation (p\_nvsurv) and the age of new venture formed (age\_form) across regions within each run of Configuration 2.

The analysis of the level of new venture formation confirmed differences in the mean of the new venture formation levels in all runs. Post-hoc Bonferroni tests demonstrated that TN formation levels were significantly lower than those of TB and TD. They also showed that if TN adopts a lower early adoption rate, its formation levels significantly increase and reach means that are not significantly different from the ones for TD and TB. The analysis of the probability of new venture formation also exhibited differences in means. Post-hoc Bonferroni tests depict similar results to the level for new venture formation, the only difference being that TB appears to have slightly higher (but not significant) survival rates than TD. These statistical results only partially confirm the results of the graphical analysis in that the results do not show significant differences between TD and TB.

*Table 6.7* ANOVA for levels of new venture formation across regions

Source	SS	df	MS	F	Prob > F
<b>Run 0</b>					
Between groups	1117.30738	5	223.461476	5.21	0.0001
Within groups	10714.677	250	42.858708		
Total	11831.9844	255	46.3999387		
Bartlett's test for equal variances: $\chi^2(5) = 7.8622$ Prob > $\chi^2 = 0.164$					
<b>Run 1</b>					
Between groups	1048.1632	5	209.63264	5.12	0.0002
Within groups	10227.9579	250	40.9118316		
Total	11276.1211	255	44.2200827		
Bartlett's test for equal variances: $\chi^2(5) = 4.8666$ Prob > $\chi^2 = 0.432$					
<b>Run 2</b>					
Between groups	1821.37693	5	364.275387	8.25	0.0000
Within groups	11044.2324	250	44.1769298		
Total	12865.6094	255	50.4533701		
Bartlett's test for equal variances: $\chi^2(5) = 7.4136$ Prob > $\chi^2 = 0.192$					

Source: Adapted from Sipp (2011).

Table 6.8 ANOVA for the age of new venture formation across regions

Source	SS	df	MS	F	Prob > F
<b>Run 0</b>					
Between groups	39.71502	5	7.943004	5.00	0.0002
Within groups	397.204096	250	1.58881638		
Total	436.919116	255	1.7134083		
Bartlett's test for equal variances: $\chi^2(5) = 7.2767$ Prob > $\chi^2 = 0.201$					
<b>Run 1</b>					
Data not available (simulation results returned errors on this variable)					
<b>Run 2</b>					
Between groups	1.89865864	5	.379731727	0.23	0.9469
Within groups	404.283758	250	1.61713503		
Total	406.182417	255	1.59287222		
Bartlett's test for equal variances: $\chi^2(5) = 7.1987$ Prob > $\chi^2 = 0.206$					

Source: Adapted from Sipp (2011).

Table 6.9 ANOVA for the probability of new venture formation across regions

Source	SS	df	MS	F	Prob > F
<b>Run 0</b>					
Between groups	.97278775	5	.19455755	12.26	0.0000
Within groups	3.96781997	250	.01587128		
Total	4.94060772	255	.019374932		
Bartlett's test for equal variances: $\chi^2(5) = 7.7993$ Prob > $\chi^2 = 0.168$					
<b>Run 1</b>					
Between groups	1.17605377	5	.235210755	16.53	0.0000
Within groups	3.55768764	250	.014230751		
Total	4.73374142	255	.018563692		
Bartlett's test for equal variances: $\chi^2(5) = 2.6524$ Prob > $\chi^2 = 0.753$					
<b>Run 2</b>					
Between groups	.95444902	5	.190889804	10.59	0.0000
Within groups	4.50606486	250	.018024259		
Total	5.46051388	255	.02141378		
Bartlett's test for equal variances: $\chi^2(5) = 6.3503$ Prob > $\chi^2 = 0.274$					

Source: Adapted from Sipp (2011).

## Summary

This study sought to answer the following research question, motivated by the role of real options as a risk management and an uncertainty filtering methodology that helps to minimize downside risk and maximize upside potential. The answers to these questions are provided below.

### Primary research question and answers

*Primary research question:*

- Why, when and how are real options used in strategic technology venturing?

*Answer:* This research showed that an environment presenting co-opetitive (simultaneous competition and collaboration) conditions trigger the use of real options (why), that serve to transform the position, posture and propensity of businesses to innovate, and thus they co-evolve (when) into more effective and efficient forms of businesses (co-specialization) (how).

### Secondary research questions and answers

*Secondary research question 1:*

- Does the use of real options in decision-making for technology investments increase in a co-opetitive environment? (why)

*Answer:* Yes, the use of real options increases in a co-opetitive environment when risk and uncertainty increase, in particular the options to abandon an investment or for an investment that creates a growth option.

*Secondary research question 2:*

- Does the use of real options in decision-making for strategic and non-strategic technology investments increase with risk and uncertainty? (when)

*Answer:* Yes, the use of rescaling and growth options increases for strategic technology investment when risk and uncertainty increase. There is, however, no significant evidence that this applies to non-strategic technology investments.

*Secondary research question 3:*

- Does the use of real options in decision-making increase when the technology investment under consideration leads to new business areas (products, services and/or processes)? (how)

*Answer:* Yes, real options use increases with risk and uncertainty when the technology investment under consideration leads to new business areas. In particular, options to rescale and the creation of growth options become more important.

## Interviews

The interviews findings showed that for the set of firms that participated in the interviews, suppliers influence technology choices for technology-producing firms. They also showed that clients impacted on

technology choices only for companies whose products were clearly client-driven and not the results of technology push. Furthermore, competitors were identified as having an impact on technology choices for technology-producing firms, otherwise firms' main interest was to keep up with what competitors offered. Finally, the findings showed that regulators' main impact on technology choices was through standard-setting, except for international technology-producing firms whose ability to compete may be affected by regulators adopting different standards in different countries.

### Simulation

In addition to providing empirical data to answer these research questions, this study also used an agents-based, knowledge-driven simulation to present evidence supporting the conceptual structure framing this study.

The simulation presented evidence that embracing risk and uncertainty can increase the level of new venture formation and the probability of new venture formation. However, it also showed that it should be adapted to the risk profile of the firm and that timing is also a factor to be considered. While increasing risk at firm creation increases both the level and the probability of new venture formation, increasing the rate of early adoption did not significantly affect it. For more risk-averse firms, lowering the rate of early adoption actually significantly increased the level of new venture formation as well as the probability of new venture formation. Finally, evidence seems to point to there being an optimal level of risk inclination, as the results from TD and TB were not statistically significant, while the results were statistically significant for TN when compared with either TB or TD (Bonferroni post-test).

## ANNEX I. List of Survey Questions

The questions will allow us to test for the following hypotheses:

H<sub>1</sub>: The use of real options in decision-making for technology investments increases in a co-opetitive environment. (Comparing sub-populations.)

H<sub>2</sub>: The use of real options in decision making for *operational, tactical and strategic* technology investments increases with risk and uncertainty.

H<sub>2A</sub>: The use of real options in decision making for *strategic* technology investments increases with risk and uncertainty. (Comparing sub-populations.)

H<sub>2B</sub>: The use of real options in decision making for *non-strategic* technology investments increases with risk and uncertainty. (Comparing sub-populations.)

H<sub>2C</sub>: The use of real options in decision making applies *more often for strategic than non-strategic* technology investments. (In all sub-populations.)

H<sub>3</sub>: The use of real options in decision making increases when the technology investment under consideration leads to new business areas (product, services and/or processes). (Comparing sub-populations.)

In order not to set specific expectations and bias the respondent, I will not refer directly to real options but to flexibility in investment (Busby and Pitts, 1997).

---

---

### **Business Profile**

- Q.1. Your business is inclined toward: (low risk/high risk)<sup>3</sup> [filter]
- Low risk projects with certain and normal rates of return
  - A balance of low risk and high risk projects
  - High risk projects with chances of very high returns
  - DK/Refuse
- Q.2. Would it be most accurate to describe your business as:<sup>3</sup> [filter]
- Producer of technology
  - Extensive user of technology
  - Producer and user of technology
  - Avoids technology
  - Other, please specify
  - DK/Refuse
- Q.3. Do you have a business website?<sup>3</sup> [filter]
- Yes
  - No
  - DK/Refuse
- Q.4. Is your Web site capable of conducting e-commerce, that is, accepting orders over the Internet and letting customers pay with a credit card through a secure Web connection?<sup>3</sup> [filter]
- Yes
  - No
  - DK/Refuse
- Q.5. When you consider making a technology investment in your business, how do you assess its financial viability? Do you primarily use (select all that apply):<sup>3,4</sup> [existence/non-existence]
- Payback period
  - Return on investment (ROI)
  - Discounted cash flow methods (NPV or IRR)
  - Gut feeling
  - Other, please specify
  - Not applicable – no major investments
  - Don't know/Refuse











**Respondent Profile**

Q.22. What is your job title?

\_\_\_\_\_

Q.23. How many people does your company employ?

- Less than 50
- 50–100
- 101–200
- 201–500
- 501–1,000
- 1,001–5,000
- More than 5,000
- Don't know/Refuse to answer

Q.24. In which industry/sector does your company operate? [list of industries]\_\_\_\_\_

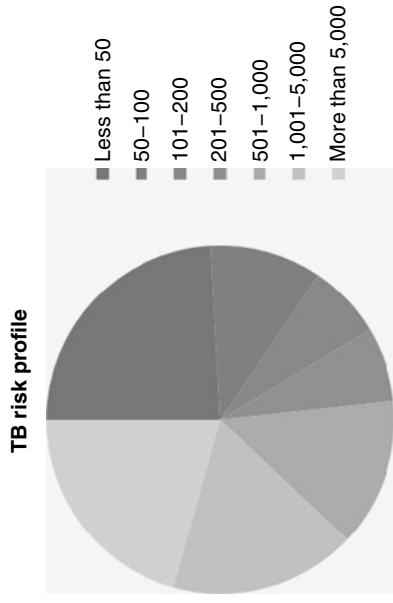
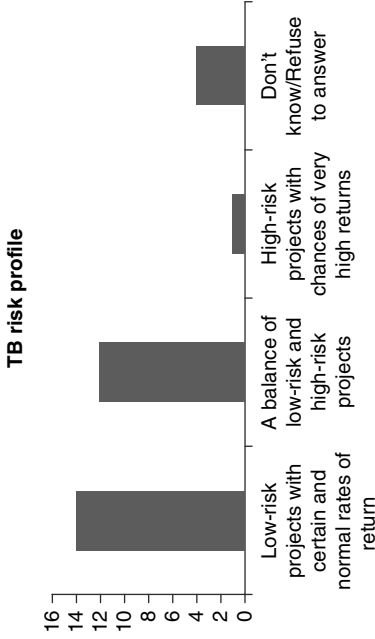
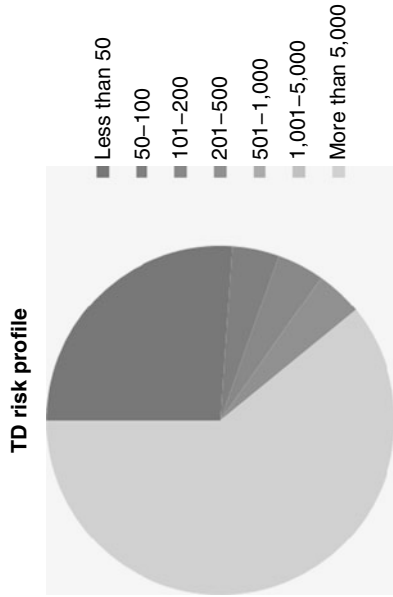
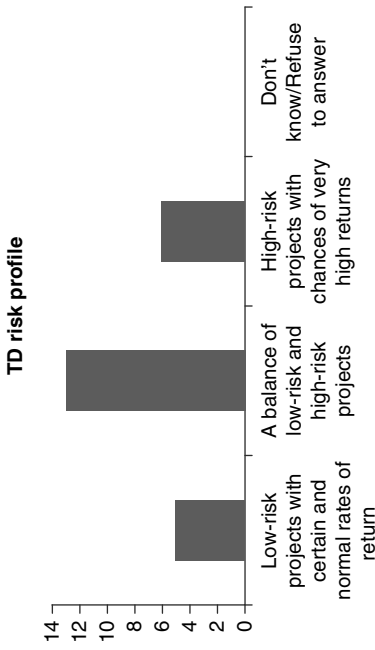
Q.25. In which country is your company headquartered? [list of countries]\_\_\_\_\_

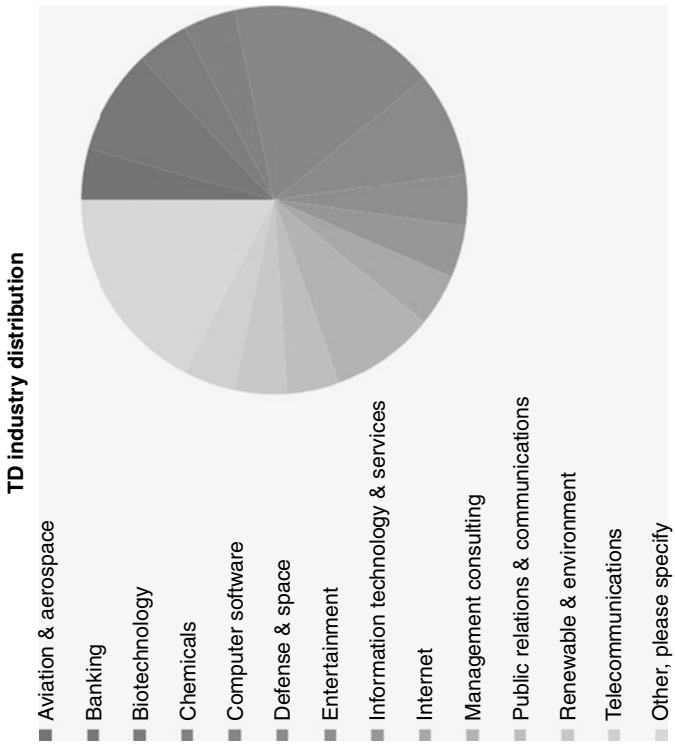
Q.26. If located in the USA, please specify in which state: [list of U.S. states]\_\_\_\_\_

Q.27. Would you be available for a follow up interview? If so, please provide your name and email and/or phone number:

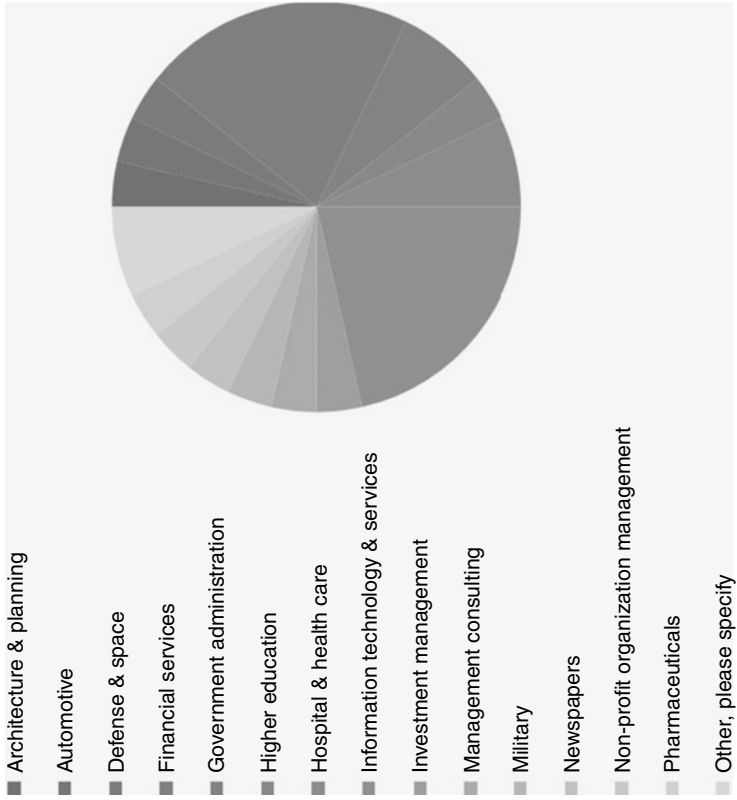
\_\_\_\_\_  
\_\_\_\_\_

**ANNEX II. Survey TD and TB Profiles**



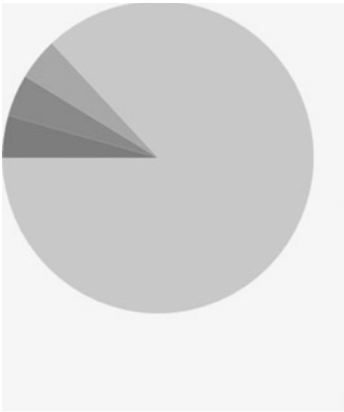


### TB industry distribution



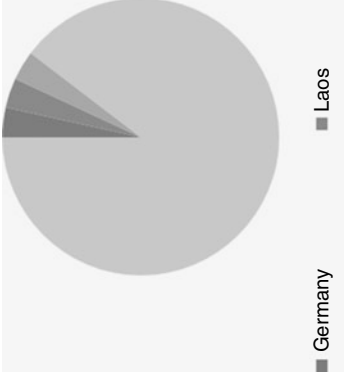


TD headquarters country distribution



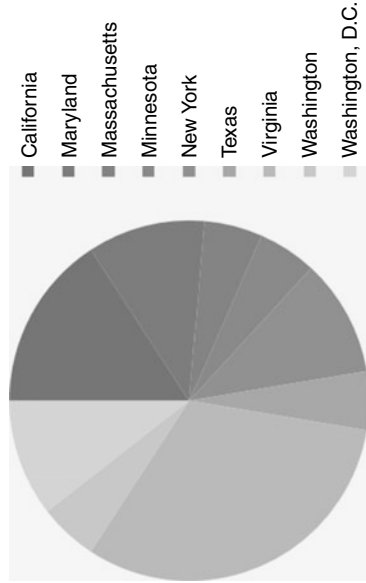
■ Australia ■ France ■ India ■ United States of America

TD headquarters country distribution



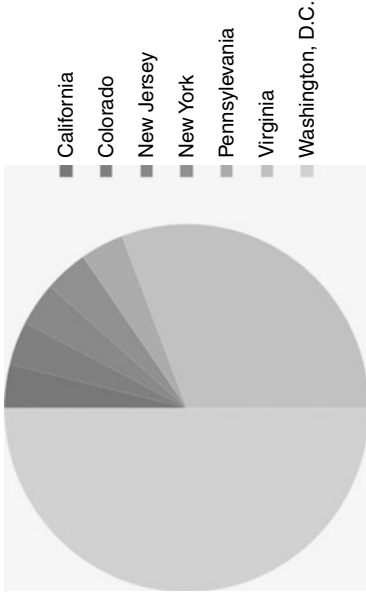
■ Germany ■ United Kingdom ■ United States of America

TD headquarters country distribution



■ California ■ Maryland ■ Massachusetts ■ Minnesota ■ New York ■ Texas ■ Virginia ■ Washington ■ Washington, D.C.

TD headquarters country distribution

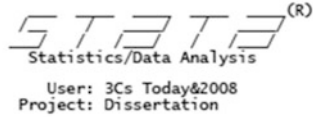


■ California ■ Colorado ■ New Jersey ■ New York ■ Pennsylvania ■ Virginia ■ Washington, D.C.

ANNEX III.

Annex VIII. Wilcoxon Rank-Sum (Mann-Whitney) Tests

3Cs Today&2008 Tuesday February 15 23:17:38 2011 Page 1



```
1 . insheet using "C:\Users\caco\Desktop\Dissertation Process\DataCollection\Survey\Survey Res
(47 vars, 55 obs)
2 . do "C:\Users\caco\Desktop\Dissertation Process\DataCollection\Survey\StataAnalysis\3Cs Tod
3 . ranksum c1postpone, by(subpop)
```

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	30	898	825
3	24	587	660
combined	54	1485	1485

unadjusted variance 3300.00  
 adjustment for ties -275.35  
 adjusted variance 3024.65

Ho: c1post~e(subpop==2) = c1post~e(subpop==3)  
 z = 1.327  
 Prob > |z| = 0.1844

```
4 . ranksum c1postpone2008, by(subpop)
```

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	30	851	825
3	24	634	660
combined	54	1485	1485

unadjusted variance 3300.00  
 adjustment for ties -160.38  
 adjusted variance 3139.62

Ho: c1p~2008(subpop==2) = c1p~2008(subpop==3)  
 z = 0.464  
 Prob > |z| = 0.6426

3Cs Today&amp;2008 Tuesday February 15 23:17:39 2011 Page 2

## 5 . ranksum clabandon, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	30	940.5	825
3	24	544.5	660
combined	54	1485	1485

unadjusted variance      3300.00  
 adjustment for ties      -180.75

adjusted variance      3119.25

Ho: claban~n(subpop==2) = claban~n(subpop==3)

z = 2.068  
 Prob > |z| = 0.0386

## 6 . ranksum clabandon2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	30	859	825
3	24	626	660
combined	54	1485	1485

unadjusted variance      3300.00  
 adjustment for ties      -178.24

adjusted variance      3121.76

Ho: cla~2008(subpop==2) = cla~2008(subpop==3)

z = 0.609  
 Prob > |z| = 0.5428

## 7 . ranksum clrescale, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	30	914.5	825
3	24	570.5	660
combined	54	1485	1485

unadjusted variance      3300.00  
 adjustment for ties      -243.40

adjusted variance      3056.60

Ho: clresc~e(subpop==2) = clresc~e(subpop==3)

z = 1.619  
 Prob > |z| = 0.1055

## 8 . ranksum clrescale2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	30	922.5	825
3	24	562.5	660
combined	54	1485	1485

unadjusted variance 3300.00

adjustment for ties -210.82

adjusted variance 3089.18

Ho: clr~2008(subpop==2) = clr~2008(subpop==3)

z = 1.754

Prob &gt; |z| = 0.0794

## 9 . ranksum clgrowth, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	30	1002	825
3	24	483	660
combined	54	1485	1485

unadjusted variance 3300.00

adjustment for ties -368.68

adjusted variance 2931.32

Ho: clgrowth(subpop==2) = clgrowth(subpop==3)

z = 3.269

Prob &gt; |z| = 0.0011

## 10 . ranksum clgrowth2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	30	933.5	825
3	24	551.5	660
combined	54	1485	1485

unadjusted variance 3300.00

adjustment for ties -256.86

adjusted variance 3043.14

Ho: clg~2008(subpop==2) = clg~2008(subpop==3)

z = 1.967

Prob &gt; |z| = 0.0492

## 11 . ranksum c1flex, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	30	963	825
3	24	522	660
combined	54	1485	1485

unadjusted variance      3300.00  
 adjustment for ties      -87.30

adjusted variance      3212.70

Ho: c1flex(subpop==2) = c1flex(subpop==3)

z = 2.435  
 Prob > |z| = 0.0149

## 12 . ranksum c1flex2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	30	871	825
3	24	614	660
combined	54	1485	1485

unadjusted variance      3300.00  
 adjustment for ties      -42.14

adjusted variance      3257.86

Ho: c1f~2008(subpop==2) = c1f~2008(subpop==3)

z = 0.806  
 Prob > |z| = 0.4203

## 13 . ranksum c2spostpone, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	780.5	742
3	24	597.5	636
combined	52	1378	1378

unadjusted variance      2968.00  
 adjustment for ties      -219.95

adjusted variance      2748.05

Ho: c2spos~e(subpop==2) = c2spos~e(subpop==3)

z = 0.734  
 Prob > |z| = 0.4627

## 14 . ranksum c2spostpone2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	779	742
3	24	599	636
combined	52	1378	1378

unadjusted variance      2968.00  
 adjustment for ties      -167.87

adjusted variance      2800.13

Ho: c2spos~8(subpop==2) = c2spos~8(subpop==3)

z = 0.699  
 Prob > |z| = 0.4844

## 15 . ranksum c2sabandon, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	765	742
3	24	613	636
combined	52	1378	1378

unadjusted variance      2968.00  
 adjustment for ties      -205.25

adjusted variance      2762.75

Ho: c2saba~n(subpop==2) = c2saba~n(subpop==3)

z = 0.438  
 Prob > |z| = 0.6617

## 16 . ranksum c2sabandon2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	750.5	742
3	24	627.5	636
combined	52	1378	1378

unadjusted variance      2968.00  
 adjustment for ties      -186.50

adjusted variance      2781.50

Ho: c2saba~8(subpop==2) = c2saba~8(subpop==3)

z = 0.161  
 Prob > |z| = 0.8720

3Cs Today&amp;2008 Tuesday February 15 23:17:39 2011 Page 6

17 . ranksum c2srescale, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	829	742
3	24	549	636
combined	52	1378	1378

unadjusted variance      2968.00  
 adjustment for ties      -269.99

adjusted variance      2698.01

Ho: c2sres~e(subpop==2) = c2sres~e(subpop==3)

z = 1.675  
 Prob > |z| = 0.0939

18 . ranksum c2srescale2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	770	742
3	24	608	636
combined	52	1378	1378

unadjusted variance      2968.00  
 adjustment for ties      -263.28

adjusted variance      2704.72

Ho: c2sres~8(subpop==2) = c2sres~8(subpop==3)

z = 0.538  
 Prob > |z| = 0.5903

19 . ranksum c2sgrowth, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	892	742
3	24	486	636
combined	52	1378	1378

unadjusted variance      2968.00  
 adjustment for ties      -343.22

adjusted variance      2624.78

Ho: c2sgro~h(subpop==2) = c2sgro~h(subpop==3)

z = 2.928  
 Prob > |z| = 0.0034

20 . ranksum c2sgrowth2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	884.5	742
3	24	493.5	636
combined	52	1378	1378

unadjusted variance      2968.00  
 adjustment for ties      -240.98

adjusted variance      2727.02

Ho: c2sgro~8(subpop==2) = c2sgro~8(subpop==3)

z = 2.729  
 Prob > |z| = 0.0064

21 . ranksum c2sflex, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	817	742
3	24	561	636
combined	52	1378	1378

unadjusted variance      2968.00  
 adjustment for ties      -47.00

adjusted variance      2921.00

Ho: c2sflex(subpop==2) = c2sflex(subpop==3)

z = 1.388  
 Prob > |z| = 0.1652

22 . ranksum c2sflex2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	787.5	742
3	24	590.5	636
combined	52	1378	1378

unadjusted variance      2968.00  
 adjustment for ties      -38.39

adjusted variance      2929.61

Ho: c2sflex~8(subpop==2) = c2sflex~8(subpop==3)

z = 0.841  
 Prob > |z| = 0.4006



## 23 . ranksum c2postpone, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	683.5	742
3	24	694.5	636
combined	52	1378	1378

unadjusted variance 2968.00

adjustment for ties -165.97

adjusted variance 2802.03

Ho: c2post~e(subpop==2) = c2post~e(subpop==3)

z = -1.105

Prob &gt; |z| = 0.2691

## 24 . ranksum c2postpone2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	710	742
3	24	668	636
combined	52	1378	1378

unadjusted variance 2968.00

adjustment for ties -118.97

adjusted variance 2849.03

Ho: c2p~2008(subpop==2) = c2p~2008(subpop==3)

z = -0.600

Prob &gt; |z| = 0.5488

## 25 . ranksum c2abandon, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	711.5	728
3	23	614.5	598
combined	51	1326	1326

unadjusted variance 2790.67

adjustment for ties -153.93

adjusted variance 2636.74

Ho: c2aban~n(subpop==2) = c2aban~n(subpop==3)

z = -0.321

Prob &gt; |z| = 0.7480

## 26 . ranksum c2abandon2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	683.5	728
3	23	642.5	598
combined	51	1326	1326

unadjusted variance 2790.67  
 adjustment for ties -174.89

adjusted variance 2615.78

Ho: c2a~2008(subpop==2) = c2a~2008(subpop==3)

$z = -0.870$   
 Prob > |z| = 0.3843

## 27 . ranksum c2rescale, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	738	742
3	24	640	636
combined	52	1378	1378

unadjusted variance 2968.00  
 adjustment for ties -256.94

adjusted variance 2711.06

Ho: c2resc~e(subpop==2) = c2resc~e(subpop==3)

$z = -0.077$   
 Prob > |z| = 0.9388

## 28 . ranksum c2rescale2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	736.5	742
3	24	641.5	636
combined	52	1378	1378

unadjusted variance 2968.00  
 adjustment for ties -165.97

adjusted variance 2802.03

Ho: c2r~2008(subpop==2) = c2r~2008(subpop==3)

$z = -0.104$   
 Prob > |z| = 0.9172

3Cs Today&amp;2008 Tuesday February 15 23:17:39 2011 Page 10

## 29 . ranksum c2growth, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	788	742
3	24	590	636
combined	52	1378	1378

unadjusted variance      2968.00  
 adjustment for ties      -219.82

adjusted variance      2748.18

Ho: c2growth(subpop==2) = c2growth(subpop==3)

z = 0.877  
 Prob > |z| = 0.3802

## 30 . ranksum c2growth2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	790	742
3	24	588	636
combined	52	1378	1378

unadjusted variance      2968.00  
 adjustment for ties      -153.43

adjusted variance      2814.57

Ho: c2g~2008(subpop==2) = c2g~2008(subpop==3)

z = 0.905  
 Prob > |z| = 0.3656

## 31 . ranksum c2flex, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	718.5	742
3	24	659.5	636
combined	52	1378	1378

unadjusted variance      2968.00  
 adjustment for ties      -54.48

adjusted variance      2913.52

Ho: c2flex(subpop==2) = c2flex(subpop==3)

z = -0.435  
 Prob > |z| = 0.6633

## 32 . ranksum c2flex2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	28	728.5	742
3	24	649.5	636
combined	52	1378	1378

unadjusted variance 2968.00

adjustment for ties -53.72

adjusted variance 2914.28

Ho: c2f~2008(subpop==2) = c2f~2008(subpop==3)

z = -0.250

Prob &gt; |z| = 0.8025

## 33 . ranksum c3postpone, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	29	840.5	783
3	24	590.5	648
combined	53	1431	1431

unadjusted variance 3132.00

adjustment for ties -188.65

adjusted variance 2943.35

Ho: c3post~e(subpop==2) = c3post~e(subpop==3)

z = 1.060

Prob &gt; |z| = 0.2892

## 34 . ranksum c3postpone2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	29	869.5	783
3	24	561.5	648
combined	53	1431	1431

unadjusted variance 3132.00

adjustment for ties -151.02

adjusted variance 2980.98

Ho: c3p~2008(subpop==2) = c3p~2008(subpop==3)

z = 1.584

Prob &gt; |z| = 0.1131

3Cs Today&amp;2008 Tuesday February 15 23:17:39 2011 Page 12

## 35 . ranksum c3abandon, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	29	799	783
3	24	632	648
combined	53	1431	1431

unadjusted variance      3132.00  
 adjustment for ties      -188.65

adjusted variance      2943.35

Ho: c3aban~n(subpop==2) = c3aban~n(subpop==3)

z = 0.295  
 Prob > |z| = 0.7681

## 36 . ranksum c3abandon2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	29	818	783
3	24	613	648
combined	53	1431	1431

unadjusted variance      3132.00  
 adjustment for ties      -189.66

adjusted variance      2942.34

Ho: c3a~2008(subpop==2) = c3a~2008(subpop==3)

z = 0.645  
 Prob > |z| = 0.5188

## 37 . ranksum c3rescale, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	29	931	783
3	24	500	648
combined	53	1431	1431

unadjusted variance      3132.00  
 adjustment for ties      -255.70

adjusted variance      2876.30

Ho: c3resc~e(subpop==2) = c3resc~e(subpop==3)

z = 2.760  
 Prob > |z| = 0.0058

38 . ranksum c3rescale2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	29	953.5	783
3	24	477.5	648
combined	53	1431	1431

unadjusted variance 3132.00

adjustment for ties -221.10

adjusted variance 2910.90

Ho: c3r~2008(subpop==2) = c3r~2008(subpop==3)

z = 3.160

Prob > |z| = 0.0016

39 . ranksum c3growth, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	29	959	783
3	24	472	648
combined	53	1431	1431

unadjusted variance 3132.00

adjustment for ties -618.60

adjusted variance 2513.40

Ho: c3growth(subpop==2) = c3growth(subpop==3)

z = 3.511

Prob > |z| = 0.0004

40 . ranksum c3growth2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	29	937.5	783
3	24	493.5	648
combined	53	1431	1431

unadjusted variance 3132.00

adjustment for ties -298.00

adjusted variance 2834.00

Ho: c3g~2008(subpop==2) = c3g~2008(subpop==3)

z = 2.902

Prob > |z| = 0.0037

3Cs Today&2008 Tuesday February 15 23:17:40 2011 Page 14

41 . ranksum c3flex, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	29	891.5	783
3	24	539.5	648
combined	53	1431	1431

unadjusted variance      3132.00  
 adjustment for ties      -29.17

adjusted variance      3102.83

Ho: c3flex(subpop==2) = c3flex(subpop==3)

z = 1.948  
 Prob > |z| = 0.0514

42 . ranksum c3flex2008, by(subpop)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

subpop	obs	rank sum	expected
2	29	905	783
3	24	526	648
combined	53	1431	1431

unadjusted variance      3132.00  
 adjustment for ties      -38.51

adjusted variance      3093.49

Ho: c3f~2008(subpop==2) = c3f~2008(subpop==3)

z = 2.193  
 Prob > |z| = 0.0283

43 .  
 end of do-file

44 .

## ANNEX IV Simulation Design

This annex presents the simulation's design as described in Provance's (2010) dissertation and has been adapted to reflect some of the changes applied to this research.

The simulation is designed as a [16x16] torus-shaped landscape (or lattice) to eliminate ordinal bias and bias against agents along edges of the landscape<sup>10</sup>. The contents of this landscape are knowledge resources that are acquired by new ventures and incumbent firms in a competition to fill market needs (Figure A.V.1).

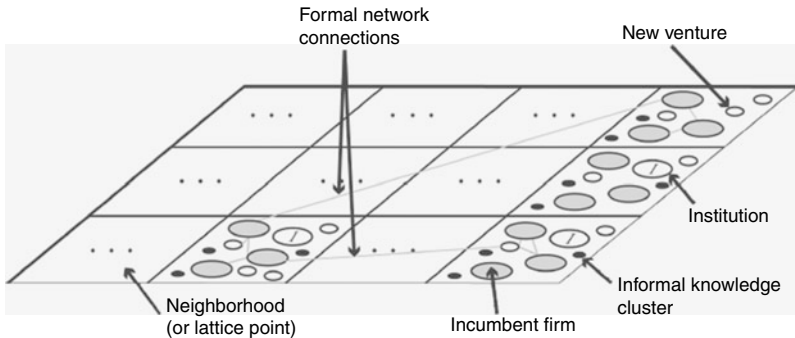


Figure A.V.1 Conceptual model of heterogeneous agent landscape of simulation

Figure A.V.1 depicts a portion of the landscape on which this simulation runs along with the heterogeneous set of agents that exist on that landscape. This simulation model includes incumbent firms, new ventures, buyers, institutions and informal knowledge clusters in each 'neighborhood' (or lattice point) on the landscape. The two former agents (firms and ventures) develop formal network connections with partners (other firms or ventures) during the execution of the simulation. Firms and ventures acquire informal knowledge clusters during the simulation. Institutions act more holistically on neighborhoods by mediating the flows of knowledge between other agents on the landscape.

Prior to initialization for a specific run, the simulation model dictates certain behaviors at a system level, shaping the landscape in order to reflect a desired set of conditions. Certain simulation parameters are set at a global level:

- The duration in time periods of an iteration of the simulation
- The number of iterations to run a particular configuration of the simulation for
- The seed key for random number generation during each iteration
- Initial levels of buyers, incumbent firms, incumbent firm network partners, and informal knowledge clusters
- Maximum distance for partner selection when growing networks
- Initialization conditions for incumbent firm, buyer and informal cluster knowledge
- Rates of entry for new informal knowledge clusters, buyers and new venture foundings
- The threshold for determining new venture creation (founder commitment to create an entrepreneurial venture)
- The threshold for entry by the new venture into the market competition (conversion of new venture into incumbent firm agent behaviors)



- The threshold for acceptance of innovation by market recipients
- Feedback thresholds and rates for observations of new venture failure and success
- Rates of change for early-adopter buyers

Other system parameters are configured at a lattice point level:

- Probabilities of new ventures and incumbent firms using informal and formal knowledge acquisition mechanisms
- Probabilities of using knowledge transformation occurring through serendipity or knowledge arbitrage
- The presence and type of institution mediating knowledge, configured as a weighting in the simulation.

At system initialization, each lattice point is populated with market recipients, incumbent firms, institutions and loose knowledge clusters up to the levels specified by the configuration of the simulation run. Each of these agents is endowed with knowledge resource characteristics, as described below.

### **Simulation agents**

The primary agents in these systems include entrepreneurial founders, new ventures, incumbent firms (“competitors”), institutions and market recipients of innovations (“buyers”). The underlying fundamental mechanism of behaviors and interactions of these agents is knowledge acquisition. The bases for the simulation are agent behaviors that dictate external knowledge acquisition events. The firm’s external knowledge accumulation process is defined in the literature as the combination of acquisition and assimilation activities, although it goes by different labeling across papers. Todorova and Durisin (2007) summarize these differences (i.e., Cohen and Levinthal, 1990; Zahra and George, 2002) in their reconceptualization of absorptive capacity. This study examines two significant components of this process: acquisition of knowledge from external sources, and transformation of acquired knowledge into useful internalized knowledge. In this simulation, the new venture is assumed to possess relatively little extant knowledge, so it must focus on acquisition from its inception. For this reason, other mechanisms of the knowledge appropriation process are held constant across agents, assuming each agent uses the knowledge acquired with perfect efficiency given constraints it has on market information and innovation capability (specified as the difference between its extant knowledge and the market need it resolves).

Knowledge possessed by an agent in this model is represented as a 28-bit binary string in which each bit represents distinct, specialized knowledge. An example of the string is depicted thusly: 0011 0101 1111 0111 1011 1100 0001. The same sized string is used for new ventures, incumbent

firms, buyers and informal knowledge clusters. The content of string differs at initialization in the numbers of bits that are 'flipped,' or changed from 0 to 1 during configuration. The string represents an innovation being developed by incumbent firms and new venture, an innovation 'needed' by buyers, or a collection of knowledge that could be useful to an innovation (informal knowledge cluster), respectively. For example, a buyer string could reflect requirements for a new product that is needed while the corresponding string of a new venture may be the innovation that fills that need.

### *Firms*

Firms are incumbent competitors introduced at the beginning of a simulation run. New ventures that meet an entry threshold described below may become "firms," too. For the purposes of defining simulation configuration initialized for each run, only the first case is addressed here. A level of six firms is configured in each lattice point at the outset of a simulation run. Each firm receives a knowledge endowment of randomly assigned 1s in 7% to 43% of the available positions in its knowledge string, as shown here:

Incumbent firm configuration at initialization:

0101 1010 1111 0000 0001 1100 0001

### *Buyers and needs*

Recipients of innovations, or "buyers," possess market needs. The specifications of these needs are not unique products, but rather a combination of requirements and preferences within a product-market domain that exhibits rarity. Different configurations of market needs exist within distinct opinion clusters in a market (Provance and DiGregorio, 2007). The needs of market recipients are expressed in the simulation as a market need string that is similar to the knowledge resource string of firms. The market need string represents a target for innovation activities of firms and new ventures. Where knowledge resource strings are composed of specialized capabilities and resources in the firm or venture, market need strings can be thought of as combinations of requirements and preferences. That is, a product-market domain may have several designs or perhaps may evolve over time to a dominant design.

The number of market needs is established at a lattice point level. The simulation used for this study distributes market needs at equal levels (6 per lattice point) across all lattice points. The simulation adds new market needs according to a probability distributed seeded with a rate configured during initialization. Market needs are also removed when the need has been satisfied by an innovation supplied from an incumbent firm or new venture. Each market need is configured initially with a randomly

assigned endowment of 1s in 50% or greater of the available positions in the market need string. For example, an initial configuration might look like the following:

Market need configuration at system initialization:

0111 1101 1010 1111 0110 1001 1011

#### *Informal knowledge clusters (Ideas)*

The ideas on the landscape represent the possibilities for informal acquisition of new knowledge. Ideas are accessed through social interaction of market participants, such as that described by Saxenian (1994) and others regarding the emergence and growth of Silicon Valley. Engineers would converse in social settings, which revealed interesting problems and identified new approaches to solutions that would lead to innovations. These interactions occurred not because of the formal relations the engineers' firms had established. Rather, proximity produced interactions. Informal access to knowledge in the simulation is modeled as the availability of loose knowledge clusters that new ventures and firms can acquire, which lead to new ideas. The process of combination is discussed below in the "Knowledge Acquisition" section.

The number of informal knowledge clusters is established at a lattice point level. In this simulation model, informal knowledge clusters are distributed equally across all lattice points, and were initially set at six informal knowledge clusters per lattice point for this study. These clusters grow at a rate prescribed during configuration, and are removed when used by new ventures or incumbent firms. Informal knowledge clusters are created at initialization by randomly assigning three (3) to four (4) bits of the informal knowledge cluster string as 1s. Any of the 28 bits could be assigned a setting of 1 with equal probability. For example, an initial configuration might look like the following:

Idea configuration at system initialization:

0100 0010 0000 0000 0001 0000 0000

#### *Potential new ventures and new ventures*

A simulation run begins with only incumbent firms, ideas, and market recipients existing on the landscape. Once the run starts, the possibility for the creation of new ventures exists. This process occurs in two stages: founder commitment, and new venture formation. Founder commitment involves the decision-making of a nascent entrepreneur that leads to the creation of a new venture. Potential new ventures are created according to a probability distribution based on seed rate defined at initialization. Potential venture knowledge endowments are granted to generated founders by assigning 1s to

zero (0) to four (4) bits of the knowledge string on a random basis with equal probability. An example of an initial configuration of the potential venture knowledge endowment (PVKE) is illustrated below.

PVKE endowment at creation: 0100 0011 0000 0000 0001 0000 0000

### **Simulation system events**

In modeling the new venture formation process, the creation of a new venture (i.e., incorporating the business, opportunity recognition) is separated from formation, or the early-stage efforts to develop a product/service and enter the market (e.g., pre-competitive R+D). New ventures exist in the simulation in one of four states: potential new venture, forming new venture, formed (or survived) new venture and failed new venture. New ventures move through these states based on their activities in events related to knowledge acquisition, transformation and use. The simulation model consists of seven events that run on a scheduled basis over the duration of the simulation:

- (0) Founder commitment and new venture creation
  - (1) Capability generation
  - (2) New venture transition to incumbent firm
  - (3) Incumbent firm product innovation
  - (4) Product innovation adoption
  - (5) Buyer resolution → replacement of filled need
  - (6) Institutional knowledge mediation

All seven events are scheduled in every lattice point at rates determined by an exponential probability distribution. These rates are further affected by feedback loops that speed up or slow down formation activities based on prior failures, successes, and other observable recent history in the lattice point. Every live agent in the system is active in one of these event states, based on their rate of action and characteristics. Each agent exhibits behaviors appropriate to that state when scheduled to undertake it. The system of events is depicted in Figure A.V.2.

#### *Founder commitment (0)*

This event refers to the entrepreneur's decision to pursue a new venture. That is, it represents the move from nascent or potential entrepreneurship to realized entrepreneurial activity. In the simulation we assume that the decision to create is related to recognition of a need on the landscape. This recognition is reflected by the degree to which a founder's vision matches a particular market need in the same lattice point.

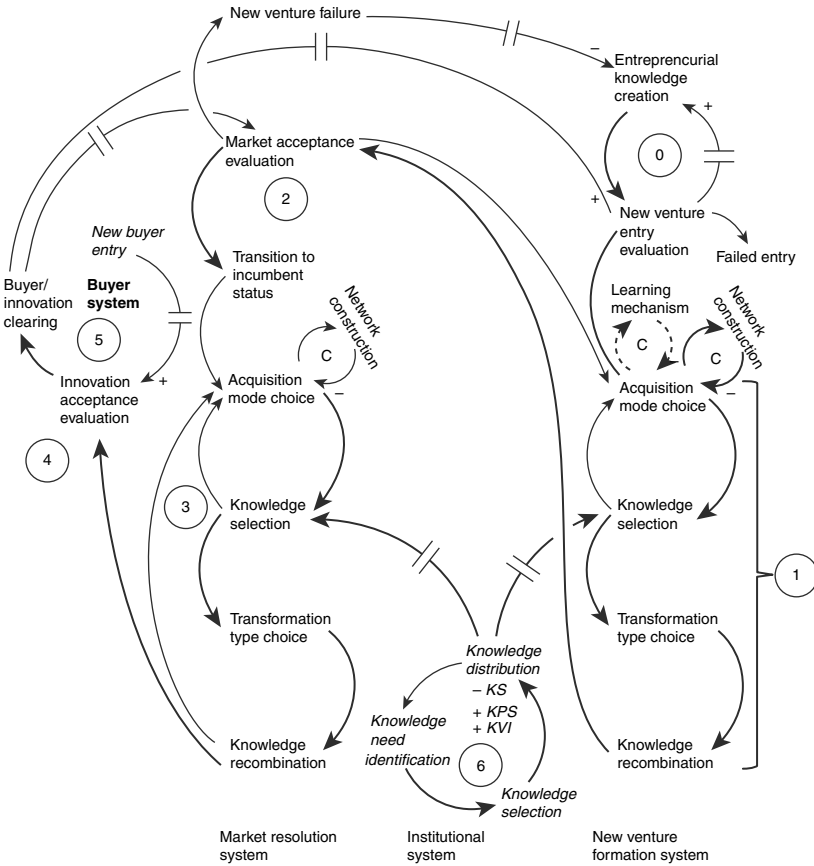


Figure A.V.2 System model of new venture formation simulation

In each period, the PVKE generated is compared to market needs strings in the same lattice point. If it matches (meaning 1s in each string are aligned) greater than 7% of the overall string comparison, then a new venture is created and it enters stage 1, the new venture formation subsystem where knowledge acquisition occurs. This threshold is based on tuning the simulation to rates of realized entrepreneurship (from nascent entrepreneurship) established by other data sources (University of Michigan, 2009).

*New venture formation (1)*

This event addresses the growth processes associated with new ventures following their founding. In this way, it is distinct from the act of creation, which has been linked to initial discovery or other value recognition actions

(Alvarez and Barney, 2005; Kirzner, 2008; Sarasvathy, 2008). Specifically, new venture formation is conceived in this model as a capability generation process based on the external acquisition of knowledge. The mode of an entrepreneur's knowledge acquisition process is manipulated between informal and formal mechanisms to represent one variable of interest in this study.

This event is operationalized as a set of decisions made by the entrepreneur regarding knowledge acquisition and transformation choices. In this study, knowledge transformation is held constant as a knowledge arbitrage function, which is the purposeful recombination of acquired knowledge with existing knowledge based on the unique perception and recognition of value by the entrepreneur (Carayannis, 2008). When this event occurs, the rule the new firm agent follows is to acquire new information in an attempt to improve its position relative to a market need in the same lattice point when it is transformed into internalized knowledge. 'Improving a position' means coming closer to a match with the market need. This rule is modified by another rule that introduces variation and sub-optimal behaviors. This rule uses an entropy algorithm to reflect experience in strategic decision making (Neyman and Okada, 2000). New ventures generally lack the same level of organizational decision-making experience as incumbents (Audretsch and Lehmann, 2005), which may lead to deficiencies in performance. In the simulation, the effects of entropy are reversed in order to simulate experience. The new venture begins its formation in a 'hot' condition of entropy. The hotter the condition, the more likely the new venture is to select detrimental knowledge leading to a sub-optimal position. As time passes and knowledge is acquired, the venture's entropic status 'cools', which increases the likelihood that the growing venture will choose knowledge that improves its position.

*Knowledge Acquisition.* Variation in the knowledge acquisition process is introduced into the system based on the formality of interaction between source and recipient. Specifically, two levels of formality are used: informal, and formal. Informal knowledge acquisition occurs through the incidental interaction of agents, and is biased toward more localized interaction. An example from Saxenian (1994) is two engineers from technology companies in Silicon Valley meeting at a bar. In the course of discussion, they exchange ideas that lead one engineer to solve a challenging technological issue with a new product. Formal knowledge acquisition occurs at the firm level through a network of obligated relationships. These relationships may range from transactional to strategic, but are formalized through contracts or other mechanisms. Supplier-customer relationships and strategic alliances are examples of this type of acquisition.

In the simulation, informal knowledge acquisition is modeled as the new venture using the knowledge contained in the string of an informal knowledge cluster that exists within the same lattice point. Formal knowledge

acquisition is modeled as knowledge procured by the firm from information flowing to the firm from a partner in the firm's network of relationships. This network has a broader distribution on the landscape than the distribution of available informal knowledge clusters in order to reflect the more geographically dispersed nature of alliance networks (Almeida and Kogut, 1997; Rosenkopf and Almeida, 2003). If a new venture is configured to prefer to acquire knowledge formally, then it will select a partner from its formal knowledge network or create a relationship with a new partner not already in its network. If the new venture does not possess any relationships, then it will create a new one as a default in order to acquire knowledge formally. The probability distribution of friends attaching to a firm's network is an inverse exponential function based on concentric rings emanating away for the firm at the focal point. The first ring has a probability of 0.5, the second ring a probability of 0.25, the third ring a probability of 0.125, and so on until the distance established during configuration has been covered.

The firm will evaluate the three (3) bit sets of knowledge from the partner's knowledge resource string until it identifies a set that improves its position relative to a buyer in its lattice point. This selection represents a local optimum for knowledge acquisition. Also, the effects of entropic behavior may hamper the selection when the new venture is younger, as was described above. It will select the three bits randomly with equal probability across all bits in the knowledge resource string. Acquisition is unidirectional. There is no quid pro quo exchange of knowledge, although the partner could select the original firm for acquisition during its turn. The model is configured with a probability (0.0-1.0) of selecting formal knowledge acquisition at initialization. This probability is established independently for each lattice point based on the design of a particular simulation run. In both types, the choice about which information to acquire from an informal knowledge cluster or node in formal network is based on identifying an improvement in the new venture's resource string relative to one of the market needs in the same lattice point (matching process). This behavioral rule is modified by an entropy-based choice rule that may reduce the improvement or even cause the new firm to choose knowledge that puts it into a lower position relative to market needs.

*Knowledge Transformation.* New ventures acquire new knowledge through formal network connections (e.g., alliances) or by absorbing localized spillovers of knowledge. Once acquired, the knowledge is transformed into innovation capabilities by combining it with the agent's existing knowledge resources. In the simulation, the knowledge transformation function recombines knowledge resources possessed by the new venture with external knowledge acquired formally or informally. This study treats knowledge transformation as either serendipity or knowledge arbitrage, based on the configuration being run. The mode of knowledge transformation

is determined probabilistically during this event based on the serendipity parameter set for the respective lattice point. This decision is made in parallel with acquisition in order to determine how the knowledge possibilities are evaluated.

Under serendipity, knowledge transformation is the unexpected addition of valuable knowledge without discarding existing knowledge. The transformation of the knowledge under conditions of serendipity would follow an additive methodology (0101 0000 0000... + 0110 1000 0000... becomes 0111 1000 0000...) in order to reflect the concept of fortuitous discovery, recognition, and exploitation. Under knowledge arbitrage conditions, the behavior exhibited by the new venture agent under this formation mechanism would be described as purposive action, actively seeking knowledge elements or clusters that improve the market fit of its innovation (Carayannis, 2009). The transformation of the knowledge would follow a replacement methodology (0101 0000 0000... + 0110 1000 0000... becomes 0110 1000 0000...) in order to reflect the concept of reallocation and recombination expressed in the original definition. That is, the venture forms as the combination of two existing knowledge configurations (the venture's extant one from the PVKE, and the externally acquired information).

#### *New venture market entry (2)*

New venture market entry is the matching process for converting a new venture into an incumbent firm. Essentially, it is the threshold at which the risk of failure diminishes substantially for a new venture because it has accumulated sufficient resources to weather adverse conditions or actions. In the simulation, this event is modeled as how well a new venture's approach (configuration of knowledge resources) is accepted by a market need in the same lattice point. If a new venture's knowledge resource string matches with one market need in the same lattice point by 60% (current default for Venture Threshold variable) or greater of the 1s in the bit string, it exits the new venture formation stage and becomes an incumbent firm. This matching process is demonstrated in Table A.V.1, in which new venture knowledge resource string matches 60% of a buyer need configuration.<sup>5</sup>

*Table A.V.1* Demonstration of knowledge matching method for thresholds

New venture knowledge resource string	0111	1001	0110	1001	0101	1011	1100
Buyer need configuration	0111	0111	0110	0111	0111	1010	1111
Matches	111	1	11	1	11	1	11



### *Incumbent firm knowledge acquisition (3)*

Incumbent firms compete for the same knowledge resources on the landscape as new ventures. They begin with advantages over the new ventures because they are configured to possess formal networks with other incumbent firms. An assumption of this model is that exploitation of the formal networks for information acquisition will substantially overwhelm any exploratory effects of informal acquisition in large organizations (March, 1991). Thus, in the simulation design incumbent firm agents are imbued with only the formal information acquisition mechanism.

### *Firm innovation market acceptance (4)*

This stage is a matching process that clears firms' innovations from their ongoing strategic actions once they meet a market need in the same lattice point. This simulated matching is conceptually equivalent with launching a new product within a specific market niche, and having it accepted in the market. In the simulation, we model the process as a matching one in which the firm's knowledge resource string is compared to market needs in the same lattice point. If the alignment of 1s in the two strings is 80% or greater, the firm's innovation is accepted.

### *Market need resolution (5)*

This final stage represents the replacement of filled market needs with new ones. In this first version of the simulation a constant level of market needs is maintained within a lattice point, once the level is established at the initialization of the run. At this stage in the simulation, the filled market need is logged for location (lattice point) and time (period) and then removed from run. The simulation does not allow for market needs to become unfilled in this version. The firm filling the need is also logged as having filled one.

### *Institutional knowledge mediation (6)*

Institutional knowledge mediation is the primary mechanism of interest in this investigation. Three distinct types of institutions of developed and employed in the simulation: 1) Knowledge-standardizing, 2) knowledge production-stimulating and 3) knowledge variation-inducing institutions. A central thesis of the study results presented in [Provance (2010)] is that new ventures interact differently with these types of institutions, which results in different levels of sustainable entrepreneurship regionally and performance at the new venture level of analysis. In the simulation, an institution is a function (rather than an agent) within a lattice point, and acts based on the conditions of that lattice point at a given time. Its effects have

the potential to spill over to surrounding lattice points based on the radius settings in the configuration, however.

### Model robustness and stability testing

As any model, this simulation proves useful if the results generated are proven to be a reflection of the agents' behavior rather than "artifacts of the programming or simulation architecture" (Provance 2010). Provance tested "the new venture simulation model was tested for both robustness and stability (Bar-Yam, 1997). This stress testing consisted of two steps: robustness of results based on landscape, and stability of results over time." The analysis showed that the model was robust and that stable performance was achieved around time period 50.

### Summary of simulation parameters and variables

Variable	Obs	Mean	Std. Dev.	Min	Max	Description
<i>Configuration 1</i>						
agentid	30,600	5,099.52	2,944.57	–	10,217.00	Agent ID number
birth	30,600	17.06	13.95	–	49.99	Period of new venture creation
x	30,600	7.51	4.09	–	15.00	X position on lattice
y	30,600	7.43	4.60	–	15.00	Y position in lattice
config	30,600	1.00	–	1.00	1.00	Configuration label
run	30,600	1.00	0.82	–	2.00	Run number
group	30,600	1.18	0.65	–	2.00	Region on lattice
age	30,600	27.28	16.46	0.01	50.00	Average age of agent in lattice point
agenv	25,992	23.25	14.54	0.01	50.00	Average age of new venture in lattice point
ageform	13,868	5.61	3.50	0.02	21.48	Average age of forming new venture in lattice point

nvfail	25,992	0.38	0.48	–	1.00	Average level of new venture failures
nvform	25,992	0.09	0.29	–	1.00	Avg. level of new ventures still forming
nvsurv	25,992	0.53	0.50	–	1.00	Average level of new ventures formed
formal	30,374	13.93	8.88	1.00	39.00	Average number of formal acquisition actions
netsize	30,374	4.68	2.79	1.00	15.00	Average network size of new venture
netlev	30,374	1.32	0.47	1.00	2.00	Average closeness centrality of new venture
netcent	30,600	0.60	0.26	–	1.00	Ratio of the number of connections to the number of agents in the network
<b>Configuration 2</b>						
agentid	32,155	16,077.00	9,282.49	–	32,154.00	Agent ID number
birth	32,155	16.97	13.71	–	49.99	Period of new venture creation
x	32,155	7.46	4.27	–	15.00	X position on lattice
y	32,155	7.54	4.60	–	15.00	Y position in lattice
config	32,155	2.00	–	2.00	2.00	Configuration label
run	32,155	1.00	0.81	–	2.00	Run number
group	32,155	2.87	1.38	–	5.00	Region on lattice
age	–					Average age of agent in lattice point

---

(Continued)

Variable	Obs	Mean	Std. Dev.	Min	Max	Description
agenv	27,547	23.27	14.52	0.01	50.00	Average age of new venture in lattice point
ageform	14,471	5.75	3.47	0.03	19.39	Average age of forming new venture in lattice point
nvfail	27,547	0.39	0.49	–	1.00	Average level of new venture failures
nvform	27,547	0.08	0.28	–	1.00	Avg. level of new ventures still forming
nvsurv	27,547	0.53	0.50	–	1.00	Average level of new ventures formed
formal	31,975	13.78	8.84	1.00	39.00	Average number of formal acquisition actions
netsize	31,975	1,196.66	2,283.31	1.00	16,428.00	Average network size of new venture
netlev	31,975	1.34	0.47	1.00	2.00	Average closeness centrality of new venture
netcent	32,155	0.60	0.26	–	1.00	Ratio of the number of connections to the number of agents in the network

## Notes

1. Each configuration generates in the order of 30,600 agents over two runs, which aggregate to 71,200 ±. When these observations are aggregated to measures of regional performance (e.g., the number of new venture formations) for this study, the resulting data set includes 1,536 observations over two configurations (16 × 16 matrix = 256 lattice points × 3 runs/matrix = 768 lattice point observations per configuration × 2 configurations = 1,536 observations).
2. As mentioned in ANNEX IV, Provance (2010) showed that the simulation became stable at or around 50 periods.

3. Question used in or adapted from an NFIB Small Business Poll.
4. Question used in or adapted from Busby and Pitts (1997).
5. Twelve 'flipped' or activated new venture knowledge bits align with activated bits in the buyer need string out of 20 possible locations ( $12/20 = 60\%$ ).

## References

- Pedhazur, E. J., & Schmelkin, L. P. (1991). *Measurement, design, and analysis: an integrated approach*. Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Sipp, C. M. (2011). Why, when and how are real options used in strategic technology venturing? Dissertation manuscript in preparation, The George Washington University School of Business, Washington, DC.

# 7

## From the Zoo to the Jungle and Back in a Second: The Profile of a Serial Entrepreneur in Action

*Thanos Venieris*

### The Z story

Thank you for your call, but we do not work with agents.

I see! Could I ask why?

Company policy.

Could I ask you for a big favour?

Go ahead!

Would you mind telling me this face to face?

I do not understand.

I would like to come from Thessaloniki, Greece, all the way to LaCoruna, Spain to meet you for three minutes and listen from you that you do not work with agents.

!!!

I am willing to take three flights Thessaloniki–Athens, Athens–Madrid and Madrid–LaCoruna. This will take me around 12 hours. And 12 hours back. I will spend 24 hours to meet you. Could you please give me three minutes to tell me that you do not work with agents?

I have been in this business for so many years and I know most of the tricks used by sales people. I will give you the 3 minutes you request, but you should know from now that the only thing you will hear from me is that we do not work with agents.

I have a three-minute gap in two weeks at 10 am.

Thank you very much Mr Marcos. See you in two weeks.

The person I was talking to was Z's production manager. Z was the fastest-growing retail chain in Europe and everyone wanted to be part of their supply chain. I had already been working for years with their main competitor, a Swedish retail giant, and I wanted to start doing business with the Spanish retailer as well.

To most business people it sounds nearly impossible to have, as clients, two giant competitors. It feels like having a wife and a mistress in the same bed at the same time. Even if it sounds quite appealing for most of men, we know that few mistresses would agree and even fewer wives.

It was 1991 and at that time my core business was a production textile agency. I had an office in Thessaloniki, Greece, and I was planning to open an office in Istanbul, Turkey, and another in Shanghai, China, where things were getting interesting for clothing production. My clients were already some of the biggest European companies, but I desperately wanted Z as well. It would have been the jewel in the crown of my company and I knew that if I could take Z, then it would have been easier for me to sweep down through the market, contacting clients which were smaller than Z.

If you are working for companies which are at the top of the pyramid, it is much easier for an entrepreneur to move down the pyramid contacting clients with lower turnover. Usually salespeople or entrepreneurs work the other way round—not feeling strong enough to attract big clients, they start at the bottom of the pyramid, moving up to bigger clients. This is a safer approach. Personally, I have always gone the opposite way. Regardless of the type of business, I have always started at the very top. I approached the best and biggest client. Surprisingly enough the success ratio was always much better than anyone would expect.

### **Back to our Z story**

I had two weeks to create a strategy that would give me the potential to start working with a company which did work with agents. And I had to do it in three minutes. The only way to break such a thick wall in three minutes was not even to attempt to break the wall. We needed to find an unguarded opening and then enter. My grandmother used to tell me: “If you really want something, you find the way. If you do not want it so strongly, you find an excuse.”

We needed to offer the Z manager something that they did not have and they could not deny. I talked immediately with my team and explained this huge opportunity: three whole minutes with Z’s production manager and we had two weeks to prepare. Someone quickly suggested that we should go downtown to their shops and see what they had missed from the latest fashion trends.

Z was a fast fashion company with an updated collection. It was so aware of the market that it rarely missed a concept. Without much hope, four people went downtown to its biggest shop in Thessaloniki and started checking its collections. At first sight it seemed to have covered everything. Then I heard the voice of Sophie, a young and fashionable member of our team, who shouted like a modern Archimedes: “EUREKA!”

They missed it. We gathered round Sophie and looked at her, trying to understand what she had found, because we could not see it. She would not reveal her findings easily to us. She said she knew exactly what they had missed and if they would not bring it to the shops in the next two weeks, we would get them. She enjoyed her victory over her boss—me—and only told us when we admitted that we could not see a gap in their collection.

“Dyed and washed garments,” she said to us, so happy about herself that we all started shouting in the shop, so that we were asked to leave by the security people.

A few weeks ago, another pioneering European Company called Diesel launched a new line of clothes: garments dyed and heavily washed. At that time, Diesel upset the market by taking a risky step in introducing garments that were dyed independently and heavily washed so that they have a vintage look. This was what Z had missed. And we had to provide it with this look very quickly before it realized itself or someone else approached Z with the idea.

We had the right information, which at that time looked important to us. Having good information means very little if you cannot cash it in. What was the best way to cash in this information? We had a quick meeting back in our office about how to use the information in the most efficient way.

Many different approaches were put forward.

Tasos said that during my meeting I should clearly point out to the production manager that they have missed the vintage look and we spotted it. That way, he said, they would take us more seriously, appreciating that we knew our business and in the future we might be able to tell them if they missed another concept.

Jenny said that it was not such a good idea to offend the production manager at least in our first meeting, showing him the mistake. He would probably take it personally and probably shut the door instead of opening it for us. Most people do not like their mistakes to be pointed out and especially by companies which want to start business with them. This type of arrogance seldom goes unpunished.

Pete suggested that since I had only three minutes with Mr Marcos, we should forget about the vintage concept and find a strategy to explain that our agency is very different from others and that we add value in the supply chain. Even though when someone pointed out to Pete that Mr Marcos would not have the power to change Z’s policy about working with agents, he insisted that we should go with such a direct approach.

Then Sophie asked what would be a strong enough reason for Mr Marcos to change his business policy. A strong reason would be that Mr Marcos could prove to his company that this decision was not reasonable, especially when there were agents like us who could bring money to Z by covering areas which were missing. Then we realized that Mr Marcos would not be interested in our vintage-look garments, but he would be interested in the



money that Z would earn by not missing the vintage look. We needed to show him that we could make this missed opportunity profitable for Z.

We had to move quickly. Since “seeing, is believing”, we decided to make a small collection of this missed concept. In his position he would immediately understand our message without you having to point out the mistake. We would present our small collection, as the latest trend, which should be adopted not only by famous brands but by successful retailers as well. On top of this, the collection should be in their favourite colours, in the price range they want and, most importantly, be in their shops very quickly. There was a lot to be done in two weeks.

Sophie went back to the shop and bought five T-shirts in different colours and with different prints on them. We immediately met with a manufacturer who was producing the vintage-look garments for Diesel as he had all the knowledge that we needed. We explained to him that we were targeting Z and asked if he wanted to be a part of it. He said that this was a serious decision and he needed to think about it and come back to us. It took him two seconds to decide and we were happy to proceed.

We asked him to copy exactly the styles that we had bought from the shop, with the same colours and the same prints. The only difference would be that our small collection should have a vintage look. We explained clearly to the manufacturer that retailers do not pay as high prices as brands, but their quantities are big so it pays back. Being in the textile business for some years, I knew that Z could sell our modern vintage collection one price group higher than its normal collection.

I gave the manufacturer the prices that I thought Z would ask for and I asked for his confirmation. The manufacturer was used to working with much higher prices and he did not want to produce the garments at those “ridiculously low” prices. Everything seemed to stop before it had even started.

At that time the manufacturer was working only with expensive brands and his gross profit was about 20%. He was innovative with a good depth of research and he needed that margin to keep him operating. I could only offer him a margin of 10% and he was not willing to accept it because at that time he could sell more expensively.

Here we had a combination lock that would open the treasure box of Z. We had all the numbers correct except for one: the producer. This is the problem with a combination lock. Even if one number is wrong it will not open. We had a new challenge in front of us.

How could we persuade a manufacturer to start producing for us and Z with a 10% profit margin, when he was busy producing for big brands with a 20% margin and he could not cover the demand? He was sending away new customers, which were queuing on his doorstep knowing that he produced for Diesel, Replay, Miss 60 and many more big brands.

After several failed meetings, I gave him a call and asked him if we could have a final meeting that would need only nine minutes. He did not want to go on with the same discussion over and over again but he was intrigued by the nine-minute meeting (so he confessed to me later) so he accepted.

I knew that this supplier had a television and video in his conference room and when I met him I asked if we could use his video for nine minutes. He agreed with curiosity but with his body language screaming that he didn't want to waste more time with me. It was a National Geographic video filmed in the Serengeti river area. North of the Serengeti were jaguars in their natural habitat, hunting zebras and antelopes. Balance had been kept for a long time in this area, when one day scientists noticed that the number of jaguars was too large and decided to move some of them south of Serengeti's river to rebalance the area.

The scientists kept watching the two groups of jaguars, the north group and the south group—especially the south group, which was more interesting for them because they wanted to see how they adapted. After a while they started seeing dead jaguars in the south group. It took them some time to realize that the jaguars could not hunt south of the Serengeti. The main reason was the different vegetation. North of the Serengeti the vegetation was high and thick. The jaguars could hide themselves in the vegetation and attack at the last moment.

Due to their physical construction, jaguars could reach a speed of 105 km/hour but only for nine seconds. After nine seconds they needed to stop.

The vegetation south of the Serengeti was low and not as thick as in the north. Zebras and antelopes could see the jaguars before their attack and they were running away. The scientists noticed that some jaguars adapted to their new environment. Even though most of them had died because they could not run for more than nine seconds, some of them reached 11 seconds. Those two seconds made a difference between life and death for both zebras and jaguars.

The video finished and the supplier was looking at me really confused. His whole body was like a big question mark. "Okay," he said, "let me see if I understood correctly. You want me to work with Z, because the vegetation in south Serengeti is low?" "Yes," I said. "At the moment you are positioned north of the Serengeti. You are well equipped like the jaguar with the knowledge that allows you to run nine seconds and get many zebras and antelopes. What will happen if the brands transfer your know-how to the Far East or cheaper production countries and you find yourself south of the textile Serengeti overnight? Could you run 11 seconds to catch a retailer or would you prefer to die?"

I continued: "Please give me 10% of your production capacity with 10% profit and keep the remaining 90% with 20% profit. I would like to train you to turn some of your business fat to active business muscle, which will

help you to survive in a less friendly future business environment. It's a very good offer. You will operate with a 19% profit and this 1% will buy you longer-term survival." He looked deeply into my eyes and then understood.

This time it took him more than two seconds to decide, but in the end he agreed to go ahead. We had one more correct number in our Z combination lock! The last number was Mr Jorge Marcos.

After the manufacturer's confirmation, the collection was prepared within one week and I was ready with the right bait to go fishing for the big fish. Before leaving, I asked my wife to give me the egg timer (the one with the sand inside which runs for three minutes).

After 12 hours travelling I arrived in Z's buying office in Spain. I had my seven T-shirts in a small bag and approached reception, telling them that I had a meeting with Mr Marcos. At the same time there were dozens of garment suppliers, mainly from the Far East, with huge suitcases full of garments, hoping that Mr Marcos would find at least one garment interesting enough to place an order with them. One Chinese supplier who was standing beside me looked at my tiny bag and asked me laughing: "Are you a button supplier? Will you show him buttons?" I said that I was an agent and I had seven T-shirts to present. "Okay," he said. "Let's meet after the meeting and see how you did."

He moved to his colleagues and was probably telling them that I came only with seven T-shirts because the laughs were loud enough to hear. The receptionist told me to go to a meeting room and wait for Mr Marcos.

Mr Marcos did not appear at 10.00 as expected, but he entered the room 45 minutes later, in a hurry and ready to make the three-minute meeting even shorter. After we introduced ourselves, I opened my bag, took out the egg timer and put it on the table. He was a bit shocked. One moment he was looking at me and the next at the timer, obviously puzzled.

"Just to make sure that I will not use more than three minutes," I told him.

He burst into laughter, softening his whole attitude immediately.

"Mr Venieris," he started, "it is really nice meeting you, but as I explained on the phone, two weeks ago..."

"Could I please use my one minute?" I asked him.

I started taking the T-shirts out of my bag, slowly, one by one, leaving them casually on the big table in front of him. His eyes changed immediately, like a shark smelling fresh blood. He looked closely at the garments, the company's own colours and its own print, with a perfect selling price. I had even attached price tags to them, which I had removed from garments that I had bought from their shop. Then I told him: "I can deliver to you whatever quantities you want in four weeks."

He looked at me very seriously and told me as he was leaving the room: "I am coming back. Please do not leave." By that time I knew that I had

hooked him. Five minutes later, a whole team of young ladies entered the room with Mr Marcos following them.

Immediately I could recognize the decision-maker. She was a slim, tall girl who looked at the seven T-shirts which were lying on the big table with the same look that a hungry lion has when it sees a young gazelle. They started talking all at the same time. I do not speak Spanish, but my knowledge of French and Italian helped me to understand most of the conversation.

Olga, the tall, slim decision-maker, had just arrived from Paris and she had seen Diesel's collection there. She said to Mr Marcos that she wanted these T-shirts in Z's shops as soon as possible. Mr Marcos told her that this man, pointing at me, was not a manufacturer but an agent, and she obviously knew that Z's policy was to work directly with the manufacturers and not via agents to save money in the supply chain.

She looked at me and again at the T-shirts and replied to Mr Marcos: "In this particular case we are going to lose more if we don't buy these T-shirts from him. Please find a way and get them." I was pretending that I did not understand anything from their conversation but my heart was already pumping in my chest. Then suddenly the ladies started shaking hands with me and leaving the room as quickly as they had entered.

I was alone with Mr Marcos again. I could see that he was trying to find a way. At that moment I felt like he needed a small push from my side. I started folding the T-shirts and putting them back in my small bag, thanking him for his time and offering my hand. He said, "Could you please wait for 15 more minutes? Give me your company details and the prices for each garment. But don't open the champagne yet!" he added quickly when he saw a glint in my eyes, which unfortunately I was too weak to hide.

I don't know how long I stayed in that room. I could not sit. I was just standing there, waiting for the door to open and get those orders. A small knock on the door this time, and Mr Marcos was there with a bunch of papers which I knew immediately were the orders.

I could not help myself and tried to take them from his hands. This was the most exciting moment of my business life. But Mr Marcos was not letting the orders out of his hands. So there we are standing, two grown men, holding the papers and each of us pulling to get them.

I looked at his eyes and he told me: "It's difficult for us, Thanos, because we have always produced this type of product in our own factories in Spain. We have never left Spain before." It was a critical moment. I looked back into his eyes and told him: "I understand you very well. But think if Columbus had thought the same way as you, he would not have found America." He smiled and let the orders go from his hands, telling me: "Go ahead! You have earned them."

That's how it started. Leaving Z's office, I met the Chinese supplier near the coffee machine. I waved the orders at him reciting an ancient Greek

motto: "It's not the quantity that matters but the quality." He checked the orders and he wanted to have a look at my samples. Then it was time for my revenge. I told him that I don't exchange my gold coins with copper ones. I wish I had more character, but after such a victory I was so human that I allowed myself this ethical back step.

We delivered the first orders and they were so happy with our performance that they came back with more orders, and we are still working with them now.

Did you like the story? I hope you did. It's a real story to its last detail. I hope that you are impressed with how cleverly we approached this unapproachable client and how I made my first sale in two hours. But my business life was not only a matter of successes. I have made many mistakes, which cost me money, credibility and growth. I will be happy to tell you about my failures as well a bit later.

I prefer failure stories from successful businessmen to their success stories. I am constantly intrigued by the stories of Lee Iacocca, Bill Gates or Donald Trump. I admire them so much because they were so clever, so dynamic and they could achieve anything they wanted under difficult circumstances of pressure and put their own stamp on events. Deep inside me I knew that I was not as talented as those great men and this was working like a brake. I envied those men, because with their actions they were showing me how small I was and made my self-confidence suffer.

Every time I have business or personality concerns, I resort to nature. Business is strongly connected to nature. Nature's number-one priority is survival; the same priority as business. I was watching National Geographic videos again and I was amazed by the action of lions. They were the best, the kings. But then I realized that there are not only lions in nature. There are so many other animals which survive as well as lions, without being lions. There are animals which move at 10 cm per hour and still survive. I don't know if the jaguar with its 105 km per hour is better than a snail. If they both manage to survive, for me they are equal. So, I decided, I need to admit first that not being a lion is not something bad. A living snail is much better than a dead lion. I made a decision to be the best I could in my area—learn as much as I can from lions and the other leaders but never forget my own nature and accept it. It was a huge relief for me. And from the moment that I accepted that it's not bad if I am not recognized worldwide, and it's more important to operate in an area which would make me happy even on a much smaller scale, everything fell into place and it was much easier for me to perform.

Now that I have told you my best success story and have shown you the big picture, let's go back and look a bit more deeply into how it actually happened. Let's try to have a look together at all of the small pieces which are part of the big picture and without which the picture could not be perfect.

I am sure that you will face the same challenge as I did when contacting new potential clients. I hope that the guidelines below will be helpful when you find yourself in the unknown area of new customers.

## **Targeting your clients**

If you are thinking of starting your own business, you will need clients to survive. Unless you enter a virgin area, like Apple when creating the iPod, you will have to operate with competition. The more mainstream the area, the greater the competition. How will you spot your future clients? It is always easier to start with the people we know. If we don't know any such people who might be our clients, then we expand the circle and move on to people who know us and know some other people who might be our clients. The more we expand the circle the more blurred it becomes, until in the end it's lost from our sight. It is always wiser to start with something small because you definitely need business experience on a smaller scale before launching into a bigger arena—it is wise to taste the soup before serving it to our guests. But the wisest way is usually the longest.

After a year of being in business and having accumulated some experience from small customers with hardly any profit, I decided to change strategy. I decided to attack the top. The main reason was that if I managed to get one or two clients which were the best and biggest in Europe, I could use this when meeting other smaller customers.

The main defence mechanism of managers or buyers is whether the supplier or agent is good enough for them. Since there is no trust built yet, the only way to proceed is to transfuse trust. The best way to transfuse trust is if the customer sees that another company, which is much bigger and better than they are, trusts you. Their defence falls apart and then you don't have to do the selling. They will try to get you because they believe that if their best competitors trust you, then it will be less risky for them to trust you too.

Never forget that nothing can be achieved without trust. Imagine trust as the environment where you are going to plant your seeds. Even if you have the best seeds in the world, if you plant them either in the North Pole or in the desert, they will never grow. Don't forget that that you don't sell products or services—you are selling trust.

You are selling trust all the time—for example, by returning a phone call at an agreed time or by being punctual for an appointment. You increase your credibility and trust. Remember that trust is like a bank account. You cannot withdraw anything if you have not deposited anything. With every action or non-action toward the client, you are putting a drop of water in the client's glass. It takes time for the glass to be filled and pay you back when you are thirsty. If you make one small mistake regarding the trust issue, then the glass empties down and you have to start all over again.

It is extremely expensive to lose trust with clients. Most of the time they do not give us a second chance, unless we have deposited so much trust with them over the years that we can afford a small trust accident. Try to find ways to build trust with your potential clients. I have found a small trick to create trust with my customers. If you prove to your clients that they can trust you on small things, they automatically assume that they can trust you on big things as well. Take good advantage of the above advice. If you are trustworthy on small issues, clients assume that you have the right mentality. And this is the most important thing if they are about to trust you with bigger orders.

### **How to build trust on small issues**

Trust is basically built on credibility. You should always try to make small deposits of credibility with your future or present clients. Many small deposits will allow you in time to make a big withdrawal.

How can we do it in practice? Let's suppose that you have managed to get an appointment with a potential client. It is important to ask from the beginning how much time you have for the appointment. Do not assume that the person will give you all the time you want for your presentation. Usually they are busy and meeting with a new supplier will take time from their daily schedule. They want short meetings with concentrated messages which are extremely focused.

It will be easier for you when contacting the person you wish to meet to inform them that you would like to have a short meeting. It can vary from ten minutes to half an hour depending on how the person is positioned. Remember that if you have a ten-minute meeting and the ten minutes has elapsed, ask the person if he is happy to extend the meeting. It will be highly appreciated because it shows two things:

- You respect the person and their time. This is something that everyone appreciates a lot. This kind of respect is shown in a professional way. If people realize that you respect them, it will be easier for them to trust you.
- You like to keep deadlines. Deadlines are critical for all companies that are worth working with. Instead of talking about yourself or your company keeping the deadlines, simply show it by keeping the deadline of the meeting. This kind of message will not be processed by the right half of the brain, but by the left one and it will give you credit. I have refused many opportunities with potential suppliers for the simple reason that they did not keep the time of our meeting and kept on selling themselves on how punctual they were.

After your presentation and the meeting, make sure that you have arranged for the next steps—who will do what.

Most first meetings fail because after an excellent presentation and having caught the future client's attention, the next steps have been neglected. Do not wait from your client to arrange the next steps. Simply ask what they are. The client could say that they will come back to you. Do not leave it like this and thank them. Narrow it down. You could say that given their busy schedule, when do they estimate that the issue will be actioned. You could ask if they need any more information from you to help them to make a decision.

Do not be afraid that you will bother the other person with this kind of question. These are open-ended questions and the other person will probably think that they are dealing with professionals who makes things happen.

I remember something clever I read about three categories of people:

- the people who make things happen;
- the people who watch things happening;
- the people who ask what happened.

Try to be in the first category. Believe me, there is less competition there.

Even the toughest manager with a big ego appreciates it when they see a person who is not just waiting for an answer. They like it when they see a person making things happen by asking about the next steps and creating deadlines. This is the way decision-makers operate and they think immediately that you belong to the group with the same mentality. Group psychology makes things much easier.

If they tell you that they need something from you, ask them directly by when they would like the information or the samples. If they give you a day and that's not possible for you, tell them directly when is the earliest you could have it done. Always retain a margin because many things could go wrong. It is better to have the samples or the information earlier than later.

Even if you have them reader sooner, do not send them earlier than you have promised to your client. Some people might think that sending the requested items earlier is better because they are quicker, but it could work the other way around—it could show that you are not on top of things. Big companies like systems. A good system means that things work the way they are expected to work. By sending the information at the time you promised, you send the message that you know how the system works and that you can be compatible with this system. Only if you have enough credibility with your client can you then bypass the system by sending products earlier than promised.

What may be wrong at the beginning of a partnership could be right later. Make sure you send everything that you are asked for at the time when it is wanted, informing the customer that you have sent it with the courier information. If you have not managed to get the information that they



wanted by the time you needed to give it (taking for granted that you kept your necessary time margin), inform your client that unfortunately you do not have the information today and when you will be able to give it to them. Having lost credibility with this incident, try to regain some by telling them, for example, that you will come back to them at a particular time. By narrowing down the time you earn some ground upon which to build trust. If you are not able to get the information at the second promised time, this shows that something is wrong in your system and you should try to improve it before contacting your next client. If this does happen a second time, I think that another approach is necessary. This happened to me with an important potential client. I had not been able to keep my promised deadlines twice. I still remember it. Everything went wrong.

After my second unkept promise that I would come back to them on Thursday after lunch, I called him on Friday morning with the information that they wanted, telling them over the phone: "Mr Bille, I really hope that you did not have lunch yesterday, because that will be the only way to make it look like I keep my promises." He burst into laughter and proceeded as if nothing wrong had happened. The use of humour is so important in business relations and I am surprised that it has been underestimated so much. But we will talk about that separately.

Back to building credibility with our potential client. If they promised to come back to you on a specific date and then did not, what would you do then? Would you call or mail them and tell them that you were waiting for their reply? You could do that, but I would not advise it. You might ask why if they request credibility and punctuality from you do they not act the same way. The first difference is that you are trying to create credibility for yourself and your company. They don't need to create credibility for themselves. By visiting them and trying to be on their supplier list, it shows immediately that they don't need to sell themselves to you.

The second reason is the "golden rule": the one who has the gold makes the rules. This company has the gold and you want it. What should you do? I can only tell you what I have done in similar cases. I knew that priorities in a company can change many times a day. Maybe they intended to call you but something urgent happened and they had to rearrange their priority list. Knowing already from the day of the meeting that something like that could happen, I was ready to face this situation. I searched on the internet for information regarding the company I was dealing with and its competitors.

Waiting for the right day, one or two days after the promised one, I sent an email to the individual informing them that I had found this particular information concerning one of their competitors and I thought they might be interested; nothing more. In this way I was reminding them indirectly that they needed to answer me. I did not mention that the deadline had passed. Maybe some might understand that this is a reminder but they would definitely appreciate the subtle way of reminding them.

The third message you are sending in this way is that you are not interested only in your company but in your future client's company as well. This could make the difference. Information is always welcome, especially if it concerns competition and its actions. Showing the decision-maker that you are trying to stay in touch with the market is definitely a credit to you. It's a small favour and they may have known that information, probably before you, but it's the intention which counts. You have earned some more ground.

In all those years there has been no one who neglected this subtle reminder. All of them came back to me, thanking me for my concern. Many of them included in the same mail the reply that I was waiting for. The smartest ones sent me a thank you letter first and the day after their reply.

Those are some small examples of how to add credibility at your initial contact with your client. We should not forget that we are still at the beginning. We are trying to build credibility on small issues, so our client will assume that they can trust us with big issues. This initial credibility is an in-between step. It is definitely not our final goal. Our final goal is to receive our first order from the client. After receiving the first order we must immediately set another goal. We must keep this client and gradually increase our business together.

### **Study your potential client's battlefield**

Before going out in the jungle and hunting, make sure that you know as much as possible about your client's battlefield. In today's globalized world, the only thing which does not change is change itself. You can get a great advantage if you are aware of the changes. Being aware of the changes alone does not help much. What it helps is the possibility of your covering those new areas and supporting your potential client, by making it cheaper and probably better than them.

I will give you an example taken again from my textile business. Around 1990, clothing companies were producing garments practically anywhere if the price was right for them. They did not pay attention to whether the workers were getting a fair wage, if they were paid overtime, if pregnant women were taking their legal maternity leave or even if children were working in their factories instead of attending school.

Clean Clothes is a non-profit organization which checks whether large companies follow the rules. It exposed many companies that did not follow a code of conduct and were interested only in profits. Consumers reacted strongly and started boycotting the products of those companies. The large companies could not afford this criticism, especially when their sales were affected, so they started to adopt a code of conduct. That means that they were forcing their suppliers to be checked by an independent organization

so as to receive approval that they were following the rules. Like most things, this was easier said than done.

Many suppliers applied to be checked in order to get the green light to continue their partnerships with large companies. They thought that if they insured all of their employees, if they did not use any child labour or if they could manage to lie to the checking organization about the forced overtime and sexual harassment they would get approval. However, checking organizations such as BSCI knew better than that.

They were checking everything in the factory—not only the basics concerning the minimum legal wage, paid overtime, vacations and the creation of labour unions, but they extended their checking areas in new directions. They were checking if the lighting was sufficient for the workers, if the air in the factory was clean, if the temperature was right for the worker, if breaks were allowed and so on. Safety was extremely important as well. Evacuation plans were hung on the walls, fire alarm practice was carried out every month and emergency exits were created.

To determine the truth, BSCI was asking the owner and their team to leave the factory while checking took place. It conducted interviews with employees and checked the truth. As expected, not one of the factories received final approval after the first meeting with BSCI. Some of them were rejected permanently because the manufacturers did not want to increase their operational costs by insuring everyone and other extra expenses, believing that their large customers would never leave them. Some suppliers agreed to make a corrective plan and get checked again after six months by which time the requested alterations would have been done. This took time and the media were still hunting among suppliers of large companies for unethical behaviour.

My company was working for many years with a Swedish retail fashion company. I was supplying them with clothes from Greece at that time. At an early stage of the media hunt, a Swedish reporter went to India where he discovered, at a supplier of the Swedish retailer, a child tied by his foot to the chair of his working mother. They filmed everything and showed it on Swedish TV. The Swedish people are extremely sensitive to all issues of social responsibility and particularly to anything concerning children. The reaction was immediate and much greater than anyone could have imagined. People were talking about it on television and in newspapers, and the sales of the retailer decreased in Scandinavia.

The company took immediate action. It admitted its mistake and apologized to its consumers. It promised at the same time that it would start clearing up the situation immediately. It did what it promised. All suppliers were informed that they should follow the newly made code of conduct within a specific time or they would be out of business with this company. It was a difficult task but we managed to do it to the end. All of my suppliers were confirmed and we got the green light to continue with the Swedish retailer.

We had accumulated a lot of knowledge in this area, so when I read in the newspaper that an English company was in trouble because it was not following any code of conduct and that its CEO was committed to clear its supplier's network immediately, we grabbed this golden opportunity.

I mailed him the same day and informed him that my company had been working with the well-known Swedish retailer for many years and our entire suppliers network had been approved. I invited him to use my supplier's network until he cleaned up his own and said that I would be happy to support any other needs he had at that time. Two days later I received a mail from the secretary of the CEO inviting me to London to discuss the idea in more detail. A week later we signed the contracts and started doing business with a company with which I had failed twice before.

We can see from this story that information only would not allow me to enter the company. The information together with the existence of the code of conduct system and perfect timing created a possibility to open the door. At that time even if I offered the CEO products with 20% lower prices than his main suppliers he would not take the offer. At that time he was concerned about the code of conduct and when I had it ready for him he bought it immediately. We are still working with this company. Even though we signed a temporary contract, and it has cleared its suppliers network, we are still doing a lot of business together. We try hard to add value to the supply chain and that's what keeps us in its suppliers' list. Don't try to sell what you have. Try to sell what the customer needs.

Do not go unprepared to a meeting thinking that you will catch the customer by telling them how good you and your company, and its products and services, are. They hear that all the time. Finding someone in the desert, even if you are offering them gold at the price of silver, they will not buy it if the only thing they want is water. Try to find ways to make your product look as if it is solving their problems and adding profitability.

If you read, for example, that your future client is cutting expenses and you are the agent of a company of electric lights which operates with lasers (turning on and off only when someone crosses a laser line), you have a good opportunity to make a sale. I am sure that your mother company provided you with all of the information about how much it can economize but this will not be enough. You have to make the sale focused and customized for the client you are visiting.

Find out how much electricity they are paying per month, how many lamps they have, which areas could be used for your products (toilets, long corridors, rooms which are not visited so often). Then you should calculate how much money they could save. Then you should have ready the service plan and the guarantee. All of this together with some reports from your previous clients with the exact amount of money that they have saved is building a solid bridge between you and your possible client which you can easily cross. If you sign a contract, make sure that they will give you

references about their cost savings. This will be good to present to future clients.

So forget about your product and services. Keep in mind all the time that your client is not actually after your product or services but is after the profit coming from your products or your services. Always connect your services and products to the profit that your client will make. Talk to them in a language that they understand; instead of telling them that it will be profitable for you, it's much better if you tell them: "Investing in our products will save you 1% of your electricity bill annually; the cost of our products is 3% of your annual bill, so in three years you have covered the cost and then in five years you have saved \$12,000s."

Do not be afraid to talk about the cost of your products and services. They will make those calculations anyway. When they see that a salesperson enters smoothly in their areas and talks like them, they appreciate it much more than we think. But talk numbers with them. Don't forget that they are employees as well. Their job is not guaranteed unless they perform well and they bring profit to their company. By increasing the profitability of their company you become an ally to them.

So be aware of as much as possible about your operational area. And even if you perform locally, remember to keep a close eye on the international moves of the companies. Try to understand how they operate and then look for the opportunity to enter.

After so many years in the textile business, I have learned that there is not a solid and unbreakable client. Clients are like medieval cities: they have high and thick walls and they watch their gates carefully. Most of the time it is difficult to move directly toward them, break the walls and conquer the city. It is always easier if you conquer the city from inside, without breaking its walls. Using the idea of the Trojan horse needs less effort and brings much better results.

Here is a story of how one of our sales managers used the Trojan horse concept to enter a company which was guarding its entrance gates from new agents and suppliers. He had tried to contact the buying director before but he was told that they were happy with their suppliers. They promised to keep our company's details and come back to us in the future. At that time I had a clever young man responsible for UK sales. He was definitely in the first category—one of those people who makes things happen. He simply could not take no for an answer.

But what can you really do if they tell you that they are not interested and you can't get even a five-minute first appointment? You can either leave the company for the moment and decide to contact it a bit later, or you can create a Trojan horse and leave it outside the city, waiting for it to take it inside. This is exactly what Tasos did. He visited many of their shops in London and talked with the salespeople. He pretended that he was a supplier of the company and had been sent from the buying office to gauge the feelings of

the salespeople. If rules had been followed, the salespeople would first have contacted the shop manager, who would have double-checked with the buying office if this was true. But once more human weakness beat the system. The salespeople were flattered that their opinion was valued by the buying office and they were willing to give Tasos secret information about the sales of their shop.

He asked many questions, trying to find a hole in the system, if they had returns from their customers, if they were happy with the products that they were receiving from their suppliers, which kind of garments sold most and so on. Everything looked fine. They were happy with the products, they had some returns from their customers, but they were few and within the expected rate. They told Tasos that they sold fashion items in good quantities but the bulk sales were coming from their basic T-shirts which were produced at that time in Turkey. Looking at the selling price of their basic T-shirts, he could estimate the buying price and he decided to attack directly at their main product group.

But how could he create a strong competitive advantage to force this company to look at us and place a small trial order with us? Everything seemed perfect. How do you penetrate a good system? The only way to penetrate it is to offer a better one. He bought many basic T-shirts and came back to Greece. He presented them to the team and asked for assistance regarding how we could attack this product group. We could not offer a considerably lower price, we did not know if they were interested in quick deliveries and we did not want to make assumptions. We needed to act on facts. Georgia said suddenly: "Let's wash them and see if they shrink, or twist or fade out. We were hoping that we could find something but everything met the tolerance levels. We had nothing."

"Let's continue washing them," Georgia insisted. Basic T-shirts are not fashion items which are worn only for one season. They should last more seasons. And a good-quality basic T-shirt would have been appreciated by clients, coming back to the same company to buy them again. We kept on washing the T-shirts until they completely lost their initial shape and they had a lot of pilling on them. That happened after 19 washes. Then Georgia asked: "Can we make our T-shirts look better after 20 washes? We need to knit the fabric in a special way and treat it with an anti-pilling treatment." This of course would increase our costs, but the total quantity of the orders was so big that we could have scales of economy and a small profit at the end.

This was our strategy. We wanted to offer them a much better basic product with a low profit, just to enter their supplier list and earn their trust, and afterwards we could move to the more profitable fashion garment production. Tasos developed samples with our quality requirements and we washed them 20 times in an independent laboratory together with the rest of the samples that Tasos had bought from their shops in London. We needed to wait a few days but when we got the results, we were pleased. The results

showed that their garments after 20 washes were outside the tolerance levels, while our samples looked much better with much less pilling and no twisting.

Tasos sent a parcel to the buying manager of the company with two washed T-shirts, one of their own and one from us, together with the results of the independent laboratory. He told the buying manager that we could immediately improve their basic T-shirts. At the same time he gave him the price of the garments, informed him that we could start immediately if he was interested and we could deliver the quantities that they wanted in four weeks to their shops. He mentioned at the same letter that big Swedish and Spanish retailers had trusted us for more than ten years and we would be happy to support his company as well.

You can guess the reaction. A few days later, Tasos received an email from the buying director inviting him to London to discuss the basic business. Tasos left London with a small trial order of 2,000 T-shirts, but he was happy because he was inside. After our first delivery and after checking that our products kept our promises, the orders became larger and larger, and slowly we took over their whole basic T-shirt business. The customer's original supplier, fortunately for us, did not react when he saw his orders become smaller. When he finally woke up and asked what had happened, he was told that the company was getting better value for money and so he was out.

Small changes are the worst ones. Most of the time, we feel that any reaction toward a small change might be an overreaction, so we don't react. Small changes could be the beginning of a bigger change. It is so much better and cheaper to react immediately to small changes because it may be too late to react when the change has become big and decisions have already been made. In this case the Turkish supplier should have reacted immediately after seeing that his basic T-shirt orders were reduced slightly. He should have contacted the buyers or the managers, with whom he should have built a good connection, and asked directly the reason for the reduction in orders. It might have been due to a drop in sales or for any other reason connected with the products that he was producing. If he had done this there is a possibility that one of the people he knew in the buying office would have revealed that they were trying a new product from Greece with better washing results. If he had had this information early enough, he could have reacted and improved his products as well. But he did not react immediately and when he did it was too late. Make sure that you train yourself to react to the smallest changes, regardless of where they come from—clients, friends, husband or wife. Your reaction should not be bigger than the change. Ask if this small change is only a small change or if it is part of a bigger change. Try to read between the lines and judge carefully if this is something that can be ignored or whether it requires extra attention. You have nothing to lose by asking, but much to lose if you don't ask until it is too late. Beware of all small changes.

After two years of operating on their basic program only, we asked them to allow us to perform on their fashion garments, and of course we got the green light immediately because our performance was excellent. Remember not to give up when you get negative answers. Think how you can create a Trojan horse to infiltrate your client's company.

### **Octopus vs. lion: And the winner is . . . be yourself!**

When I was younger I attended many seminars about personal development. Anything you can imagine: religious meetings, philosophical approaches, trendy directions and many others. In one of them the speaker asked the audience what kind of animal we would like to be. Most of the participants raised their hands rather quickly and gave their answers. One wanted to be a lion, another a tiger, the third wanted to be a horse, a beautiful girl said with a shy smile that she would like to be a butterfly. They had given their answers and all of them were either strong or beautiful animals, except for me. I could not understand the question. Was there a trap behind it? Would the answer show something about our character? I thought a bit more and then I gave my answer to the frustrated speaker, who did not understand why it took me so long to answer a simple question. "Octopus," I said loudly, and most of the participants started laughing, the speaker included.

"Why?" the speaker asked, "do you think you will be able to eat with eight tentacles?" Until I gave my answer, he had not asked anyone to justify their choice. It seemed that a lion, a tiger, a horse and even a butterfly suited him as answers. But the ugly octopus did not match with what he had in mind. "Why would you like to be an octopus?" he repeated. More laughs from the participants made me hesitate and hate myself at the time. Why had I not said an animal such as a jaguar and been left alone. Now I had to explain to everyone and I was not sure whether my answer would raise more laughs. But it was too late. I stood up and tried to be as sure about myself as possible, trying to apply what I had learned about body language, talking to an audience and all the rest. I made sure that my tone of voice showed self-confidence and my attitude showed that I was above their laughter.

"I would like to be an octopus for many reasons. First, an octopus adapts to its environment much better than the rest of the animals. It uses perfect camouflage and changes its colour quickly to match the colour of the environment with a speed that intrigues scientists. The colour change is an excellent defence mechanism because its enemies cannot spot it immediately. Lions are definitely strong and handsome animals, but lions cannot change their colour to green when they approach a bushy area.

If an octopus's enemies spot it, there is a second plan. It jets ink toward the hungry and heartless enemy, creating a dark cloud around it, which buys enough time for it to escape. Zebras and antelopes are beautiful animals but



they have only one escape plan—to run faster than the lion or the cheetah. Every morning in the jungle the lion knows that it has to run faster than the slowest zebra of the herd to be able to have dinner. The zebra knows that it has to run faster than the fastest lion to have a life. In the jungle it does not matter if you are a lion or a zebra. What matters is to run.

The third reason I like octopus, I continued, is that it does not have a spine. This gives the octopus such flexibility that it can enter the tiniest hole and hunt or hide. It allows it to be in places which are inaccessible to other creatures.

In many seminars I have attended, I have learned that we should be able to adapt to the changes of our environment quickly, we should always have a plan B in our projects and we should be flexible. I think that my octopus covers all three areas much better than the lion, the cheetah, the horse or the beautiful butterfly. That's why I would like to be an octopus."

People started to applaud, while the speaker's face became like a wooden African evil mask. From his reaction I guessed he would have chosen to be a moray eel, for the simple reason that morays eat octopuses.

In my business life I have read many books about sales techniques, body language, the most effective people, mafia managers, the art of war and success stories of amazing people. Every book has something good to say about how to act, what to do and what not to do. In reading all of these books I felt like a bee visiting many different flowers and trying to produce my honey. Something was missing but I could not capture what it was. Then one day in the supermarket trying to buy honey, I realized what was missing. I noticed that "flower honey" came from different companies and it was the cheapest honey you could buy. Beside it were displayed the more exclusive types of honey, such as orange blossom, lavender and acacia. Those types had their own personality—they were made from specific flowers and they were so much different from the standard flower honey.

And then I got it. All of those books teaching us such nice things (at least the ones I read) gave advice which should be applicable to anyone. It seemed to me that everybody who had read the *Best Salesman of the World* should become the best salesman of the world. It also seemed that many of these books were selling a nice shoe but forgot to ask our size. Most of us tried to squeeze our feet into these wonderful shoes but they were either too tight or too large for us. And then we were blaming ourselves about our foot size. It is important to remember that our character is unique. Every one of our actions should be completely compatible with our character. If you find techniques or ideas which do not match with your philosophy or mentality, simply drop them without hesitation. Do not be afraid to be yourself, even if you don't match the standards which you believe are necessary for your business. People appreciate authenticity. I personally appreciate a small authentic shell more than a big one made of plastic. And because people appreciate authenticity, they recognize it when they see it.

I told you before that at the beginning of my business career I chose to be an octopus. This would allow me quick adaptability, plans B and C for each project and to have flexibility, which would allow me to enter even the smallest openings and create many opportunities. It worked in the beginning but not very well. I tried to imitate an octopus in my business life, being flexible and adaptable, but it was not me. As I said before, every time I need to answer questions, I firstly see what mother nature is doing. She created a wonderful kingdom made up of plants and animals. The difference with our human kingdom is that we humans have kings. Mother nature's kingdoms do not have kings; she is against this kind of discrimination and dislikes royal families. Mother nature does not believe that the survival of a group should depend upon one single creature, and certainly not that this power should be inherited by the descendants of the king. She treats every creature equally and respects them to the same degree. The lion being the king of the jungle is a human approach, which shows our need to be ruled by someone else.

Mother nature is unique: she does not show any preference to any particular creature. She is not especially fond of any particular characteristics—speed, for example, or volume, or appearance. If she had a weakness about the above, the whole planet would be full of huge, beautiful elephants running at 300 km per hour. The appreciation of speed, volume or appearance is again a human characteristic. Mother nature loves everything. She loves speed and gave it to cheetahs. She loves slow and offered it to the sloth. Some of us may wonder how can anyone offer something which is such an obvious disadvantage. Things are not always as they seem. First of all, why is being slow a disadvantage? Why have we bought so easily the idea that “time is money”? Why is fast better than slow? Modern industry tried to take advantage of fastness, promoting it as something modern, good and non-negotiable. Pressure cookers, fast food, fast lanes, non-stop trains, drive-in restaurants and so many other applications of “speed is good” have been planted deep into our brain the idea that “slow is bad”.

Some consider being slow is an advantage for sloths. If you had to choose between a hungry eagle and a happy sloth, what would you chose? Some 30 years ago, I should have definitely chosen to be an eagle. Now I would go for the sloth without a second thought.

Back to mother nature again. She offered everything to everyone. Speed is good for cheetahs, slow is perfect for sloths, keen eyesight is excellent for eagles, but albatrosses do not have keen eyesight, having the best sense of smell in the whole bird kingdom. This great bird spends its time hovering above the ocean on the look-out for food. And to help it to do this, it has an extra large nose on top of its beak. This helps it to detect food floating on the sea, even when it is dark.

The humble cricket has been offered the best sense of touch in the world. When you have a lot of predators, it makes sense to stay alert. The cricket

is helped in this by possessing incredibly sensitive hairs below its abdomen. These are able to pick up the faintest change in air flow produced by attacking predators, such as flying wasps and running spiders. The owl, on the other hand, has the sharpest hearing in the animal world. These birds have phenomenal hearing. Their large ear holes are at slightly different heights, above and below eye level, helping them to pinpoint the vertical position of sound sources. But truly astonishing is their reaction time. In complete darkness it takes a tawny owl less than 0.01 seconds to assess the precise direction of a scurrying mouse, for example.

Mother nature loves every creature and she offered them different gifts. No animal tries to imitate another animal because someone told them that the other animal is better. Each living creature keeps being itself, developing its own characteristics, improving them, but it never tries to be something else. The same applies to people. It is important to be ourselves. We cannot develop the abilities of every human in the world. We cannot copy the most successful businessmen. Let's try to find out what our advantages are, and work at developing those advantages. Don't stretch yourself to become something you are not. It will be expensive for both your private and your business life.

I like this quote: "A pine needle dropped in the forest. The deer heard it. The eagle saw it. The bear smelled it." The dropping pine needle is the information. All three animals accessed this information using their best sense. Thank God there is not such an animal which could hear, see and smell the pine needle dropping.

Starting my business, I was insecure about my knowledge of the textile industry. I tried to learn as much as I could as quickly as I could, but the more I learned, the more I realized there was so much more to learn. When meeting clients I was not authentic. I tried hard to hide my areas of ignorance and I tried to be someone I was not. I used expensive company stationary, I wore expensive clothes (whatever I could afford at the time) and I was trying to sell myself as an expert in textiles. My performance was poor. I was able to get some small European clients but I was not succeeding even with medium-size clients. I tried to apply whatever I had learned in university and from all the books I had read, but it was still not working. I was making contact but I could not persuade clients to start working with my company.

After a year, even the smaller clients started leaving my company and I experienced strong financial pressure. My expenses were higher than my monthly income from commission. I had to make a decision. I had enough money for one more trip abroad and some final meetings with customers whom I had previously contacted. If I managed to get at least one new client from that trip, I could continue my business. If I were to fail, I would return to Greece and have to close my company. It was critical. My home phone was cut off for two months because I could not afford to pay the bill. I decided

that my last trip should be Stockholm, Sweden. I knew the language, which I thought at that time was a great advantage. I knew the market and the big players, and I thought that I had much more chance there than anywhere else in Europe. I made the final arrangements with my target customers and I took two huge suitcases full of samples from every possible supplier who could give me samples.

Looking back now, my sample-gathering was awful; it contained mixed qualities and there was no collection concept at all. But at that time I thought that I had a fantastic collection and everybody in Stockholm would want to buy my garments. The reality was so different. Most of my meetings went badly. The buyers told me that they were not interested in what they saw. Some of them told me that they might come back to me in the future but I had no positive answers. After the last appointment I was devastated. Everything had finished. I tried everything and I had failed. I still remember the noise of the broken wheel of my green plastic suitcase on the pavements of Stockholm that rainy and grey day.

I returned to my hotel just before lunch and I had nothing else to do except wait for the next morning to catch my flight back to Greece. I had some money left in my wallet and I decided to buy myself a nice lunch at an expensive restaurant. At that time I needed something good in my life. I entered the restaurant and asked for a table for one. I ordered salmon, salad and a glass of Chablis, looking at all of the other people in the restaurant who looked like they had managed their business and were enjoying the fruits of it: well-dressed people, laughter and a nice atmosphere. Everybody looked pleased and happy, except for me. I was trying to figure out my next steps but it was impossible. Then I noticed that the head waiter of the restaurant was a bit uneasy. There was a gentleman waiting in front of the reception and a lot of movement occurring between the staff. Something was wrong.

The head waiter started moving from table to table asking something but receiving a negative response from everyone. Then he came over to my table. He explained politely that there has been a misunderstanding and one of their best clients did not have a table for lunch. He was alone and the head waiter asked me if I minded if he shared my table. What was taboo for the Swedish—having lunch with a stranger—was a must for the Greeks. I nodded to the head waiter, thinking that it would be good for me to talk with a stranger under the circumstances. After a while the gentleman stood in front of my table, presenting himself and shaking hands. He thanked me for sharing my table with him and he started a polite conversation about where I was from and what I was doing in Sweden.

I was under so much pressure, so I told him everything. I told him that I had graduated from a Greek university with honours. I got a master's degree in strategic management, and I had tried to enter the textile agency business. I was rather new and did not have the experience required even

by medium-sized companies. I told him that I was struggling financially and that tomorrow upon my return to Greece I would have to close my company. I confessed that I felt this was not right. I told him that I knew I was good, much better than most of the textile agents. I told him that if anyone would trust me, I would do anything to prove them right. I only wanted someone to believe in me and give me one chance. Then I stopped. He was listening to me carefully and he did not interrupt me.

When I had finished he told me: "I might be able to help you. I have a friend who is a buying manager in a medium-size Swedish company. He told me the name of the company but it did not ring a bell. It was a promotion company which was buying large quantities of basic T-shirts, sweatshirts and tracksuits, and it was printing (in Sweden) its client's logo on the garments. He excused himself to make a phone call to his friend and then he returned, telling me that he had arranged a meeting with his friend at 15.00. He gave me the company's details and told me that he had to rush back to his office. I was sitting there with a small piece of paper in my hands but much hope in my heart. It was already 13.30 and I had one-and-a-half hours to get to the company, which was located outside Stockholm's centre.

I asked for the bill, when the head waiter informed me that it had been taken care of by the gentleman who had had lunch with me. When I approached the reception of the company at exactly 15.24, the receptionist informed me that Mr Carlson should meet me at 15.30. I passed those six minutes checking the environment and trying to extract information about the mentality and the psychology of the people working there. That was what some of the books I had read advised good sellers to do. At exactly 15.30 I was shown to a meeting room. When the receptionist opened the door, I saw the gentleman I had had lunch with smile at me, enjoying the expression on my face. It took me a few seconds to realize that I had had lunch with the buying manager of a textile company and that, after telling him the whole truth about my inexperience, he still wanted to meet with me and talk business.

Looking at me and smiling, he said: "Here is the chance you wanted, Thanos. Sell!" Two hours later I was sitting at the underground station letting trains pass by. I had more important things to do. I was calculating the commission that I was going to get from the orders I received: 150,000 white T-shirts, 50,000 white sweatshirts and 15,000 tracksuits. When I pressed the final button on my calculator, I could not believe my eyes. The commission was so big that it could extend my business life for at least another six months. From the train station I phoned Mr Carlson. Of course, I thanked him very much for his trust and the chance he was giving me, but then I wanted to ask why he did it. It took him a while before answering:

I have been in business for many years. I have met and worked with many different people from many countries with different mentalities.

At the beginning I was considering many different factors before starting work with someone. Some of my partnerships were successful, some were mediocre but most of them were disastrous. It took me several years to understand the most important factor for a good future partnership; THE RIGHT MENTALITY AND HONESTY. If the right mentality is there and the experience is missing, I will still go for it. But if the right mentality is there with honesty, I never let this chance escape. You have been honest with me and your mentality is the one we need for this company. I know that I am taking a risk by ordering such big quantities from you without first testing small orders, but I have the feeling that you will not prove me wrong and you will perform as we expect. There is one more reason I helped you. A long time ago, when I needed help, someone gave it to me. When I asked him how I could pay him back, he told me that I should do the same thing to someone who needs help. You should do the same Thanos. Remember to help someone when he needs your help whenever you are in a position to do so. This will be your debt to me.

Unfortunately, I have forgotten his advice.

### **There is always another way!**

Years later, being the most successful textile agency in Greece, we were operating in many countries. We were selling clothes to big retailers and brands in Sweden, Norway, the UK, Ireland, France, Germany, the Netherlands, Belgium, Italy and Spain. We had managed to make our company like a big black hole in the textile business, absorbing any potential client who wanted to produce in Greece. We were happy in the office and enjoying the sweet taste of success. Money was pouring into the company and we were hiring more and more employees to cover increasing demand. At that stage I felt that I was too important to deal with hiring new employees. I trusted my people and gave them the authority to hire without having my final approval. Each department had its own budget and they could spend it any way they wanted. I asked them to make their department profitable and bring more business to the company. I offered a percentage of their turnover on top of their wage, making them happy partners. Each department decided how to spend its budget in order to bring more business to the company.

The Germany department, for example, was hiring more employees because it wanted to keep its performance really high in terms of the quality of products and services offered to the German market, while the UK department was spending most of its budget on an inspirational trip abroad and buying samples from trendsetting companies. After copying or altering the samples, they offered them to the high fashion UK market. Some departments were clever enough to co-operate and make synergies that led to cost-cutting. So the UK department could show some of the newly bought

samples to the Germany department and in return it was getting support from the production controllers of the German department, when needed. I did not interfere with their choices as long as the profits of the company were rising. My people were happy because they were given the opportunity to act as entrepreneurs, enjoying both the security of the zoo and the excitement of a small part of a jungle. I interfered just once.

The Netherlands department wanted to hire someone as a merchandiser's assistant. The merchandiser takes care of orders, making sure that the client's requests are followed regarding the standards of clothes and procedures. Clothing production is a complicated procedure with many steps in between and it is difficult for one person to do it all. Small teams are usually necessary to achieve good performance. The departments were competing with each other regarding the quality of their teams and gradually they were raising standards in order to hire someone new. Control was soon lost. For the simple position of a merchandiser's assistant, the department was asking for at least two foreign languages besides Greek, university graduation, a knowledge of computers and so many other things as if they were working at NASA. Our company had a great name in the market and usually we received good applicants, but they were missing some important points.

My office door opened suddenly—without my secretary informing me—and a young girl entered my office clearly frustrated. She was wearing jeans and a T-shirt, and her hair was coloured shocking pink. She had many tattoos on her body and her face was pierced in many places. There was no dress code in my office, but my employees have always kept within whatever they thought the limits might be. None of them had such an extreme appearance as this girl. My secretary ran after her and told me in frustration that she was sorry but she had not been able to stop her. I told my secretary that it was okay and asked her to close the door behind the punk intruder. I asked the girl to sit down and asked her if she would like something to drink. I was curious what it was all about. The young girl sat down and thanked me but she did not want anything. She told me that she wanted to see me just to complain. I asked her to tell me the whole story from the beginning, while at the same time I could see people outside my office coming and going, probably asking my secretary what was happening.

"My name is Eleni," she began, "and I am a student in business administration at the Thessaloniki Aristotle University. I only speak English and I don't know much about computers. I need to work to be able to support my studies because my family can't do it. I have applied for any possible job but no one has accepted me because I was either under-qualified or over-qualified. The main reason is that I don't have any previous work experience. And I am asking you how am I going to get any kind of experience if no one will hire me because of my lack of experience? Please, Mr Venieris, I am desperate. I need to work to finish my university course and drive my life in the direction I want. Please give me a chance. Hire me for two months and if you are

not pleased with my performance I will leave your company. If you want, I could remove all my piercing rings, cover my tattoos and come dressed as a nun, but please hire me. If you will not hire me now, I will have to take my only other offer working in a company answering erotic phone calls from men with fantasies, and believe me I don't want to do it. But I will. She looked at my desk where I had photographs of my wife and two children. Would you like your daughter to be in the same situation as mine, when she needs work?"

I was looking at this daring young girl with her tattoos and piercings and hearing the desperation in her voice. She was good at selling. Immediately I remembered myself several years ago in a luxury restaurant in Stockholm, saying similar things to an unknown gentleman, with whom I was sharing my table. I knew that I owed it to that person who gave me a chance when I needed it. I saw myself in this young girl and the words came out of my mouth quicker than my thoughts. "You are hired. Welcome to our company." She opened her eyes as if she could not believe what she was hearing, and after some seconds she said with a big smile: "Thank you very much Mr Venieris. I will make sure that you will never regret this decision." And she did exactly what she had promised. She gave her soul to the company, and with her energy gave the department a new push, even though she had to face the temporary hostility of her supervisor, because she had bypassed her during the hiring process. After two years I promoted her to head of the Netherlands department and she did a great job. Our clients loved her because she took good care of their orders and she tried hard to offer them nice styles and good prices.

As expected, my decision created a problem between me and the director of the Netherlands department. By hiring Eleni after she had been rejected by the director, I had dented the director's ego and showed everyone in the company that she had made a mistake. It was me that had made the mistake. Before being so impulsive and hiring Eleni, I should have told her that we would reconsider her application and get back to her shortly. I should have discussed it with the director of the Netherlands department and explained why I wanted to hire this girl. Then I should have left the hiring to the director, saving her face in the process. I tried to correct it afterwards but it was not the same. I lost the trust of my old director and, even though I thought that she would forget it and move on, after eight months she resigned from my company, moving to another clothing agency on a lower salary. People value pride highly. Remember this when you deal with those around you. Try not to hurt their pride. Unfortunately I made several mistakes in this vein at the beginning of my career, but now I know better. Eleni broke the rules and she got what she wanted. There may have been other girls who were more qualified than her but they have not been hired, simply because they followed the rules and accepted "No" for an answer without trying to find another way. Remember: "There is always another way!"



The incident below happened just a month ago. It was autumn 2011 and Greece is in a deep financial crisis. It made headlines globally as its huge deficit was challenging the euro. People were losing their jobs and the unemployment rate had reached 18%. It was a sunny morning and I was enjoying my coffee in a nice coffee shop with a garden, thinking about my writing, and I was deep in thought. I did not even notice when an old and a young man sat at the table beside me. Gradually I caught their conversation, because the old man, who was the father of the younger man, was complaining that the family was struggling financially and he needed his son to find work again. The young man tried to explain to his father that he had sent his CV to more than 30 companies but all the replies that he had received were negative. Hearing the names of the companies, I understood that the young man had experience in the mobile phone industry but he was fired, as were many thousands of others. I joined in the conversation (this is acceptable in Greece), and I wanted to learn more about the young man's CV and the efforts that he had made so far. After a while I realized that he was a bright young man with a natural gift for sales. I told him that having a natural gift for sales does not help much if we cannot sell ourselves. I asked him what measures he had taken so far in order to get hired by a mobile phone company. He told me that he needed to fill in application forms and he had to mail them together with his CV to the person in Athens who was responsible for hiring new staff. I asked the young man what in his opinion was his strongest point. He told me that it was his direct communication skills with the clients. I asked him if he was showing this in his CV clearly. He told me that unfortunately he could not show it in his CV, but the hiring system did not allow for an interview until the applicants have been chosen first from their CVs.

I asked him how he could show on his CV that this process is not the best for companies because it is difficult to demonstrate the soul of a salesman on a CV. He could not think of anything. Then I came up with a suggestion. "Look," I said. "You have tried their way and it clearly isn't working for you." Albert Einstein said that insanity is doing the same thing over and over again and expecting different results. Why don't you try another approach?"

"Like what?" he asked me, a bit embarrassed because he saw hope in his father's eyes together with a judgment that his son had not tried everything.

"If you believe that the system with CVs does not allow you to show your whole personality and your strongest points, why don't you demonstrate it by following the system but crossing its lines at the same time?"

"I don't understand," he said.

"You have nothing to lose at this point, since you have applied to all of the mobile phone companies and they have rejected you. I would advise you to resend your CV to all of them again with some changes. Write only your name and your mobile phone number. Instead of filling in all of the information that they request regarding your studies and your previous experiences,

simply write something like this: "I wonder why a modern company like yours pays such attention to CVs, leaving out the most important part of a salesperson: the person himself!"

I told him that if I ever got a CV like this, I would consider it worth a deeper look and I would definitely want to meet the person. I also told him that this was my impression but I could not guarantee that it would work for other people, but since he had nothing to lose I advised him to do it. He told me that he did not believe that it would work, but he promised to his father that he would do it. Before leaving the coffee shop, I gave him my phone number and asked him to inform me how it went. Some 23 days later he called me. He was hired by a company that had rejected him before. He thanked me for the advice and he told me that from now on he would remember that "There is always another way!"

We were always trying to find "the other way" in our company to penetrate new organizations. I remember the case of the global brand of athletic clothes. We had tried to be their supplier for years but to no avail. Randomness plays an extremely important role both in our lives and business. This time randomness was on our side. A buyer who was working in another company was hired by this huge brand. We had been working with her for many years in her previous company and she was pleased with our work. Her previous company was not an athletic company; it was a global brand as well but its focus was fashion and quality. At the beginning she had just passed us the information that she had moved to a new company. We were happy and were expecting that she would like to introduce us to it as one of her best suppliers and she would open the gate for us. Time passed and nothing happened. I gave her a call and asked her directly if there was a reason why she had not introduced us to her new company. She told me that she assumed that we would not be interested in working with her new company because of its athletic orientation. When I told her that we were interested, she said she would make the connection and come back to me. Once more I felt happy that I did not leave it as it was, but I took the initiative to ask. I was thinking that profit is as sweet coming from an athletic company as coming from a fashion company. The Turkish have a good saying: "Eat the grape and don't ask which vineyard it has come from!"

After two weeks she called me and said that she had arranged a meeting with the manager of the company, the product managers, the head designer and the buyers from the ladies and men's departments. She told me clearly that a different approach would be needed from my side because the brand was not so much interested in fashion garments but more in special qualities and fabrics. Since athletic garments were not our core business, we did not have many good fabric developments or ideas to catch them. Another approach was definitely needed but we did not have much time because the meeting was the week after.

I was in the lobby of the company's huge building waiting to be called for the meeting. I was a bit stressed because I was not sure that my strategy would work and catch this big fish. I had never made this approach before and I was curious about the results. The receptionist showed me to a large meeting room. I was impressed by the design of the building and its interior decoration. It was clearly sending a message to the visitor: power! I entered the room and the buyer I knew, after making the necessary introductions, took her seat because she was the buyer for the ladies' line. I sat down as well and I opened my Hermes leather notebook. This was my only way at that moment to whisper my own message of power. The head designer opened the conversation and said that the ladies department buyer had told them a lot about me and me company. "Will you show us your collection?" he said. This was usually what most companies were interested in. The collection and the direction were important, since all other trust issues have somehow been covered. This was my new approach for this company. I had no collection with me to show to the decision-makers! "I am so sorry!" I answered immediately. "I thought that a company like yours would not be interested in looking at samples; I thought that a company like yours would be more interested in increasing its profits!" All of the participants were exchanging glances and their faces looked disappointed and doubtful, especially the buyer I knew who had introduced me to the brand company—she looked as if she could not believe what she was hearing and was trying to hide her anger about the difficult position I had put her in. "I am very sorry," I said again and I started closing my Hermes notebook, which was full of calligraphic notes. I stood up and tried to take my coat which was on the chair beside me, when the voice of the general manager broke the silence. "What exactly do you mean, Mr Venieris, by increasing our profits? Please sit down and the rest of you may go for the moment," the manager said loudly. I knew that I did not have a victory yet, but my first big hurdle was cleared, since I was about to sit with the general manager of this huge company and talk at a managerial level, without other people involved in the conversation attempting to drive it away from my objectives.

I started my presentation, telling the general manager about our huge global clients, giving him proof at the same time of what I was talking about. I explained that working for more than 20 years with a number of giant clothing retailers not only means that we are presenting fascinating collections every season but also shows that we have a much deeper connection at a managerial level. I told him that our main purpose as a local clothing agency in Greece and Turkey is to make sure that we can solve our client's problems in the best possible way, because we have a deep knowledge of the local market. Then I showed him the various projects that we had successfully completed with our large clients and asked him openly to discuss with me the main problems that they were facing producing in Greece and Turkey. Our office was not interested in kicking out their old suppliers but

we were interested in supporting the brand company on a new level of cooperation. It worked. I did not go there to sell clothes to them; I went there to sell them profit. I positioned myself not as a clothing agent but as a doctor who has experience enough to help the patient. The general manager told me two major problems that they were facing with their suppliers and told me that he would be interested to see our suggestions. The bridge between the brand company and our company was finally built. All the rest is history. We have been working with the company for many years and each year when we renew the contract, I always remember that there is always another way.

### **You never know**

In 1976 I had just finished my military service in Greece and I needed a break. My brother was studying in Stockholm and he invited me to stay with him for a while. After the army, Sweden did not sound so bad. My brother was already well connected and he promised me a wonderful month. Stockholm was beautiful, the people were beautiful and everything looked beautiful. One month passed quickly and I needed to return to Greece, but I wanted more.

At that time, before the European Union, it was difficult to get a visa for Sweden, especially for Greeks. I returned to Greece and I applied to the Swedish Embassy for a visa. After examining my documents, they asked for an interview. The lady who interviewed me was really tough. She was going through my documents and something was not fitting the image she had about Greeks asking for a visa. I had a university degree, I had a very good job, I could speak three languages and I was asking for a Swedish visa. She looked straight in my eyes and said: "Look, I really don't understand why you want to go to Sweden for one year. Give me a good reason and I will give you the visa. Take into consideration that I have been in this position for 17 years and I have heard all possible reasons and excuses. In particular, do not tell me that you fell in love with a beautiful Swedish girl who you are going to marry." At that moment she was like a potential client.

My mind started working really fast. The reason I wanted the visa was that I liked Sweden and I wanted to live there for a year: so simple and the truth. But I knew that if I told her the real reason she would probably not give me the visa. I needed to think as if I was her. Something came into my mind but it was risky. I decided to take the risk. I looked straight into her eyes and told her very slowly: "I want to go to Sweden because I cannot stand double-parked cars on Greek streets." Her face did not move. She was like ice. I thought I had blown it. Then she said: "This is something I understand very well!" I was the only one who got a visa that day. All the other Greek people who had been refused came and asked me what I had said to the question about the reason for wanting a visa. No one believed my answer.

They thought I was kidding. But my approach was completely different than their approach. I tried to think with the mind of the decision-maker and not with my own mind. It had worked.

I enjoyed living in Stockholm. After a while I got a part-time job in Victoria, Stockholm's trendy restaurant. I was washing the dishes. It was a boring job but the money was good, I had free food and on my days off I was allowed to enter the bar, while most Mediterranean foreigners were not welcome. I was doing a good job, making sure that there were enough clean dishes for the waiters. I checked frequently if the number of glasses was sufficient for the night and I kept my working area clean at all times. The waiters were happy and they told their manager about the "new" Greek guy, asking him not to move me from that position because I was doing a great job. But thank goodness the manager was more open-minded. One night he came and congratulated me for the good job I was doing. He asked me how come I loved such a job and I performed it so well. I told him that I hated the job but that I did it so well because one day I would like to do a job that I would love. He asked me if I could attend some Swedish language courses and I told him that I was already taking lessons in Swedish. Several months went by without anything special happening. I was learning Swedish very quickly and I started to communicate with the waiters in Swedish.

One night a waiter did not show up and the stand-in was sick. It was Saturday night and the restaurant was fully booked. The manager had a problem which he needed to resolve quickly. He came and asked me if I could do the waiter's job for one night. He gave me the key to the machine and there I was. Of course it was difficult, of course I panicked many times, of course I made mistakes, but in the end I made it. At the end of the night I was exhausted but happy. The manager came to me and asked me if I wanted to be a waiter. I managed that because I was good at washing dishes. It pays to remember that if you are good at small things, people will assume that you are good at big things as well.

I was very happy as a waiter. My Greek friends were jealous and could not understand why the manager chose me that day and not them. During the summer, students used to work for a month or two in several companies to get work experience. They were paid by the state and companies used them for basic tasks. That summer a young teenager came to our restaurant and was introduced as Lille Fabe. His name was Fabian but, because he was young, everybody called him Lille Fabe ("Little Fabe"). He was hired as a *nisse*, which is Swedish for "assistant", and his role was to assist the waiters, making sure that there was always fresh coffee for customers, and that there were clean knives, forks and glasses in the right place. He also had to change the ashtrays and help the waiters to clear tables. After a couple of days, Lille Fabe was doing everything he was expected to do and even more. He was happy, smiling at everybody and helping the waiter who was in most need. I liked this young guy very much and I talked with the waiters the same

night telling them that we should give him some tips because we should encourage him to continue performing well. At that time the waiters were getting good tips so we were earning a lot of “black” money.

The other waiters did not seem to like my idea. They did not want to give money to a teenager who was paid by the state and whom they would probably never see for the rest of their lives. Lille Fabe overheard the discussion but said nothing. The day after he was as good as the day before. His attitude did not change and his performance was exactly the same. After our shift finished, all of the staff were sitting enjoying a beer and a cigarette. That night I took a beer glass, put inside the glass ten Swedish kronor and placed it in the middle of the table, saying loudly that this was my contribution to Lille Fabe who was doing a really good job every day. Lille Fabe looked at me with much appreciation and thanked me, then the other waiters felt shame and all put ten kronor each in the glass too. There were seven waiters, so Lille Fabe earned 70 crowns that day. This continued every day until Lille Fabe needed to go back to school. He thanked everyone and closed the door behind him.

In 1991 we had our best year with our large Swedish retailer. Our business had grown dramatically. We knew what they needed, they put a lot of trust in us, the buyers were introducing us to new departments and the orders kept on increasing. Since we were selling to different departments—men’s, ladies, children, babies, swimwear, sportswear—no one from the Swedish company knew the total turnover they were making with us, until one day a manager pressed a button to see what the percentage of each of their suppliers was. He was shocked when he saw the total amount in millions that we were responsible for. At that time we were selling approximately 10% of their whole collection. This was a tremendous number and immediately he put our company on hold. He circulated an internal letter informing everyone that my company, a rather unknown company, counted as an accumulated risk for them. No more orders should be placed with this Greek company until a proper investigation was made by their managers. The purpose of the investigation was for the Swedish company to visit our Greek offices and look into our company’s finances and the potential to support such a big turnover. We had not been informed about the internal letter, and all of a sudden three managers came to our offices in Thessaloniki. They did not reveal the real purpose of their trip but they told us that they would like to see how our company operated.

They got a free pass from me to sit near any employee they chose and ask any questions. I was a bit nervous because I did not know what was happening. Then I noticed that the most senior manager was looking at me in a very strange way. He asked me if I had ever lived in Sweden. When I said “yes”, he asked me if I had worked as a waiter in a certain restaurant. I thought that he might have eaten there and remembered me, so I asked. He started smiling and told me that he was Lille Fabe. He said that he still remembered how I took the beer glass and put money in it. I smiled back and

I told him: "Fabian, I hope that you will never forget this, now that you are a big manager in this company!" After a while, Fabian informed Stockholm that our company had the green light and orders were once more allowed to be placed with us. Of course our company was a good company at that time, but I am not sure that Fabian would have praised us so much if that beer glass incident had not happened 14 years before. The same Fabian was Fabian Mansson who later became the CEO of H&M and he was on the Fortune cover as the golden boy.

I have heard so many stories about people achieving their goals simply because they have been nice to people when they did not need to be. And when they needed them, those people remembered the nice behaviour and it was easier for them to behave positively. I have a very good friend, George Ioannidis, in the construction business. Besides that he is a philosopher with a great attitude toward life and people. He has a good sense of fairness and kindness, and he always treats people in an amazingly kind and polite way, even the ones he does not need for his business. Years ago he used to go for a summer vacation to a resort in Northern Greece. He chose a small house in front of the sea for a quiet vacation. The owners of the house were a couple who were renting other houses to other guests. George did not have any particular connection with the owners but he and his partner Tasoula were kind toward them, but nothing special. Years passed by, George and Tasoula got married and had two children, and their vacation plans changed. They built their own summer house so they did not go back to the old small one that they had been using for several years.

George's construction business was expanding. He made clever moves by buying the right land, building the right type of apartments and selling them at the right price. His clients were happy with the quality and they mentioned to their friends about the great value for money. After a while, George decided to expand his business by not only building apartments in cities but also building summer houses. His summer house business grew well so he was looking for more land on which to build. Someone passed George information that the owner of the small summer houses where he used to go for vacation several years ago was selling his land, and due to the perfect location, most of the Thessaloniki developers were fighting to close the deal with him. George visited the owner and they were both happy to see each other after all those years. The owner did not know that George had become a big developer. George told him directly and openly that he was interested in buying his land and to build beautiful summer houses. He also told him that he did not want to make an offer but he would be willing to pay as much as the highest price that the land owner would receive from the other developers.

George's main competitor was a huge Greek construction company which was 20 times the size of his company. Given this, he was not overly optimistic that he would get the deal because the other company was very prestigious at that time and he thought that the land owner might choose it

instead. Days went by without any call from the land owner and he began thinking that he had gone with his competitor and did not want to inform George about it because he was feeling uncomfortable. He was about to forget the whole thing when he received a phone call from the land owner informing him that he would be happy to offer his land to George. He could not believe what he was hearing but thanked the land owner and they agreed to meet the day after to discuss details. George was curious to find out why the land owner had chosen him. He got the most amazing answer:

I discussed it with my wife and she insisted on giving you the land. The only reason for her decision is that you and Tasoula were the only guests we had who kept your room clean all the time and when you had to return to Thessaloniki after the end of your vacation, you left the room as clean as it was when you came. This showed to her that you respected other people and you have principles. We decided to offer our land to people with principles and not to a huge company without a face.

I read somewhere that people will forget what you have done, but they will never forget how you made them feel. Try to make people feel well and they will try their best to give it back to you. My grandmother used to say: "Make sure that the words you say and the actions you take towards other people are sweet, because sooner or later you will be forced to eat them." I have forgotten this rule several times in my business life but one time was particularly expensive.

In 1992, which was one of our best years, we were working with some of the best and biggest European clients, including H&M, Zara and Primark. At that time we were the biggest clothing agency in Greece and many clients were trying to get our services because we were reliable and system orientated when other clothing agencies were living in the past. We received an email request for a meeting with the manager of a Dutch company interested in working with us. It was the first time that we had heard the name of the company but we accepted the meeting. The manager introduced her company, telling us from the beginning that it was small but that it had big plans for quick expansion into Europe. She needed our fashion input and our quick deliveries, but the quantities of the clothes it was buying was small for our size. As an agency we focused on big retailers and we had contracts with big manufacturers. Small clients were not compatible with our system and our supply chain. I explained this to the manager as kindly as I could and told her that she could contact us again as soon as her quantities reached our minimum requirement. She left our company, assuring me that she understood. I was proud that I could afford to choose my clients, and I was following the advice of management gurus that we should only take on clients that were compatible with our company. I did everything right according to what I had read but time proved that I had made a big mistake.



Two years later I was trying to begin business with a Dutch company. It had 450 shops in five European countries and every supplier and agent was trying to get a contract with it. Having persuaded large companies like Zara and H&M to work with my company, I was pretty sure that I would easily get that medium-size Dutch company. I managed to get an appointment with the division manager and I had done my homework really well. I knew nearly everything about the company: its strategy, its competition, its sales figures, the markets it was buying from and its fashion direction. I had prepared a wonderful presentation which matched its strategy and I was celebrating my success even before the meeting started. As soon as I opened the door for my meeting with the division manager, I saw that there was a lady in the room but I did not pay much attention to her, focusing on who I thought was the decision-maker. Then this person told me that she would like to present the buying director of the company. I turned to the lady, offering my hand for a handshake and saying "Nice to meet you," when she replied rather coldly: "But we have met before." I tried to remember where or how we had met but I couldn't.

Then she told me about our first meeting and my negative attitude toward her, when she needed my help. I remembered her and I tried to explain that at that time we could not help her but, now that she worked in a big company, things were different and we would be happy to support all of her needs. She looked at me and said slowly,

in this company we are not looking for agents with the right collection, but we are looking for agents with the right mentality. And I know that you do not have the right mentality. Thank you for your time but we are not interested in working with your company, at least as long as I work here.

And she kept her promise. I tried to bypass her and contact her superiors, I asked people who knew both of us to help, but nothing worked. The doors of the company were closed to my company for more than seven years.

Several years later we met accidentally in Mexx, a Dutch clothing company which operates globally. We had been working with Mexx before she joined the company, so it was not possible for her to damage our business with Mexx. She was the head of a department we were not doing business with. I saw her in the cafeteria there and I approached her to say hello and to tell her that I had learned my lesson, thanking her for this because she was right. I asked: "After all these years, could you please tell me, what kind of answer would you expect from an agent with the right mentality?"

"If after all these years you cannot find the answer, you have lost a lot of time," she answered but with a smile this time. "Okay, let us try once more," she said. "Let's pretend that this is our first meeting, I still work for the small Dutch company and I have come to Greece asking for your support. What

would your reply be today?" I was unprepared and my mind had to work quickly. What had I learned? After a while I told her that this would be my reply today:

Thank you very much for choosing us among so other many agents. You were very clear about the needs of your company. We have a major challenge in front of us. Our company focuses on big retailers and our whole operational system supports their needs. The contracts we have with manufacturers put a minimum limit on the amount of garments. Unfortunately we do not have a supplier's network to serve medium-sized clients like your company. We are looking at it, but we are not ready at the moment. Until we build our medium-sized network, and since you do not have any contacts in Greece, would you like me to source for you and introduce you to an agent who specializes in companies of your size? I could support you with our fashion input, but the production would be taken care of by another agent. I could be in close contact with you and the agent to ensure that they perform to your standards. Even though you will have another agent in Greece, should you ever need any kind of assistance please do not hesitate to contact me. If you would like our quality department to check the clothes produced by another agent, we will be happy to do it for you. That would have been my reply today.

She replied:

It seems that you did not miss the lesson. If you had given me this answer then, I would have appreciated it so much and I would have introduced you to all the people I knew in the textile business, because you had the right mentality and attitude. So, I think that we should try something together now in my new department in Mexx.

We did a lot of business together and we remain friends today.

We should always be careful how we treat and talk to people. Life is strange. People who may seem quite unimportant to us now may be the gatekeepers of tomorrow. It depends on our attitude if we are able to turn gatekeepers into gate openers. Even if you don't want a customer who approaches you, try to handle it carefully, remembering to consider their pride. Human pride is a hungry animal. Remember to keep it satisfied at all times.

### **Do not underestimate yourself or your company**

I read somewhere that if a person standing at a corner of a busy street asked for 100 euros from each passerby in return for 500 euros, very few people would go for that exchange. The main reason is that there is no reasonable

justification for the exchange. We cannot understand why someone would like to lose money in such a stupid way. In every exchange there must be a reasonable give and take. I have a friend, Fiorina, who is an excellent lawyer. She graduated with honours from Thessaloniki University of Law and received her postgraduate from Sorbonne Law School in France. After graduating she had many offers of work in Paris's best law firms. For personal reasons she wanted to return to Greece and after doing so she started applying for jobs at several Greek law firms. Her qualifications were good and she was offered an interview by all of them. Most of her interviews went well and she was pleased. She had the most interesting application at the end. It was at the most prestigious law firm in Greece and she really wanted to work there. During the interview with the president of the firm, she was a bit stressed, but answered all of the critical questions well. Then it came to the last question: if we hire you, how much do you think would be a fair wage for you?

She replied: "I don't mind my wage. It will be an honour to work with you. I have so much still to learn from you." The interview ended there and Fiorina was optimistic that she would get the job. She had a friend working at the firm and she had already informed Fiorina that other applicants were much less qualified than her. A week later the reply came informing Fiorina that unfortunately they could not hire her. Fiorina was shocked. She could not believe that they had rejected her. She contacted her friend who told Fiorina that her last answer was the one which made the president offer the job to a less qualified lawyer, but to someone who believed more in themselves than she did. She had studied at one of the best universities in Europe but she did not believe in herself sufficiently to put a price tag on her services. If we do not believe in ourselves, how can we expect others to?

We all need clients to survive. Most of us are willing to press our profit margins in order to win a contract from our competitors. But when lowering prices, make sure that you do not undervalue your services, like Fiorina did. Clients understand desperate salespeople and they may not trust the cheapest offer. They will trust the most reliable offer. So, if in the place of the person who was exchanging 100 euro notes with 500 euros, we place a person with high credibility, the Pope, for example, then everything will change. We will all go to the Pope with a 100 euro note and leave with 500 euros because it is the person who makes an action credible or not. You will find credibility underpins everything that you do or don't do.

## **From the zoo to the jungle**

### **Follow your heart**

Your graduation day is coming. You had four wonderful years in college, then you did a postgraduate degree, maybe an MBA, and the time is approaching for you to prove to your family and to yourself that you can be successful

in business. Your family spent a small fortune on your studies and they are relieved now that you will finally make your own money. You learned a lot in college and managed all of the case studies. You were one of the best in your classroom and your teachers are optimistic about you. You may have worked as an intern in the summer. Everything went fine. But if everything went fine, why are you losing sleep lately? Why do you try to change the subject when it comes to future plans about work? How come you had all the solutions for the case studies but you cannot find the simplest solution about which direction to move in now? I know exactly how it feels. I was in the same situation 25 years ago and I still remember those feelings.

Some of you may have cleared your mind and be very sure about the direction you want to move in. Some of you may find shelter in the family firm with a supportive father or mother. It might not be exactly what you really wanted but "If you can't have what you love, then love what you have." The most important issue is not to find a direction but to find the direction which is right for you. Business is not prêt-à-porter, it is made-to-measure, meaning that it's made according to the measurements of our body. Only if a cloth is made exactly for us will it feel comfortable. If we buy a beautiful prêt-à-porter piece, even if we buy it with a big discount, if it does not fit us then the purchase is not a success. We will feel uncomfortable when we wear it. Wearing an uncomfortable piece of clothing does not make us happy, even if it is very beautiful. It is much more important to find the right job for us than to find the right shoe. A pair of shoes we can all more or less afford to throw away, but it is not the same with our professions.

We must be sure that our job suits us perfectly. But how can we be sure of this? A few people know what they want to be from a young age. Fewer become what they have dreamed of from their childhood. The rest of us try two or maybe more jobs until we are not sure that this is the right job for us. Imagine that you had all the money in the world so you did not need to work for money. What would you like to do then? Is there anything you would love to do? I can imagine that some will answer "I would like to travel the world with my jet, surrounded by beautiful women or men, stay in the best places, buy the best cars, the best jewellery, the best houses, the best yachts." But as time goes by you might get bored by doing nothing. What would you love to do when you don't need to do something. If you find this, then this is the profession that suits you. Do not be dazzled by fancy jobs because they are in fashion now and they might give you social status. When it comes to job selection, think that you are the only person in the world and you would like to do something. Do not base your decisions on what others think is good but on what your heart seeks.

Even if you have an MBA in strategic management and you find out that what you really want is to have a small restaurant, because that's what will give you real pleasure, do it. Use all of the knowledge you have accumulated in college to run the little restaurant well and I believe that if you really love

this job, you will make it a big success and you will be happy. If an error is not corrected, it will become a bigger mistake. Just because you studied marketing, and you did not recognize earlier that there is something else you would like to do, do not let the error continue. When it comes to business, let your heart lead you. I insist on this for your own good. Make absolutely sure that you love the job you are going to do. If you love your job, then you will not need to work for the rest of your life. You will do it for fun and it will definitely succeed.

Do not stay in your mind's prison just because you made a decision some years ago about your job. You have the right to change your mind if you really want to. As early as you understand that you want to do something different than what is expected from you, take courage and inform people. The earlier you do it, the better. It is very important for you to live and act in harmony with yourself rather than not be happy in a profession. If you are sure about the direction, everything will be much easier for you. If you are moving to an area where you are not happy, even the smallest obstacle will look big to you and your road will nearly always be uphill. Consider carefully where you want to go. Our heart is our compass. If it is left alone it will always show our north. But our heart is surrounded by many electric wires with strong electric currents, such as family, friends, society and ego, and all of those change the direction of our compass from the real north to a faulty one. And when we find out about our mistake, then our life is gone.

### **First yourself**

Academic knowledge is poured into us as if we were empty bottles. For reasons which are easy to understand, we are approached as part of a production process. We should accumulate as much knowledge as possible. More importance is given to knowledge and less to our character. Our character, our philosophy and our attitude toward life are not taken into consideration at all. We are told to load ourselves with knowledge and do whatever we want with it. The best approach is to use it in a way that is aligned with your character. But this is easier said than done. I think that the time has come when we need to re-evaluate our priorities.

I do not care what all the geniuses say about the importance of knowledge. Knowledge is very important but it should not be put above our character and our philosophy. Every person in this world has a philosophy. Philosophy is our attitude toward life—our values, our principles, our ideas about good and bad, about the trace we want to leave behind us. A few centuries ago there was a very clear line about the good and the bad. Religion had a very strong influence in people's lives and decisions. Nowadays everything has changed. There is no forced outside rule about good and bad. Of course, there is the law which sets a line with our obligations to society, but when it comes to moral issues, we are freer to choose and decide what is best for

us. We build our character based on our DNA, our environment, our families, friends, books, education and inspiration from other people we admire. And here we are, unique with our own values, our own beliefs and our own principles.

But we are not as welcomed by our society as we would expect. Society accepts people more readily who agree with the mainstream direction and it tends to oppose people who act differently. Society acts like Procrustes in ancient Greek mythology—making people fit the size of his iron bed by stretching them or amputating their legs. Society has several beds, depending on the times in which we live, the country we live in and the friends we have at different times. New idols appear every now and then, and values change dramatically.

At the same time as society was awarding the footballer David Beckham not only for his achievements in football but for his marriage to Victoria, in his advertising for Dolce and Gabbana, at the same time society was awarding Mother Teresa for her work. She chose another area. She did not listen to the voices of society; she listened to the voices of her heart. She did not have to lie on Procrustes' bed. She did not pass from this street. She chose to operate in areas where she felt comfortable, and that's why she succeeded. If we have a closer look at all of the people who have been successful in any area, it's because they loved what they did and they loved it because they felt comfortable in this area.

### **Dare to show your multiple faces**

There are many forces driving the economy in different directions, but if we were asked to name economy's core, what would that be? Some time ago I would have been afraid to give the answer I am about to give, but now I can do it. I can do it for a simple reason: I have overcome fear. I believe that the moving force of the whole economy is and has always been fear.

Our fear for the unknown future guides us to save money. Our fear of being isolated from community forces us to follow its rules. The fear of getting old pushes most women to support the cosmetic industry. The fear of punishment in life after death drags us to live our lives according to our religion. Fear, fear, fear! It is everywhere in our lives. We grow up with it and die with it. Fear has been planted so well and so deep inside us that we can hardly separate it from our own selves. They made us believe that us and fear is the same, so we don't need to separate them. It is like a world conspiracy against us. Everyone tries harder and harder to make our fear bigger in the expectation that we will buy things and ideas to settle our fears. Governments, religious leaders, institutions, companies, people, everyone tries in their own way to plant new fears inside us or to grow an already existing fear.

Do you want proof? It's very easy. Let's have a look at most advertisements on television.

- insurance companies: fear about the future;
- companies which sell diet products: fear about our health or fear of being rejected by society for being overweight;
- cosmetics companies: fear of growing old (as if it is something bad);
- car companies: fear about our social status;
- detergent companies: fear of germs;
- organic food companies: fear about our health;
- environmental organizations: fear for our planet;
- perfume companies: fear of smelling bad;
- pet food companies: fear about our pets not being healthy or happy;
- colleges: fear about our working future.

From today let's look at all advertisement campaigns with a new look. Try to find the fear behind them. You will definitely find it because it's always there. The advertisers all know it and make a lot of money from it. Fear is everywhere in our lives but no one taught us to see it as our enemy. For most of us, fear is like an uninvited guest whom we share our homes with, hoping that he will soon pack and leave. But this never happens; instead he invites more members of his family into our homes and they take our space and peace. So far our best reaction is to pretend not to see them, often by using some sleeping pills to make us relax and forget.

I think that the time has come for us to react. We need to open our eyes and have a good look at all of the uninvited guests that have entered our home and force them to leave. This is our space and we will welcome only what we want. It is not easy to get rid of all of our fears immediately but we could make a first step in the right direction. With the time we will make many small steps in the right direction and hopefully we will be able to kick out some of our fears. Buddha, Jesus, Allah and a few more have overcome fear completely. This should not be our goal. Every person should have their own goal about how much fear-free space they need to feel more comfortable. We should start with ourselves. We should not be afraid of accepting ourselves the way we are, fearing that our image will not be accepted by others. Our lives are framed on three sides, creating a triangle; our personal side, our social side and our business side. Inside this triangle we operate. Every entrepreneur is a human being who operates in those three different fields. Each field overlaps the other and has its own rules. Some rules are aligned and some are not. Ideally our triangle should have all of its sides equal but this rarely happens in reality. Each person creates their own triangle depending on their willingness and capabilities. Some people give priority to their business side, reducing proportionally the sides of their private and social life. Others prefer to do it the other way around. Society loves equal-sided triangles and promotes them in every way it can. I tried to take away any kind of guilt from the people who cannot manage to create equal triangles in their lives. Most of us have to move all the time among the zoo of our

private life, to the park of our social life and to the jungle of our business life. I would like to show that there are no good or bad triangles. The triangle of each person has its own beauty and people should not be forced to change the shape of them as long as they are happy.

I have always been interested in different mythologies—Greek, Roman, Scandinavian, Egyptian, Sumerian, Babylonian. I found it interesting how those ancient societies created such myths and the message they were sending to people. For me, mythology can tell us more about societies than history itself. During my long journey in mythology, I have liked different gods in different periods of my life. I can understand now, that my preferences were connected to my philosophy at that time. This philosophy of course kept changing because I was growing up and I was rearranging my priorities in life, and after some time I lost my interest in all of those ancient gods—until recently. I saw one old familiar god from a new angle and it made him appear so modern. I am talking about the Roman god Janus who is the god of beginnings and transitions. He has two faces and he is not ashamed of this. In modern society the word “double-faced” is not intended as a compliment. Modern society loves the linear approach because it is easier to understand and control. Living in this society we have, unconsciously, accepted the idea that being “double-faced” is simply not good. I believe that most of us have not only one face, or even two, but many faces. This happens because our business life, our social life and our personal life are located in different areas. We need to look at them all the time and if we had one face to guard all three areas we would very soon have serious neck problems.

But having more than one face is not accepted by society, so since our social area puts a lot of pressure on us, we prefer to show society the face that we believe is most accepted and cover our other faces as if they did not exist. But our other faces don't like being covered because they want to breathe the same air as our social face and they need our acceptance. If we keep them covered all the time and if we don't take good care of them, they will be angry and their anger will come back to us. And here comes Janus. He shows us that having two faces is wonderful, because we can look in two directions at the same time without feeling ashamed that we are different. We can learn something new. We should not feel bad or guilty having more than one face, and we should dare to accept ourselves even being proud about new possibilities. We are not a multiple personality. Janus has one body but two heads to look in different directions. Being able to have different viewing angles in our life is a huge advantage and it's very human. I wonder for what reason this idea has been outcast in our society. I think that if we believed in myths nowadays, we would change the face of Janus from a two-faced god to a multifaced god. I believe that it is closer to human nature and it will be healthier for all of us to accept it and continue our lives with this idea.



This could be a first step in the right direction: to accept our different faces and dare show them to everyone. By doing this, we will kick out some unpleasant uninvited fear guests from our private space and if we like the extra space, we can move on and kick some more fears out of our lives. The fewer fears we have the more space we will have. Space in our lives is exactly like space in a rainforest. It's rare but the trees who earn more space, manage to survive much longer than others.

### **Try to connect things which seem impossible to connect**

Holy Mount Athos is a peninsula in Northern Greece. It is called a holy mountain because there are 20 monasteries, built during the Byzantine times. No women are allowed to enter the holy mountain because according to the Byzantine tradition this place is dedicated to the Virgin Mary who was on a boat trip, when due to a storm she needed to get to the land. When she saw the beauty of the place she said that this would be "her garden." Monasteries have been built there and it has been called the "Garden of Virgin Mary." The monks decided to respect the Virgin Mary's request and they have dedicated to her the whole of Mount Athos, not allowing any other woman to enter since then. It is a really beautiful place. The monks have resisted science and civilization, and only recently have they allowed electricity to enter their lives. Cars were not allowed until just a few years ago, so transport was either by foot or horse. The monks lived in harmony with nature, using old traditional methods of cultivation, without any fertilizers or modern machinery. The only sounds heard are natural sounds and the only smells you smell are natural.

Being under a lot of pressure, just recently, I decided to go to Mount Athos for four days to take a real break. I needed to go to a beautiful place with no Internet access, no phones, no newspapers and no traffic jams. Mount Athos was the perfect place to be. I asked an old friend who is a monk there to arrange for an invitation and there I was. Being a guest I enjoyed the monks' hospitality but I wanted to do something in return for them. I asked them if they needed any help from my side and they told me that they would be happy if I could assist the person who was looking after the monastery's garden. I did not know they had a garden because it was not visible from the monastery. It was just five minutes' walk from the monastery and I loved it from the moment I saw it. Being a city man, I never have the opportunity to work in a garden. This was something new for me and I got really excited. The garden was big and well organized. On one side there were vegetables and on the other side fruit trees and grapes. In between there were wonderful herbs, such as tarragon, parsley, chamomile, rosemary, dill and lavender. I had never seen so many vegetables in my life gathered together: tomatoes, eggplants, artichokes, green beans, peppers and many others. And the fruit trees were laden with fruit—chestnuts, pomegranates,

quinces, apples, pears, grapes. The shape and appearance of the vegetables and fruits were not as attractive as those that we see in supermarkets but their taste was unbeatable. I tried nearly everything and the taste reminded me of the tastes that fruit had when I was a child. I was thrilled with my work in the garden.

We collected vegetables in the morning, and they were cooked immediately and served for our lunch. I asked the monk responsible for the garden why the taste is so wonderful. He told me that they do not use any chemicals and they grow them naturally. On the second day I noticed that there was a large quantity of vegetables and fruits that had not been collected and was instead left dying on the trees. I asked the monk why such waste was allowed. He told me that they produce more than they can consume. They give a lot to other monasteries and monks who live outside monasteries, but they were still throwing away a lot. The third day I was invited to Mylopotamos. I was thrilled by this invitation. Mylopotamos is a wonderful place on a rock in front of the sea where there is a house and two monks who live there. One of them, Epiphanius, is very famous for two reasons. The first reason is that he has his own vineyard and produces a delicious local wine, which is appreciated by wine consumers all over Greece. The second reason is that Epiphanius is a wonderful cook. He is known throughout Greece and has published a book on holy mountain cookery which has become a best-seller. That night, Epiphanius invited about 20 monks to his house and he said he would cook for them because it was his name day. I accepted the invitation immediately and I could not wait until the time I would taste his famous cooking. The dinner was delicious: salad with fresh vegetable from his garden, and then a wonderful fish in a lemon sauce with organically grown potatoes. The dinner was accompanied by his own wines and it was such a culinary experience, not often seen in a monastery. I was happy to meet Epiphanius. He was a 50-year-old man, happy, positive thinking and an excellent host.

My last day was quiet and I enjoyed gardening and the peace of the place. But my last night was not as quiet as expected. Even though I went to bed early and I was tired, I could not sleep. Many thoughts were entering my mind and refused to leave: delicious fruits, healthy vegetables, organically grown, unplanned production, an excess of valuable products, waste; tasty recipes with organic products. How could all of these be connected in a system which could generate the creation of a new business and bring profit? After several hours of mind-surfing it suddenly all fell into place. I remembered that I had a friend in the frozen food industry. His name is Dimitris T. and he is the manager of Greece's leading company in the frozen food sector. It produces frozen vegetables and herbs, such as green beans, green peas, carrots, onion and parsley. Lately it had launched a new product line with ready-made recipes, such as fish soup, where the consumer needed to add only the water, the oil and the fish to the rest of the frozen ingredients. The

intention was to save time for working people who wanted a nice warm dinner for their families but did not have enough time to prepare it. At that moment I thought about connecting the monasteries with this company. As soon as I could, I called my friend Dimitris and asked him if he would be interested in launching a new line in the market of organic frozen products. He told me that they had recently launched an organic vegetable line and that the reaction had been very good. The main challenge was that they could not get enough certified organic products to buy. It seemed that the demand was greater than the supply. Then I told him my idea about launching a new line with holy mountain organic products. Everybody in Greece knows the holy mountain and they are sure that they grow pure organic products there. He told me that he liked the idea but he needed to discuss it with his marketing department first. Before ending the phone call, I asked him if he knew of Father Epiphanius's cooking abilities and the new book that he had published which was a bestseller. He had, so I asked him if he would be interested in launching a new line of ready-made frozen food with recipes by Epiphanius. He told me that he liked the idea very much and he would need to discuss it with his marketing department.

Just before leaving, I arranged a meeting with Epiphanius and shared my thoughts with him. He was flattered and he told me that he would be happy to start a co-operation with this big Greek company. He would give them his recipes and make sure that they followed them exactly in mass production, and he told me that he would share his profits with me because it was my idea. Then I explained my idea of the monasteries selling their organic products to the deep-frozen product company. Of course the production should be carefully planned and many other details had to be arranged, but the new idea was born. As yet we are looking more deeply into the subject and no decision has been taken. It may work. It may not.

I told you this story because I would like to ask you to have your business antennas on, all of the time. Keep your eyes and ears open. Try to transform information into opportunities, especially in new areas where no one else has been before. We cannot all be Bill Gates. But we could easily transform a four-day holiday in Mount Athos into the possibility of a profitable business if we are looking more carefully where and how to build bridges between supply and demand.

### **Administrating change**

There are many definitions of the term "businessman." What would you answer if someone asked you what a businessman is? Most of us can recognize a businessman when we see one. But when we try to describe one, we see that it is not as easy as it seems. In the *Oxford English Dictionary* a businessman (or businesswoman) is a person who works in commerce, especially at executive level. I looked up "entrepreneur" in the same dictionary.

This is a person who sets up a business or businesses. I looked up the word “business” in the same dictionary.

Business. 1. a person’s regular occupation. 2. work to be done or matters to be attended to. 3. a person’s concern. 4. commercial activity. 5. a commercial organization. 6. informal. A difficult or problematic matter. 7. (the business) informal. An excellent person or thing. 8. actions other than dialogue in a play.

(Stephenson, 2010)

Everything is correct, of course. But is this the idea we have for entrepreneurs or businessmen? Of course there are many definitions. If someone asked me what a businessman is and wanted my very concentrated meaning of this word, I would immediately answer that “a businessman is the administrator of change.”

Someone said that “the only thing which does not change is change itself.” What a wonderful saying and how true. A few centuries ago, Galileo and then Newton came out with the word “inertia.” Inertia in physics is the characteristic feature of bodies to resist any change in their kinetic situation. This means that you either calm or continue to perform smooth linear motion when the component of forces brought to them is zero. Inertia would be fine for us if it happened only to objects, but it seems that this principal applies to people as well. Most of us resist any change in our existing situation. We all have a comfort zone that we move in, and any kind of change which moves us out of our comfort zone is not welcome. Change has never been welcomed in the history of mankind. Due to society’s inertia, change has been fought. Think Jesus and Romans. Think Galileo and the Inquisition. Think Pizzaro and Maya. This happens because change affects the interests of the parties involved. New ideas, new products and new scientific discoveries create a dynamic movement in a balanced environment. This means that it’s creating space for new business opportunities. This space, of course, has been taken from existing companies, which react to the change because they are losing ground, power or profits. It is not only big organizations which resist change. Most individuals do the same. We have been brought up with the idea that if things do not operate the way they are expected to, this is something which is not good. If things remain the same, it’s easier for us to control them. When things change, until we build a new system to control them again, this in-between transition period is a headache for most of us. We must get out of our comfort zone, stretch ourselves, and learn new things and new procedures. Getting out of our comfort zone requires extra energy, and most of us see this as a cost and not as an investment.

Administrating change is natural in all creatures fighting for survival. It was natural to humans thousands of years ago, but then organized society

built high walls between humans and nature. Architecture helped people to survive hot summers and ice-cold winters. Medicine helped people to live longer. Natural selection of the fittest was replaced by organized society protecting its citizens. People moved their trust to society and did not have to be so adaptable to changes in nature. Instead they needed to be adaptable to changes in society if they wanted to survive. Adaptability to societal changes was important but if some people failed, this did not have such a dramatic effect as the failure to adapt to nature's changes. Cities absorbed most of the turbulence of social change, showing a more socialistic face toward its citizens than before. Within society there were other social units, such as the family and unions which absorbed turbulence for family or union members. So, gradually, individuals have lost a great deal of their original adaptability to change. On top of that, people started believing that change was not good for them and here we are. Even the smallest change upsets us or makes us nervous. I believe that at this stage we need to go back some thousands years and rediscover what we have lost: our natural instinct to adapt to change.

Do you know how to boil a living frog? If we put it in hot water, it will jump out immediately. The only way to boil a frog is to put it in lukewarm water and then increase the temperature by one degree per hour. The frog, like most of us, even though it senses the slow change in temperature, does not react because it does not want to get out of its comfort zone. Remaining in its comfort zone it becomes a boiled frog.

## January 1, 2011

The waves of change do not come regularly at the same frequency, height, direction or strength, but they may come from any direction, at any height and strength. Our position toward the wave is suddenly wrong, even though it was perfect for the previous wave. This is what happened to me when I found myself in the wrong position in my textile business. I had set up a good organization in Turkey and everything was working fine. Our clients were happy with our fast fashion project and we were delivering large quantities of the latest fashion garments. The orders kept increasing and everything looked promising for the future, allowing me to buy some time from my regular business to continue my writing, something that I liked very much. Elias Carayannis, on the other hand, kept asking me how many new pages I had written since we last spoke and I felt bad because I wanted to continue with my writing but I noticed something that made me rearrange my priorities again. Very slowly at first but starting to gather pace, the quantity of our incoming orders was decreasing. We looked into it to find

out what had happened. Did we do something wrong? Had the level of our customer service declined? Had our customers found another company in Turkey which offered better services? Had we missed something? I decided to follow some old advice—never assume—and so I asked my clients directly what was happening.

It is easy to ask but not so easy to get the right answer—my clients' answers did not help me to understand what was happening. They told me that there was no problem with my company and that they were very pleased. Their sales figures were lower than expected and this had forced them to change their buying behavior. It was not easy getting these answers because big companies are not willing to share new strategies with suppliers. Even though this would affect the business of their suppliers, they do not think that it's important to inform them in advance. I believe that the main reason is that managers disconnect their personal idea of fairness and political correctness from the company's. I am sure that on a private level they would inform their neighbors in the case of a change of everyday routine. For example, if they were having a party they would inform their neighbors about it and ask for their understanding in case the music was louder than usual. If people are informed in advance then generally their tolerance level increases. But if people are put in an embarrassing situation, usually they react. The same manager who is kind enough to inform his neighbors about the party does not feel the same responsibility to inform his company's suppliers about the "party" that his company is about to give. Usually the suppliers learn about that party when it has started and unfortunately the suppliers are not in the same position as the neighbors. They cannot call the police and complain. They will either stay sleepless until the party is over or they will move to another building or another client who does not make such a noise. Most people disconnect their personal morality from the company's because it is more convenient.

I have pointed this out before but I believe that it is so important that I need to say it again. There should be only one morality, but it seems that in our time nothing can stay solid for a long time, and even morality is allowed to wear different dresses. Graucho Marx said it brilliantly: "those are my principles and if you don't like them I have others as well!"

You should never assume that a person who has a high moral code in his private life will act with the same morality when it comes to business. If you make this assumption and move forward, you will be disappointed more times than you could ever expect. To come back to our story, putting all of the small pieces of information that I had gathered from my clients, I could see a bigger picture. Our fast fashion project had not performed as well as was expected in sales terms. Consumers were not willing to pay the extra money to buy a very fashionable garment produced in Europe. The sales figures of the less fashionable clothes coming from the Far East were providing companies with better profit. So they decided to move more production

to the Far East where their margins were higher and to reduce European production budgets. But of course they had forgotten to inform European suppliers about this critical decision, simply because they did not feel that they needed to. Since their final consumers do not inform them personally about their changes in behavior, why should the big companies inform their suppliers. So our promising Fast Fashion project was proved to have less impact than expected. We were bleeding and an urgent cure was needed. First we needed to replace the blood that we had lost and quickly. We talked with our design department and asked them to be much sharper in their collections, presenting very fashionable, attractive clothes, with special fabrics which would require time to be copied in the Far East. At the same time for our more cutting-edge fashion collection, we discussed with our producers about reducing our margins in order to increase the flow of incoming orders until we came up with a new idea. This new strategy paid back rather quickly, but the profit margins of the whole supply chain were too small to keep everyone happy. We urgently needed something else which would take us out of the uphill struggle of low margins. Of course, this is easier said than done again. What else could we do? We had tried to compete with Far East low prices, with more fashion, shorter lead times and lower profit margins. We had managed to build a wave breaker and to stop some waves, but we were not prepared for a tsunami. Even if we built higher wave breakers, this could not hold back the biggest waves. We needed to move from our position to another, where the tsunami waves could not reach us.

But how much can anyone do with clothes? How can anyone create new niches in an oversaturated market, constantly changing, without an easily predictable direction? Everything seemed blocked. We had meeting after meeting trying to find a way out, a new idea, something that would give us an edge against the Far East. What were people interested in nowadays? What was important to them now which was not important five years ago? Has this need been recognized by the big retailers? Has this need been calculated and included in their strategy? Someone in a meeting said: "What about the environment?" Another replied: "Great idea! What about making clothes which will prevent the ice melting at the poles?"

Everybody laughed but I thought of Mahatma Gandhi answering the question "What do you think of Western civilization?" with his answer: "I think it would be a good idea!" It could have been a good idea. That's what I thought and I wished it could be done. The fashion industry had approached the environmental challenge in the past, offering consumers clothes made with organic cotton. This meant that the whole procedure of growing, collecting, spinning, dyeing, knitting and garment-making was done in an environmentally friendly way. No fertilizers and chemicals were used during the whole production process. Water recycling was necessary and there was a strong code of conduct regarding the human rights of workers and their working conditions. It sounded like a good project but

there were some obstacles of course. Firstly the price of organic cotton was more expensive than the non-organic version. The whole procedure together with the code of conduct increased the final price of the products by about 20 times the price of non-organic cotton.

At the same time, the restrictions in the use of chemicals limited the possibilities of many colors in such garments. At the start, all garments were their natural off-white color and not dyed. No prints could be used until later when organic pigments were produced. After a while more colors were added, such as indigo and brown, but the whole color palette was extremely limited compared with the palette of non-organic cotton. When the first organic collections were launched, there was a positive reaction from consumers because it was trendy and fun. But soon consumers did not follow the retailers because they did not want to spend extra money on a T-shirt which could be worn for a maximum of one season. The collections looked boring with few colors and prints, and soon the whole project had been buried. For a few years the word "organic" was taboo in the textile world. But the environmental issue had started to return to the clothes retailing industry from a new angle. Organic was out but recycled was in. People in Europe and the United States were more familiar now with the idea of recycling. They were recycling glass bottles, aluminum tins, paper and garbage. It did not cost anything and gave them a nice feeling of doing something good. So some clothing companies wanting to improve their image in the eyes of environmentally sensitive customers produced clothes from recycled materials. Those materials included cotton, polyester and viscose. These materials could cover a range of clothes and would have many advantages over the old organic approach. The recycled cotton yarn was produced either from old clothes or from remnants after cutting the fabric. Previously remnants were thrown out as waste, but now they were recycled and used to make a new material. The disadvantage was that the waste is from already-dyed fabric, so they needed to separate the recycled yarns by color. This meant that companies needed to choose colors from an existing color palette of recycled yarn producers. So if they want to use an orange color in recycled yarn, they need to make sure first that this color is available in the market. If they are lucky they can proceed. If not they need to compromise with a similar available color. The second disadvantage is that recycled cotton yarn is very short. This is not good for the industry. The longer the cotton fiber, the better. It has better pilling results and is more sustainable. T-shirts produced with 100% recycled cotton would be difficult to produce because the fiber breaks easily during the knitting procedure. The surface of the fabric would be rougher than normal and it would not last for as many wash cycles as a T-shirt produced with non-recycled cotton. To make it more commercial, recycled cotton needs to be mixed with non-recycled cotton at a percentage of 50%. By adding 50% of non-recycled cotton, the fiber becomes stronger and could be more easily knitted, and the quality of the fabric is



improved significantly. The price would be workable now, and a new product could be launched in the market. But the recycled system needed to be approved by an international organization which would set up the rules and the routines of production for recycled clothes. This organization was set up and every company which wanted to produce recycled garments needed to obtain certification from the organization.

We decided to go for it. We had several meetings with our suppliers and explained to them that we needed to move to a new and less-competitive area—clothes produced from recycled yarns. The production companies needed to be stretched again into unknown territory, trying to survive until the launch of our new project. The most difficult part was adapting to the new routines of recycled yarn procedures which were set up by the international organization. Besides that, production companies needed to be linked with other companies which were producing recycled yarn, transporting, storing, knitting and dying. All of those individual companies needed to be certified by the international organization too. On top of that, the organization set up rules for the cooperation of all of the above companies. My company needed to be certified as well, as the coordinator of all of the production companies. This procedure took time and money but finally it was complete. Before offering this project to our clients, we needed to secure our sources in case demand was big. We did not want to offer recycled clothes to our customers before securing a sufficient supply for the quantities that they might need. We were entering a risky area of discussion with companies which produced recycled cotton, other companies which produced recycled polyester and other companies which produced recycled viscose. We needed to know how much stock they had in recycled yarns, which were their bigger clients and if there was a pattern in their demand—for example, if they were selling more recycled yarns during the spring/summer period than in winter. We needed to know if they ran out of stock, how much time we would need to get the quantities we required. We discussed the possibility of price fluctuation during the same season. Then we needed to sit down with the whole supply chain, put all of the information together and create a system. This is crucial when you deal with big companies. If we were to present a project to our large clients without a system, it would have been a definite failure.

Just imagine us presenting our garments made from recycled yarns and our production organization with all of the necessary certificates. This is the easy part. The more difficult part is to persuade large companies that you are able to support their needs in any possible scenario. They asked many questions; if we could guarantee continuous flow of the merchandize whenever they needed it; if we could guarantee prices for at least one season; if we would guarantee that our delivery times will be kept; and if we could guarantee that production standards would be met all the time. They know exactly what they want. I advise anyone who is introducing a new project to a client to

be very careful during the presentation. You should think only from your client's point of view: what needs do they have and, even before they ask you all of the above questions, you should present both the questions and the answers. Your client will be happy to see that you have done your job and part of his job as well, trying to secure the whole system.

If the new product or service you are offering has gaps which you have not been able to fill, do not wait for these gaps to be found by your client; be brave enough to present them to them. Tell them directly about the weak points of your product or service. They will appreciate much more your directness and openness, and the strength of your position. Asking for their opinion and advice about how those weaknesses can be addressed, you are in the right place for solid cooperation. Don't forget that by doing this you are making a big deposit in your credibility account with that particular client. They are not used to this kind of sales technique and may not have developed a response to it. Sometimes I used to invent weaknesses which were not real. When the person heard me doubting my project due to such imaginary weaknesses, he supported my project by trying to persuade me that my doubts were excessive.

After creating a solid system for recycled-yarn clothes, we presented it to our biggest clients. We tried to cover everything. First we talked about selling the project as if we were employees of their company and we were only interested in their prospects. We told them that following their sales figures, we had noticed that they had dropped from two-digit numbers to single digits. Their margins had dropped as well and the competition required more blood. We told them that we had noticed their interest in the environment and we believed that this interested added value to the image of the company. We told them that we could support their environmental campaign by being able to produce garments from recycled yarns. We informed them that we were aware that the organic approach some years ago did not have the expected results but we believed that the new recycled approach would be more successful because people were much more involved now in the recycling process. There was also much more awareness now about climate change and the environment. Then we presented the whole supply chain, yarn suppliers together with our contracts, forwarders, knitting factories, dyeing factories, printing factories and manufacturers. After this presentation we discussed prices, which we would keep the same for the whole season. We discussed the lead times of our products and offered the gift of non-commitment. This meant that they were not forced to prebook with us by being committed to a certain quantity per season. In a few words, we made sure that the client could make an easy decision, because we had prepared everything covering their needs, without forcing them to take any risks. And this was the secret of the success.

We needed to take risks ourselves to force the client think "Why not?" Even if the project was not a success, the client had nothing to lose.

And most of our clients replied positively. The rest did not reject our project. They liked it but they were not ready to launch it due to other priorities. They asked for all of the information and promised to come back to us when they were ready. We informed them that their competitors had already bought it from us, and this made our project appeal to them even more. It's human psychology that when our bigger competitor buys something, it's easier for us to want to buy it too.

I would like to point out at this stage that your presentation should not only be focused on your product or service. This is the mistake that most salespeople make. It is important that you show your client that your approach is managerial. You should prove that you know their battlefield and not just your own. Your project should offer more weapons to win the battle against their competitors. This is why you need to approach everything from a so-called "helicopter view," showing that you have studied their company, you know their mission, you know their strategy and you are offering something to help them reach their goals. Of course there is inertia in every big company: the bigger the company, the bigger the inertia. But meetings must be made from their side; priorities need to be rearranged; new campaigns need to be executed, because this new project needs to be marketed well. You need to know that when you introduce a new product or service you will need to wait. Do not get disappointed if your clients do not react quickly to your fabulous project.

Finally, after five months, we received the first order from our biggest client. It was a big order and it informed us that it was interested in making it bigger. It had prepared a big campaign introducing recycled yarn garments and most of its departments were interested in going ahead. At this stage the Far East was not even in the race because it did not have the knowledge or the interest in recycled garments. It was so booked up with normal orders and there was no need at that moment for it to stretch to create a recycled yarn process. But this was not the only reason I stopped writing this chapter. The whole recycled procedure took me approximately eight months, but at the same time I have learned that no one needs to relax for a long time after a successful project. I have done this several times before in my business life and I did not want to make this mistake again. I knew by now that sooner or later our new project would be attacked by others. If the project was successful then I knew that our clients would want to increase their margins and they would turn to the Far East. They would be willing to transfer all of the knowledge there and they had the power to force their suppliers to follow. To begin with they would place small trial orders there, while working with us, and if the Far East could achieve what was required, then more orders would be placed there and fewer orders would be placed with us until finally everything went to the Far East.

When will this end? Isn't there any rest in the word of business? What am I doing wrong? Why couldn't I come up with a Facebook idea and relax

for the rest of my life? This kind of thought often comes to mind but thank goodness only for a while. What could we do that did not exist in the market that no one else has thought of, that will attract the attention of big clothing companies and will be difficult for the Far East to follow suit. Days, weeks, months went by without any ideas. We thought that everything was already done and we could not see an opportunity for a breakthrough. Even though it was at the top of our agenda, it started to fade because we could not move toward anything new. It was always in the back of our minds, but as time went by it went further back. Months after, I had a lunch with a good friend, Sema, in Istanbul. We were working on a project and we needed to arrange our next steps. We were enjoying a delicious Turkish meze when her sister, Sifa, who I had not met before, unexpectedly joined us. I believe that in Europe or the United States, first of all no sister or brother would pass for an unplanned visit, but even if they did they would not think to join a business lunch just to socialize. We stopped talking about business and turned to talk of family issues. This seemed so normal there. If this had happened in Sweden, for example, I would have been extremely surprised and maybe a bit annoyed, but in Istanbul it seemed the right thing to do. We had a lovely lunch and I started asking Sifa about herself and her business. She told me about her partnership operating in the hygiene business selling antibacterial coatings. She explained that a Turkish chemist had patented an invention for a coating which transforms the treated area to an antibacterial surface for five years. They were selling to convention centers, hospitals, schools and the food industry successfully. She told me that even though the product was not cheap, more and more companies were interested in buying the antibacterial coating because hygiene was becoming more important to people after the outbreak of new diseases, such as bird flu. We talked about many other different things and then we separated, rearranging another meeting with Sema because, due to Sifa's arrival, we had not been able to complete our agenda. A few days later, while I was dealing with something else, a thought came to my mind out of nowhere and I called Sifa. I asked her if she could arrange a meeting with the Turkish chemist because I would like to meet him and ask him a few questions. This in other countries might be more difficult because everyone is too busy to deal with meetings without any specific reason, but in Turkey this was easy. She called the chemist and I had a meeting with him in two days. She did not even ask me what I had in mind. I asked her to join the meeting and she agreed. A strange idea had been fixed in my mind for some days now. If this chemist could make antibacterial coatings, was there potential to make antibacterial clothes? Heightened awareness of the many viruses infecting us recently had made people very sensitive and extra careful about their hygiene. Many new products had been launched in the market, including antibacterial hand gels, powders, soaps and detergents. I thought that maybe we should look into this area in the clothing industry.

I googled antibacterial clothes and found that they existed in the market in two main areas. One was the high-end market, where you obtain an antibacterial shirt for the price of \$10,000. The other area was for premature babies which needed extra protection and so parents were willing to pay the extra cost to secure the health of their baby. My idea was not a breakthrough because it was already there. The only difference was that I wanted to apply this idea to the retail business. We needed to thoroughly research the procedures to find out if it was commercially possible. Before the meeting I was very excited, hoping that what I was asking for was possible and I could already see potential success and a lot of money. The chemist was a pleasant man and very good in his area. He loved his job and he was deeply involved in hygiene chemistry. I explained my thoughts and asked him if it was possible. He came straight to the point. It was possible but besides himself we would definitely need a manufacturer that was able to apply the chemical methods to clothes. For me and my clients it was important that this procedure was not done with chemicals, because of their strict environmental policy. He reassured me that the procedure was not chemical but used silver ions, and he was optimistic that big retailers would go for it. I needed to put my toe into the water before jumping completely in. I contacted a manager in a big Swedish retail company and explained my idea, wanting to hear if she thought that it would interest them. She knew their strategy and I wanted to save time and money in case this was not a priority for her company at present. She listened carefully and told me to go ahead thinking that we could make a full presentation about antibacterial clothes to her management team. With the first light on green, I quickly needed to organize the whole production line and see the strengths and weaknesses of the whole system. We had four big challenges in front of us:

- proving that our clothes were antibacterial;
- determining how many washes could be done before our clothes lost their antibacterial properties;
- determining whether antibacterial garment production could be sustainable;
- calculating whether we could offer our new products at an attractive price for big retailers.

The answers were as follows.

- We selected a well-known independent chemical laboratory to conduct the tests and provide the results.

- We needed to balance the longevity of the antibacterial effect with the price. It was decided that 50 washes was enough, taking into consideration that nowadays people change their wardrobe more often than they used to.
- We contacted one of the best and biggest garment manufacturers in Turkey, headed by a charismatic man with a clear vision and open to innovation. When I explained my idea, he told me that he was already into trials of antibacterial garments with Nike so his R&D department was already working on it. Firstly I was a bit disappointed that someone else was ahead of me, but on second thoughts I was reassured that I was moving in the same direction as Nike. Nonetheless, my contact liked the idea of antibacterial clothes in the retail industry and he put me in touch directly with his R&D manager. We went through the whole production process, carrying out many tests and finally reaching the conclusion that it could be done.
- Price was our biggest challenge. This extra procedure would increase the cost of production but we needed to find a way to absorb this extra cost. My idea was to sell the antibacterial garments to big retailers at the same price as they were used to buying normal garments from Turkey without squeezing our margins. It seemed like a “mission impossible” when someone suggested that we move the production line to another country where our costs would be less. Our target groups for antibacterial clothes were underwear, socks, t-shirts, pajamas, swimwear and sportswear. These products were not so fashion orientated and we could allow extra weeks for production in a cheaper country. We were lucky because my contact already had a big production unit in Egypt where operational costs were lower than in Turkey. He gave us some capacity at this huge Egyptian factory for antibacterial clothes, which would help to improve our margins.

We were ready for the presentation to our Swedish client. This company has a department in Stockholm which examines all new projects. It is a team of specialists who have a strong sense of what can work commercially and how much their company can benefit from the project. This was the biggest and only obstacle to our target. If we could get its approval then it was time for us to open the bottle of champagne. We needed to make an excellent presentation to this department and it needed to be perfectly balanced. It listened to us carefully, asked many questions during our presentation and promised to get back to us in two weeks. It did exactly as it promised. Two weeks later we received their answer. We did not get the green light. The department's concern about the environment was much greater than we had expected. It did not want to pollute water with silver ions which would be removed from the clothes during washing. It was nice to see that the company was so committed to its principles. So we did not succeed. The bitter taste of failure

was strong but that is life and that is business. We will definitely not succeed in all of our attempts. Someone said that “the biggest failure in life is the failure to try,” and I agree. Even though we did not succeed, we all felt that our minds were working in the right direction. And if the mentality is right, then success will definitely come even after several failures.

We have left our antibacterial clothes project. Even though there are many more clients who might accept it, because they do not have such a strict environmental policy, we don’t want to launch it. If our products are not good for the environment, we need to take a brave decision. And we are proud about our decision. Thank God that we are in a position to be able to afford this kind of decision.

### **Is cheating bad?**

This might sound like a stupid question to which most of us will reply “Yes.” In most societies, cheating is considered to be unethical, and people are told especially from childhood that they should not cheat. Why does society consider cheating to be something bad? Whenever I am not sure about something being good or bad I turn to nature. Nature is the mastermind of survival. It has billions of years of experience and knows better than anyone about the art of survival. Watching documentaries, I have noticed that deceiving and cheating in nature is not considered unethical or even bad. There are birds which throw eggs from another bird’s nest and replace them with their own, cheating the nest owner into hatching someone else’s eggs. Infidelity is not considered a crime in the bird world, but it has to be kept within their own species. There are other birds which simply add their own eggs on top of the existing eggs in another bird’s nest.

Nature has a completely different approach to cheating and deceiving than do humans. Who is right and who is wrong? It’s a difficult question which touches many areas and I don’t want to answer it. I will leave the answer to you. Have I been deceptive in business? Yes I have many times. If I were not afraid of being exposed I would tell many stories where I deceived, but for the time being I will divulge only the most innocent example. In 1989 I was trying to enter a Dutch clothing company. It was a medium-size company with a 10% market share of the Dutch market and it was expanding to the neighboring countries of Belgium, France, Switzerland and Germany. A buyer I knew from another company had a good contact in the men’s division and she was willing to help me by putting me in touch with this man. An appointment was set up and I thought at that time that this would be an easy job for me. But things rarely work in the way we expect them to. There were more people in the meeting besides him. Of course, no one told me in advance about that, to make the necessary arrangements. I was introduced to the production manager and the head designer of the department. After my presentation about how good my

company was, the value we could add compared with other textile agents, the large companies that we work with and a demonstration of our collection, I was sure that the client would be a piece of. My self-esteem was high but I was too confident—something that decision-makers don't particularly like. The decision-maker at that time was the product manager. I did not know that and I was referring mostly to the division manager. It seems that neither the product manager nor the head designer liked my obvious preference and I was thanked for my presentation and told that the company was covered in terms of suppliers and agents, and that they had a waiting list anyway. They said that they would keep my contact details and contact me in the future if needed. That was a big wall that I crashed into and since I did not expect this kind of answer, I could not hide the surprise from my face. At that time, money was playing a critical role in choosing a supplier and due to the oversupply of such suppliers, some of them offered commission back to the decision-makers for orders placed with them. Trust was the cornerstone of this procedure and unless the supplier made a huge mistake in production, they were usually covered by the product managers because they were earning huge amounts of black money. I don't know if this was the case with this particular product manager but every time I failed to enter a company, this thought was like a balsam on my wounded pride. I left the company bitterly disappointed and hoping to find another way in, as I had several times in the past. I found out the hard way that the decision-maker was the product manager, but I knew that decisions could change if product managers were pressured from other departments, particularly the buying department or the design department.

At that time designers started to gain more ground in a company's decision-making process because the big retailers realized that a fashionable concept paid back much better than old-fashioned concepts. Designers from many respectable retailers were visiting global trend fairs to keep up with the trends when it came to new fabrics, colours and shapes. *Premiere Vision* was the jewel in the crown at those fairs and it was always packed with designers from all over the world. At that time it was not common for textile agents to attend these fairs because agents were mostly involved with the production of clothes that companies wanted. My good friend Liselotte who knew the textile world well and had worked with companies such as Tommy Hilfinger, Hugo Boss and Esprit advised me to start visiting the fairs. She thought that it would be a good idea to know the direction that fashion was moving in and be prepared to cover future demand, especially in fabrics. So I asked her to take me with her to the next fair. Her plans were to visit a fair in London at Earl's Court. It was a new world for me. I saw the strangest of outfits from the world's best designers and I was trying to understand what they were doing. There were many long tables with small swatches of fabrics developed by textile companies. Everyone was squeezed in front of those tables, touching the small swatches of fabric and becoming ecstatic. There were huge wall panels



displaying the next season's colours. I was surprised that the designers were so interested in colours since the huge majority of them were wearing black. I told Liselotte that I felt like a fish out of water and I asked if we could break for coffee. Over coffee she tried to show me how the system worked. I could benefit from this knowledge by contacting designers in the future, in parallel with product managers, to demonstrate that we follow trends and know the rules of the game. While talking I noticed a lady who was passing the café. She had tied her sweater on to the long handle of her hand bag but the sweater slipped down and it was lying on the floor, sweeping the floor as the designer moved with grace. I told Liselotte that I should inform the lady about the accident but she held me back saying "Don't you dare. How do you know that this is not a new style?" And she was right. I did not know and I am still wondering even now.

After my first experience at the fair, Liselotte insisted that I should visit *Premiere Vision* in Paris, which was the Mecca of fairs. I planned my trip there and this time it was easier because I knew the rules of the game. I did exactly as we did in London but I could not get the ecstatic feeling that the designers did when touching the small fabric swatches. I did not want to look different so I pretended to be ecstatic for the first time in my life, receiving the approval of other designers as if I was one of them. While doing this I spotted a lady who looked familiar, but I could not remember where I had met her. She was so absorbed in the small fabric swatches to notice that I was staring at her. I wracked my brains and suddenly remembered that she was the head designer of the Dutch company that I had visited some months ago and who had shown me the exit door. My first thought was to go and talk to her again, showing her that I was attending this fair and was part of the game, but a bad feeling inside stopped me. I hid behind a group of Japanese designers and decided to follow her secretly. This would be a good opportunity to see how designers operate at a fair and get some knowledge too. So I became her shadow for the whole day. I followed her to every stand she visited and kept notes about the stands. When she was choosing the colours for the next season, I was just behind her looking at her notes and copying them. She had only a small break for lunch and at closing time I was so tired, but very happy because I thought that I had done something important. At that moment I did not know what to do with the information but I was sure that I would come up with a great suggestion soon. The morning after, I had a long and big breakfast trying to compensate for the torture of the sandwich lunch the previous day and a little devil appeared in the corner of my mind. I knew exactly what I was going to do today.

I went to the fair again and visited the stands that the Dutch designer had visited the previous day, presenting myself as her production coordinator (I did not mention my nationality, in case my conspiracy was revealed in the future by some random factor). I told them that she wanted me to have

all of the fabrics that she had chosen to make our final decision about which fabrics we would buy from them at the beginning of the next season. When they heard that we intended to buy from them, they were more than happy to open the file of the designer to show me exactly what she had ordered from them. Usually when someone orders new fabric swatches from the fabric developers, it takes time and occurs once the fair is over. They need to organize all of the swatches which have been ordered by potential future clients and since there is no urgency because it's for the next season, they don't rush. I told every stand that our production meeting was the beginning of next week and it would be very helpful if I could take the swatches that the designer ordered, instead of waiting until I received them by post in a couple of weeks. Timing helped a lot because it was the last day of the fair and attendance had dropped, so I finally got all of the fabric swatches that the designer had chosen for her next collection. I had copied all of the colours that she chose as well, and just two days after the fair I couriered her a big envelope with everything I had got from Premiere Vision. I sent her most of the swatches that she had picked; I was tempted to send her everything she chose but I thought that it would be too good to be true. I even enclosed the colours that she had picked as my suggestions for the next season. I explained in my letter that having visited Premiere Vision as usual together with our designers, we thought that the enclosed fabric swatches would fit her new collection.

You can imagine her reaction. She called me immediately after receiving the parcel and could not hide her surprise at the accuracy of our designers thoughts about her future direction. She had not even received the swatches she had ordered but had received ours just two days after the fair. She asked how we had managed this miracle. The impact of this was so strong on the designer that she really wanted to work with someone who was on the same wavelength as her when it came to fashion. Designers are usually overloaded with work and they don't have much time to explain to their team the details of their collection. The ideal situation for them is to find someone who understands what they want without losing any time. This was perfect for her. She told me clearly that she would like to work with us on the developments for next season. She knew that the production manager had refused us previously but now she had some new crucial information—our fashion knowledge—and this gave us a competitive advantage over the company's old suppliers. She promised to discuss it with her management team and come back to me. A week later I received an invitation to visit the company in Amsterdam to talk about business. The gate was open. Did I cheat in business? As you can see, I did. Did I harm anyone? I don't know. What I know is that we worked with this company for more than 20 years and we both made a lot of money. Is cheating bad? Who can say for sure?

## **Thank God, we have bad news!**

Napoleon Bonaparte said: "Never awake me when you have good news to announce, because with good news nothing presses; but when you have bad news, arouse me immediately, for then there is not an instant to be lost." What is bad news? The dictionary defines it as "an unpleasant or undesirable person or thing." Most of us would agree with this definition but let's start digging a bit to see how correct it is and if it can be applied to business. No one likes to hear bad news because it means that something has gone out of our control and requires our energy, time and probably money to bring it back to what we think is normal. A problem is a normal situation with increased cost. This is a more positive approach to the problem and the bad news. How does nature handle bad news? I can think of a simple example: fever and pain. No one wants to get a fever, especially on their wedding day, on the day of an important meeting or during a vacation. Fever and pain are nature's way of telling us quickly that something is wrong with our system. At an early stage it sends us warning signals that need our attention. But we don't always translate this information correctly if we are upset that we are getting a fever because we will not be able to perform as we expected. If we neglect the first warnings and continue as if nothing is wrong, nature will send us stronger signals: either the fever will get higher or we will have minor aches. If we neglect the second warnings then they get stronger, and if we do not react, mother nature gets really cross and punishes us severely with a kidney failure, an ulcer or even harder with a heart attack, for example.

Let's look back again. Nature is like a good neighbor who informs us at an early stage that our pipe is leaking in the back yard. Should we be angry with the neighbor who gives us this information? On the contrary, we should thank them and try to fix the damage as quickly as possible. Nature is kinder than our neighbor because even if we neglect the first warnings, she is not too proud to send us more signs that we should check our system. Most neighbors wouldn't come to tell us about our pipe again. Usually our next step in the case of a fever is to try to fight it as quickly as we can. Instead of fighting the cause, we attack the result of it—the fever—and take painkillers, hoping that the fever will go. The wise person, as soon as they get fever or pain, will visit a doctor who will make the right diagnosis and prescribe medication. If the doctor is correct, the illness will soon pass. We might receive this kind of warning in our social or business life. At first it comes as a soft warning and if we neglect it there are further signals trying to alert us to what is going to happen. Even at this stage we could correct the damage, but we usually learn about it when it is too late. Why is this? It is a bit complicated. First, making mistakes in a company is not rewarded with a salary increase. The boss doesn't tend to talk about their own mistakes, sending the message to the rest of the organization that mistakes are not allowed.

If someone makes a mistake they will try to hide it as quickly as possible, before someone discovers it. Most of the time, trying to hide or correct it yourself makes things worse, and if the problem becomes bigger then it will be more expensive for the company to resolve. The impact and the consequences grow and the person loses a lot of credibility. Usually good news travels at the speed of light in a company while bad news is the opposite.

I learned the following from a good friend who changed the rules within his company with remarkable results. He was the owner and the boss of a medium-size company, but he shared his mistakes with his employees. He discussed his mistakes at meetings, very casually as if it was something quite normal. He was clever enough to tell his employees that mistakes are not only allowed but welcome because it shows that people are working. He was willing to accept hundreds of new mistakes every day by his employees, but he made it crystal clear that if a person made the same mistake twice, they did not even need to meet with the boss and explain. They could go straight to the accounting office and get their compensation, because this person was immediately fired. With this strategy, people were not afraid to make mistakes thinking that they would be punished. They were trying to find new ways of operating, and they did not feel guilty if something went wrong. They informed their boss immediately, knowing that their honesty would be appreciated and the boss had at a very early stage an overview of the problem. After solving the problem with the assistance of his employees, they passed this information to the rest of the staff on their Monday meetings, so it would not happen again. Making mistakes was accepted but repetition of mistakes was punished severely by firing the person who did it, regardless of whether that person was a cleaner or a manager. All of the staff loved the new rules and they found them fair. People who were fired never complained about the company but they blamed themselves for their poor performance.

My friend started seeing results very quickly. His company was operating smoothly, employees were experimenting in new ways and he was aware immediately of any problems. He was so pleased that he extended the “bad news strategy” in areas beyond the everyday work of his employees. He informed his employees that “bringing bad news” would be taken into consideration in their salary increase. The more bad news they brought to the company, the better increase they would get. Bad news could come from many different areas, such as customer satisfaction, distribution problems, competitor’s success—anything. He welcomed all bad news and the worse it was the better. He started receiving information that would otherwise have been hidden from him and the whole network worked perfectly. He was able to discover most fires at an early stage, when firefighting was not a mammoth task, and he kept his company healthy because he treated it like a living organism. When the company had a fever or pain, he knew immediately, and since he was a good doctor, he gave the right medicine and the company thrived. I congratulated him for sharing this new approach and

I tried it in my company. It worked miracles. Something so simple. Why had I not heard of it or read about it before? How come people are still ashamed about their business mistakes? Why don't clever managers create a "mistake-friendly environment" in their companies to make things easier for everyone and make the company healthier?

Several months after following his advice, I met and thanked him again. Then he told me that he was so pleased with this strategy that he had pushed it even further. I could not imagine how it could be pushed further and he told me something so unique that it took me days to understand and admire his guts. He extended this strategy to his clients. He realized that he needed an accurate thermometer to measure the temperature of his company. He frequently tried to get customer feedback about the performance of his company and mostly received the same answer: "everything is fine." He believed this, assuming that they were telling the truth, until two big clients moved to a competitor. He could not understand it. It seems that his "welcoming bad news" policy was lacking somewhere and no one had understood anything until the clients left and it was too late. He viewed his company like a house built of Lego bricks. Having lost clients, he realized that the house that he had built was not comfortable enough for them. The problem was that the clients had not informed him about their dissatisfaction at an early enough stage to enable him to take the necessary action. If he could have this information from clients as soon as he was underperforming, this would be the key to taking action early enough. So he removed all of the Lego bricks and started rearranging them in a way that the new house would be comfortable for his clients while wondering how he could receive information about underperformance in a timely manner. He could not call his clients every day asking about performance. People are busy and don't have time for feedback, assuming that it's not their business to correct their suppliers. It is up to their suppliers to find a system for keeping their performance high. Clients should feel dissatisfaction only when the value for money offered from their supplier is less than expected. When clients place an order with us, they buy from us at a price which they think is fair in terms of the value of what they receive. If the value is less, the client is not satisfied. If the value is more than expected, then customer satisfaction increases. If the value is exactly as expected, the client is satisfied and keeps placing orders with us. My friend was wondering how he could obtain a quick response from his clients regarding the value for money of products that he had delivered to them. He came up with the following breakthrough. Even if they had agreed a price before the order was placed, when my friend delivered the products, he wrote on the invoice that the client was free to pay as much as he thought the products were worth. This was crazy—offering your client the possibility to take the goods and not pay at all. It was a high-risk area but he was sending a brand-new message to his clients. The new message was that "I am open and transparent to you, I am not focused only on profits, but I care

for you and your company, offering a new way of partnership rather than a supplier's."

The results were astonishing. There was never a case in which his clients did not pay the invoice. Buyers and managers were so pleasantly surprised by this breakthrough attitude that they increased the amount of orders with my friend because the right mentality was there, and in business it is this mentality which plays the most important role. When some of his deliveries were not up to standard, the client paid less and informing my friend of the reason. In this way he received immediate feedback on any weaknesses in his production system and he could fix them quickly. Even though you might wonder if he lost profit by receiving less money than expected from his clients, the opposite was happening. In effect he was paying an insurance premium to secure his future business for sudden and unexpected changes. Maybe we should reconsider the true value of bad news and try to welcome it as a good friend who really cares about us. We should create a system for receiving bad news quickly because as Colin Powell (US Secretary of State) said: "Bad news isn't wine. It does not improve with age."

### **The "tricky" orange story: Birds, milk and information flow**

The documentary absorbed me immediately: it was about information flow in the animal world. The program started by showing some pictures of birds which were drinking milk from milk bottles on doorsteps of houses in London just before World War II. The presenter informed us that until the war there were mainly two kinds of bird observed in London enjoying milk from bottles just after the milkmen had delivered them. This was a daily routine for the two species and the numbers were expanding since they were not competing with each other because there were plenty of bottles in the big city. But then something changed. After World War II, Londoners needed to rebuild London and the birds needed to rebuild the knowledge that they had about their milky breakfast because a new invention broke through in the form of an aluminium foil cover on the bottles. This little thing was a dramatic shift for the birds because now, drinking the milk directly from the bottle was not as easy as it was before. After a while, scientists noticed that the population of one species of bird decreased significantly while the population of the second species remained unchanged. Scientists were curious as to why and started observing the two species more closely. They were shocked by the findings. When the two species faced the change to aluminium covers, some of them gave up easily as soon as they realized that something shiny was blocking them from their breakfast. Others tried harder and were able to break the aluminium top with their beaks and enjoy the milk that they might have missed for a couple of days. Most of the birds in the first species did not manage to find the solution and their numbers declined, but the second species managed to solve the problem. Like their

counterparts in the first species, some of the birds managed to drink milk by trying harder and breaking the aluminium top with their beaks. The difference with the second species was that the information about the new way of drinking milk was passed to all of the birds in the species. Scientists did not know exactly how this happened, but they could see that all birds in the second species were able to break the aluminium cover while only a few of the first species could. The birds in the first species either could not pass on their knowledge or they did not want to. The results were that the population of the first species decreased dramatically while the population of the second species remained stable. Isn't it amazing? Two similar groups of living organisms faced the same challenge. They both had the solution but only one group survived simply because they passed the accumulated knowledge to others.

Exactly the same thing happens in private and business life. The life or death of a person or a company could depend simply on the flow of the right information. But how do we get access to the right information? The solution came to me suddenly in the middle of a concert. Someone said: "For the good things to happen, it takes time: the great things happen quickly." I saw that what we needed was the right communication. How do we communicate with each other correctly? I did not know the answer, even though I had read several books about the importance of the right communication. I was so impressed by the birds and milk incident that I needed to find a way to make sure that communication between members of my team was good so that information flowed quickly and correctly within the company. I intended to educate my people with a seminar about communication and I started visiting different companies which organized such seminars to find out if they had what I was looking for. They were all happy to meet me and "Yes" they had done many successful seminars about communication before with companies much bigger than mine, "Yes" the communication within my company would be improved and transform to better performance, and "Yes" this would result in more orders from our customers and I would soon become richer than Bill Gates. I asked them to show me a draft of what the seminar would entail. I had 50 people in my company and because I wanted an intensive course, the seminar would be held over two days. It was good money for the companies providing seminars and since there were not too many companies in my city paying for such seminars, they were all very interested in getting the job.

After a few days I met with them again and was shown nice presentations about good and bad communication, hoping that this would be exactly what I wanted. But this was not what I wanted, and since no one had asked me what I wanted from the seminar, I listened to everyone and would make my decision after all of the presentations. However, most of the presentations were not "sexy." I wanted something different for my people. I wanted something that they would remember and apply in their everyday business

lives. I was in luck. A young manager from a newly established company offered me exactly what I wanted. He told me that instead of boring the attendees with charts, diagrams and words of wise men about communication or success stories, we should make the seminar fun for everyone. We would play games where everybody would learn the benefits of the right communication and the high cost of miscommunication. I wanted to hear more about the kind of games he had in mind and he was more than happy to provide details of a couple of games, explaining the messages hidden within. We fixed the seminar weekend and everybody was happy except for my employees, who thought that they would be wasting their weekend in another boring seminar about how to make their boss richer. On Saturday morning they were all surprised because the room was not arranged with desks, projectors, paper and pens as they were expecting. The room was arranged like a huge living room, with sofas, comfortable armchairs, flowers, carpets, paintings on the walls and a nice bar. It looked more like a reception than a seminar. As the first wrinkles of disappointment left their faces, they sat comfortably, took their coffee, tea or vodka, and waited curiously for the next move.

And it started. Alex, the guy who was the head of the seminar team, announced: "We are going to play games today." He created three teams from the 17 people. He explained that in the first game only two teams would compete, while the third team would act as judge. He asked team number 1 to leave the room and then addressed team number 2, telling them as follows. "Each one of you is the world's richest person. You have a great life, you enjoy anything you want. Recently you found out that you suffer from a very serious disease, which unfortunately is not curable and you are going to die in 20 minutes from now. But there is some good news. This morning a famous scientist who has created a special orange arrived at this hotel. If you can drink the juice of this special orange, you will be cured immediately. But there is one challenge. A person from team number 1 wants the same orange, because he has a fatal disease as well and he is as rich as you are and he also knows about the existence of the orange. You will meet with the person of the first team and you will have ten minutes to persuade him to allow you to buy the orange. If you are not able to buy the orange you will die. You cannot share the orange with the other person because half an orange does not have the power to cure you. You need to stretch your negotiation skills to be able to get this orange from your competitor." Then Alex asked the teams to switch around and told team number 1 exactly the same story with one small but crucial difference. He told team number 1 that they could be cured by eating the peel of the orange. Team number 3 where I belonged immediately noticed the difference and we could see the very cleverly set trap for the two groups. They both wanted the orange desperately, but not the same part of the orange. We were curious to see if they would be able to find this out.



Everyone was invited back in to the room and Alex arranged us in couples with one person from each of teams 1 and 2 and then added one of us from team 3 as referee. Alex told everyone that they had just ten minutes to negotiate and I was chosen to be the referee between two ladies, Popi and Sofia. Sofia started first and asked Popi if she would be interested in selling her rights to the orange. Popi, of course, said no. Sofia told Popi that she was willing to give all her fortune for the orange, while Popi answered that they do not accept euros in paradise or even worse in hell. Sofia tried another more emotional way. She was a mother of two lovely daughters while Popi was still single. She said: "My dear Popi I have two children who need me. If I die, who will take care of them?" But Popi hit back immediately: "My dear Sofia, you have been blessed to have two children and so far you have tasted the fruit of motherhood. Why don't you give me the chance to become a mother as well?" The conversation continued in the same way with both ladies running like crazy but getting nowhere. Ten minutes passed quickly with no agreement having been reached, so the two women were officially dead. They hated each other because they both believed that they could not reach an agreement because the other person was too selfish to make a sacrifice. I was curious to find out if any pair had reached a deal with both staying alive. All the referees met with Alex and informed him of the results. Everybody sat down, most of them disappointed about the outcome of their negotiations, hoping that no one else had reached the difficult agreement. Alex announced the results. Out of 34 people, only two had reached an agreement and stayed alive. These two people had reached an agreement because Michael, one of the pair, took the right path from the beginning, simply by not assuming. He had gone to the guy from the other group and asked a simple question: "What exactly do you need from the orange?" When the other guy answered that he needed the juice of the orange, Michael said that he needed the peel. So they could buy it together and each one could take whatever he needed. The agreement was reached in less than a minute. Everybody applauded for Michael and his partner, who was simply lucky to be chosen randomly to negotiate with Michael even though everybody was jealous that they missed this simple question. I asked Alex if our success rate of 1 out of 34 was low. Alex told me that our rate was unusually high. He informed us that he had done the same game in many previous seminars and only one other man had found the solution. I asked him why this was and he replied with the simple statement: "Because people assume!"

At that time I was not able to grasp fully the gravity of this statement. I could only see that the rest of my people had failed simply because they assumed that the other person needed exactly the same thing as they did. Later I discovered that in most cases of misunderstanding and miscommunication, the secret root is assumption. I do not know why we assume so much. We assume, and we assume a lot. And our assumptions lead us to

the wrong path of miscommunication and misunderstanding, fights, and loss of energy, money and time. It seems that assuming works the same way as a small detonator works for a large bomb. The bomb is relatively safe until this small detonator is activated, and then the bomb explodes with disastrous effect. If we all knew that we had a huge bomb in our homes, which can be activated by a small detonator, what would we do? Would we ever activate it, or would we try to disarm it? We all know the answer. If we all know, why don't we all disarm the detonator of assumption immediately?

The first big step toward disarming assumption is simple. We need to ask. But why do we not ask? I think that people do not ask because we are afraid that if we ask, the other person will think that we don't know. It all comes down to insecurity. If you are going to remember only two words out of this book, please let it be "never assume." Do not be afraid to ask. Ask even the simplest question to remove the element of assumption. People who ask are not weak. They are strong and they send the right message to the other person. They don't know something but are secure enough to ask. It is so much more expensive not to ask and to assume. Start immediately. You can look in your past and if you agree that for most of your troubles, either business or personal, assuming was the evil root, then act. Stop assuming and start asking. It is not as easy as it sounds, because the assumption root is so deeply ingrained in our way of thinking that it needs a lot of patience to trace it, dig deeper and take it out of our personal make-up. Even if you make small steps in the "never assume" direction, you will see immediate results. You will see that fewer misunderstandings and easier communication between people make people happier.

After the whole seminar with other similar games, my people left with a brand-new perspective on looking at communication. They understood its importance, and the clever ones started applying it immediately to both their private and their business lives. I still remember the words of one lady. She had been working with us for five years. She was positive, proactive and focused on her work. A couple of months after the seminar, she came to my office to talk to me. I thought that it was about a business matter but I was surprised to hear her thanking me for the communication seminar that she had attended. She told me that communication with her clients had improved dramatically and that the profits of her department had increased by 19%, but this was not as important for her. She told me that the seminar had opened her eyes and allowed her head to turn in the right direction. It had actually saved her marriage, which had been going in a bad direction due to miscommunication. She was now enjoying a happy life with her husband and their two children. She told me that her happy family life helped her to perform better in her business as well. Michael, the guy who solved the tricky orange problem, was given many chances to climb the company's hierarchy and after a couple of years he became the manager of our Istanbul

office, running it very successfully, because he was clever enough never to assume and always to ask.

### ***The Old Man and the Sea or Mutiny on the Bounty?***

I love harbors. It's not just for the view of the open ocean, the seagulls and the fresh breeze, but mainly it's about boats and ships. They all have their own personality; from the small fishing boats to the huge tankers. Each one has a story to tell. But just looking at them we can understand their possibilities. Boats which are crewed by one man only have completely different possibilities than those with two men, or those with 500 men. Of course even a single-man boat could achieve something extraordinary. Let's not forget Hemingway's novel *The Old Man and the Sea* in which Santiago, after 84 unlucky days without catching any fish, catches a big marlin on the 85th. Even though he was lucky to get such a big fish, he did not manage in the end to take it back to the village, simply because he was alone in the boat. Sharks attacked the hooked fish and left only the bones for Santiago. Similarly it is not easy to run a company alone. The good thing is that we have full control of what is happening. But since we need to cover everything, we are not able to look deeper into each area which needs our attention. We often have to deal with issues which are important, with issues which are urgent, and worst of all sometimes we have to deal with issues which are both urgent and important. Simple advice: do not ever let important issues become urgent, because the cost of dealing with something urgent and important is too high, compared with the cost of running something that is only urgent or important. Santiago was either lucky or an excellent fisherman and he finally hooked his huge marlin. But hooking the fish is only the first step. Success is to get the fish in to land and to sell it. Santiago did not make it, simply because he was alone. He could not cope with all of the needs at the same time. And so the sharks won. If he had had assistance, things might have turned out differently. There is strength in numbers.

### ***New mathematics* $1 + 0 = 1$ , $1 + 1 = \text{synergy}$**

This concept of teams working together came to be known as "synergy," which is defined by *Webster's Revised Unabridged Dictionary* as the working together of two things to produce an effect greater than the sum of their individual effects. In other words, one and one equals three! The term comes from the Greek *synergia*, which means joint work and cooperative action. An experiment with mules proves this clearly:

"In 1885, the World Series of Mule Team Competition was held in Chicago. The winning team of mules was able to pull 9,000 pounds. The second-place team pulled slightly less. Someone came up with the idea of

hitching both the first and second teams to a load. Together the teams pulled a 30,000-pound load. This excellent example of synergy was duplicated in Death Valley when a young foreman name Stiles noticed that a team of twelve mules was hauling loads twice the size that eight mules could have. This set him to thinking and experimenting. No one will ever guess what size was found to be most efficient. A twenty-mule team would up pulling ten tons—about half the capacity of a modern railroad freight car (ibid)."

(Traill, 2014).

The same applies in business. It is easier to carry the heavy weight of a business with one or more persons than doing it alone.

We all need other people to carry out our business goals. Mother nature uses and supports synergies in her survival project. Instead of offering all of the necessary equipment to an animal, she gives it a partner. Scientists call synergy between animals "symbiosis." This is a Greek word and means living together. Nature supports synergies in fantastic ways. There are synergies not only between two parts but even between three and four different living organisms. The goal is always survival with the minimum cost. But even though we said before that nature does not approve morality, in synergies she has a special sense of fairness. Isn't it strange how nature manages to make different animals work together? For example, a crocodile relies on the plover bird to clean out food from between its teeth—food that would otherwise rot and cause pain to the crocodile. The plover enters the crocodile's wide-open mouth and eats the food from between its teeth. These animals put aside their differences and are happy together. Why is it so difficult between humans? Some people prefer to work alone because they want to have full control and they do not trust others. If the crocodile felt the same way, it would either need to learn how to use a toothbrush or it would have rotten teeth.

We can all understand that we can achieve more if we make synergies with other people. We can make different types of synergy, just as some animals do. We have seen from the Chicago experiment that two horses working together pull much more than the addition of the pulling power of two horses pulling separately. If we apply this to business, we could work together with someone who has similar knowledge to us in the business field. We can work together with this person, each dealing with different areas. One, for example, could deal with our suppliers and the second person could deal with our sales. This is the easiest and most common way of cooperation, often called partnership. Partnership works fine until the two people have different ideas either about solving a problem or regarding the expansion of the company, or for much simpler issues, like hiring a new employee. Trust is the root of a good partnership and the best way to keep this partnership for a long time is to separate very clearly the operational areas right from

the beginning. My grandfather used to say: "A pig with two owners dies of hunger!" Make sure that you separate the areas with your partner, ensuring that there is not an area where you overlap. Discuss openly with your partner that mistakes might happen on either side during the operation, but it is crucial that each person takes care of their own area. If a problem occurs in one area, it is better instead of accusing the other person of the mistake to correct it together and then learn from it and continue. Mistakes always happen, so make sure that those mistakes, unless they are huge and your company is in danger, do not affect your personal relationship with your partner. Make sure that you show your appreciation for your partner's contribution to the company and remember all the time that you are in the same boat, rowing in the same direction.

It is wise to keep in mind the worst-case scenario should you come into conflict with your partner, for whatever reason. It is much better to discuss this possibility with your partner from the beginning of your cooperation, when things are going well between you and together with a good lawyer, to create a way out of your partnership should it be needed. It is also worth remembering that if a company builds bridges between clients and suppliers, it is always better to keep your bridge open with your clients than with your suppliers. Of course, your company could be temporarily damaged by breaking your partnership, but you could make up the lost ground if you have control of your clients and they trust you personally. You should always try to prove to your clients that even if your company is systematic, things work because of your personal attendance. Make sure that your clients believe that without you, your company would underperform. So, if you split from your partnership you will still have the bridges open to your clients. In today's world it is much more difficult to find clients than suppliers. If you have clients, many suppliers will follow you, even if they had a better relationship with your ex-partner. Keep this card only for yourself and never tell anyone else about it. This is your secret and a successful way out in case of conflict.

Besides the above kind of cooperation between two people, you will also need to make synergies with other people outside your organization if you want to offer your clients a more attractive package. My wife owns two beautiful villas on the magnificent island of Mykonos. She rents them during the summer period to people who want the privacy of a home instead of a hotel. She has made a "synergy" with a cleaning lady, arranging to pay her only when the villas are rented, thus reducing her permanent costs. She has also made an arrangement with a technician, who takes care of the swimming pools, the villas and the transport for clients from the airport to the villas. My wife wanted to attract people at the premium end of the market, so she has had to increase her services for clients who might want more from their vacation than just a clean villa and a swimming pool. She made extra arrangements with cooks who could cook for the clients, hair stylists

who would visit the villas and offer their services, babysitters, masseurs, yoga teachers, party organizers, car rentals, yacht and boat rentals, and even helicopter rental. Offering this kind of service has increased her business dramatically. Without paying anything she makes extra profit, because she keeps a percentage of the fees from all of the above services. She has built many bridges and she can simply sit back and collect the tolls from those people who want to pass the bridges.

But numbers are not always good. Most of us know about the mutiny on the *Bounty* in 1789 when Fletcher Christian, lured by life in the Pacific on Tahiti or Pitcairn Island, led a mutiny against Captain William Bligh on board HMS *Bounty*. Here we have a different story—a large ship with many people aboard and a whole organization which failed to reach its mission the same way that Santiago failed. Santiago failed simply because he was alone, and the commanding officer of *Bounty* failed simply because he was working together with more people.

Shared profit is a strong motivation for partnership synergies. But the desire for profit is not everything. Try to look beyond profit. Check what they believe, their principles, their friends and their attitude toward other people. Analyze their personality and behavior as deeply as you can. Approach your future synergy partner exactly as you would have approached your future wife or husband. Try to find out if you have a similar sense of humor, similar principles, similar values and similar attitudes toward your future clients and suppliers. This of course does not mean that if you do not have the same sense of humor as a person you should not partner with them. I remember what a good friend told me some years ago. He was in the pharmaceutical business and he needed to find a partner because he wanted to expand his business. He contacted several people and he gradually narrowed down his list to two people, but he was not sure which one to choose. They both had the same qualities when it came to business approach, lifestyle and mentality. He asked my advice about which one he should finally choose. I did not want to give him any advice (one of the few correct choices I have made in my life). Then something happened. We were all invited to the same birthday party. My friend told me that each one of the two candidates had different strengths which he needed but he wanted only one. He asked me to join them and tell him my opinion afterwards. I followed him reluctantly and, after a while, we were sitting in a quiet corner of a beautiful garden, making small talk about everything else except the hot issue of partnership. And then it happened. A waitress on her way to us stumbled in the grass and threw a whole tray full of drinks over us. I was the luckiest with only a glass of vodka and tonic spilt on my black trousers, but the other guys were not as lucky. Campari with orange juice is something you can't miss, especially on white linen trousers. The poor waitress was so embarrassed. She was a young trainee who was wishing that she was anywhere but there. Since I was the least affected by the accident, I tried to set a light tone for the

whole event. "Oh, that was lovely, cooling down with a vodka and tonic on such a hot night, and especially under the Greek financial crisis. I hope you aren't going to cool down the rest of the guests with something more expensive!" I said loudly, and laughed! My friend and the second guy said to the waitress not to be too upset about the accident as they were heading toward the men's room to try to wash the Campari out of their white linen shirts and trousers. The third guy exploded. He was furious and shouted at the waitress about how stupid she was, and said he would talk to her boss as she had destroyed a lovely evening and she should pay for the dry-cleaning of his clothes. We were all shocked by his extreme reaction. My friend, hearing the guy shouting at the waitress, came back and took the waitress aside. He calmed her down because she was crying and told her not to worry about her job. At the same time, he made a signal to me with his eyes, meaning that he had decided which one of the two guys he should take for the partnership.

He was so thankful to the young girl, who had helped to reveal the well-hidden hot temper of one of his candidates, that he spoke to her manager and passed on good words about her service. Since my friend was a well-known businessman in the city, the manager not only kept the young waitress but promoted her to head waitress. My friend announced his decision the day after to both of the candidates. His instinct has been proved right. He made an excellent partnership with the gentle guy. I think I got the most out of this incident too. Every time I visit the nice restaurant where the young waitress is working, I get excellent service from her and she always asks me if would like a vodka and tonic or a Campari and orange.

But we have not finished the interesting story of the mutiny on the *Bounty* in 1787. On an expedition, HMS *Bounty* spent ten months at sea to reach Tahiti with the aim of picking up breadfruit plants to transport to the West Indies to be grown as a cheap supply of food for slaves. However, during a five-month stay on the island of Tahiti, many of the crew enjoyed the local hospitality and some became integrated with the Tahitians, including Fletcher Christian, who married a local woman. Captain Bligh increasingly blamed Christian for any problems that arose, and relations between the Captain and his crew deteriorated during this time, with Bligh prone to harsh outbursts. Nonetheless, the *Bounty* set sail for the West Indies with the breadfruit plants but after a few weeks at sea, the mutiny led by Christian took place. Bligh and 18 of the crew who remained loyal to him were forced to set off in *Bounty's* seven-metre launch boat while the mutineers plus a few other loyalists stayed on board the *Bounty*. Bligh oversaw an epic 47-day journey which eventually took him to Timor, from where he subsequently returned to Britain to report the mutiny, and from where another boat (*Pandora*) set sail to track down the mutineers and bring them to justice. Meanwhile the mutineers eventually returned to Tahiti, where most remained after a failed attempt to settle on another island. However, *Pandora* eventually caught up with them on Tahiti and recaptured 14 of the

mutineers and loyalists. After leaving Tahiti, *Pandora* continued its search for the *Bounty* and the remaining mutineers on other islands, but to no avail. The ship unfortunately hit a reef and sank, losing 31 crew and 4 prisoners. The survivors, including ten mutineers, eventually returned to Britain where the prisoners were put on trial. Only three were found guilty and hanged. In the meantime, Bligh had set off on another voyage to collect the breadfruit trees; this time the voyage was successful, but the slaves in the West Indies refused to eat the breadfruit.

People with different priorities could not work together to bring the project to an end. Have you noticed something odd? The whole breadfruit expedition project was a failure. Why? What went wrong? As you have probably guessed, the whole project was based on the assumption that the natives would eat the breadfruit. By now we know that assuming can lead us into difficult situations. It would have been much easier if they had tried to test the reaction of the natives to breadfruit on a smaller scale, before launching such an expensive expedition. This, of course would have saved time, money and lives for the British Empire, but we would not have been able to enjoy Marlon Brando's performance in the film.

### **Who needs another shoe company?**

I have always admired, how some entrepreneurs not only manage to make room in an oversaturated market but they make such a difference and create a brand. One of those businessmen is the creator of the shoe company TOMS, Blake Mycoskie. He founded TOMS Shoes in 2006 and today it is a for-profit firm based in California with a non-profit subsidiary called Friend of TOMS. For every pair of shoes sold, the company donates a pair to a child in need. I like the story of how the firm was conceived and has grown. There are a number of points worth remembering from the Blake Mycoskie success story as follows:

- He was not offered this idea by some great consultancy firm.
- He did not get this idea sitting in his office and discussing development with his managers. He was on vacation in Argentina and suddenly it hit him. Seeing so many children without shoes, the idea formed in his mind. Don't think that sitting and working in your office is the best way to expand your business. Take some time, go out, look at people, talk to people and if your brain is fertile enough then the first good seed of a new idea will bring results.
- He kept his motto simple: "One for One". For every shoe sale, the company offers one pair of shoes to children who need them.
- He did not pay for expensive advertising campaigns. Nowadays, everyone knows the "truth" about advertisements and doubts their credibility. We all know that part of the price we pay to buy a product is paying for



the promotion of that particular product. Blake Mycoskie decided not to pay for advertising but he chose to build a company which will respect its workers and the environment, and on the top of that it helps people who are in need. The success of TOMS shows us that there is no better advertisement than to “advertise” that you don’t advertise.

Helping people in need is actually a “must do” for governments, although it can seem that governments often have bigger fish to fry than increasing the level of satisfaction among their own citizens. Governments have left a gap, which until now companies have not thought to fill. There was a clear line about what governments and what companies can do. Mycoskie simply crossed that line and he substituted for the government, and it worked.

He did not expect such a response. An interview in the Greek magazine *Epsilon* (July 17, 2011) with Tina Kouloufakou went as follows:

*TK:* How do you explain that people like your shoes?

*BM:* At the beginning people loved the idea “One for One”, so some people started wearing them. Then TOMS shoes were worn by some trendsetters and then came the influential people. Today our clients like the TOMS style as much as the idea of the offer.”

*TK:* Did you expect such success?

*BM:* Not at all! The shoes are very simple. Being very soft, I was expecting that only people who like comfort would buy them. It was a pleasant surprise that people liked their style as well.

*TK:* Is social responsibility the new fashion?

*BM:* During the 1960s and 1970s it was cool to be ironic, sarcastic, uncompromised, revolutionary. Today it is cool when you recycle, care about others, when you are concerned about global warming.

I would like to share some thoughts with you regarding the success of TOMS. I was wondering why people reacted so well to the “One to One” idea? Most of us do things from time to time that we are not proud of. Today’s rhythm of life has made us selfish, and this combined with a lack of time does not allow us to always act charitably. We may think about it sometimes, but we do not take any action, simply because it is complicated. We could of course donate to several organizations, but even if we know where our money goes, we cannot see exactly what our money has been used for. TOMS makes it much easier for us. The organization tells us that for each pair of shoes we buy, it will give a pair of shoes to a child in need. Our contribution is much clearer. We know that we are helping a child somewhere in the world. We don’t need to go to a post office and send money to an organization. We don’t need to go to Africa to help children. We can do this in the nice environment of a retailer, satisfying at the same time more

needs than simply the need for a pair of shoes. At the same time, since TOMS shoes have a logo on the shoes, we send a message to everyone that we care. If we send money to a charity, no one will know unless we tell them, and it is not nice to self-advertise our charity-giving. Wearing a pair of shoes made by a company with such well-known social responsibility makes us feel good.

If we look at a list of the top ten most innovative retail companies (from [www.fastcompany.com](http://www.fastcompany.com)), we can see some patterns. Some of them show clearly that they respect their customers by offering them information or possibilities which were unthinkable just five years ago (e.g., Walmart, Nike):

1. Walmart
2. Apple
3. Amazon
4. GoodGuide
5. Nike
6. Toms Shoes
7. Chipotle
8. Hot Topic
9. Lululemon
10. Best Buy

Some of them simply add value in their services to their customers (Apple, Amazon, Hot Topic, Lululemon and Best Buy). Others with a better and clearer view offer their clients the pleasure of social involvement and responsibility (Chipotle, Toms Shoes, Good Guide). The last companies show a new direction, and I strongly believe that more companies will soon follow. It is important for a company to leave a clear mark on the environmental and social map. People need proof that you commit to what you are promising. Blake Mycoskie did it the right way. He not only sent the shoes that he promised to the children but he went personally and put the shoes on the children himself. Of course he does not do this with all of them but many photographs were circulated showing Mycoskie putting shoes on children's feet. This makes a difference. If I were a TOMS client I could imagine a particular pair of shoes which Mycoskie is putting on a child's feet as coming from me, and that would make me feel wonderful and want to become an ambassador for TOMS. This is the reason why 700,000 people on Twitter and more than a million on Facebook advertise TOMS shoes—because TOMS makes them feel good. People forget what you do, but they will never forget how you made them feel. TOMS not only sells products; at the same time it sells feelings. Find a way to add this kind of feeling to your products and you won't have to worry about the survival of your company.

Even if your company and products are not directly linked with the environment, they are certainly indirectly linked. I remember a story a friend

told me about 20 years ago. At that time the environmental movement was not as strong as it is today. Every Christmas he faced the same problem. It was a custom to send Christmas presents to his customers. He had many different customers and it was difficult to find a suitable gift which would please them all. He tried to separate his clients into groups and sent presents with his company's logo hoping that they'd be appreciated. However, the customers' reactions were poor. Everybody expected a present for Christmas, but expectations were greater than my friend's presents. He spent a lot of money on these presents but he didn't get the results that he hoped for. He received a cold "thank you" letter from his customers and he could feel that they were disappointed by his poor taste in Christmas presents. They were expecting something bigger and more expensive because they thought that my friend made a lot of profit from their orders and he should return some of it in the form of an expensive gift. He spent a lot of time trying to find a solution, when one day his young son came to him with a letter from school about donating a small amount to UNICEF. The young man asked his father if he could donate a small amount to UNICEF from his allowance and my friend agreed. In that moment he had found the solution he was looking for. Next Christmas he would not send useless presents to his clients; he would donate his whole Christmas present budget to UNICEF. So, just before Christmas, he sent all of his clients a letter informing them that instead of sending them Christmas presents he had donated the whole amount to UNICEF. He enclosed the official receipt from UNICEF in his letter, showing that the whole amount had been received. The reaction of his customers was immediate. First of all they saw that my friend was generous with his donation because for the first time they saw the whole amount. Second, he implied that this donation was not his but was his clients' donation to UNICEF, which made all of the clients feel that they had done some good themselves. For the first time the Christmas present money brought him good results. He received many warm "thank you" letters and he claims that it has strengthened his relations with his clients. So there are many ways to move in this direction and give your clients that feeling that they are doing something good via you.

One more vital detail from the TOMS story is where the company's founder Blake Mycoskie was criticized for speaking at a "Focus on the Family" event. The "Focus on the Family" organization has strong anti-gay views and in response to the criticism, Mycoskie wrote an apology explaining that if he'd know the full extent of the organization's beliefs he would not have participated. I find this incident crucial for two reasons. Firstly, I am sure that we all love to see great people making mistakes. It feels like getting an injection of antibiotics, strengthening our defence mechanism: if great people make mistakes, we should not be so hard on ourselves because we make mistakes as well. Secondly, Mycoskie made a mistake and they got him. But he did the right thing: he admitted his mistake and apologized, making a

statement that he and his company support equal human and civil rights. I am sure that Mycoskie will not make the same mistake again. People can understand and forgive mistakes if the person or company comes out bravely and admits it. Simply admitting it won't solve the problem, so we must make a statement informing our clients of the action that we have taken so that the same thing will not happen again.

Clever companies admit their mistakes immediately, and history shows that they get their second chance. Do you remember the Perrier story from 1990 when benzene (a carcinogen) was found in some of the company's bottles? The cost of withdrawal was over \$40 million. Despite the high cost, they did it and the consumers gave them a second chance. Perrier is still alive and kicking. Who could say that it would be the same if they had chosen another way of reacting?

### **Apocalypse now . . . and then!**

In the final book of the New Testament, the Book of Revelation, written by John, one of the 12 apostles of Jesus Christ, John, has a vision about the second coming of Jesus. He describes 26 events that will happen before the second coming, preparing people on earth for this extraordinary event—26 major warnings before the final crisis! I wish I had half of them every time a crisis has rushed into my company without even knocking on the door. Crises happen to all of us. Unfortunately there is not an internationally accepted scale of measuring the size of a crisis as there is for earthquakes. The main reason is that a crisis can be in our personal life, our social life or our business life. Each person has a private meter that measures the crisis. What is a crisis for one person could be a blessing for the next. The year 1990 was an important one for my company. Four years after our starting operations, we had established good business and personal relations with all of our clients. We were building trust, and our orders and profits were increasing. The future never seemed brighter. Our main client was a big Swedish retailer which was expanding rapidly and needed more clothes every season. It was opening new shops in new countries and was buying from us in ever bigger quantities. We cooperated closely and visited the company's head office in Stockholm every month, spending one week there where we presented our latest collections to all departments. Such was the trust in us that it was very open about its future needs regarding qualities and quantities. It gave us inside information which was extremely valuable to us. We had relaxed somewhat and forgotten about the basic rules of survival: to be alert and watch out because predators can appear suddenly and eat you alive. In business life, a predator can not only come from the competition. The worst kind of predator comes from inside the company and mainly from the owner. The worst predator is an action or a lack of action from the owner, which can

bring on cataclysmic events in the company and destroy in seconds what has been built over many years.

This is not fiction. I have been the worst predator of my company at a time when we were visiting Stockholm's head office each month and staying in a hotel for a week, which proved neither nice nor practical because we needed more room for the samples, parcels, faxes and everything else for our business. We decided to buy a small flat in Stockholm where we could stay and work in a more convenient environment. We circulated this idea among the buyers and managers in our client's buying office. Soon after, a buyer contacted us, explaining that she wanted to move to another apartment and to sell her existing place. First she asked for permission from her managers to sell her apartment to us (a supplier). The managers told us that they had nothing against it, taking into consideration that the transaction would be made legally and transparently. We proceeded quickly and soon we were enjoying our new flat in one of the best neighborhoods in Stockholm. We loved living and working there. It was easier for us to take family members with us to Stockholm, especially during summer when it was beautiful. Most of the buyers learned about our new flat in Stockholm and they knew that we were using it for a week each month. Several months passed and business with our client was growing. This further strengthened our relationship and the company felt that we were almost part of it. Everything seemed perfect. Suddenly the storm struck out of nowhere. One morning my brother received a call from one of the biggest buyers at our Swedish client. She was the buyer for the teenage girls' department. We had an excellent business partnership and she was buying big quantities from us. However, during the call the buyer informed my brother that the night before she had split up from her boyfriend and he had asked her to leave his apartment immediately. She could not afford to stay in a hotel or move quickly into her own apartment because her financial situation was not great. Of course she was hoping that things would improve between herself and her boyfriend and she could move back with him very soon. She asked my brother if she could use our Stockholm flat for a maximum of one week. She felt very uncomfortable making this request but she had exhausted all other possibilities. My brother told her that he needed to discuss it with me, since we were partners in business, and he promised to get back to her the day after. I told my brother that we could not do this without informing the management of the Swedish company. I knew that even though my brother's intentions were good, it could be mistaken as a bribe and jeopardize our whole business with our biggest client and ruin our good name in the market. However, my brother persevered, saying that it was just for one week and that the lady had promised that she would inform her bosses because she did not want to jeopardize her position in the company either. The timing was bad for me as well. Since the start of our business, when my brother and I had different

opinions, it had always been done my way. For once I wanted to go with his decision. I told him that I did not agree but, if he wanted to, he could proceed. I stressed just one point and that was to ensure that the managers of the Swedish client were informed. He told me that he would take care of it and phoned her back to let her know we were both happy to offer her the flat for a week. The only thing we requested from her was to inform her managers. She was very happy and promised to do so. She moved in to our flat the same evening. It seemed that my brother had assumed that one week was equal to five working days and one weekend. It turned out that the buyer's week had many more working days and many more weekends! She kept on postponing her departure week after week, finding different excuses, but she assured us that her managers were aware and that there was no problem from within her company. I was pushing my brother to find a reason to enforce her to leave the flat. We were still visiting our client and, since we did not have the use of the flat, we had to use hotels once again. My brother did not want to force the issue because he did not want to upset her and possibly lose her department's business.

Six months later we received an official letter from the manager of the Swedish company asking my brother and me to visit them in Stockholm to discuss a serious business issue. Just one day after the letter arrived, the buyer called my brother to inform him that she had resigned from the company because of the situation with our apartment. She admitted that she had not informed her managers as originally promised and had made the mistake of giving our flat's address to her company as her permanent residence. She had even organized parties in our flat and invited other buyers to the event. With our names on the door, and some enemies she had within the company, it did not take long before someone informed management that the buyer of their biggest department was using a supplier's flat, probably without paying any rent. The prospect of potential bribery could not be ignored. My brother felt terrible. I was sorry and upset as well, but since I had given my permission I did not want to blame him for the whole episode. I simply told him that in the future he would only deal with production, leaving the sensitive area of client management to me.

News circulated quickly within the Swedish organization and everybody preferred to stay away from us until management had reached a decision. With all of our contacts at a distance, we could not get any information about the depth of the problem from the client's perspective. We knew exactly what had happened but we could not prove anything. We asked the buyer to tell the truth, knowing that her credibility was already low, but she refused to support us. She had her own firefighting to do. So we went to Stockholm feeling anxious about the meeting and its outcome. The meeting was planned for 10.00 a.m., and we duly arrived in reception and asked which meeting room we should go to. The staff on reception had always been very kind and helpful to us but this time they were colder than

the Swedish winter and informed us rather formally that our meeting was planned for the big meeting room. We had never been in the big meeting room and this was one more signal that this was really serious.

We entered the room two minutes before 10.00 a.m., knowing that the Swedish were always exceptionally punctual for their appointments. However, minutes passed and still it was just my brother and me in the room with a growing sense of devastation. At 10.20 a.m. the door opened and five managers we knew entered the meeting room together with a gentleman we had never met before. There was not a single welcome, not a single smile. They all sat down and introduced us to the gentleman as the manager of the legal department. The door was quietly but firmly closed. Two hours later the door opened again. They left without a handshake, informing us that they would come back with their decision in a week. In the meantime, they informed us coldly: "You will execute our running orders, but as you can understand, there is a "buying stop" from your company." After the meeting was over, my brother and I were very concerned because they had been direct with their questions and hard with their criticism regarding our extremely unprofessional attitude toward their company. They were also suspicious about our answers. They knew that we had a lot to lose, so our credibility was at stake. First of all we apologized, realizing our big mistake. We told them the whole story, as it had happened, explaining that the buyer had promised that she would inform them about her moving temporarily into our flat. We acknowledged that we took a huge risk by not informing the managers ourselves. We asked them to contact all of the buyers and managers whom we had worked with for many years and check our performance and morality. All those years we had made many deposits in our "credibility account" by informing clients when they made a mistake on their invoices in our favour; by putting a higher price than the one we had agreed; when we were offering them discounts which were never requested because we wanted them to go to market with competitive prices; and many other individual examples of support that we had provided. These were weak arguments against the solid accusation of bribery, and we knew it. We did have one good argument. Fortunately, during the six months during her stay at our flat, the buyer did not place more orders with us than she had placed the season before. If we did not make any extra profit from this unethical favor, the accusation of bribery was not so strong because they could not prove that we made any extra money. As it turns out, the orders from this buyer were slightly lower than in previous seasons. By explaining all of this we were very open with the managers, but since we could not read their poker faces, we were unable to foretell the impact of our statements and apologies. We had to wait a week and it was the longest week of my life.

As promised, on the exact day, we received a fax informing us that due to a lack of strong evidence proving the allegations against bribery and due to our excellent performance in the past, they offered us the decision of reasonable

doubt and they would allow us to continue as their supplier. However, we would be on probation in the future and if they noticed the slightest deviation from their code of ethics, this would signal the permanent end of our cooperation. You can imagine the celebration at our office. Everyone was aware of the situation and everybody's job was at stake if the Swedish client had decided to terminate our contract. Almost as quickly as the euphoria of surviving the storm came, I wanted to know what was the critical factor in the above decision. I knew that it was far too soon to ask this kind of question. I needed to wait until the wound had begun to heal.

If I am good at anything, it is waiting. I waited for two whole years until I asked for a meeting with one of the managers who was part of the interrogation and asked him what had tipped the decision in our favor. He looked me in the eye and told me that it was not a tiny issue but a big solid issue that had tipped the scale in our favor. "It was your character," he told me.

During all those years, you had indirectly shown us, not only how well your company operates, but we knew about the morality of your character. If this had happened with another supplier, whose character and morality were not as crystal clear to us as yours, we should have hung him immediately.

This was extremely important to me. The truth is that during all those years, when we were not discussing business with managers and buyers, we were discussing general issues. This could have been during a business dinner, a coffee break or many other occasions when we met. I was never afraid to tell them what I really believed about many issues and I dared to expose my opinions about nearly everything: from global pollution to charity to the way to fire an employee who was underperforming. Without knowing it, I was making constant small deposits in my "credibility account" and, when the time came to make a huge withdrawal, it was possible. And this was what made the difference between the life and death of my company. The character of an owner—at least in a medium-size company where the owner is known by clients and personality—plays an important role. Make sure you keep making deposits in your personal credibility account with clients, business partners, friends and family. I hope that you will never need to make a withdrawal from this account, but life showed me that it does come. And this could save your company and you when an unexpected crisis rushes into your life without having the courtesy to knock on your door.

## **Finally**

I don't suggest that you should follow everything written in this chapter. It may have worked for me but it may not work for you. I see my experiences as many different-colored yarns. During all those years I accumulated



many colors, some of them bright (my successes) some of them dark (my failures) and some of them neutral. All of these colors have given me the opportunity to weave the carpet of my life. I have used all of the colors that I have collected and I am happy with the result. The dark colors of my failures make the bright colors of my successes look even brighter, and all of them combine with the neutral colors of my everyday life to make a beautiful and soft carpet of my life where I feel comfortable. It is not a perfect carpet. It has many weaving faults and maybe the colors could be combined better by someone else, but it is my carpet.

## References

- Stevenson, A. (2010). *Oxford dictionary of English* (3rd ed.). New York, NY: Oxford University Press.
- Traill, I. (2012). *Biblical Synergy*. Unknown: Traillblazer Ministries.

# Index

- academic literature, 51, 94–6, 162
- ambiguity, 53, 63
- association, 110, 113, 121, 126, 162, 170, 173
- business
  - model, 34, 90, 119, 226
  - plan, 107, 140, 169
  - strategy, 66, 159, 180
- clairvoyant oracle, 7, 9, 26, 75, 92–3, 99–100, 125, 131–2, 134, 136, 143, 145–6, 152–3, 155–6, 161
- co-evolution, 4, 17, 24, 51, 59, 61, 70–2, 74, 88, 90, 93, 124, 135, 137, 156–7, 180, 186, 188, 191–2, 194–9, 201–5, 212, 226
- co-evolve, *see* co-evolution
- competition, 4, 18, 24, 26, 58–9, 63, 72, 80, 84, 98, 114, 121, 127, 168, 175–6, 180, 188, 191, 194–5, 215–16, 222, 225, 247–8, 270, 272, 274, 297, 314, 331, 340
- competitive
  - advantage, 4, 21, 24, 49, 58, 60, 62, 64, 78, 83, 124, 132, 134, 157, 180, 185–6, 191–2, 194–5, 278, 322
  - disadvantage, 177
- consumer, 67, 83, 98, 105, 114, 135, 306
- cooperation, 4, 45, 50, 58, 72, 84, 191, 194–5, 292, 313–14, 332–3, 344
- co-opete, *see* co-opetition
- co-opetition, 4, 15, 24, 58, 70, 72, 90, 93, 124, 135, 137, 156–7, 180, 186, 188, 191–2, 194–9, 201–5, 210–11, 222–3, 225
- co-opetitive, *see* co-opetition
- co-specialization, 4, 24, 70, 72, 90, 93, 124, 135, 137, 156–7, 180, 186, 188, 191–2, 194–9, 201–5, 214, 222, 228
- co-specialize, *see* co-specialization
- creative destruction, 2, 5–7, 19, 23–4, 26, 33–4, 72–3, 85, 87, 93, 124–5, 157–8, 180, 183–5, 193, 196
- creativity, 3, 6–7, 15, 17, 24–5, 33, 51, 58–61, 66–8, 70, 74–5, 78, 85, 88, 93, 122–5, 132, 142, 157–8, 164–6, 173–4, 177, 187–8, 206–7
- dystechnia, 7, 28, 91, 94–9, 102–3, 126, 129, 159–62, 177, 179–80, 182
- empirical, 13, 24, 39, 41, 82, 102, 123, 131–2, 156, 162, 164–5, 167–9, 181, 183, 192, 204, 207, 223
- entrepreneur, 1–2, 6, 8–10, 13, 30–5, 39, 43–4, 49–50, 74–6, 88–9, 91–3, 100, 102–3, 108, 117, 120, 122, 127, 131–2, 135–6, 138, 140–6, 150, 152–6, 161, 163–4, 167, 169, 174–5, 177, 179, 181, 251, 254, 262–3, 303, 307
- entrepreneurial
  - activity, 1, 158, 162, 252
  - behavior, 131, 144
  - opportunity, 28, 159–60, 182
  - venture, 103, 140, 248
- entrepreneurship
  - serial, 139, 262
  - technology, 22, 25, 29–30, 35, 43–4, 46, 74–5, 93, 102–3, 125, 129, 137–8, 142, 158–63, 207
- financial
  - assets, 19, 74
  - capital, 12, 69, 146, 187
  - crisis, 289, 335
  - impact, 79, 133
  - options, 189
  - services, 15, 59, 214, 232
- global/local (gloCal), 12, 17, 19, 26, 54, 56, 69–70, 125, 158

- innovate, 13, 60, 82, 116, 148, 222
- innovation, 4–7, 9, 12–19, 21–2, 24–30, 32–5, 40, 49, 51, 54–5, 58–9, 61, 66–70, 74
  - ecosystem, 4, 12, 15, 17, 24–5, 58–9, 67, 69–70, 74, 85, 88–91, 93, 102, 122–4, 135, 156, 158, 179, 186–8, 206, 208
  - network, 12, 15–16, 21, 25, 58, 67, 69, 87–8, 91, 93, 124–5, 136, 158, 185–7, 192
  - process, 79, 133
  - technology, 7, 14, 18, 28, 54, 77, 79, 82, 84, 89, 94–5, 103, 129–30, 133, 135–6, 139, 159, 164
- institution, 9, 34–6, 40, 74, 76, 127, 131, 159, 161, 248–9, 257
  
- knowledge
  - social, 147
  - tacit, 40, 61, 67
  - transfer, 5, 16, 50, 57, 93, 124, 157, 180
  
- learning
  - collective, 82
  - economic, 16, 35, 46, 56, 68, 186
  - higher-order, 13, 35, 53, 61–2, 131, 186, 192
  - human, 22, 74, 77, 160
  - individual, 21, 190
  - operational, 64, 191, 194
  - organizational, 21, 27, 53–4, 61, 63, 67, 190
  - shared, 193, 195
  - societal, 82, 176
  - strategic, 64, 191, 194
  - tacit, 63
  - tactical, 21, 64, 191, 194
  - technical, 85
  - technological, 16, 20–1, 24–5, 35, 46, 53–4, 57, 61–6, 72, 93, 123–5, 153–8, 179–80, 184, 186, 190–1, 204–7
  
- M&A, *see* merger and acquisition
- merger and acquisition (M&A), 192–4, 197–204
  
- obsessed maniac, 7, 9, 26, 75, 92–3, 99, 101, 125, 131–2, 136, 143, 145–6, 156, 161
- organizational culture, 51–4, 61, 129
  
- risk
  - acceptance, 31, 33, 50, 223
  - avoidance, 50
  - calculating, 3, 9, 50, 76, 131, 203, 211–12, 222–4, 226–7
  - conditions, 19, 72–3, 109, 122, 143–4, 155, 183–4, 188, 200, 209, 230, 256, 294, 325
  - management, 202, 222
  - reduction, 144
  - results, 100
  - taking, 3, 31, 75, 166, 286, 292, 343
  
- SKARSE™, *see* strategic knowledge serendipity and arbitrage
- social
  - action, 36–7, 43
  - evolution, 29–30, 35, 46
  - expectation, 36
  - institutions, 11, 45
  - life, 303–4, 340
  - network, 5, 54, 186, 193, 207
  - research, 15, 19
  - responsibility, 275, 337–8
  - revolution, 172
  - science, 29, 74, 127, 131, 181
  - scientist, 28, 130
  - status, 300, 303
  - structure, 38, 40, 44, 71
  - systems, 46
- start-up, 34, 84, 105, 107, 139, 149, 161, 174, 176
- strategic knowledge serendipity and arbitrage (SKARSE™), 19, 72–3, 131–2, 156–7, 183, 185–6, 190, 192–3, 198–9, 204–5
  
- theory
  - catastrophe, 205
  - chaos, 97, 205
  - dynamic, 27, 128
  - economic, 17, 41–2, 46, 49, 71, 74, 121, 131, 163
  - evolutionary, 41, 44, 128
  - game, 23, 29–30

theory – *continued*

grounded, 12–13, 23, 26, 29, 91, 102,  
127, 129, 132, 138, 142–4, 156,  
159, 162, 180  
growth, 7–8, 17, 48, 56, 64, 93  
institutional, 36, 41–2, 122  
interdisciplinary, 161  
mathematical, 27, 129  
organizational, 161  
Schumpeter's, 6, 26,  
125, 158

system, 54, 58, 97, 206  
value, 126, 163

uncertainty, 9, 19, 33–4, 72–3, 75, 127,  
131, 164, 183–4, 188–9, 211–12,  
222–3, 226–7

venture capital, 105, 140, 192  
venture capitalist, 25, 125, 158, 169  
venture creation, 192, 209, 248, 252,  
258–9