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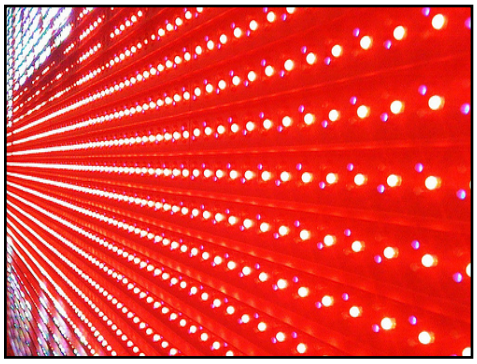
August 2012



Entrepreneurship in the 21st Century

Welcome to the August 2012 issue of the *Technology Innovation Management Review*. The editorial theme of this issue is Entrepreneurship in the 21st Century. We invite your comments on the articles in this issue as well as suggestions for future article topics and issue themes.

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Chris McPhee

Overview

The *Technology Innovation Management Review* (TIM Review) provides insights about the issues and emerging trends relevant to launching and growing technology businesses. The TIM Review focuses on the theories, strategies, and tools that help small and large technology companies succeed.

Our readers are looking for practical ideas they can apply within their own organizations. The TIM Review brings together diverse viewpoints – from academics, entrepreneurs, companies of all sizes, the public sector, the third sector, and others – to bridge the gap between theory and practice. In particular, we focus on the topics of technology and global entrepreneurship in small and large companies.

Upcoming Issues

- *September:* Living Labs
  Guest Editors: Seppo Leminen and Mika Westerlund
- *October:* Born Global
  Guest Editor: Tony Bailetti

We welcome input from readers into upcoming themes. Please visit timreview.ca to suggest themes and nominate authors and guest editors.

Contribute

Contribute to the TIM Review in the following ways:

- Read and comment on past articles and blog posts.
- Review the upcoming themes and tell us what topics you would like to see covered.
- Write an article for a future issue; see the author guidelines and editorial process for details.
- Recommend colleagues as authors or guest editors.
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Editorial: Entrepreneurship in the 21st Century

Chris McPhee

Welcome to the August issue of the TIM Review. This month's theme is Entrepreneurship in the 21st Century. For this issue, we asked authors to focus on aspects of entrepreneurship that represent new challenges or paradigm shifts for entrepreneurs, managers, and researchers.

In the first article, **Blair Winsor** from Edinburgh Napier University's business school in the United Kingdom examines the impact of time pressure on innovation. Through his in-depth study of a successful medium-sized consultancy, he asks whether managers should increase or decrease the time pressures imposed on project teams if they wish to enhance innovation in their firms. The results yielded three practical implications for management teams and underscored the importance of the effects of time for innovation.

Next, **Tom Duxbury**, PhD Candidate in the Sprott School of Business at Carleton University in Ottawa, draws upon his academic research and practical experience mentoring startups to distinguish between creativity and innovation in the context of entrepreneurship. While many entrepreneurs use the terms "creativity" and "innovation" interchangeably, this article emphasizes the importance of commercialization with respect to the latter term and the need to foster organizational cultures to support both creative *and* innovative activities. The author includes three specific recommendations for entrepreneurs wishing to maximize the creative (and innovative) potential of their organizations.

Malcolm Smith, Head of the Department of Marketing at the University of Manitoba's I.H. Asper School of Business, and **Mavis McRae**, Entrepreneur-in-Residence and Acting Director of the Stu Clark Centre for Entrepreneurship, report on their experiences of creating and managing entrepreneurship programs at the Stu Clark Centre for Entrepreneurship. The article emphasizes the lessons they have learned and the challenges they have faced while encouraging youth to develop new businesses with a global entrepreneurship mindset.

Sonia Bot, executive and strategist, and **Paul Renaud**, Chief Executive of The Lanigan Group, examine entrepreneurial capability within the IT functions of established firms. They apply a process-based perspective to the challenges of balancing exploitation (taking advantage of what you already have) versus exploration (discovering something new). This work is an extension of an earlier article on process ambidexterity for entrepreneurial firms (Bot, 2012; timreview.ca/article/547), but in this case, the emphasis is on balancing exploitation versus exploration within the IT functions of firms. The article provides a framework for organizations to develop process ambidexterity, thereby providing their IT function with entrepreneurial capability and increased alignment with the organization's business function.

Shruti Satsangi, recent graduate of the Technology Innovation Management program at Carleton University, describes her research into alliances within business ecosystems. In the 21st Century, few companies are able to "go it alone", and yet it is not always clear which other companies would make the best partners for a given organization. By applying landscape theory to a study of the mobile phone industry, a method was developed for companies to identify the best possible alliance options within a business ecosystem.

These five articles are just a small sample of the topics that are relevant to entrepreneurship in the 21st Century. However, we hope that they provide you with helpful new insights and will encourage you to contribute further articles and suggestions to advance our understanding of the contemporary challenges of entrepreneurship.

In September, we welcome **Seppo Leminen**, Principal Lecturer at the Laurea University of Applied Sciences, Finland, and **Mika Westerlund**, Assistant Professor at Carleton University's Sprott School of Business, as guest editors for the theme of Living Labs. Living Labs are physical or virtual environments that bring together "firms, public agencies, universities, institutes, and

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users all collaborating for creation, prototyping, validating, and testing of new technologies, services, products and systems in real-life contexts" (Westerlund and Leminen, 2011; timreview.ca/article/489).

In October, the theme is Born Global, which refers to new ventures that act "to satisfy a global niche from day one" (Tanev, 2012; timreview.ca/article/532). The guest editor for the October issue is Tony Bailetti, Director of the Institute for Technology Entrepreneurship and Commercialization at Carleton University, who invites you to submit articles related to this theme. If you would like to contribute an article to this issue, please contact us (timreview.ca/contact) to discuss possible article topics.

As always, we welcome your feedback, suggestions for future themes, and contributions of articles. We hope you enjoy this issue of the TIM Review and will share your comments on articles online. Please also feel free to contact us directly (timreview.ca/contact) with feedback or article submissions.

Chris McPhee
Editor-in-Chief

About the Editor

Chris McPhee is Editor-in-Chief of the Technology Innovation Management Review. Chris holds an MASc degree in Technology Innovation Management from Carleton University in Ottawa and BScH and MSc degrees in Biology from Queen's University in Kingston. He has over 15 years of management, design, and content-development experience in Canada and Scotland, primarily in the science, health, and education sectors. As an advisor and editor, he helps entrepreneurs, executives, and researchers develop and express their ideas.

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Managing Innovation under Time Pressure: A Practical Perspective

Blair Winsor

> *He that will not apply new remedies must expect new evils, for time is the greatest innovator.*
>
> Francis Bacon (1561–1626)
> Philosopher, statesman, scientist, jurist, and author

This article examines the effects of time pressure on innovation. Does time pressure stimulate or eliminate innovation or, in other words, should managers increase or reduce time pressures if they are trying to enhance innovation in their firms? Unfortunately, current research on the subject is ambivalent. To provide some clarity, this innovation management dilemma was examined in a fast-growing, medium-sized communication and IT consultancy ("First"), which claimed to be "highly innovative". Detailed data on five projects was collected over an 18-month period using practice-based methods. Each project team was followed in real time via observation and interviews. The data was then analyzed by dividing project work into three phases: i) negotiating the project particulars with the client; ii) conducting project work; and iii) project evaluation. This detailed analysis revealed how time pressures eliminated innovation in First's client-based project work and suggested three implications for the management of innovation. Firstly, managers should try to avoid imposing excessive time pressures on their project teams. Secondly, they should ensure that there is space between projects to enable reflection. Thirdly, managers should ensure that project debriefs occur and that they cover potential innovations.

Introduction

The effective management of innovation is an important topic for most businesses and will very likely become more important as the 21st century progresses (Tidd and Bessant, 2009; tinyurl.com/cje7lpf). This article examines the effects of time on innovation in consultancy project work and the implications of these effects for innovation management. In this context, innovation management can be defined as: *creating a process that enables the sharing of knowledge leading to improvements to existing business processes and/or services or the creation of new processes and/or services* (Swan et al., 1999: tinyurl.com/cgy3gje; Van de Ven, 1986: http://tinyurl.com/bvkr978). Consultancies are, arguably, an appropriate place to examine innovation management, as they invariably claim to be innovative and innovation management is usually considered essential for firm survival (Alvesson, 2004: tinyurl.com/bpugarq; Heusinkveld et al., 2009: tinyurl.com/c6xl59s). In addition, time, embodied in project schedules, billable hours, and utilization rates is a "commoditized" (i.e., each time measurement has an equivalent monetary value – time really is money in a consultancy!) and predominant element in consultancy work. Unsurprisingly, the existing literature suggests that time pressures are the norm in consultancy work (e.g., Alvesson, 2004: tinyurl.com/bpugarq; Keegan and Turner, 2002: tinyurl.com/ccjjotu). A logical consequence of the commodification of time is the desire to compress it; as Adam (2003; tinyurl.com/cpsyll5) notes "when time is money, faster means better". Consultancy project work is, then, an ideal place to examine the role that time pressures play in promoting or constraining innovation.

Time and its implications for businesses and managers has been an enduring topic generally (e.g., Taylor, 1911: tinyurl.com/cmj5uaf; Oncken and Wass, 1974: tinyurl.com/28l3cxh; Covey, 1994: tinyurl.com/bm554t5). Time pressures in consultancies or project work has also been dis-

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cussed in previous research (e.g., Gardner et al., 2008: tinyurl.com/cl7hdte; Gersick, 1988: tinyurl.com/btfum24 and 1989: tinyurl.com/c4f3kfc; Heusinkveld and Benders, 2003: tinyurl.com/cyu3mtg and 2005: tinyurl.com/c7hbh6b; Keegan and Turner, 2002: tinyurl.com/ccjjotu). However, despite this substantial effort there is still considerable disagreement among researchers, some suggesting that time pressures can increase innovation while others argue the opposite. A likely reason for this ambivalence is that much of their work has been limited to post-project accounts and interviewees' retrospective sense making, which may have obscured what was actually occurring. Additionally, this previous research has tended to focus on internal non-client projects designed to produce new services rather than innovation during "normal" client work. By examining the details of normal client-centred project work as it occurred, the research used here attempts to overcome these shortcomings. This article will, then, after briefly explaining the research methodology and the data, discuss the practical innovation management issues associated with the stifling effects of time on innovation.

Research Site and Data

"First" was established in 1993 and from 2000 to 2008 had successfully expanded from one office in Scotland to three other offices in Houston, London, and The Hague. Revenues in 2010 were in excess of £7 million ($11 million). First's work was organized around two main service lines: i) communication strategy development and integrated (usually internal) communications (e.g., marketing of the client firm's intranet to firm employees) and ii) e-learning (e.g., interactive computer or web-based training, multimedia, and face-to-face training around virtual team working). Supporting these service lines was, what was termed, a subsidiary design and new media for communications, learning, and promotion service. This research was conducted in the Scotland office, which had about 20 of the firm's 100 consultants. First's clients included some of the largest firms in the oil and gas industry as well as other large multinationals. First's considerable success was based upon, at least from the Directors' perspectives, its ability to innovate. First presented itself to potential clients as a leader in the delivery of bespoke services in its areas of expertise and was "driven by innovation". First's 2008 business plan listed eight "...key innovations that have driven firm growth..." in the areas of IT-based work design and communications, including, for example, virtual team working and remote collaboration, learning management systems and video streaming, and productivity coaching.

The research for this article utilized the relatively new and evolving practice-based approach. This approach is derived from pre-existing qualitative ethnographic methods, which are widely used and accepted (Denzin and Lincoln, 2000: tinyurl.com/bnokmpk and 2005: tinyurl.com/d4pcclq). Nicolini (2009; tinyurl.com/c8gd7j6) offers an in-depth account of what constitutes practice-based methods. The approach is distinctive for the attention that is paid to the "micro-level" or granular details of work practices. This is particularly relevant here, where the focus was on the practical, even mundane, reality of innovation management. I followed five projects – referred to herein as Tec, Video, Invoicing, Expense, and Software – over a period of 18 months in 2007 and 2008. Access to consultants and project documents was virtually unfettered. In addition, some client access was negotiated, enabling observation of client/consultant meetings and a client interview. Forty interviews were conducted with First's consultants and additional data was also collected during 37 days of observation. On these days, I was able to "hot desk" with the consultants and could, therefore, closely observe their practices and informally ask questions or seek clarification as they went about project work. Observations were documented as they occurred or shortly thereafter. Data analysis was inductive and comprised three interrelated parts. In the first part, the transcribed interviews, observational notes/reflections, and project/client documentation were coded in NVivo (tinyurl.com/6myasf), broadly around the practices that constituted project work. This part of the research was open-ended, exploratory, and iterative. In the second part, the analysis focused more on the impact of time on innovation management in each project. In the final part, in order to refine the analysis, project practices were grouped according to three clearly defined project phases: i) negotiating the project particulars with the client; ii) conducting project work; and iii) project evaluation. This provides the framing for the discussion which follows the project descriptions below.

First usually carry out 60 to 70 projects in the Scotland office each year. The five projects briefly mentioned here were described by those involved as "fairly typical" of their work (see Table 1 for a summary of each project). The Tec project required the creation of two 30-minute e-learning training modules. In the Video project, First designed a communications campaign to increase employee usage of the client's videoconferencing facilities. The Awareness Campaign, as it was called, had a number of components, including; branding, poster and prompt card production, website development, intranet advertising, and training

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Table 1. Summary of project data and findings

	Project				
	Tec	**Video**	**Invoicing**	**Expense**	**Software**
Duration	08/07 – 12/07	01/08 – 07/08	06/08 – 10/08	08/08 –12/08	08/08 – 03/09
K value	£26,000	£13,000	£17,000	£10,000	£60,000
Purpose	Train client staff to use software	Comms. for video-conferencing	Comms. for intro. of invoicing system	Comms. for intro. of online expense process	Increase software usage
Main Deliverables	Two 30 min. e-learning modules	Branding; Comms (emails, webpage, Poster/Zap stand); Training (class-based)	Branding; Comms (webpage, news letter, Poster/ Zap stand, desk drop); Training (class-based)	Comms (emails, webpage, deskdrop); Training (class-based)	Branding; Comms (webpage); Full website
Time Pressures	Very high – caused by delays and overruns in Phase 1	High – caused by "project creep"	High – caused by potential for delays	High – caused by potential for delays	High – caused by "short timeframe"

sessions. The next project, Invoicing, involved communication and training related to the use of a new electronic invoicing system and was part of a series of so-called "e-systems" being implemented by the client. In the Expense project, First delivered communication and training around the introduction of a new electronic business expense form. This was another e-systems implementation for the same client as Invoicing. The Software project was fairly large and complex for First and involved internal marketing and communications to increase the usage of a third party's software by about 2500 of the client's employees.

Discussion

Analysis of First's projects highlighted that time pressures eliminated innovation during project work. In other words, the consultancy team provided a bespoke service to the client – after all, this is what they were hired to do – which would, usually, be seen as innovative by the client. For First, however, this was routine, not innovative. This was surprising given the innovation claims and undeniable success enjoyed by the firm. While innovation can come from a variety of sources, not "harvesting" innovation from client project work leaves, arguably, a significant gap. However, time's stifling effect on innovation during project work can be clearly seen by dividing it into three phases. The first phase of work in all projects entailed a negotiation between First and the client to determine project tasks and overall timeframe and costs. Typically it was First's Business Developer who would negotiate with the client and she, unlike the client, had a deep knowledge of the tasks involved and consequently greater sensitivity to the time required to actually accomplish those tasks. When considering time, she applied several temporal heuristics, including implicit assumptions that clients would provide timely information, obtain internal approvals, and respond with feedback around aspects of the design, etc. in a prompt manner during the project. Many of First's projects came from long-term repeat clients, so there was often extensive previous experience on which to base these assumptions. Additionally, she considered the consultant's expected future workloads, though it would be quite exceptional to refuse projects because of scheduling issues, as, once accepted, there was often the possibility to delay or reschedule their start. So the business developer had a well-developed

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and sophisticated appreciation of time and tasks which she applied during contract negotiations with the client. Clock time as it related to work tasks was, then, "fixed" in client contracts, which were in many instances very brief, focused on clock-time frames, day rates, delivery dates, and so forth, and this was where the emphasis would lie in the management of First's project work. This emphasis generated the initial circumstances that appeared to militate against providing First's workers with conditions conducive to innovation during the next phase.

The second phase of project work entailed the development of the service for the client. Schedules here were tightly overseen and consultants billing and utilization were regularly monitored in all projects. First's managers were deeply aware of the vicissitudes of the work, having previously worked as consultants themselves and, given First's medium size, their close proximity to the project work. However, this sensitivity, somewhat paradoxically reinforced their focus in this phase on the three overarching aspects of clock time that predominated here: project schedule, billing, and utilization. This kind of managerial oversight was focused on the short term, aiming to control and create orderly patterns of project work. This focus played a significant role in the work of project teams, arguably shaping their ability to engage in innovative practices. First's Business Developer and project managers had primary responsibility for ensuring that the clock-time goals related to billing and utilization were met. Using the firm's billing and utilization systems, they would continually track projects and individuals to ensure that stipulated times were being met. Clients were similarly focused on this commoditized time. They had limited budgets and needed to ensure, not only that services were delivered on time, but also that they were on budget. Both client and consultants were then, driven by the clichéd assertion that "time is money". The effect of this emphasis on time-based control in this phase was to inhibit innovation. First's consultants also had tight work schedules; almost invariably, they were juggling multiple projects at the same time or when they finished one project they were immediately starting another. Time pressures therefore, made the intervals between projects very short or non-existent. This lack of "slack" in consultants' work lives seemed, arguably, to affect their ability to reflect on their work and, therefore, severely limited their ability to think about innovation. It is in this phase, then, that the stifling effects of time pressures on innovation can best be seen. There was simply no time to think about innovation, the overriding imperative was to finish the project!

The third phase of project work entailed an evaluation of the project by the client, the project team, and First management. Given the importance placed on timeframes during project delivery they were, assuming that the agreed project services had been delivered, the most crucial component of this evaluation (Lindkvist et al., 1998; tinyurl.com/bvaofca). If project timeframes had been met, or shortened, then the project was judged a "success" and project team members quickly moved on to the next project. Additionally, First rarely conducted project debriefs or "washes" except where problems resulting in failure to meet budgets were encountered. Thus, even project evaluations seemed to limit potential innovation.

This analysis, then, suggests that managers working in project-based environments should be extremely wary of time's effects on innovation and guard against imposing excessive time pressures where innovation is needed, as time pressures here, rather than enhancing innovation, actually stifled it. Arguably, managers, need to do three things. Firstly, try to avoid imposing excessive time pressures on their workers, as these appear to be detrimental to innovation during project work. In other words, managers should realize that how they use time control will have an effect on innovation, particularly if they decide to focus on the use of time to control project work. A heightened awareness of the implications of time in project work may enable firms to increase their innovative output while still maintaining project control. Secondly, ensure that there is time between projects to enable workers to reflect on their practices. This slack or "down time" is, perhaps, particularly important where the project work is highly time pressured. Thirdly, ensure that project debriefs occur and that they cover potential innovations, for example, asking project team members to reflect on what could have been done differently. Overall, managers must be very conscious of the impact of time-based control systems on innovation. In First, many of these were not designed, if designed at all, to encourage innovation in project work. Indeed, First's management appeared to be unaware that their billing and utilization system did not have to be "taken for granted" and could be adjusted to enhance or stifle innovation.

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Conclusion

Innovation management and time were examined in a successful medium-sized consultancy. The analysis revealed that time pressures eliminated innovation in the consultancy's project work and suggested three implications for the management of innovation in time-pressured environments. So the message for 21st century managers is clear: they need to be highly sensitive to the effects of time in their workplace to ensure that time enhances rather than stifles innovation.

Acknowledgements

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About the Author

Blair Winsor is a full-time lecturer in Edinburgh Napier University's business school in the United Kingdom and currently teaches in the innovation management and entrepreneurship areas. He received his PhD from the University of Warwick's Business School where he studied innovation in consultancies. Blair also has an MBA from SDA Bocconi in Italy and a law degree from the University of Ottawa in Canada. He has had business and consultancy experience in both the United Kingdom and North America.

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Creativity: Linking Theory and Practice for Entrepreneurs

Tom Duxbury

> *"Creativity represents a balance between knowledge and freeing oneself of that knowledge."*
>
> Robert J. Sternberg
> Psychologist and author

In this article, creativity research is brought into focus for those involved in the practice of entrepreneurship. The author provides a background on creativity research, how it is defined, and systems models that attempt to explain it. The author distinguishes between creative and innovative activities, and provides advice to entrepreneurs to help realize the creative potential of their organizations. The author reinforces the view that entrepreneurs create new value by investing in ideas, and specific recommendations are made for creating supportive structures, building teams of creative individuals, and successfully championing ideas to acquire the resources they need to produce innovations.

Introduction

Creativity, in the form of the ability to effectively generate novel solutions to relevant problems, can be a source of significant competitive advantage, especially in rapidly changing environments. Creativity is important to entrepreneurs because it is the first stage in the process of innovation, providing the stimulus for opportunity discovery and new venture creation. As new entrants, entrepreneurs often justify themselves upon the same dimensions as creativity: novelty, usefulness, and appropriateness. Arguably, one of the first tasks demanded of an entrepreneur is to manifest creative ability through the conceiving of new product-market opportunities and unique value propositions. From these initial acts of creativity, entrepreneurs must build effective organizations that can repeatedly bring ideas to commercially valuable forms in order to survive and grow.

This article begins with a brief review of perspectives on creativity in organizations and examines the interaction of personal attributes and the work context. The relationship with innovation is distinguished next, with a view towards aligning appropriate activities with stage of development. In organizational contexts, creativity does not occur in isolation, and systems models that attempt to explain interaction effects are highlighted. The article concludes with specific recommendations to entrepreneurs in setting the creative climate internally and selling their ideas externally.

This article is targeted towards entrepreneurs seeking actionable knowledge from creativity research. Firstly, it is useful to begin with a clarification of what the creativity construct represents in modern usage.

What is Creativity?

Creativity has evolved from origins in mysticism and divine inspiration to being a key performance contributor in helping organizations adapt to changing environments. There have been many conceptualizations of creativity over time, but research over the past fifty years has produced some consistent themes. It has been defined variously as a process, as a product outcome, and in social constructionist terms. Creativity is most commonly described today as the generation or production of ideas that are *novel* and *useful (*Amabile, 1988; Res. in Org. Behavior, Vol. 10: 123-167). In order to be useful, creative ideas must also be *appropriate*, that is, of potential value towards accomplishing desired goals. These ideas may reflect either a recombination of existing materials or an introduction of new materials to the organization (James and Drown, 2012; tinyurl.com/cx74bfx). Selection among alternatives is important; the

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task to be completed "must be open ended, rather than having a single, obvious solution" (Amabile and Mueller, 2008; tinyurl.com/clfh925). Although various qualifiers have been attached to creative activity, it remains central to the innovative capacity of modern organizations.

The main conceptual challenge with creativity as ideas that are novel, useful, and appropriate, is that it is difficult to objectively measure as an output variable, as it depends upon the context and observer's perspective. Following this viewpoint, Ford (1996; tinyurl.com/bmfj7w7) argues that creativity is a "domain-specific, subjective judgment of the novelty and value of an outcome of a particular action". The domain is a cultural aspect that includes the structured knowledge system that an individual must access and gain knowledge of, in order to create something new and make a change to the domain. The criteria of novelty, usefulness, and value towards goals raise the question of *who* is to make that decision. Csikszentmihalyi (1999; tinyurl.com/bonozgt) argues that it is the experts within a domain who are the gatekeepers of such value judgments; they constitute "the field" and define what is creative. In practice, gatekeepers of domains may extend well beyond the experts, to include *anyone* with influence within that domain (Ford, 1996; tinyurl.com/bmfj7w7). In new product development for example, the field may include fellow developers, the CTO, an entrepreneur-leader, lead users, analysts, and investors.

In Csikszentmihalyi's systems model, domains interact with fields and individual behaviours to produce something that is potentially creative; only when a *lasting change* to a domain has been made, can it be said that creativity occurred. The concept of lasting domain change as a test of creativity has the appeal of objectivity, however it also means that creativity may only be established after the fact. Thus, timing is also an important consideration in determining creativity. For instance, when Apple's iPhone first appeared, critics initially panned the device as lacking novelty, demonstrating "nothing new". However, few would argue that over time, the iPhone has made a lasting change to the domain of smartphones, and thus *became* creative. Two consequences of creative domain change for entrepreneurs are that: i) it will likely be initially challenged by those representing the skeptical field and ii) creativity takes time and persistence to prove out.

In organizational contexts specifically, Mumford, Hester, and Robledo (2012; tinyurl.com/cx74bfx) assert that creativity is the "production of high-quality, original, and elegant solutions to problems". Their definition emphasizes the performance nature of creativity and further implies that it is a *problem-solving* activity involving cognition at high levels, from which *decisions* will be made. This view underscores the deliberate undertaking of creativity as a means for generating better solutions, rather than a "flash out of the blue". The conditions of novelty, usefulness, and appropriateness remain valuable criteria in helping distinguish creativity from other organizational routines. Wild ideas for example, while novel, are not viewed as creative unless (or until) they are useful to an organization. As George (2007; tinyurl.com/d2xbobk) put it:

> *"Novelty for novelty's sake, therefore is not the same thing as creativity. Similarly, effective problem solving is certainly useful in organizations but does not necessarily reflect creativity; in order for problem solving to be creative, generated solutions must be novel."*

Creativity can be considered to exist along a continuum, with activities ranging from incremental (minor adaptations) to radical (major breakthroughs). In considering the type of problems requiring creative thought, Mumford, Hester, and Robledo (2012; tinyurl.com/cx74bfx) list five problem characteristics; they are: i) ill defined, ii) novel, iii) demanding, iv) complex, and v) exploitable. The definition of a creative strategy or solution varies by the field or job involved, but it can be said that creative behaviours result to some degree in identifying original and better ways to accomplish something useful. Some level of creativity might be expected as a requirement across a wide spectrum of occupations (Shalley and Zhou, 2008; tinyurl.com/clfh925). Examples of organizational-creativity contexts might include business models, strategic decision making, problem solving, product development, managerial activities, marketing, operational processes, financing, and everyday improvements in workplace routines. It should be recognized that there are opportunities to infuse creativity throughout most organizational functions.

Relationship to Innovation

Creativity is distinguished in the literature from *innovation*, considered the crafting of creative solutions into new products, processes, or services (Woodman et al., 1993; tinyurl.com/bv7k2qg). Innovation is commonly regarded as the *successful implementation* of creative ideas and its acceptance by various stakeholders in organizations (Oldham and Cummings, 1996; tinyurl.com/bo9qaje). Creativity is considered a necessary,

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but not sufficient pre-condition for innovation (Mumford et al., 2012; tinyurl.com/cx74bfx). The innovation literature often refers to ideation processes as the "fuzzy front end" of innovation, reflecting an unclear understanding of creativity as an initial process step (e.g., Kim and Wilemon, 2002; tinyurl.com/bvpdoqf). Although innovation is often an important end goal of organizational structures supporting creativity, scholars have been careful to maintain separation in the literature of these two constructs (Mumford et al., 2012; tinyurl.com/cx74bfx).

Creativity, as the generation of new ideas that are novel, useful, and appropriate, is therefore the *precursor* to innovation, the successful commercial exploitation of those ideas. Ideas that do not meet those three criteria at a point in time, from the vantage point of one applying the label, remain as simply ideas. The *process* of ideation and selection has been conceptually modeled after Darwinian evolutionary theories, in which ideas mutate freely, however only those ideas that are well adapted to the host environment survive. Under Campbell's (1960; tinyurl.com/czs7egz) evolutionary perspective for example, the creative process may be divided into three components: i) variance: the generation of many ideas through brainstorming, flashes of insight or other means; ii) selection: deciding which ideas are pursued as opportunities; and iii) retention: the ability to perpetuate the idea.

These three process stages (VSR: variation, selection, retention) are identifiable inside every organization that turns creative ideas into market innovations. It is important to recognize that threshold-level competency in all three VSR stages is critical to overall ideation performance; the "host environment" needs to be favorable internally. Entrepreneurial organizations are particularly adept at lowering the both the latency and cycle time of ideation, relative to established players. Thus, an organization may generate many ideas but be poor at selecting which ones to implement; alternatively they may demonstrate brilliant operational execution but have little creative capability to initiate the process.

When viewed this way, it becomes more apparent how firms may be creative, but not yet innovative, and this describes the pre-commercialization phase of any new venture. The impact of this difference is more than an academic label: an organization's priorities, activities, and structures must align with the appropriate life-stage objective. In other words: first creativity, then innovation. It is important that this transition be deliberate, overt, and in the right order. When a startup shifts gears from the exploratory towards the exploitative side of innovation, it is very difficult to support the risk and uncertainty associated with ongoing novel variations (Tushman and O'Reilly, 1996; Calif. Man. Rev. 38: 8-40). Ventures that transition to commercialization phases prematurely risk never establishing the ideation capabilities described earlier.

What is a Creative Person?

Many perceive individuals as "being creative" or not, citing outstanding examples such as Einstein or Picasso as possessing uniquely creative personalities. "Personalities" refer to a set of personal characteristics that uniquely influence one's cognitions, emotions, motivations, and behaviours in various situations. In summarizing the empirical findings over the previous 15 years, Barron and Harrington (1981; tinyurl.com/bow6bhc) reported a "fairly stable set of core characteristics" linked to creative achievement in many domains. These characteristics included high valuation of esthetic qualities in experience, broad interests, attraction to complexity, high energy, independence of judgment, autonomy, intuition, self-confidence, ability to resolve antinomies, and a firm sense of "being creative".

Many studies have attempted to establish links between creativity and personality attributes, particularly the Five Factor Model (Norman, 1963; tinyurl.com/ce3oqt5). Of the five factors, "openness to experience" is considered the most strongly linked to creativity (e.g., Shalley et al., 2004; tinyurl.com/bpcrpwd). McCrae (1987; tinyurl.com/ccatl6n), for example, tested and found consistent association between divergent-thinking-test measures and the openness to experience factor, but not the other four. "Openness" factors include traits of intellectual curiosity, originality, nonconforming, active imagination and aesthetic sensitivity, and preference for variety. Individuals high on the openness-to-experience dimension are considered broad minded, curious, and untraditional (Shalley et al., 2004; tinyurl.com/bpcrpwd).

Besides openness to experience, two other personal attributes have long been linked to creative ability: divergent thinking and cognitive style. Divergent thinking refers to an individual's fluency in generating original or "outside of the box" ideas (Guildford, 1950: tinyurl.com/c3uyztk; Torrance, 1974: tinyurl.com/cbtovpd). Cognitive style describes the way individuals think, per-

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ceive, and remember information; it also refers to a person's individual problem-solving and decision-making approaches, which are considered part of creative processes. Kirton's (1976; tinyurl.com/d854ysm) Adaptive-Innovation theory is one of the most popular cognitive style models applied to the investigation of creative problem solving. Kirton (1976; tinyurl.com/d854ysm) contended that everyone may be located on a continuum ranging from an "ability to do things better" (Adapters), to an "ability to do things differently" (Innovators). On one hand, Adaptors are characterized by precision, methodicalness, discipline and conformity; they rarely challenge rules. Innovators, on the other hand, are seen as undisciplined, tangential thinkers who often challenge rules and the status quo to develop new problem solutions (Kirton, 1976; tinyurl.com/d854ysm). In developing measures to evaluate cognitive flexibility, empirical studies have found support for the link between Kirton's Innovator style and creativity (Fleenor and Taylor, 1994; tinyurl.com/d9jd5rr). Although certain traits and cognitions have been linked to creativity in settings that support it, a unique "creativity trait" has never been discovered, however. For entrepreneurs, the right "creative person" for their team might require several means for detection.

Work Contexts and Confluence Theories of Creativity

In addition to the work environment, Amabile's (1983; tinyurl.com/c7ch7o2) componential theory of creativity identifies three individual characteristics that must be present for creative output: intrinsic motivation, domain-relevant skills, and creativity-relevant cognitive processes. Of these three, intrinsic motivation – considered to be the individual pursuit of tasks for its own sake – is considered critical to creative performance. Intrinsic motivation, as both a persistent trait and state, creates the drive to persist with difficult tasks, take risks, and overcome obstacles associated with introducing new things. According to Amabile, contextual variables, (e.g., leader support) are thought to affect creativity through their effect on intrinsic motivation. Domain-relevant skills refer to the expertise required to effect meaningful changes to domains, while creativity-relevant cognitive processes include divergent thinking ability, as well as decision-making styles discussed earlier.

Although personal traits may contribute to creative performance, creativity in organizations takes place in a work context, often in groups. The complex interaction of work-setting components serves to enhance or inhibit the contribution of individual factors; as Woodman, Sawyer, and Griffin (1993; tinyurl.com/bv7k2qg) put it:

> *"Individual creativity is a function of antecedent conditions (e.g., past reinforcement history, biographical variables), cognitive style and ability (e.g., divergent thinking, ideational fluency), personality factors (e.g., self-esteem, locus of control), relevant knowledge, motivation, social influences (e.g., social facilitation, social rewards), and contextual influences (e.g., physical environment, task and time constraints)."*

Sternberg (2006; tinyurl.com/c7rjd9q) emphasized that six distinct but interrelated resources are required, at least at threshold levels, in confluence for creativity: intellectual abilities, knowledge, styles of thinking, personality, motivation, and environment. In considering these factors, both Sternberg (2006; tinyurl.com/c7rjd9q) and Csikszentmihalyi (1999; tinyurl.com/bonozgt) point out that, in the end, creative contributors have options and make *deliberate* decisions about how their creativity is expressed. In other words, although individual traits are one component of creative output, creative actors themselves will alter or switch their environments to suit their needs. For entrepreneurs establishing a creative context, it is important to recognize three things: i) creative output is contingent upon a supportive work environment; ii) there are several contributing factors, but maintaining intrinsic motivation is key to individual outperformance; and iii) creative actors are decision makers and will not remain in place when the first two criteria are not met.

Putting the Research to Work

There are three broad contexts in which entrepreneurs interact with creativity: i) structuring a supportive work environment; ii) selecting appropriate team members; and iii) championing ideas externally. Recommendations for these contexts will be discussed in the following sub-sections.

Creative work environment

Although startup environments are often perceived as being highly creative, in practice the research suggests this is difficult to achieve without deliberate efforts to foster creativity. Entrepreneurs play a critical role in defining values and belief systems that form lasting cultural norms of their organizations. Many of the factors affecting creativity are within the span of control of an entrepreneur-leader in the early-formation stages of an organization, either by vision, goal, and context setting,

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or by careful selection of team members. The literature on work contexts that support creativity is extensive and can be distilled into prime factors of leader support for goal setting, autonomy, persistence, open exchange of diverse ideas, and reward systems that encourage experimentation and do not punish failures. The work environment has a well established impact on intrinsic motivation; extrinsic rewards (e.g., performance bonuses, promotions) have not been reliably shown to affect creative output. It is not difficult for organizations to inadvertently discourage creativity over time, particularly as priority shifts to commercialization, rather than ideation. As Steve Jobs has shown, entrepreneurs that embed creativity as a cultural value from the outset will be rewarded with the ability to consistently bring new ideas to market for many years to come.

Selecting team members for creativity

Forming effective early teams is an important task of entrepreneurs, and the raw materials of creative work are the workers themselves. Although researchers have linked various traits and capabilities to creative potential, the most consistent themes lie in dimensions of openness to new experiences, divergent thinking, intrinsic motivation, and cognitive style. These characteristics are unlikely to be hidden or nascent in adults, and even a simple conversation about past behaviors can be informative. For example, "open" people will likely be able to list new activities they have undertaken recently. Another person may have spent thousands of hours mastering a musical instrument or a project of their own, displaying the personal drive and tenacity associated with intrinsic motivation. In assessing divergent thinking, one established measure simply asks the subject to list as many uses as they can of a household object, such as a brick. Entrepreneurs may also consider using a simple and robust measure of cognitive style, Kirton's Adaption-Innovation Inventory (Kirton, 1976; tinyurl.com/d854ysm). This 32-item, self-reported questionnaire provides an indication of people's preferred approach to problem solving, and high-performing teams will likely benefit from a mix of adaptors and innovators. In work teams, such diversity has long been established as key to generating new approaches and avoiding "group think". The selection of team members or co-founders who hold differing views, and may not fit well with others, is a challenging but essential task for entrepreneurs.

Championing creativity

An effective entrepreneurial champion is able to gather resources in support of their vision and ideas (e.g., investment capital, team members), whereas a less capable one is not. Sternberg (2006; tinyurl.com/c7rjd9q), in his investment theory of creativity, described how entrepreneurs "buy ideas low and sell them high". Sternberg's argument is that virtually *all* creative ideas start out of favour, due to their required novelty and inherent delays in acceptance by the others in recognizing their usefulness and appropriateness. As new ideas gain acceptance in a field, their commercial value rises, at which point the entrepreneur is celebrated and in a position to "sell their idea high". In this way, entrepreneurs may be said to create new value from ideas.

It has been observed that not all creativity is valued, however. For instance, "creative accounting" commonly has a negative association with novelty, whereas "creative finance" might not. The routine and paradoxical rejection of ideas by those that espouse creativity as goal has interested researchers for some time. When people are motivated to reduce uncertainty, Mueller and colleagues (2012; tinyurl.com/bua5lqa) recently found empirical support for not only an implicit bias against creativity, but an impaired ability to recognize it. This may help entrepreneurs understand why their efforts to sell promising ideas may fail to win over financiers and team members who ought to support them.

In early stages, competencies in championing and promoting ideas are key to acquiring resources needed to turn them into market innovations. It is a myth that good ideas sell themselves, and without effective championing, even the best and most creative ones will inevitably remain in the starting blocks. It is the author's observation that many entrepreneurs have promising ideas, however they struggle in their efforts to champion them and need to be reminded of the consequences of this.

Conclusions

In this article, the author has provided actionable knowledge for entrepreneurs seeking to make use of creativity research. Creativity matters to entrepreneurs because not only must their initial ideas exhibit dimensions of novelty, usefulness, and appropriateness to justify firm formation, but the capacity to sustainably create commercial value from ideas must be demonstrated. There are many perspectives of creativity resulting from its inherent subjectivity, however this does not detract from the need for understanding how to foster it.

The author has distinguished between creativity as the production of ideas that are novel, useful and appropriate, and innovation: the successful commercialization

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of those ideas. Creativity may also be viewed as a judgment made by the field of gatekeepers within domains (i.e., structured knowledge systems that constitute existing knowledge). One test of creativity is to consider whether a lasting change to a domain has been made; the context of initiating change and new value provides a direct link to entrepreneurship.

Three recommendations are provided for entrepreneurs. Firstly, entrepreneurs must ensure their new ventures value and consequently provide deep cultural support for creativity. This requires leaders to create environments that promote the generation, selection, and retention of ideas, while not punishing failed attempts. Secondly, the research provides guidance to entrepreneurs in selecting team members with characteristics linked to creativity (i.e., primarily openness to experience, intrinsic motivation, divergent thinking, and a cognitive style that favours innovation over adaption). Lastly, entrepreneurs are reminded of their critical role in effectively championing ideas, a capability that ensures ideas get what they need to become worthy innovations.

Recommended Reading

- How to Kill Creativity
  (Amabile, 1998; tinyurl.com/2v2yjyd)

- Creativity in Organizations: Facilitators and Inhibitors
  (Soriano de Alencar, 2012; tinyurl.com/cx74bfx)

- Creativity as an Investment
  (Sternberg et al., 1997; Calif. Man. Rev. 40(1): 8-20)

About the Author

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Creating Tomorrow's Global Entrepreneurs: A Case Study of the Stu Clark Centre for Entrepreneurship

Malcolm C. Smith and Mavis McRae

> *"When I went to university, we didn't have these opportunities. We just took 'regular' business courses and then, when we started a business, we learned from the School of Hard Knocks."*
>
> Stu Clark
> Entrepreneur and Philanthropist

This article presents a case study of the University of Manitoba's Stu Clark Centre for Entrepreneurship. The Centre provides experiential entrepreneurial training for youth as well as undergraduate and MBA students. The article describes the various programs the Centre is involved with both locally and internationally. These include preparing students for investment competitions, entrepreneurship day camps for at-risk youth, undergraduate entrepreneurship student exchange, and national and international training of entrepreneurship teachers.

Introduction

The Stu Clark Centre for Entrepreneurship (hereafter referred to as "the Centre") is housed in the I.H. Asper School of Business' Department of Marketing at the University of Manitoba in Winnipeg, Canada (see Figure 1). Its major focus is to encourage the development of new businesses and global entrepreneurship thinking among young adults and youth by encouraging them to consider entrepreneurship as their life's calling. Thus, the Centre's mission is to create a new breed of entrepreneurs by means of experiential education. This article discusses the successful programs developed and implemented at this major Canadian business school to foster and promote entrepreneurship at local, national, and international levels among youth and young adults. The article also shares some of the challenges faced and lessons learned by the Centre.

Background

The Stu Clark Centre (umanitoba.ca/entrepreneur/) was founded in 1989 as the Asper Centre for Entrepreneurship and renamed the Stu Clark Centre for Entrepreneurship in 2008 in recognition of Mr. Stu Clark, a successful entrepreneur alumnus of the University of Manitoba, who made a major financial gift to support the Centre. While the mission of the Centre is to provide general entrepreneurship training, the Centre has two major foci: i) developing entrepreneurs on a local/national level and ii) developing entrepreneurs on an international level. The first focus fulfils the desires of the founder of the Centre, Mr. Israel Asper, and the namesake/benefactor, Mr. Stu Clark who both wished to have entrepreneurship courses offered in the Business School's curriculum and to the local/national community since they did not have the opportunity to have such formal training. Subsequently, sponsorship funds are directed to encourage entrepreneurship a career choice for university students and youth in the province of Manitoba. The second focus follows one of the University of Manitoba's directives, which is international collaboration. While the I.H. Asper School of Business had various international initiatives, the Centre's activities in the international arena include partnering with universities outside Canada as well as aiding in the training of entrepreneurs in developing countries, as will be discussed later in this article.

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Figure 1. The Stu Clark Centre for Entrepreneurship

The Centre operates with an Executive Director and up to four staff members. Students involved with the Centre are mentored by a local Entrepreneur-in-Residence. Additionally, two successful entrepreneurs from the United States act as International Entrepreneurs-in-Residence. They visit the Centre two times each year and spend time advising students and speaking with the local business community. The Centre has an Advisory Board consisting of local and international entrepreneurs, faculty members from the Asper School of Business and four international universities, and major funders who support the Centre financially.

With a budget of approximately $800,000, the Stu Clark Centre for Entrepreneurship currently supports a variety of national and international programs aimed at youth as well as university students and adults. The Centre's major programs are described below.

Business Planning Development and Business Plan Competitions

International competitions
Each year, the Stu Clark Centre guides undergraduate and MBA student teams in preparing a business plan for a new enterprise and some teams go on to compete in local and international investment competitions. Students develop their business plans during the Fall Semester in their "New Venture Analysis" course and the students who develop the top-ranked plans go on to represent the Stu Clark Centre and the University of Manitoba at the investment competitions, which usually take place from February through May. Many of these competitions are held in the United States (e.g., Atlanta, GA; Cincinnati, OH; Louisville, KY; Portland, OR), but some are hosted by universities in such countries as Brazil, Hong Kong, and Thailand. Judges for these competitions are typically successful venture capitalists and angel investors. The business plans are for a wide variety of ventures, but an emphasis is placed on startups for high-technology initiatives. The ideas for these specific startups have often come from the local scientific business community such as the Winnipeg National Research Council office. The teams are coached by staff members and the local and international Entrepreneurs-in-Residence who have experience in launching high-tech companies.

Since the Centre began participating in these events, its students have won 48 first-place finishes at competitions in Europe, Asia, South America, and across North America. In doing so, the student teams have won in excess of $1 million in cash and in-kind prizes. Perhaps more importantly, over 30 businesses have been launched by our student teams based on these business plans, which employ over 500 people and they have raised in excess of $30 million. Examples of successful startups that have sprung from the Stu Clark Centre are NovaDAQ Medical Technologies (novadaq.com) and CrackBerry (crackberry.com). The complete story of CrackBerry can be found at crackberry.com/crack-team.

The Stu Clark Venture Challenge
In 2004, the Centre launched its own investment competition – the Stu Clark Investment Competition (tinyurl.com/cd9tebp) – which takes place at the end of March each year and has attracted teams from Canada, the USA, Brazil, and Thailand. This competition consists of a tradeshow, an "elevator pitch" competition and the formal presentation and defense of business plans. Grand winners of the Stu Clark Investment Competition gain a place in the Venture Lab Investment Competition (formerly MOOT Corp. Global Competition), which is considered the "Super Bowl" of business planning competitions. Past winners have also been invited to close NASDAQ in New York City in the late summer.

Nicol Entrepreneurial Award Competition
The Stu Clark Centre annually participates in the Nicol Entrepreneurial Award Competition (nicol-award.com), which is a Canada-wide entrepreneurship competition

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founded by Wes Nicol for university undergraduate students from any discipline. The competition requires individuals to present a business plan to a panel of judges which is video-taped. Students from Engineering, Arts, Architecture, and Business have participated in the past at the University of Manitoba. The winner of this local competition has their business plan and video forwarded as a national semi-finalist and the videos are reviewed by a panel to select the six national finalists. Finalists travel to Ottawa, Canada to present and defend their plans in front of a panel of judges.

Manitoba High School Business Plan Competition

The Stu Clark Centre also hosts the Manitoba High School Investment Competition (tinyurl.com/csqk9wz), which is held at the end of April each year and is open to any secondary school student in the province. As individuals or in teams of up to three, students present business plans, participate in a tradeshow, and give an elevator pitch of their new business idea. The winner(s) receive a $2000 scholarship for post-secondary education at any business program offered in Manitoba.

Entrepreneurship Education for Youth

Since 1998, the Centre has run summer entrepreneur "day camps" at the Asper School of Business aimed at youth who are at risk. These camps are offered free of charge to the participants and include transportation to and from the university and lunch each day (funded by sponsors).

Prior to 2011, these camps were known as the Curry BizCamp in Entrepreneurship and were offered for two age groups. The first group was Winnipeg youth aged 12 to 14 years old. This group's one-week camp involved lessons on how to start and run a small business. The camp also included an experiential exercise in which students were given start-up money to purchase materials to make arts-and-crafts products. These products were then sold at a local outdoor market and the students were allowed to keep their profits (see Figure 2). As a final exercise, the students gave presentations about what they had learned from this endeavor.

The second age group included 15 to 18 year-olds who participated in a two-week day camp. These students were not only taught the fundamentals of starting a small business, but also how to develop a business plan. They were coached on presentation skills and were then required to present their business plan to a panel of local judges, and winners received a cash prize. The end of the camp culminated with an official graduation ceremony where certificates of participation were presented to each student.

Figure 2. BizCamp students selling their wares

In 2011, the format of the day camp was changed, as well as the name. Now called the "New Venture Adventure" (tinyurl.com/blpyynv), the day camp is for 10 to 12 year olds. Camp participants learn how to be true entrepreneurs through a variety of activities and classroom lessons, and they have a chance to create their own retail business. This camp (as well as the former BizCamp) is taught by locally trained entrepreneurship instructors at the Asper School of Business during the summer vacation. The young students cover basic marketing, opportunity recognition, break-even analysis, presentation skills, and learning what it takes to be an entrepreneur. This is done via formal classes and exercises, class trips, and guest speakers from the local business community. Students from the New Venture Adventure camp also develop and present a business plan. They then participate in a sales competition that begins with students receiving a small cash base to invest in their business idea. The students then go en masse to a large retail outlet where they purchase supplies with their investment funds. After returning to the business school, the students "manufacture" their products (e.g., jewelry, greeting cards, picture frames), which they then sell to the public. As an incentive, they are allowed to keep their profits. The program also involves a retail evaluation exercise where the students travel to a local shopping mall and compare and evaluate different types of retail outlets ranging from large department stores to small independent operations.

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North American Mobility Program for Undergraduate Business Students

The Stu Clark Centre is part of the North American Mobility Program in Higher Education (tinyurl.com/d6dwgbm) is a consortium of North American business schools that exchange undergraduate business students for a semester. Two universities from Canada (University of Manitoba and Laurentian University), two from the USA (University of North Dakota and the State University of New York at Plattsburg), and two from Mexico (Guadalajara and Nuevo León) are participating in this project. The Mobility Program began in 2011 and is funded by a grant from Human Resources and Skills Development Canada (HRSDC).

The purpose of this program is to further develop students' professional mobility by acquiring the skill sets, experiences, and knowledge base necessary to understand, analyze, develop models for, and practice entrepreneurship in Canadian, Mexican, or US markets. As part of this program, the exchange students take undergraduate courses in product planning and development, new venture analysis, and other entrepreneurship courses at their home and host universities. In doing so, the students not only learn about doing business and living in other cultures, but they also make valuable contacts around North America.

During the Fall 2011 Semester, 11 students from the Asper School of Business, the United States, and Mexico participated in the Mobility Program at the University of Manitoba. A highlight of the semester was the "New Product Planning and Development Tradeshow" where groups consisting of students from a mix of the participating universities presented their ideas for a new product launch in a tradeshow format (see Figure 3). This was held in conjunction with a faculty symposium attended by seven professors from the American and Mexican partner universities. Students from each institution will be eligible to go on exchange to the other member universities for the next three years.

International Partners

The Stu Clark Centre partners with various universities from around the world. In doing so, the Centre exchanges program ideas and best practices with its partners. Past and present partners include universities from the United States (e.g., University of Michigan, University of Oregon, Rice University, University of Texas at Austin), Ireland (Queen's College Belfast), France (Groupe ESC Troyes), Brazil (Fundacao Getulio Vargas), Japan (Akita University), and the Philippines (De La Salle University).

Figure 3. Participants in a North American Mobility tradeshow

Training of Entrepreneur Teachers

As part of the Paul Martin Aboriginal Education Initiative (maei-ieam.ca), the Stu Clark Centre also participates as a site for teacher training in entrepreneurship. Three times per year, secondary school teachers from across Canada come to Winnipeg to be trained over four days on how to teach the typical secondary-school curriculum in entrepreneurship. Teachers who participate in this program must come from a school where there is a large aboriginal student enrolment. The goal of the Paul Martin Aboriginal Education Initiative is to encourage aboriginal students to continue their education and to provide them with the skills to start their own business.

International Outreach

On an international scale, the Stu Clark Centre sends specially trained instructors to international locations to train local adults to become teachers of entrepreneurship. The Canadian Trade Commissioner Service (TCS MANIL) in Manila, Philippines identified a need to conduct training in entrepreneurship for the indigenous people of the Philippines who are located in areas hosting mining companies. The TCS contacted the Centre about introducing the Curry BizCamp in

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Entrepreneurship program to the Philippines, specifically to help the indigenous people develop their business interests to create sustainable economic plans, for now and after the mines are exhausted. The Philippine BizCamp project, with support from TCS MANIL and the Centre, was launched in September 2010.

The first step in bringing BizCamp to the Philippines was a "Train the Trainers" workshop that created a pool of 21 certified BizCamp trainers (see Figure 4). This session was delivered by the Executive Director of the Centre and a Manitoba teacher certified to train new trainers. The newly graduated BizCamp instructors then conducted a three-week pilot run of the Philippine BizCamp. Three mining project sites located in Mindanao's Caraga regions were chosen to host the pilot BizCamps. Participants involved 30 members of the Mamanwa and Manobo tribes of varying ages and educational backgrounds. The trainers held the first two weeks of classes at the mine sites where participants learned about business basics, spoke with local entrepreneurs, and toured various businesses. The final week brought the three groups together in Surigao City where they prepared their business plans, met with coaches and received feedback, and conducted market research outside their home territory at the local public market. The groups presented their business ideas to a panel of volunteer judges from the business, financial, and mining sectors. Business plans included retail products based on their traditional tribal beadworks, tilapia fish farming, ginger farming, and handicrafts making use of indigenous water lily and romblom grass. Three teams proceeded to the final round of the competition where they presented their plans in front of an audience of over 100 family and friends as well as business and government representatives.

The highlight and reward for the participants' efforts was the opportunity to "graduate" from the BizCamp program wearing graduation gowns and caps to a traditional graduation ceremony in the presence of family, friends, and the business community. This highly emotional event represented the first time many of the indigenous people had participated in a graduation ceremony, since most of them never finished high school (See Figure 5).

Many additional success stories emerged from the event. During the market research trip to Surigao public market, five of the nine teams secured initial orders for their product. This expanded the teams' market reach to bring in revenue from outside their community. The tilapia team expanded their product ideas from growing and selling whole fish to value-added products such as fish balls and smoked fish, and they eventually secured angel financing for their business. The ginger farming team acquired start-up capital from the tribal chiefs who attended the business plan presentation. The pilot project was considered a success and the future expansion of Philippine BizCamp is now under development.

Figure 4. Philippine BizCamp Trainers with their Canadian instructor

Figure 5. Graduates of the Phillipine BizCamp

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As a result of the success of this program, the Canadian Trade Commission expressed interest in developing a similar program in Vietnam and similar teacher training took place there in February, 2012.

Lessons Learned

While the Stu Clark Centre for Entrepreneurship has had success on many fronts since its foundation in 1989, this has not come without challenges which vary from year to year.

In particular, sustained sponsorship for the youth day camps is a challenge. Many sponsors want to see tracking of success such as the number of "graduates" of these programs who go on to be entrepreneurs. Tracking of this age group is nearly impossible since many do not keep in touch with the Centre or do not respond to attempts to track their education or career choices. Many of the participants of summer day camps are from lower-income families who tend to move quite often. This makes tracking of past participants even more difficult. Additionally, privacy issues can impede the reporting of any successes to donors unless the participants grant permission the Centre to release information about them. For some programs, there is over demand and the sponsorship funds are not sufficient to allow all applicants to participate.

The Centre faces additional challenges with the formation of new teams each year to compete in the international business plan competitions. Student numbers and skills vary from year to year. Thus, a large pool of candidates with not only the ability but also the dedication and willingness to commit time and effort on top of their regular studies is ideal, but not always available.

Furthermore, finding "investible" ideas for business plan development is always a challenge in the city of Winnipeg and the Manitoba community. It is essential to have an "investment-worthy" idea (i.e., one that would be sustainable or applicable to a large market) as opposed to a "small-business" idea. Judges at the competitions are often angel investors, venture capitalists and investment bankers who are looking for high rates of return. The best potential businesses for these competitions tend to be in the high-technology area. Subsequently, much time and effort is required from the Centre's staff to seek out these business opportunities before the preparatory course begins in the fall semester. Often, the ideas for new businesses come from the University of Manitoba's Intellectual Property Office or the local scientific community.

Conclusion

Through its various endeavors, the Stu Clark Centre carries out its goal of encouraging the development of new businesses and global entrepreneurship. It does so not only by training youth and students to develop new businesses, but the Centre also facilitates exchange of university entrepreneurship students as well as national and international training of teachers of entrepreneurship. While its accomplishments have come with challenges, its success to date can be measured in terms of the number of competitions its teams have won, the number of businesses that have been started as a result of its training programs, and the accomplishment of training teachers of entrepreneurship in the Philippines and Vietnam in addition to those trained in Canada.

There is a growing need for entrepreneurs – on both a local and international scale. The Stu Clark Centre for Entrepreneurship looks forward to continuing to play a role in creating tomorrow's global entrepreneurs.

About the Authors

Malcolm Smith is the Head of the Department of Marketing at the University of Manitoba's I.H. Asper School of Business. From 1999-2004, Dr. Smith was Associate Dean (Research and Graduate Programs) in the Asper School. He has been a visiting professor at universities in the Ukraine, Taipei, Bangkok, and Oregon, USA. Dr. Smith was also the Director of the Asper School's International Student Exchange Program from 2004-2007. Dr. Smith received his BScH and MBA from Queen's University and his PhD from the University of Oregon. His research has been presented at numerous national and international conferences and published in various journals.

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Malcolm C. Smith and Mavis McRae

About the Authors (Continued)

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Process Ambidexterity for IT Entrepreneurship

Sonia D. Bot and Paul E. Renaud

> *"If everything is under control, you're going too slow."*
> Mario Andretti
> Retired world champion racing driver

All firms use information technology (IT). Larger firms have information technology organizations whose business function is to supply and manage IT infrastructure and applications to support business needs for IT. While some firms have chosen to outsource the IT function, the majority rely on an internal IT organization that is focused on running the IT infrastructure and optimizing IT operations and applications by exploiting technology improvements over time. Most IT organizations have little capacity to carry out transformational initiatives because they are focused on incremental improvements needed to run the business. As the global economy contracts, growing cost pressure on firms escalates the need for the IT function to behave in a more entrepreneurial manner that accelerates the availability of new technological solutions to enhance productivity and lower cost of doing business.

This article provides a process-based perspective for understanding and addressing an IT function's ability to implement entrepreneurial practices that better align the IT function to business functions. This is done by developing the capability of process ambidexterity. Improving an IT organization's entrepreneurial ability results in improved productivity, shorter time to market, and lower operational costs – as validated by recent practice with major firms in the USA. Developing process ambidexterity in the IT function benefits those who govern IT, the executives who lead IT, as well as their peers in the business functions that depend on IT.

Introduction

Bot (2012; timreview.ca/article/547) described a process-based perspective to balancing mainstream exploitation and new-stream exploration in the management of innovation-based technology firms. The resulting capability is known as process ambidexterity and requires disciplined, agile, and lean business management.

Building upon the definition proposed by Lee and colleagues (2009; tinyurl.com/9lxgjjt) and Bot (2012; timreview.ca/article/547), *process ambidexterity* is a firm's capability for utilizing both process alignment and process adaptability. *Process alignment* deals with rigour, discipline, consistency, and maturity of the processes. *Process adaptability* deals with agility, responsiveness, flexibility, and customization of the processes.

This article examines how the concepts of process ambidexterity can be applied to the IT function within a firm whose broad mandate is to provide businesses with applications and core infrastructure resources that enable their firm's business strategy and execution. This includes automating business processes, capturing customer transactions, synthesizing and providing information to support decision making, and promoting productivity and collaboration. This article uses the terminology of "business value chains", "business functions", and "business activities" established by Porter (1985; tinyurl.com/8ul8upn).

Most IT organizations have optimized themselves for *operations* (that is, *Running the Firm*) but not for *change* (that is, *Transforming the Firm*). They are primarily focused on the supply chain of technology (*IT*

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Supply) at the expense of the differences in need for technology across the firm's business value chains (*Business Demand*). This is evident in how the IT function is organized, which is typically silo-oriented around technological domains such as data centre operations, networks, storage, computing, and applications. These internal IT groups focus on technology evolution and engineering related to incremental technology advancement in which "change" is limited to change-management practices intended to reduce the risk of upgrades to existing technologies. Consequently, transformational change is often introduced by end users who force technological innovation onto a reluctant IT organization; examples over time include: microcomputers, desktop productivity applications, business intelligence tools, websites, smartphones, and tablets. IT organizations in many cases have little capacity, no experience, and no processes to innovate and lead transformational change on their own.

This article considers how mainstream exploitation and entrepreneurial exploration apply to the IT function of firms. Exploratory practices support entrepreneurship when they are customer facing and value seeking. The balanced application of both exploitative and exploratory approaches to managing IT introduces a new entrepreneurial aspect within firms of all sizes – regardless of whether the firm as a whole might be characterized as mainstream or entrepreneurial. In other words, it is possible for the IT function of a firm to acquire the advantages of an entrepreneurial approach even if the firm itself is a large well-established, mainstream business or government agency.

Entrepreneurship in IT requires processes for managing Business Demand by aligning to the firm's priorities and for exploring new ways of satisfying that demand. Process ambidexterity is introduced along with supporting mechanisms as a means to achieve balance between exploitation and exploration, and thus foster IT entrepreneurship.

The benefits of this approach were validated in practice with large firms such as Sprint, Morgan Stanley, and Wachovia/Wells Fargo (Bishop, 2009; tinyurl.com/8zvljsk). The resulting improvement from employing entrepreneurial practices include improved productivity, shortened time to market, increased revenue, and lowered overall operational costs. As an example, applying process ambidexterity principles at Wachovia's investment bank led to significantly improved service levels at half the ongoing cost of IT delivery. The introduction of new innovations were transformational to that firm; for example, introducing the capability for real-time calculation of intra-day trade risks enabled Wachovia to cost-effectively offer new products based on a wide variety of derivative combinations of equity and debt securities.

Mainstream Exploitation and New-Stream Exploration in IT

Exploitation is fundamentally about utilizing what you already have in an incremental, progressive, and stepwise manner (Table 1). In an IT context, *mainstream exploitation* refers to the evolution of the existing infrastructure and applications that service the current needs of the firm. There are many well-established IT processes and standards for mainstream exploitation such as ITIL (tinyurl.com/mukhg), COBIT (tinyurl.com/cthkvgk), and the Enhanced TMN Operational Model (eTOM; tinyurl.com/yctfjk7), as well as best practices recommended by major IT vendors. IT organizations use these processes to exploit what they already know and the resources they already have to make existing situations systematically better. Progress is sequential, predictable, and evolutionary but cannot be transformational since the future is a linear projection of the past.

Exploration is fundamentally about experiential discovery of discontinuous opportunities by researching what IT organizations do not know about the technologies they do not yet have, to see if they should acquire them (Table 1). In an IT context, *new-stream exploration* refers to the entrepreneurial practice of new-technology adoption intended to enable new business activities or to transform the delivery of existing activities beyond the limitations of currently deployed IT solutions. IT organizations pursue an iterative, trial-and-error approach to learning more about what they do not yet know, to determine whether new ways or technologies should be pursued. This approach leads to transformational change since the future is not necessarily limited by the past.

When relying only on an exploitative approach, the bar is never set high enough for the result to be transformational to the firm. Few IT organizations are able to strike a balance between exploitation and exploration because IT managers are incented to ensure that the infrastructure for running the business is reliable and low risk. Aggressive objectives and high-risk strategies are not encouraged by the culture of most IT organizations.

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Table 1. Characteristics of mainstream exploitative IT and new-stream exploratory IT*

Dimension	Operational IT (Mainstream Exploitation)	Entrepreneurial IT (New-stream Exploration)
Strategic Intent	Running organization efficiently	Enabling transformation, changing cost structure
Alignment	IT Supply Chain	Business Value Chain
Management Goal	Keep business running	Cost-effective business impact
Investment Focus	Advancing current technologies, serving current customers	Exploring new, emerging technologies, enabling new business activities
Key Metrics	IT effectiveness and efficiency	Return on IT investment
Critical Tasks	Operations, efficiency, incremental innovation, refinement	Adaptability, new IT solutions, breakthrough innovation, meeting unmet needs
Competencies	Operational, change management	Entrepreneurial, risk management
Structure	Formal, procedural	Adaptive, outcome-driven
Controls & Rewards	Operational expenditures, service delivery	Capital expenditures, productivity
Culture	Efficiency, low risk, quality, operations	Speed, flexibility, experimentation, projects
Employee Skills	Refine current skills and capabilities	Develop entirely new skills
Leadership role	Authoritative, protective	Visionary, involved

*Adapted from Bot (2012; timreview.ca/article/547), O'Reilly and Tushman (2004; tinyurl.com/cj6arfy), and Morris et al. (2010; tinyurl.com/cesk9lz).

Not surprisingly, most IT resources are devoted to operation, maintenance, and support, that is, the smooth running of the existing environment, with the balance dedicated to exploitative projects intended to remove the known problems in the firm's computing experience. This is accompanied by extensive processes for operational IT such as change management, problem management, and service management. By contrast, most IT organizations lack resources to explore new technologies and few have processes for aligning with or responding to the changing needs of the firm. New-technology introduction projects are usually "wild cat" with few constraints and no metrics, and they are rarely repeatable.

For example, during the 1980s, most IT organizations pursued exploitation of minicomputer and mainframe-based timesharing. Meanwhile, end-user business units explored the use of PCs and forced many IT organizations to respond to the transformational opportunities that network-based computing offered. History repeated itself with Internet-enabled computing in the 1990s and again with smartphone/tablet computing in the current millennium. These are all examples of transformations led by entrepreneurial users adopting technology ahead of their IT organizations.

Both lack of alignment and poor adaptation of processes are intrinsic sources of the imbalance between

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mainstream exploitation and entrepreneurial exploration, where exploitation trumps exploration in practice. Process ambidexterity is a capability that is essential for breaking out of this patterned behaviour.

Process Ambidexterity to Achieve Balance

Process ambidexterity requires disciplined, agile, and lean management. Below and in Figure 1, five mechanisms that managers can use to achieve balance through process ambidexterity in an IT context are presented. These mechanism are adapted from Bot (2012; timreview.ca/article/547) and are based on best practices as well as applying academic theory to an IT context. These mechanisms are:

i. Business-aligned IT governance that includes a process for balancing the Business Demand with the IT Supply

ii. Key performance indicators (KPIs) and balanced scorecards
   a. Top level: demand management
   b. Sub-level: supply management
   c. Sub-level: capability management

iii. IT management and processes based on a process-management control system

iv. Disciplined improvement

v. Organizational structure and leadership

Figure 1 also depicts a process ambidexterity framework with three components:

1. Demand management involves understanding business requirements so that IT can be best aligned to fulfill them. The inherent trade-off between control and growth must be evaluated for each business function with different outcomes possible for different business functions. In times of positive or negative economic stress on the business, managing demand requires greater emphasis on transformational change, such as using technology to lower the delivery cost of business services.

2. *Supply management* involves ongoing engineering, optimization, and operation of the existing IT supply chain of resources (e.g., networks, storage, systems, applications), in short, everything required to keep the business running.

3. *Capability management* involves proactive management of the people, processes, and technical capabilities and competencies required to support the components described above. IT has diverse technical specialities as well as business analytic, project management, risk management, contracting, and financial skills. In large firms, IT must manage these capabilities globally, encompassing many regulations, labour laws, and social customs.

These three components are measured by KPIs and are reported via "balanced scorecards" that are layered. At the top level, KPIs for demand management focus on business priorities and ensure alignment of IT investment decisions with the needs of the firm. At the sub-levels, KPIs for supply management measure process performance to ensure IT process effectiveness, and KPIs for capability management address IT process maturity.

These KPIs focus on what is important and signal what is not working. They identify performance gaps, which can then be prioritized into disciplined improvement initiatives. The outcomes of improvement initiatives are measureable and are reflected in balanced scorecards. Throughout this cycle, organizational structure, leadership, and capability maturity require accountability based on clear ownership, commitment, and competencies.

Business-aligned IT governance

In the post-Enron era, IT governance became increasingly formalized with elaborate risk management, process standards, and control frameworks (e.g., COBIT, ITIL, ISO 17799). It is widely accepted that effective governance is not merely about compliance with controls, but also the creation of a culture that improves enterprise-wide decision making (including risk management) and the transparency of decision-making processes.

Improving decision making in IT is synonymous with improving alignment between business objectives and IT planning. The importance of aligning IT to business strategy is well established (Henderson and Venkatraman, 1993; tinyurl.com/8j7kd4a). Strategic alignment-assessment models, such as those by Luftman and colleagues (2000: Comm. of Austral. Info. Soc., Vol 4; 1999: tinyurl.com/8r24c2q), focus on which elements of business and IT should be aligned and how maturity might be ascertained. A critical success factor for IT governance is ensuring that IT is and remains aligned to the needs of

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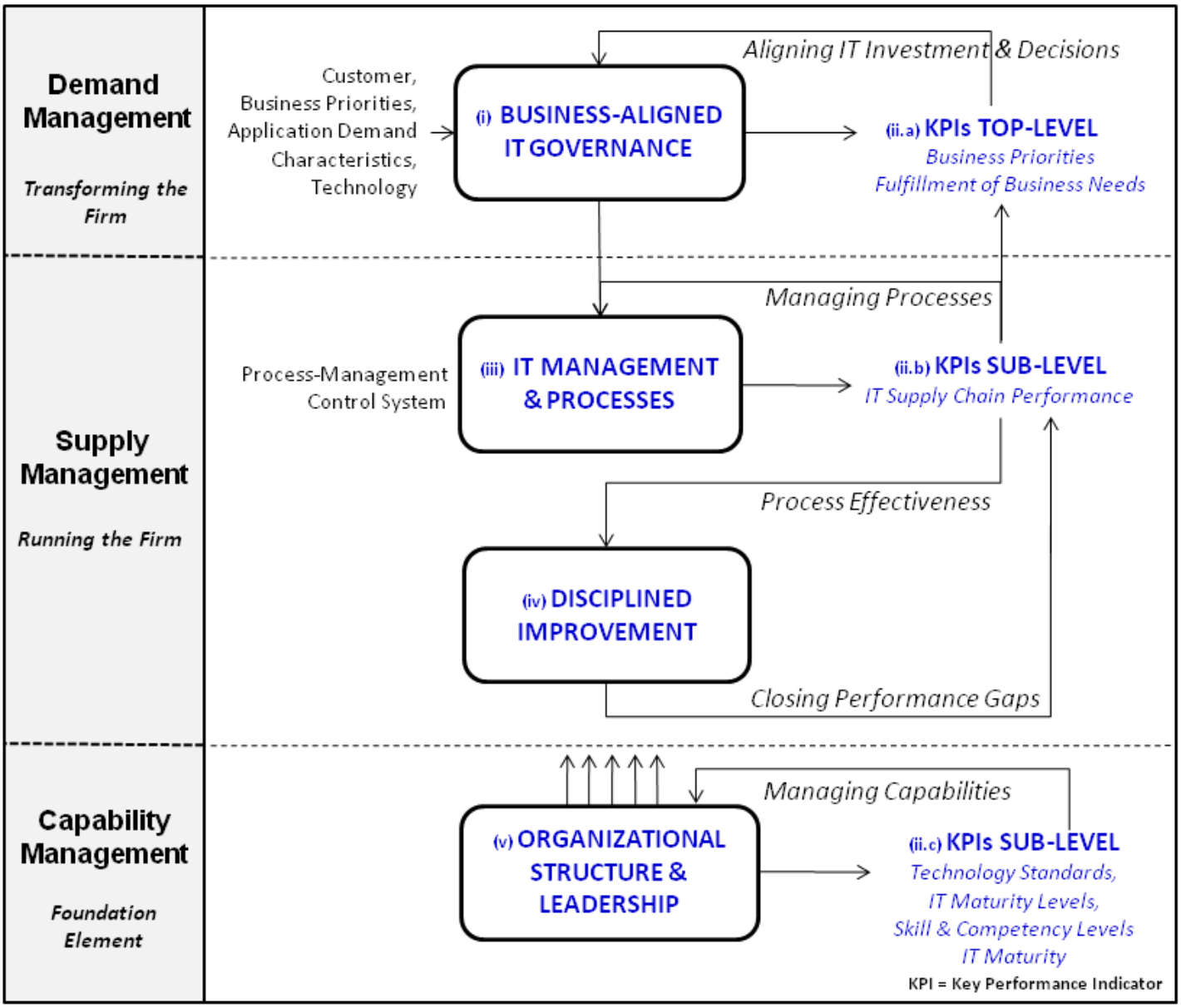

Figure 1. Process ambidexterity mechanisms for IT

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the business it serves (De Haes and Van Grembergen, 2004; tinyurl.com/8grjjow). It is also recognized that this cannot be achieved via structural alignment, but requires a dynamic approach to alignment (Leonard, 2008; tinyurl.com/8vphe6c).

In practice, aligning IT to the needs of the firm is difficult because both IT budgets and resources are finite and are always less than Business Demand. Needs must be understood and prioritized, investment trade-offs must be evaluated and weighed against existing initiatives, service level objectives must be negotiated, and transition roadmaps must be aligned to respond in time to support business initiatives. IT issues that become more pronounced with the size of the firm include:

- balancing the need for increased control by the IT function and greater business flexibility within business functions
- maintaining the degree of control required by corporate governance policies
- ensuring that the allocation of infrastructure is commensurate with changes to business priorities (which may require rebalancing resources)

Any dynamic approach to business alignment must be rooted in the processes for governing the IT function. While business-aligned governance of IT may be done informally in some IT organizations, it is not done at all in many, and very few have well-defined processes for ensuring business alignment such as profiling business demand by business function, mapping usage patterns, and a system of KPIs for predicting and assessing alternative IT outcomes.

The IT priorities of a firm will vary greatly by business function – even within the same business value chain. IT alignment is maximized by using a profile of Business Demand by business function because the inherent trade-off between control and flexibility can be evaluated differently for different business functions. Some functions (such as accounting) may require very tight control and a low-risk computing environment characterized by high-availability computing clusters, while others (such as sales) may require more flexibility in using new technologies for messaging, collaboration, and mobility. IT governance that allows for variation by business function can transcend these differences while maintaining a common governance framework and ensuring that the consumption of resources by business function is aligned to investment priorities for each function.

Key performance indicators and balanced scorecards

The advantages to linking balanced scorecards for managing business objectives to a balanced scorecard for IT has been proven (Van Grembergen, et al., 2003; tinyurl.com/8d84del). Process alignment can be further improved by adding an adaptive process for maintaining strategic IT alignment that is measured by top-level KPIs that focus on demand management. These KPIs must measure: i) enablement of business priorities (IT Strategic Balanced Scorecard); ii) alignment to user requirements (IT Development Balanced Scorecard); and iii) satisfaction of service-level objectives (IT Operational Balanced Scorecard).

Any balanced scorecard for organizing top-level IT KPIs must encompass all three areas and be defined in business terms that are anchored in business priorities. For example, IT must always be cost-effective. Yet, this would not be a top-level KPI unless there was an overall business priority to reduce costs – for example, a bank might improve its capital ratio by mandating a cost-takedown in IT since profit is the cheapest form of capital and IT cost savings go straight to the bottom line – or a specific business function might need to lower its spending on IT. In the absence of a business-driven priority, the KPI would be a sub-level indicator of process performance.

Sub-level indicators for supply management are anchored in process performance and are based on IT planning, development and engineering, and operations. Since each of these areas is implemented by processes that require specific technologies, skills, and competencies, these KPIs are supported by another set of KPIs focusing on capability management and relate to the maturity level of IT capabilities (i.e., people, processes, and technical capabilities). For example, IT operations includes processes for systems monitoring, problem management, and change management and each of these requires distinct technology (e.g., tools such as monitoring systems, diagnostic and recovery aids, trouble ticket management systems) and skills ranging across clerical to technical to managerial.

IT management and processes based on a process-management control system

A process-management control system is the foundation for managing processes (e.g., alignment, adaptabil-

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ity, and performance to targets), focusing improvements, and sustaining the gains realized from improvement efforts. This system is based on the continual measurement of process performance (using KPIs and balanced scorecards) against critical business and customer requirements (Bot, 2012; timreview.ca/article/547).

A process-management control system is comprised of:

1. A process owner who is accountable for the governance, performance, and maintenance of the process.

2. Process documentation, including process inputs, outputs, flow, decisions, and roles.

3. KPIs mapped directly to specific process steps with predictive and outcome indicators.

4. Specific monitoring actions and accountabilities for process performance.

While there are many IT process frameworks, such as COBIT, ITIL, and eTOM, the lack of exploratory processes is significant in all these major frameworks, which all focus on the exploitative aspects. From an entrepreneurial perspective, missing exploratory processes include demand profiling, solution integration, IT product management, new technology assessment, and new product introduction.

Disciplined improvement

Improvement initiatives must be approached in a systematic and disciplined manner if they are to succeed. Otherwise, organizations get stuck in a cycle, known as the "capability trap" (Repenning et al., 2001; tinyurl.com/bcr6cw), where they spin for years with ample goodwill to improve (yet not achieve) performance results. Typically, these efforts are not successful because they fail to consider the dynamics of the end-to-end process and identify true root causes. Methodologies that overcome the capability trap by supporting disciplined improvement include Lean, Six Sigma, Design for Six Sigma, and Kaizen (Bot, 2012; timreview.ca/article/547).

These methodologies are widely applied to the exploitative processes in IT. For example, many have adopted some form of Lean in application development (typically Agile methodologies) and in the management of data centres (for example, the Power Usage Effectiveness methodology). Six Sigma and Design for Six Sigma are encountered in problem and change management processes within IT. However, their application to IT exploration is in its infancy.

Organizational structure and leadership

According to O'Reilly and Tushman (2004; tinyurl.com/cj6arfy), traditional organizational structures impede the balance between exploration and exploitation initiatives. They describe the ideal ambidextrous organization where exploitative and exploratory teams are independent units in which each team has its own processes, structures, and cultures. When integrated into the same senior-management hierarchy, an ambidextrous organization can excel in supporting both exploratory and exploitive initiatives as long as the senior team is committed to operating ambidextrously, even if they are not ambidextrous themselves.

An ambidextrous IT organization can be implemented by making the CTO group responsible for all IT exploratory and exploitative processes including demand profiling, product management, technology introduction, standardization, and engineering. From a governance perspective, the CTO becomes the process owner for demand management. This separates operational IT from entrepreneurial IT practices, and further balance between exploitative and exploratory processes can be achieved by separating different teams within the CTO organization. Operations staff should be seconded on a temporary basis into exploratory activities to ensure that an operational perspective is a part of the entrepreneurial assessment and to lower the resistance of transitioning new-stream technologies into the mainstream, thereby avoiding "toss it over the wall" syndrome.

Furthermore, most IT organizations must pivot their product management practices to be internal-customer facing. They must also deliver products that are fit for purpose (measured by definable and differentiated offered value that responds to different needs across business functions).

When compared to other disciplines, IT organizations have well-developed practices for managing competencies and capabilities. Many IT organizations have separated operations from engineering to improve cost-effectiveness of competency management and some have further outsourced some or all of their operational competencies. Outsourcing exploratory competencies is not recommended for firms that must

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compete within a fast-moving digital economy because it means ceding entrepreneurship to a third party. The capability model developed by TOGAF (togaf.org) decomposes capabilities into: people, process, technology capabilities, where this model is useful for organizing competency management.

Conclusion

This article provides a process-based framework for understanding and addressing how to balance operational exploitation and entrepreneurial exploration in IT. Entrepreneurial IT enables ongoing business transformation via new processes by understanding value to the firm, implementing innovative new technology to bring about transformational change, and ensuring that IT solutions are well-suited for all addressable internal opportunities.

This article makes two contributions:

1. It identifies that IT can develop an entrepreneurial capability that balances both demand and supply management, and that process ambidexterity enables this in a practical way.

2. It presents a practical and real-world framework for developing process ambidexterity in IT.

By becoming ambidextrous, IT can more effectively and predictably enable transformational change while simultaneously improving efficiency.

Demand management extends the governance function and is tailored to the differing needs of each business function. The resulting impact on IT governance is profound because the process of demand management is formalized to assure dynamic and continuous alignment between the strategic priorities of the firm and IT decision making. Supply management extends existing IT management processes that deal with running the business with a process-management control system and accompanying disciplined improvement.

Process ambidexterity requires committed leadership and a separation of exploitative and exploratory teams. Since most IT organizations have a well-developed immune system against change, formalizing the role of a change agent within the leadership of the IT organization is critical. The change agent must have full executive and technical support, and authority to bring forward change. This is the proper role of the IT function's CTO.

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Predicting Ecosystem Alliances Using Landscape Theory

Shruti Satsangi

> *"No employer today is independent of those about him. He cannot succeed alone, no matter how great his ability or capital. Business today is more than ever a question of cooperation."*
>
> Orison Swett Marden (1850–1924)
> Writer, physician, and hotelier

Previous articles in the TIM Review have covered various aspects of the concept of business ecosystems, from the types of ecosystems to keystone strategy, to different member roles and value co-creation. While there is no dearth of suggested best practices that organizations should follow as ecosystem members, it can be difficult to apply these insights into actionable steps for them to take. This is especially true when the ecosystem members already have a prior history of cooperation or competition with each other, as opposed to where a new ecosystem is created.

Landscape theory, a political science approach to predicting coalition formation and strategic alliances, can be a useful complement to ecosystems studies by providing a tool to evaluate the best possible alliance options for an organization, given information about itself and the other companies in the system. As shown in the case study of mobile device manufacturers choosing platform providers in the mobile ecosystem, this tool is highly flexible and customizable, with more data providing a more accurate view of the alliances in the ecosystem. At the same time, with even basic parameters, companies can glean significant information about which coalitions will best serve their interest and overall standing within the ecosystem.

This article shows the synergies between landscape theory and an ecosystems approach and offers a practical, actionable way in which to analyze individual member benefits.

Introduction

Increasingly businesses are realizing the realities of the global economy, in which firms must move fast to capture opportunities, revenue, and market share. Rapid innovation cycles are possible today, but only when firms take advantage of complementary assets of other firms and work collaboratively. Stopping to reinvent the wheel can result in firms having to play catch up later, or worse, become irrelevant altogether.

In this new, interdependent business world, Moore's (1993, tinyurl.com/bwjqc3j) seminal work on the structure of businesses as an ecosystem of dependent entities is perhaps the best way to characterize and explain business interactions. This business scenario applies to the mobile industry as well, where the emergence of smartphones over the past six years has resulted in the convergence of traditional and newer players into a collaborative and competitive environment, where firms need to work together to appropriate the most

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value out of their combined market offering as well as compete by differentiating themselves. The mobile business has been repeatedly described in the literature using the framework of business ecosystems theory (Gueguen and Isckia, 2009: tinyurl.com/c6tvff5; Basole, 2009: tinyurl.com/92u58ed; Lin and Ye, 2009: tinyurl.com/9zx5se7).

Part of the central premise of an ecosystem is the emergence of a platform on top of which businesses can offer value-added products and services. This type of organization is also seen in the converging mobile ecosystem, where mobile operating system (OS) providers are poised to take the central role of platform providers and serve as a link between the various traditional and newer players in the ecosystem. This central connective role within the industry leads to platform providers being looked at as the keystones of the converging mobile ecosystem, as it is these firms that provide the stable common asset of a mobile OS platform to which other players can link complementary products and value added services (Iansiti and Levien, 2004; tinyurl.com/bqaol6f). In this way, the actions of a keystone are instrumental in determining the success of every player that is connected to it, and the success of the ecosystem itself.

In order to be successful, keystones must structure their platform such that it can rapidly grow and achieve a large market share and installed base of customers, in other words, become the dominant design. Keeping in mind the interconnected nature of the organizations within an ecosystem, one of the most effective ways to study this growth is using network theory.

Network theory posits that, as a technology platform attracts more users, its perceived value increases and it becomes more attractive to new potential customers. This provides increasing returns as the network increases. This effect is seen time and again within the technology industry and is widely used to explain the emergence of a dominant platform (e.g., Abernathy and Utterback, 1978: tinyurl.com/bt4ql9d; Teece, 1988: tinyurl.com/bpq5nvo; Tegarden et al., 1999: tinyurl.com/c5trt47). In many cases, network effects of a technology are so strong that they can override its deficiencies and disadvantages relative to its competitors.

However, network theory has some limitations. Firstly, for each example of network effects cited in the literature, there are different factors that affect why and how a platform gains traction and attracts users, thereby achieving the dominant status. Deconstructing the success path often requires deep knowledge of the ecosystem around the platform and industry mechanisms.

A second limitation of network theory is that it is mainly a retrospective analytical tool. It has been used to explain the evolution of a platform or keystone to achieving dominance, but only after the fact. While this offers insights into what factors to consider for future success, these factors change from time to time and industry to industry. Therefore, network theory is not as useful as a predictive device, and when it is used, detailed knowledge and data about the industry is virtually a pre-requisite.

Due to these limitations, network theory does not offer us a full picture of evolving ecosystems, which are still in their nascent stages. This is an apt description of the mobile ecosystem, with several mobile OS providers competing to achieve the status of dominator. Each of these platform providers is trying to attract players offering complementary assets, such as the device manufacturers and applications developers, but offer very different value propositions. As such, there is no clear winner or pre-dominant platform in this ecosystem yet, and it would be interesting to observe how the ecosystem changes over time, until a dominant platform becomes clear.

What would be even more useful, especially for the firms that are looking to make an investment decision to align with one OS platform over the other, would be to be able to predict and analyze which OS they should put their investment dollars in. With the limitations that network theory poses, another approach to solving this problem would be to consider Axelrod and Bennett's (1993; tinyurl.com/ckchctb) landscape theory of aggregation.

Landscape theory is a framework with which Axelrod and Bennett have studied alliance formation. This theory takes a few variables related to the clout of each "actor" in the system (Size) and their tendency to ally with all other actors in the system (this is said to determine their Propensity to work together). Using the Size and Propensity measures, the optimal alliance for the actors in a system can be determined.

The theory has been widely used to predict alliances for World War II, the airline industry, and the setting of UNIX standards, and these retrospective predictions have been corroborated by the actual coalitions that were formed.

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Applying this framework to the mobile ecosystem, we can determine which mobile OS platform the mobile device manufacturers, mobile application providers, or mobile network operators should align themselves with in order to appropriate the most value for their business. In this way, landscape theory is a complementary tool to network theory for predicting and understanding business ecosystems and platform success.

Landscape Theory of Aggregation

Now that it is clear what gaps landscape theory can fill in predicting ecosystem alliance formation, it will useful to understand the landscape theory of aggregation as formulated by Axelrod and Bennett (1993; tinyurl.com/ckchctb). Subsequently, we will discuss how we extended this model by removing some of its limitations.

Aggregation refers to the organization of elements of a system into patterns that tend to put highly compatible elements together and keep less compatible elements apart. Landscape theory predicts how aggregation will lead to alignments or alliances among actors.

For a set of n actors in any application of the theory, three constructs – *size, propensity, and configuration* – are defined. The size of an actor, $s_i > 0$, is a reflection of the importance of that actor to others. Size can be measured by demographic, industrial, and economic factors, or any combination of these, depending on what is important in a particular application. The theory states that actors in a system will work to maximize the size of their alliance, because greater size equates to greater access to resources, which can ensure success for the alliance members. In this way, the size measure reflects the concept of cooperation between firms in ecosystems theory.

Another key premise of landscape theory is that two actors have a certain propensity to work together. That propensity will be positive if two actors have a tendency to cooperate with each other, and it will be negative if they do not. In the context of businesses forming alliances, strong competitors will have increased negative propensity to work together. Therefore, propensity is a measure of how willing two firms are to be in the same alliance. In this way, the propensity measure reflects the concept of competition between firms in ecosystems theory. Landscape theory assumes that propensity is a symmetric property of two actors in a system, in other words, actor B will have the same propensity toward actor A that A has towards B.

A configuration is a partition of the actors in a system into one of two groups. This can also be called an alliance structure. For all possible alliance structures, a distance matrix is created, which describes how the actors are arranged in two groups with Dij, the distance between actor i and j, being 0 if they are in the same group, and 1 if they are different groups. For example, for four firms, A, B, C, and D, two possible configurations and their respective distance matrices are shown in Figure 1.

By operationalizing size, propensity, and distance with real values, it is possible calculate the utility or payoff function for each actor in each possible alliance structure, as well as the overall "energy" of each structure. The structure that yields the lowest energy value is the optimal alliance configuration per the theory. The formula for energy of the configuration is given below:

$$E(X) = \sum_i \sum_j s_i s_j p_{ij} d_{ij}(X),$$

The minimization of the energy of a system can be described as the optimal balance of cooperation (measured by size, s) and competition (measured by propensity, p) within the firms in the system, so as to maximize the value they receive by being part of an alliance.

Figure 2 shows the three main constructs of landscape theory: size, propensity, and configuration. Size represents the cooperative need of the firm to create an alliance that will be large and influential enough to ensure success. Propensity represents the competitive nature of the firm and the desire to win over its closest competitors. Configurations represent all the possible ways in which a group of firms can be arranged into two alliances. The configuration yielding the lowest energy is the optimal alliance.

Research Method: Application of Landscape Theory to the Mobile Ecosystem

As it is presented by Axelrod and Bennett (1993; tinyurl.com/ckchctb), there are some limitations to landscape theory, which have to be dealt with in order to use it to model the mobile ecosystem. The two limitations and their resolutions are as follows:

1. A firm can only belong to one alliance. This limitation means that firms cannot be modeled as being allies of two different mobile platform providers, although this can be a legitimate strategic stance taken by certain firms in the mobile ecosystem. The way in which this

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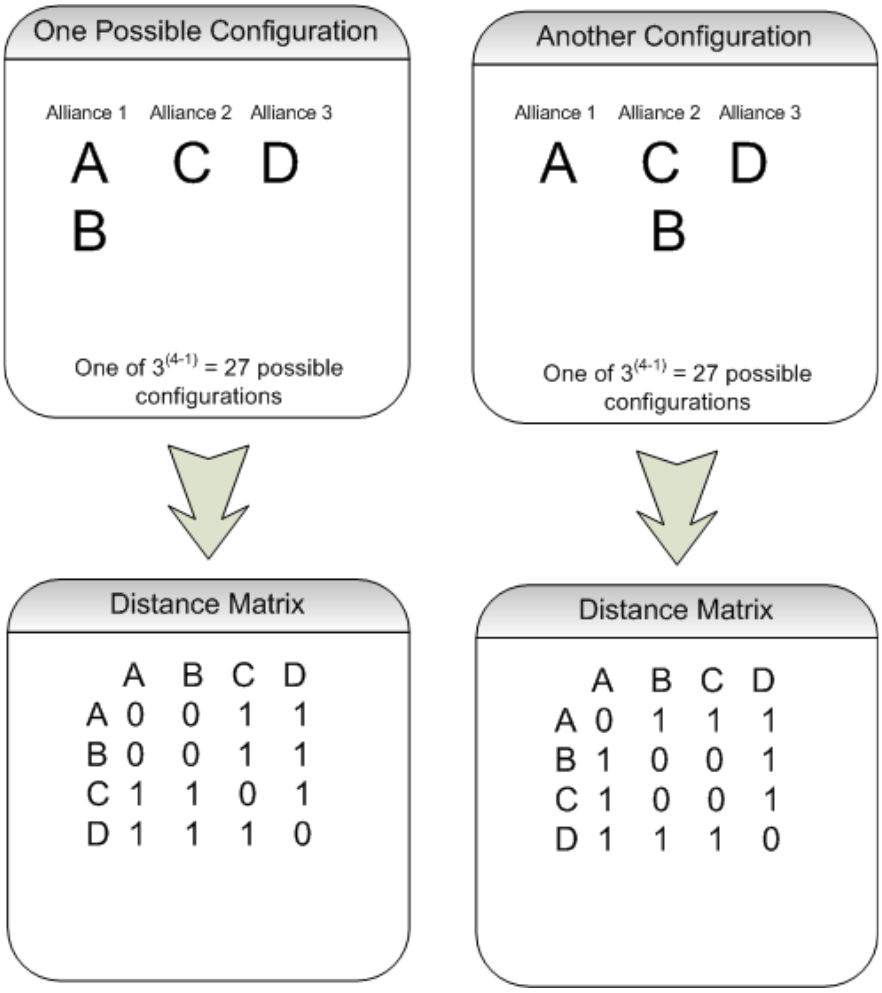

Figure 1. Potential alliance configurations and their corresponding distance matrices for four hypothetical companies

limitation was avoided was to consider only device manufacturers in the sample set. This was based on the network analysis studies done by Basole and Karla (2011; tinyurl.com/8zy7g2t), which show that the mean "degree centrality" (tinyurl.com/8n3poq4) to platform providers (number of connections to platform providers) was under 2 for the device manufacturers while being up to 7 for network operators. By limiting the sample set to device manufacturers, we were able to work within this limitation of the landscape model.

2. Only two alliances are possible with the current theory. This is a limitation when studying the mobile ecosystem because each mobile OS platform provider will have to be modeled as a separate alliance in order to correctly predict which one each device manufacturer will align with. In order to overcome this, the definition of distance was modified so that as long two firms were not in the same alliance, the distance between them was considered to be 1. This means that Firm A does not care which alliance Firm B is in; as long as Firm B is in a different alliance from A, the distance between them will be 1. If they are in the same alliance, the distance will be 0.

Once these limitations were taken care of, the next step was to formulate how size and propensity would be measured for the sample set (i.e., mobile device manufacturers and OS platform providers). Fortunately, a similar analysis had previously been done by Axelrod and colleagues (1995; tinyurl.com/8h9qehm) for the Unix workstation industry, which was used for reference.

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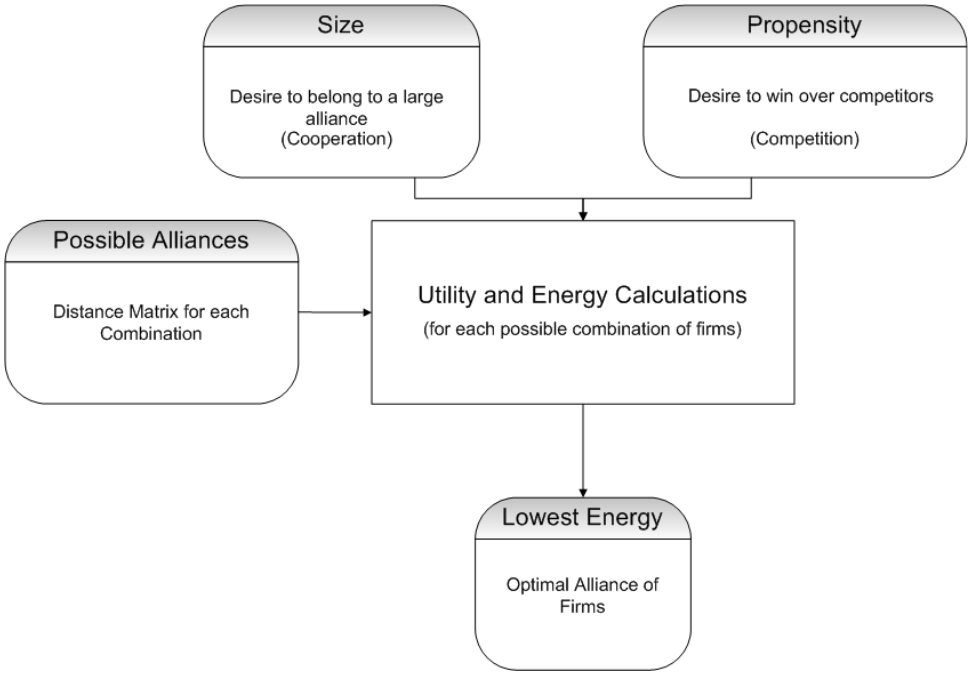

Figure 2. Main constructs of landscape theory

Like the mobile industry, the formation of alliances during the Unix wars (tinyurl.com/ymz326) had the goal of creating standards-setting coalitions. Following the approach used by Axelrod and colleagues in their Unix Wars research paper, the size and propensity equations were formulated as below:

$$Size_{MPP} = ½(\text{Market Share}) + ½(\text{Revenue})$$

$$Size_{MDM} = ½(\text{Market Share}) + ½(\text{Operating Profit})$$

Market share is a common indicator of firm performance in the mobile industry, making it an easy metric to obtain. Similarly, revenue of a platform provider's (MPP) mobile division indicates the investment capability that a firm may have to launch and establish a mobile OS platform through providing the software development kits (SDKs), support forums, and application stores or marketplaces to fully develop the value network around the platform.

In the case of device manufacturers (MDMs), operating profit is a good indicator of the money a firm has to reinvest into the R&D activities of developing new mobile phones, which will also involve choosing the mobile OS platform for the handsets.

The propensity equations are as follows:

$$\text{PropensityMPP-MPP} = [1 - (\alpha+\beta)]$$

$$\text{PropensityMPP-MDM} = [1 - \alpha] + [\text{Phone Releases on MPP(previous year)/Total Phone Releases}]$$

$$\text{PropensityMDM-MDM} = [1 - (\alpha+\beta)]$$

Note: α is the basic measure of rivalry, with β being an additional rivalry measure, used for close rivals. As defined by the model, $0 \leq \alpha \leq 1$ and $0 \leq \beta \leq 1$, with the base case being $\alpha=1$ and $\beta=1$. By varying the values of α and β, a sensitivity analysis can be performed on the results of the model.

An important point to note is that propensities between a platform provider and a device manufacturer differ from those between two device manufacturers or two platform providers. Based on Axelrod and colleagues (1995; tinyurl.com/8h9qehm), firms that were both platform providers or were both device manufacturers were modeled as close rivals, while firms in different segments were modeled as distant rivals. Axelrod and colleagues propose that firms serving the same segment will tend to have a greater tendency to compete with

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each other and thus will be more unlikely to ally with one another.

For distant rivals, an additional parameter was considered in the propensity calculation – the actual ties between a platform and device manufacturer, as measured by the phones released on that platform by the manufacturer in the past. This parameter accounts for any additional tendency for a platform provider and device manufacturer to work together, based on past data, making it a good propensity metric.

For this experiment, the sample set was limited to only those platforms that were licensable (i.e., those that allowed adoption by third parties) and to the top 1% of mobile device manufacturers (so as to select the most important firms to track in the mobile ecosystem). The providers considered were Microsoft (Windows Mobile), Symbian (Symbian OS), and Google (Android). The device manufacturers considered were Nokia, Motorola, Samsung, Sony Ericsson, and LG with the addition of ZTE and Huawei in 2010.

The data gathered to calculate the size and propensity values were all publicly available from the company websites and tax filings. Phone releases by platform and by manufacturer were gathered from phonescoop.com.

Figure 3 summarizes how the landscape model was operationalized for the converging mobile ecosystem.

Results

Using the above definitions for distance, size, and propensity, energy calculations were made for each possible alliance structure with the firms listed above. The configurations with the lowest energy were the optimal alliances returned by the model.

The results agree well with the visualizations of the actual mobile ecosystem between 2006 and 2010 (Basole and Karla, 2011; tinyurl.com/8zy7g2t). Figure 4 compares the 2010 alliances predicted by the model to the actual alliance visualizations that were carried out by Basole and Karla. This is an apt comparison because the

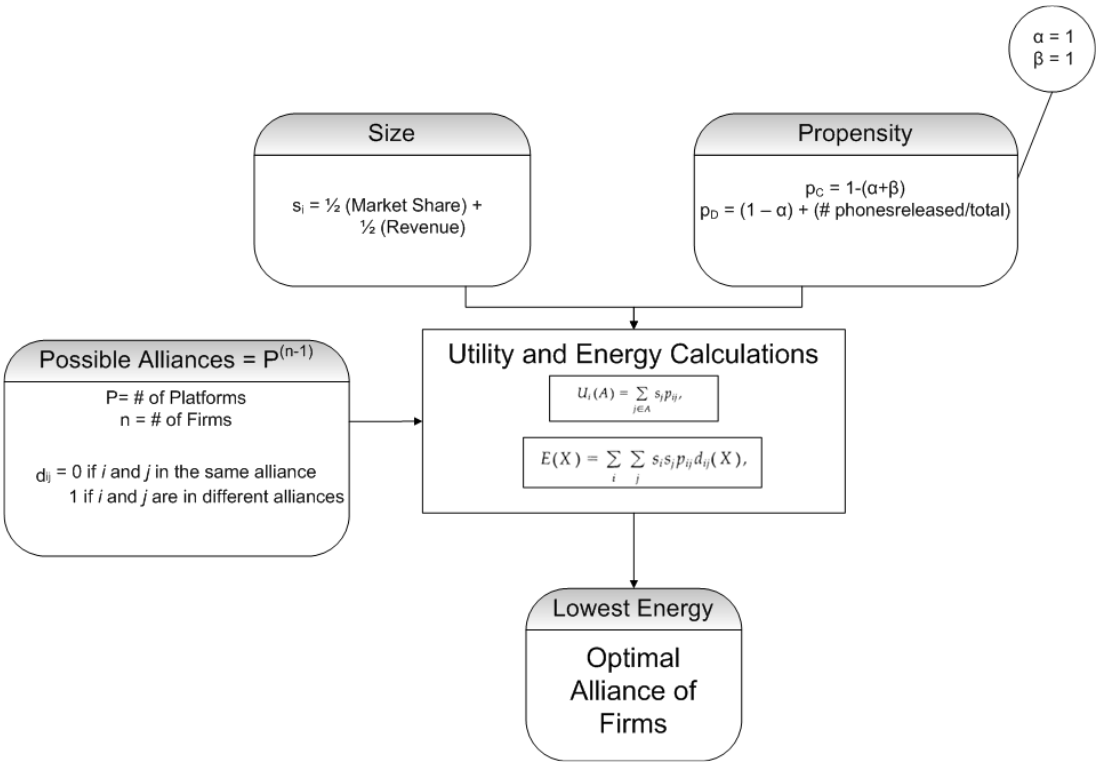

Figure 3. Landscape model for the mobile ecosystems (MDMs and MPPs)

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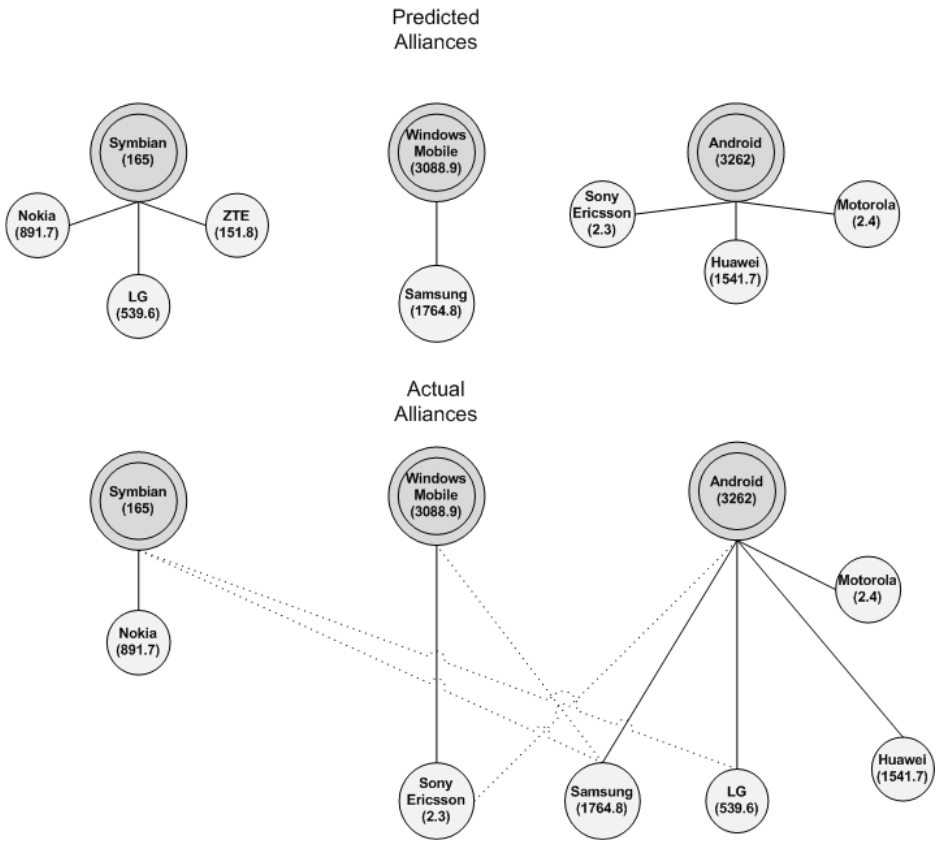

Figure 4. Results predicted by landscape model compared to the actual alliances (2010)

Basole and Karla paper draws the visual representations of the mobile ecosystem using the Kamada-Kawai algorithm (tinyurl.com/casxq6v), which is based on the idea of optimizing a balanced spring system through energy minimization. By using this algorithm, nodes that are close will pull on each other, while those that are distant will push one another apart. In the figure, the platform provider that the manufacturer is closest to (i.e., its strongest ally) is indicated by the solid line while any alliance with other platform providers is indicated by a dotted line. Note that ZTE is not represented in Basole and Karla's paper. Out of the remaining six device manufacturers, we can see that the landscape model results match the actual state of the ecosystem alliances, with the platform choice of Nokia, Motorola, and Huawei predicted correctly. In reality, LG has ties to both Symbian and Android, but the landscape model predicts Symbian as the platform of choice for the firm. A few discrepancies in the alliances are seen for Sony Ericsson and Samsung, with the latter being placed in the Windows alliance while the former is placed in the Android alliance, which are not the results reflected in the visualization. This possibly points to other parameters that are outside the scope of the model that could explain the actual alliance structures that occurred. It also might indicate that the real alliance structures are not the ideal ones for the firms in question.

Overall, the major findings of this research are that:

1. Very basic, universal size and propensity metrics, such as market size and market segment, are well supported by the visualizations of the real state of the ecosystem between 2006 and 2010.

2. At times, the model returns optimal alliances contrary to the actual alliances at that time, but those results make more sense when analyzed in retrospect. For example, in reality, Sony Ericsson stuck to the Symbian platform for longer than was advisable based on the predictions of the landscape model. This delay could account for the significant loss of market share experienced by the firm. Based on the results of the model, Sony Ericsson should have committed to Android

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much earlier. In addition to this, sometimes the tool shows the basis for alliance decisions that firms took after 2010. For example, the acquisition of Motorola Mobility by Google is supported by the alliances predicted in 2010 by the model. It clearly shows that Motorola will choose Android as its OS platform. This suggests that the model has some value as a predictive tool.

Conclusions

As shown, not only does landscape theory provide meaningful results as a predictive and analytical model for device manufacturers to strategically pick mobile OS platforms for their future phone offerings, but it shows great promise in its extensibility to various other players in the mobile ecosystem, as well as business ecosystems in general.

Through this research, landscape theory also shows itself to be a useful framework to employ where network theory has its limitations, namely, the lack of predictive ability for a still-evolving ecosystem and the requirement of significant industry knowledge to be a useful explanatory tool. With the landscape model, very basic, universal and publicly available business metrics such as market share and revenue can be used to gain substantial insight into how firms should align themselves to maximize their future success. In this way, the model is complementary to network theory in the understanding of ecosystem evolution.

Furthermore, the extensibility and flexibility of the model is such that adding industry specific knowledge (by refining the propensity definition accordingly) serves to further improve its efficacy. In this way, landscape theory can be combined with network theory, measuring the network effects of different industry factors by modeling them as part of the size and propensity constructs, as appropriate.

By clearly showing the parallels between business ecosystems research and landscape theory through the study of alliance formation in the mobile industry, this research shows the harmony between these two research streams and opens up new avenues for further research involving both these theoretical frameworks. It is hoped that this is of interest to researchers and scholars of both these fields and that future research be undertaken to further explore links between them and their applicability to other industries besides mobile.

In industry terms, this research may be of great relevance to strategic decision makers within private (businesses) and public organizations (government) seeking to better understand and plan the alliances into which they enter and also to understand the overall shape of the ecosystem to which they belong. The landscape theory model applied in the context of a business ecosystem is practical way in which they can achieve the goal of aligning themselves with the correct platform and partners to achieve success.

Recommended Reading and Resources

1. Ken Binmore's review of Robert Axelrod's book, *The Complexity of Cooperation: Agent-Based Models of Competition and Collaboration*, provides helpful background information on landscape theory:
   tinyurl.com/8ccrwmw

2. Complete results from this research, including links to the raw data and code written to perform the calculations, are available here:
   shrutisatsangi.com/research

About the Author

Shruti Satsangi is a recent graduate of the Technology Innovation Management program at Carleton University, in Ottawa, Canada, where she researched coalition and competition within business ecosystems. Her Master's thesis focused on implementing landscape theory to better explain coalition formation within the mobile ecosystem. Ms. Satsangi received a Bachelor's in Computer Engineering from the University of Waterloo with specializations in Management Science and Telecommunications. She has extensive experience in the development of large, carrier-grade 4G mobile communication systems. Shruti is currently serving as a committee member for the Innovation and Entrepreneurship track at the Grace Hopper Conference 2012. She is also a member of CU-Women in Science and Engineering, IEEE WiE, and the IEEE Communications Society and an occasional guest blogger for the Anita Borg Institute.

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