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Technology Entrepreneurship

Welcome to the April 2012 issue of the *Technology Innovation Management Review*. The editorial theme of this issue is Technology Entrepreneurship. 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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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 entrepreneurship, economic development, open source business, and innovation management.

Upcoming Issues

- *May*: Technology Entrepreneurship
Guest Editor: Tony Bailetti
- *June*: Global Business Creation
Guest Editors: Marko Seppä and Stoyan Tanev
- *July*: Social Innovation
Guest Editor: Stephen Huddart

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: Technology Entrepreneurship

Chris McPhee, Editor-in-Chief

Tony Bailetti, Guest Editor

From the Editor-in-Chief

It is my pleasure to welcome back **Tony Bailetti**, Director of Carleton University's Technology Innovation Management program, as the guest editor for four issues on the theme of Technology Entrepreneurship: February, March, April, and May.

In June, we will examine the theme of Global Business Creation with **Marko Seppä**, founder of Global Faculty Partners for Problems Worth Solving LP, and **Stoyan Tanev**, Associate Professor at the University of Southern Denmark.

In July, we will be joined by **Stephen Huddart**, President and CEO of the J.W. McConnell Family Foundation, as guest editor for the theme of Social Innovation.

Also note that **Dave Thomas** is delivering the next TIM Lecture at Carleton University in Ottawa, Canada, on April 19, 2012. His lecture title is "Next Generation Technology Challenges & Business Opportunities". The event is free; register [here](#) if you wish to attend.

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 (timreview.ca/contact) directly with feedback or article submissions.

Chris McPhee
Editor-in-Chief

From the Guest Editor

Welcome to the April issue of the *TIM Review*. This is the third of four issues that examine technology entrepreneurship.

The April issue includes five articles and a report on a TIM lecture. The five articles provide: i) tools and actionable processes that can be used to describe a firm's business model, define a business opportunity, and balance mainstream exploitation and new-stream exploration; ii) a discussion of the horizon-management issues faced by top management teams of large entrepreneurial companies; and iii) a description of the role of a university in technology entrepreneurship. The report summarizes the second lecture of the 2012 TIM Lecture Series titled "The Importance of Dealing with Risk for New Businesses", presented by Tony Lackey on March 21, 2012.

Steven Muegge, an Assistant Professor at the Sprott School of Business at Carleton University, provides a tool that a technology entrepreneur can use to describe a firm's business model in a form that is both concise and explicit. Dr. Muegge also shares preliminary results and lessons learned gained from applying the tool in six technology startups.

Michael Weiss, an Associate Professor in the Faculty of Engineering and Design at Carleton University, describes an approach that technology entrepreneurs can use to discover business opportunities from examining user frustrations.

Sonia Bot, an executive that specializes in strategy and business execution for technology innovation and corporate entrepreneurship ventures, describes a process-based perspective to balancing mainstream exploitation and new-stream exploration in medium and large-sized entrepreneurial firms. The resulting capability is known as process ambidexterity and requires disciplined, agile, and lean business management.

Peter Carbone, an executive who is often called on to address new business and technology challenges, discusses some of the horizon-management issues faced

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Chris McPhee and Tony Bailetti

by top management teams of large entrepreneurial companies and overviews some mechanisms and processes that have worked effectively.

Jonathan Wells, Executive Director of the Research Centre in Technology Innovation at Carleton University, discusses the role that universities play in the process of launching and supporting small and medium-sized technology-based businesses.

Tony Lackey, Manager of Risk and Insurance at Carleton University, discussed how risk management can play an important role in the success of a new business. He identified the key risks faced by new entrepreneurs and the risk mitigation techniques of which they should be aware.

The field of technology entrepreneurship offers many opportunities for scholarly inquiry and innovative industrial initiatives. We are delighted with the quality and quantity of the articles on technology entrepreneurship that have been submitted.

We hope that you, your colleagues, and your organizations benefit from reading the April issue of the *TIM Review*.

Tony Bailetti
Guest Editor

About the Authors

Chris McPhee is Editor-in-Chief of the *Technology Innovation Management Review* and is in the Technology Innovation Management program at Carleton University in Ottawa. Chris received his BScH and MSc degrees in Biology from Queen's University in Kingston, following which he worked in a variety of management, design, and content development roles on science education software projects in Canada and Scotland.

Tony Bailetti is an Associate Professor in the Sprott School of Business and the Department of Systems and Computer Engineering at Carleton University, Ottawa, Canada. Professor Bailetti is the Director of Carleton University's Technology Innovation Management program. His research, teaching, and community contributions support technology entrepreneurship, regional economic development, and international co-innovation.

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Business Model Discovery by Technology Entrepreneurs

Steven Muegge

*“There is considerable evidence that business success”
depends as much on organizational innovation, for
example, design of business models, as it does on the
selection of physical technologies.*

David Teece

Researcher, Consultant, and Professor

Value creation and value capture are central to technology entrepreneurship. The ways in which a particular firm creates and captures value are the foundation of that firm's business model, which is an explanation of how the business delivers value to a set of customers at attractive profits. Despite the deep conceptual link between business models and technology entrepreneurship, little is known about the processes by which technology entrepreneurs produce successful business models. This article makes three contributions to partially address this knowledge gap. First, it argues that business model discovery by technology entrepreneurs can be, and often should be, disciplined by both intention and structure. Second, it provides a tool for disciplined business model discovery that includes an actionable process and a worksheet for describing a business model in a form that is both concise and explicit. Third, it shares preliminary results and lessons learned from six technology entrepreneurs applying a disciplined process to strengthen or reinvent the business models of their own nascent technology businesses.

Introduction

Strategy and innovation scholar Henry Chesbrough writes: “A business model has two important functions. It must create value within the value chain; and it must capture a piece of value for the focal firm in that chain” (Chesbrough et al., 2006; tinyurl.com/8x8byvv). Though debate continues among researchers and practitioners about precise operational definitions and rival classification schemes, consensus has gradually emerged that understanding how a particular firm creates and captures value is central to a full understanding of how and why that firm's revenues exceed its costs over time.

Value creation and value capture establish a deep connection between business models and technology entrepreneurship. In the February 2012 issue of the *TIM Review*, guest editor Tony Bailetti defined technology entrepreneurship as an investment in a project that as-

sembles and deploys specialized individuals and heterogeneous assets that are intricately related to advances in scientific and technological knowledge for the purpose of creating and capturing value for a firm (Bailetti, 2012; timreview.ca/article/520). According to Bailetti, the ultimate outcomes of technology entrepreneurship are value creation and value capture, and the sources of value creation and value capture may not be the same over the long run. Nonetheless, little is known about the processes by which technology entrepreneurs produce successful business models that both create and capture value. Although 22 of the 93 technology entrepreneurship articles identified by Bailetti examine themes of revenue generation, cost reduction, operations, and business transformation, the specific ways in which technology entrepreneurs discover alternative new approaches for value creation and capture, and the ways in which they select between alternatives, received little attention in these articles.

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Steven Muegge

This article makes three contributions to the ongoing conversation about business models and technology entrepreneurship, with each contribution presented in its own section. The first section develops and articulates a cogent argument that business model discovery by technology entrepreneurs can be a disciplined process, where *discipline* refers to both *intention*, in the sense that opportunities for learning arise through deliberate design, and *structure*, in the sense that activities are organized as a project work plan to produce specific deliverables. The second section presents a tool for disciplined business model discovery by technology entrepreneurs. The third section shares preliminary results and lessons learned from six technology entrepreneurs applying this tool with their own nascent technology businesses. A final section concludes the article.

Business Model Discovery

In *Seizing the White Space*, Mark Johnson (2010; tinyurl.com/7a9jcyw) defines a business model as the way in which a company delivers value to a set of customers at a profit. In this view, *all firms have a business model*, regardless of whether that model is explicit and codified, or implicit in employee behaviours and tacit operating procedures, or at some midpoint along a spectrum between those two poles. Alternative perspectives and definitions of a business model include the story of how a business works, the map linking technological potential to economic outcomes, and the explanation for how a company is expected to make money. Other metaphors include blue print, architecture, logic, and narrative. Table 1 summarizes excerpts from the small but growing research literature on business models.

Many open questions remain. Are business models best understood as broad patterns or archetypes chosen from a finite list, or as something unique that is highly specialized and particular to each firm? Do business models emerge from a discrete choice process or from a continuous process of redesign and discovery? Much depends on the definitions used, but empirical evidence from Chesbrough and Rosenbloom (2002; tinyurl.com/7x2g65m) and Chesbrough (2006; tinyurl.com/7qg9szz) favours the latter explanations of business model discovery. According to this body of research: i) the set of all feasible business models is not foreseeable in advance; ii) business models are discovered through search and heuristic logic in a reshaping process; and iii) the reshaping process creates learning opportunities that themselves may contribute importantly to success. This article adopts the discovery perspective.

The definition for technology entrepreneurship (Bailetti, 2012; timreview.ca/article/520) does imply two important differences between the processes of business model discovery of technology entrepreneurs and other types of entrepreneur, both arising from the deep connection between the technology entrepreneurship mechanisms of value creation and value capture and the advancement of science and technology. First, some scientific and technological domains experience rapid change driven by frequent innovations, both incremental and radical. Mobile “smartphone” handsets and application software, cloud computing, and online social media services are three examples of fast-paced domains in which business models must either evolve more quickly or be re-invented more frequently and abruptly than in domains with less technological interdependence or a slower pace of technological change. Second, many technology entrepreneurs have deep roots in engineering, science, and technology. Theory and evidence from organizational psychology suggests that the ways in which individuals frame and define problems and the ways in which they process information to make sense of uncertain situations are all shaped in part by their past experience and domain expertise. For successful scientists and engineers, framing issues as business and management problems rather than technological problems may be an ongoing challenge. Both of these differences are of degree rather than kind, but they do imply that the process of business model discovery for technology entrepreneurs is likely to differ in important ways from that of the “typical” entrepreneur engaging in other forms of entrepreneurship.

Researchers and practitioners have proposed various business model frameworks to operationalize the business model concept. Frameworks explicitly identify an underlying logic, a minimal set of requisite components, and a way to specify each component and its relationships to other components. By establishing a common vocabulary and underlying logic, business model frameworks can advance the dialogue beyond abstractions and narrative stories, and they enable comparison between different firms and of the same firm at different points in time. This article employs a four-factor framework adapted from multiple sources, including the business model research literature, practitioner articles published the *TIM Review* (e.g., Bailetti, 2009; timreview.ca/article/226), and the experience of the author and his colleagues from delivering the Lead to Win program (<http://leadtowin.ca>) and mentoring nascent technology entrepreneurs. The next subsection provides more information on business model frameworks and the particular framework employed for this article.

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Table 1. Excerpts from the management research literature on business models

Source	Explanation of what a business model is or does
Amit & Zott (2001) tinyurl.com/6r5pv9j	“A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities” (p. 511). Amit & Zott emphasizes value creation.
Chesbrough & Rosenbloom (2002) tinyurl.com/83d395h	A business model links technological potential to economic outcomes. The set of all feasible business models is not foreseeable in advance. A business model is discovered through search and heuristic logic in a reshaping process creating learning opportunities that themselves may contribute importantly to success.
Magretta (2002) tinyurl.com/7prxc7c	The business model is a story that explains how the business works. In this view, the business model is a fluid narrative rather than an operationalized framework.
Hedman & Kalling (2003) tinyurl.com/86vds8s	A business model explains how a venture is expected to make money.
Zott & Amit (2007) tinyurl.com/7fzqno9	“A business model elucidates how an organization is linked to external stakeholders, and how it engages in economic exchanges with them to create value for all exchange partners” (p. 181). Two business model design themes are design novelty and design efficiency; both themes are associated with higher firm performance and can co-exist together.
Fiet & Patel (2008) tinyurl.com/7r7e7df	A forgiving business model is a business model in which risk is disproportionately borne by others while venture payoffs and shared proportionately by an entrepreneur and investors.
Zott & Amit (2008) tinyurl.com/cydetd8	“The business model is a structural template of how a focal firm transacts with customers, partners, and vendors; that is, how it chooses to connect with factor and product markets. It refers to the overall gestalt of these possibly interlinked boundary-spanning transactions” (p. 3).
Bailletti (2009) timreview.ca/article/226	Business models and market offers are two sides of the same coin: “For a company's commercialization efforts to succeed, it needs to come up with great market offers which have great business models” (p. 4). Conceptual tools can help capture, share and communicate the strength of a company's business model and help articulate tacit knowledge into explicit knowledge.
Doganova & Eyquem-Renault (2009) tinyurl.com/crl2aku	“The business model is a narrative and calculative device that allows entrepreneurs to explore a market and plays a performative role by contributing to the construction of the techno-economic network of an innovation” (p. 1559).
Al-Debei & Avison (2010) tinyurl.com/cwgz59u	The “business model” is a popular notion among practitioners, but as a theoretical construct, there is little consensus among scholars regarding its operational definition, its compositional facets, or its classification schema.
Osterwalder & Pigneur (2010) tinyurl.com/d2svk4o	“The business model is like a blueprint for a strategy to be implemented through organizational structures, processes, and systems” (p. 15).
Johnson (2010) tinyurl.com/ccu6u7p	A business model “defines the way the company delivers value to a set of customers at a profit” (p. 7).
George & Bock (2011) tinyurl.com/cjkubak	The management research literature variously describes business models as: i) organizational designs; ii) links between resources and business outcomes; iii) organizational narratives; iv) opportunities for innovation as well as links between technological innovation and organization structure; v) transaction structures; and vi) facilitative intermediaries in the process of moving from opportunity to value creation.

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Business model frameworks

Business model frameworks provide a common vocabulary and structure to discuss and compare business models. An ideal business model framework would be intuitively understandable, as simple as possible, and yet retain just enough complexity and nuance to sufficiently capture the operationally and strategically relevant aspects of the business. Many different frameworks have been proposed in the management research literature and the popular business press with no shared consensus on which framework is best, or even which circumstances would favour one framework over another. This article employs a four-factor business model framework intended to specifically address the main concerns of technology entrepreneurs. It is adapted from multiple sources, including three frameworks in the practitioner literature: the “four-box” framework of Mark Johnson and the Innosight consulting company (seizingthewhitespace.com), the six-function framework from Henry Chesbrough's research on open innovation (tinyurl.com/2ow32e), and the Business Model Canvas (tinyurl.com/2b6qfcy) of Alexander Osterwalder and Yves Pigneur. It draws also on the business models research literature (e.g., Table 1), practitioner articles in the *Open Source Business Resource* and *TIM Review*, and the experience of the author and his colleagues working with early-stage technology entrepreneurs.

The framework has four components. The first component is the *importance* of the customer “pain point”, expressed as an underlying job-to-be-done, a problem-to-be-solved, or an unmet need. Christensen and colleagues (2007; tinyurl.com/6nqm652) argue that a customer perspective on the marketplace, anchored around *a job that the customer needs done*, is more effective than traditional marketing management that segments around customer demographics and differentiates one offer from competing offers by adding product features and functions. A job that the customer needs done – that *pains* the customer because that job is not being done – is the starting point and the conceptual bedrock of a strong business model.

The second component is a set of *stakeholder value propositions* (SVPs). According to Anderson and colleagues (2006; tinyurl.com/6tmrqvv), strong value propositions are based on “points of difference” and “points of parity” with competing solutions. Customers are one important group of stakeholders, but support from other stakeholder groups, each with its own motives and each ap-

propriating different stakeholder value, may also be critical to success. Likewise, there may be multiple segments of customers with differing value propositions. This component makes all of that explicit by identifying the critical-to-success stakeholder group and articulating a compelling value proposition for each.

The third component is an explanation of the revenues and costs of delivering on the SVPs, and an explanation of why revenues exceed costs in a way that produces attractive profits. Johnson and colleagues (2010; tinyurl.com/yen7bkz) call this component a *profit formula*. The metaphor is of a chemical formula rather than a mathematical formula – it is a succinct explanation in words rather than a spreadsheet of sales and expense numbers. The first part of the profit formula identifies the *revenue trigger* and the *stakeholder who pays*. In the traditional view of neoclassical economics, the business firm is a merchant-producer that takes inputs from suppliers, transforms those inputs into a product, and sells that product to a customer through a market exchange. Product sales to customers are one possible revenue trigger, but increasingly, many technology entrepreneurship opportunities are more complex. Multi-sided platform opportunities (tinyurl.com/prdzqj) bring together multiple stakeholder groups that each benefit in different ways. For instance, Iyer and Davenport (2008; tinyurl.com/3954du2) describe the Google advertising and search platform as bringing together four stakeholder groups: consumers searching for information, content providers with information, advertisers, and innovators of new products and services. Some stakeholders may pay, others may participate for free, and others may need to be paid to contribute. The second part of the profit formula explains the *cost structure* – where money must be spent to deliver on the SVPs. The third part explains why these revenues and costs will produce attractive profits. In other words, why revenues will exceed costs over the long term to an extent that justifies investment and continued operation. Offering product at a low price is not a sustainable competitive advantage, but a cost structure that allows a company to earn attractive profits at a lower price point can enable a winning business model that competitors cannot imitate.

The fourth component is an explanation of the critical-to-success *capabilities* needed to deliver on the SVPs while earning attractive profits, and an explanation of how the firm will obtain access to those capabilities or prevent access by rivals. Capabilities can include re-

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sources (assets that the firm needs to obtain) and processes (actions that the firm needs to do). Innovation researchers have long recognized that complementary assets (tinyurl.com/7h7y93e) are often required to profit from technological innovation. Increasingly, technology entrepreneurs can neither own nor exclusively control all of the capabilities needed to create and capture value, and must find novel ways to access these capabilities. Examples include collaborating with others, adopting industry platforms and open standards, nurturing communities of innovation (tinyurl.com/74rne78), and participating in business ecosystems (tinyurl.com/7ohjicqh). This component explicitly identifies the capabilities required and the means by which each of those capabilities will be obtained. The individuals and organizations that provide access to critical capabilities may become critical-to-success stakeholders that require compelling SVPs in the second component of the framework.

Table 2 compares and contrasts this four-factor framework with three other business model frameworks. For technology entrepreneurs, this framework is well-suited to the complex stakeholder interactions, multi-sided platform opportunities, distributed innovation, collaboration with other entrepreneurs, and rivalry over complementary assets that are prominent features of many technology-intensive businesses. The tool presented in the next section includes a worksheet for writing down a business model using the four components of this framework. First, however, the next subsection elaborates on the notions of discipline, intent, and structure.

Intent and structure in disciplined business model discovery

A point of difference between this article and prior work is the emphasis on disciplined business model discovery. Discipline here has two components. The first component is intent, so that opportunities for learning arise through deliberate design and action rather than serendipity or random chance. Technology entrepreneurs can deliberately identify and undertake activities to acquire new information, test assumptions, and uncover new options. The second component is structure, so that discovery-driven activities are organized as project, with beginning and end points in time, specific deliverables, and a work plan to produce those deliverables. Structure does not imply heavyweight upfront planning or inflexibility. Many product development projects maintain tremendous flexibility through frequent iterations and active learning within a lightweight structure; agile software development is a prominent example (Smith, 2007: tinyurl.com/7cqfry2;

Highsmith, 2009: tinyurl.com/7twmkcx). By adopting intent and structure, the process of business model discovery can be managed with comparable discipline to the ways in which entrepreneurs manage costs, product development, and other critical-to-success business activities.

Discipline with respect to intent and structure is the salient difference between the discovery process examined here and the more ad hoc “heuristic” search and shaping process observed in much prior business model research including the descriptive field studies by Chesbrough and his colleagues. Chesbrough (2002; tinyurl.com/733ruxk) examined each of the 35 technology-intensive firms that spun out of Xerox Corporation between 1979 and 1998, and concluded that most of the technologies did not initially have obvious value. Some firms attempted transformations of the technology and business model that resulted in evident value while others did not. Follow-on work by Chesbrough and Rosenbloom (2002; tinyurl.com/7x2g65m) developed detailed case studies on six of these spin-off firms and concluded that significant transformation occurred in the business models of successful spin-offs, while search and learning in failed ventures were quite limited.

In summary, extant research suggests that technology entrepreneurs who can discover and implement stronger business models for their firms are more likely to achieve higher levels of success. Thus improving the process of business model discovery is of high relevance to both research and practice. The next section proposes a tool for business model discovery disciplined by both intention and structure.

A Tool for Disciplined Business Model Discovery

The tool described here is comprised of two parts: an actionable five-step process (Figure 1) and a worksheet for specifying a business model (Box 1). Box 1 provides a worksheet for writing down the four components of a business model in a form that is at once concise, precise, and explicit. It was developed initially for the Lead to Win entrepreneurship program (leadtowin.ca), then adapted for use within the business model projects of Carleton University's Technology Innovation Management program (TIM; carleton.ca/tim). For each component, the worksheet explains the form that the answer should take, and the limited writing space enforces clarity and parsimony. The research collectively argues that good business models are simply and clearly stated using no more words than necessary to convey a message.

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Table 2. Comparison of this framework with three other business model frameworks

	“Seizing the Whitespace” four-box framework	“Open Innovation” six-function framework	“Business model canvas”
Parts	Four boxes: 1) Customer value proposition (CVP) 2) Profit formula 3) Key resources 4) Key processes	Six functions: 1) Articulate the <i>value proposition</i> for users. 2) Identify a <i>market segment</i> . 3) Define the <i>value chain</i> of suppliers and customers. 4) Specify the revenue generation mechanism and estimate the <i>cost structure and profit</i> potential. 5) Position the firm within a <i>value network</i> , including complementors and competitors. 6) Formulate the <i>competitive strategy</i> to gain and hold advantage over rivals.	Nine basic building blocks: 1) Customer segments (CS). 2) Value propositions (VP). 3) Channels (CH). 4) Customer relationships (CR). 5) Revenue streams (R\$). 6) Key resources (KR). 7) Key activities (KA). 8) Key partnerships (KP). 9) Cost structure (C\$).
How this framework is similar	<ul style="list-style-type: none"> • Direct mapping from the four boxes: <ul style="list-style-type: none"> • Stakeholder value propositions (SVPs) include the CVP. • Profit formula includes revenue, costs and profit. • Capabilities include resources and processes. • Parsimony. • Small number of parts. • Parts build on previous parts. 	<ul style="list-style-type: none"> • Partial mapping from the six functions: <ul style="list-style-type: none"> • SVPs include the value proposition and market segment, and may include complementors. • Profit formula includes revenue, costs and profit. • Capabilities may include aspects of the value chain and value network. 	<ul style="list-style-type: none"> • Direct mapping from the nine building blocks: <ul style="list-style-type: none"> • SVPs include the CS and VP blocks, and aspects of the CH and CR blocks. • Profit formula includes the R\$ and C\$ blocks. • Capabilities include the KR and KA blocks and aspects of the CH, CR and KP blocks.
How this framework is different.	<ul style="list-style-type: none"> • Importance of the problem is explicit rather than folded into the value proposition. • Requires value propositions for each stakeholder group (SVPs) rather than a single customer value proposition (CVP) that combines the problem and offer. • The capabilities component includes both resources and processes, and makes explicit how the business will secure access to each. 	<ul style="list-style-type: none"> • Requires value propositions for each stakeholder group (SVPs) rather than a single value proposition for users. • The capabilities component makes explicit how the business will secure access to key capabilities; emphasis is different from value chain and value network which emphasize relationships. • Does not directly address competitive strategy (implicit in SVPs and profit formula). 	<ul style="list-style-type: none"> • Importance of the problem is explicit. • Less granular; fewer parts. • Requires value propositions for each stakeholder group (SVPs) rather than treating customers and other stakeholders separately. • The capabilities component encompasses five business model canvas building blocks. This framework is simpler, but requires more judgment to employ well.

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Box 1. Worksheet for specifying a business model

<p>Importance (pain point)</p> <p>Explain why the job-to-be-done, problem, or unmet need matters to stakeholders.</p>
<p>Stakeholder Value Propositions</p> <p>Explain the value for each critical stakeholder. <i>We have # critical stakeholders. To stakeholder #1, we provide... To stakeholder #2, we create... . . .</i></p>
<p>Profit Formula</p> <p>Explain how the business produces attractive profits. <i>Our revenues are Our costs are Other attributes critical to our business are Our revenues are greater than our costs because</i></p>
<p>Capabilities (resources and processes)</p> <p>Explain how the business obtains access to key resources and processes. <i>We need access to <u>these key resources and processes</u> . (Explain how you secure access to each capability, collaborate for capabilities that you neither own nor control, and protect your own unique intellectual property).</i></p>

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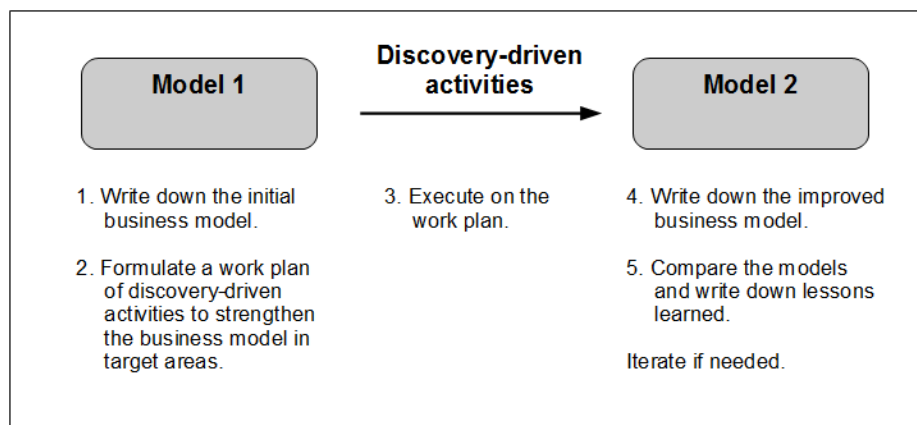


Figure 1. A disciplined five-step process for business model discovery

The five prescriptive steps of the process are as follows.

Step 1. Write down the initial business model. For clarity, we label this “Model 1” and explain how the business works using the four-part business model framework described earlier and the worksheet of Box 1. The intent at this step is making explicit what is known and unknown about how the business works. The initial business model may be complete, with clear explanations for each part, or it may be incomplete, with gaps and unknowns, guesses and unsupported assumptions, or enumerated lists of possibilities with no clear decision rule or winner – either case is fine. If the best explanation at this time is “I don’t know how to price my offer” or “We have identified three jobs-to-be-done by the customer, but we haven’t decided which to address first”, that is what you write down.

Step 2. Identify specific target areas to improve, identify a set of discovery-driven activities to strengthen the business model in the target areas, and develop a work plan for implementation. This step groups together several interconnected tasks that collectively form a plan of action and make that plan explicit. First, candidly assess the strengths and weaknesses of Model 1 to identify the areas most needing improvement. Assessment tools may sometimes be helpful, such as the tool for assessing business model strength published in the February 2009 issue of the OSBR (Bailetti, 2009; timreview.ca/article/226). Based on your objectives, the context, and the results of your assessment, select one or more target areas of the business model to deliberately strengthen. Depending on the completeness of the initial business model, im-

proving target areas may require generating new options, collecting information and reducing uncertainty, or selecting among a list of known options. Because each part of the framework builds on and depends on previous parts, it may make sense to work on strengthening earlier parts before proceeding to later parts. Next, identify a set of activities to deliberately strengthen the target areas. Examples of possible discovery-driven activities include direct interaction with stakeholders (e.g., interviews or focus groups), collection and analysis of publicly available information (e.g., competitive analysis), structured data collection (e.g., a large sample questionnaire), multiple parallel market experiments, and development of concept prototypes or beta products. Finally, structure these activities into a project work plan, with a distinct beginning and end point, and a clear set of specific, measurable, and actionable deliverables. The work plan should explicitly include activities to collect missing information and analysis activities to process and learn from that information after it is available. Be diligent about writing everything down – you will need this information later.

Step 3. Execute on the work plan. Complete the discovery-driven activities to produce the deliverables. The plan of action developed in step 2 may change in response to new information or to take advantage of opportunities discovered while executing on the plan.

Step 4. Write down the new business model. For clarity and consistency with previous steps, we label this “Model 2” and employ the same business model framework and worksheet format as in step 1.

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Step 5. Compare the two business models and clearly articulate lessons learned. Review your notes from previous steps and try to clearly articulate i) how Model 2 is different from Model 1; ii) what was learned between Model 2 and Model 1; and iii) what actions would need to be undertaken to implement Model 2. As with each prior step, continue keeping comprehensive written notes. Accurate and extensive notes of steps 1 through step 4 are needed to complete step 5. These five steps can be iterated again to discover “Model 3”, or enfolded into an ongoing continuous improvement process to discover “Model n+1”, and good notes about step 5 may be valuable in future iterations.

Also important is candidly assessing whether Model 2 is, in fact, an improvement over Model 1 or is merely different. The ultimate test of a business model is whether or not it makes money over time by both creating and capturing value. Without a field trial to actually implement the new business model, there are at least three complementary, evidence-based approaches to assessing improvement. A first approach is *weight of evidence*. For example: “I have now spoken with XXX customers in YYY categories about value propositions and willingness to pay; previously I had spoken only to ZZZ users in the same category” or “I ran four experiments, and scenario 3 had better measurable results than the others, including the scenario of my initial business model.” An entrepreneur who can make statements like these may have higher confidence in Model 2 than in Model 1 due to the accumulating weight of evidence. A second approach is *increased knowledge and reduced uncertainty*. List the “unknowns” for Model 1 and Model 2 and determine whether the second list is shorter than the first list. Some subjectivity and interpretation is required here in assessing knowledge and uncertainty. For example, the discovery-driven activities of business model discovery may actually uncover “unknowns” that were not previously recognized in the list for Model 1. If so, the list of “unknowns” might actually become longer. In the sometimes awkward language of decision theory, overall uncertainty could be reduced by transforming “unknown unknowns” into “known unknowns” that can be further investigated. Alternatively, or in addition, you could list what is known about each model and determine whether the second list is longer than the first. A third approach is *measurement with an assessment tool*. For example, you could apply the business model assessment tool from the February 2009 OSBR (Bailetti, 2009; timreview.ca/article/226) on both Model 1 and Model 2 and compare the numerical results. None of these approaches are ideal replace-

ments for a field trial, but each provides some information, and they may complement one another in combination.

This process of disciplined business discovery was developed initially for graduate engineering and computer science students completing applied research in Carleton University's Technology Innovation Management (TIM; carleton.ca/tim) program, however nothing about the process restricts its application to that context. Box 2 provides more information about the TIM program and the role of applied research in the TIM degree requirements. The next section presents preliminary results of applying the process by entrepreneurs in the TIM program.

Applying the Process and Worksheet

Table 3 presents summary results of six projects of disciplined business model discovery undertaken by six technology entrepreneurs. Some of these entrepreneurs had successful companies that they wanted to grow to the next stage, either by scaling what they had or by transforming their business into something very different. Some were in the early days of launching their first company and sought to grow from the first paying customer to the sustainable revenues that could bootstrap further growth. One was making a decision whether or not to enter a new market and sought to assess whether or not there was a viable business model in this new space. All six entrepreneurs were also graduate students in Carleton University's TIM program and I was the faculty supervisor for each of their applied research projects. In that capacity, I worked with each entrepreneur to clearly specify the objective, deliverables, relevance, and contribution of their applied research

Box 2. Graduate studies in technology innovation management

Technology Innovation Management (TIM; carleton.ca/tim) is a research-based graduate program at Carleton University in Ottawa, Canada. One option for graduate students earning a Master of Engineering degree is to complete an applied research project that solves a problem for a client company. Some TIM graduate students are entrepreneurs with their own companies and some of these students become their own clients and undertake applied research to strengthen their company's business model.

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and a viable work plan to produce the deliverables, advised them on data collection, analysis, and interpreting their results, and helped them clearly communicate what they did and what they learned as a concise project report. Individually, each project discovered a business model to exploit a business opportunity. Collectively, this set of projects contributes to an ongoing research program on the business models and strategic decisions of technology entrepreneurs.

Each technology entrepreneur completed the five-step process outlined in the previous section. The details of each business model are the intellectual property of the entrepreneurs, so only summary information is reported here. The projects varied widely in the completeness of their initial business models: some began with all four parts of the framework fully specified, while others began with large gaps, unknowns, and lists of possible alternatives. The projects also varied widely in the areas targeted for improvement: most focused on improving two areas of the business model framework, but the target areas collectively spanned the entire four-part framework. The work undertaken to improve the business models likewise varied, with discovery-driven activities including loosely-structured interviews with potential customers, a structured online survey of a customer segment, a “lead user” study of individuals whose needs are far ahead of the mainstream market, analysis of competitor pricing and business models, and the construction of concept prototypes and early-stage “alpha” products. One project was completed in December 2011, four projects are in their late stages with completion expected in April 2012, and one early-stage project expects to complete in August 2012.

The lessons learned from these projects varied widely. Two entrepreneurs refocused their business models on different customer problems: the first discovered an adjacent problem that was more lucrative than the original focus and the second discovered that the initial target problem was actually several closely related problems with interdependencies, complementarities, and economies of scope. Another entrepreneur discovered new revenue opportunities through technology licensing that could supplement their revenue stream of product sales. Two entrepreneurs redefined the ways in which they were segmenting stakeholders, resulting in sharper and more compelling value propositions. Three entrepreneurs learned about the buying behaviour of

customers, which allowed them to improve their profit formulas. Two entrepreneurs developed requirement specifications for the minimum viable product demanded by their target customers and developed plans to acquire that functionality.

Conclusion

This article has examined the process of business model discovery by technology entrepreneurs. It has argued for the efficacy of a disciplined approach, provided a tool comprised of an actionable five-step process and a business model worksheet, and presented preliminary results and lessons learned from application of the tool by six technology entrepreneurs with nascent technology businesses. All projects examined here employed a four-factor business model framework described in this article, but nothing precludes an entrepreneur from employing a disciplined discovery process using a different business model framework. Likewise, all projects examined here were conducted as applied research projects within Carleton University's TIM program, but nothing precludes others seeking to exploit a business opportunity from employing a disciplined discovery process in other settings. The key points advocated here are *intent* to learn quickly through deliberate action, and a *structure* similar to the way in which engineers and scientists approach product development and other critical business functions. Although preliminary, these early field results provide some empirical support for the argument that discipline of intent and structure can help technology entrepreneurs think more clearly about their businesses and channel effort into discovery-driven activities more likely to achieve desired outcomes.

Acknowledgments

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Table 3. Summary of six projects of business model discovery

Entrepreneur Company name	John Schreuders	Natasha D'Souza	Samer Abu-Saifan	Elias Majic	James Makienko	Robert Poole
Opportunity	Software for emergency response management	Virtual EyeSee Virtual therapy software for children with special needs	Autism Ottawa Educational technology and methods for children with autism	Ottercall Mobile language learning software	HiveDirect Software and services for collaborative scalable video transcription	Freebird Solutions Software for economic development in the knowledge economy
Project status (actual completion date or forecast)	Completed (December 2011)	In progress (April 2012)	In progress (April 2012)	In progress (April 2012)	In progress (April 2012)	In progress (August 2012)
Target areas of business model to strengthen	Value propositions Capabilities	Job-to-be-done (*) Value propositions Profit formula	Value propositions Profit formula Capabilities	Value propositions Profit formula Capabilities (*)	Value propositions Profit formula	Value propositions Capabilities
Discovery-driven activities	- Online survey of potential users. - User feedback on a “wire-frame” concept prototype.	- Interviews with parents and educational service providers to understand needs and buying behaviours.	- Interviews with potential lead users to understand value propositions and requirements. - Construction of a prototype system. - User trials of prototype system.	- Competitive analysis of rival offers, especially revenue triggers and pricing. - “Small bet” market probes executed as parallel experiments.	- Construction of a prototype system. - Lead user trials of prototype system. - Interviews with various stakeholders to understand value propositions and buying behaviour.	- Comparison of alternative approaches and outcomes of community-building.
Lessons learned (examples of outcomes that strengthened the initial business model)	- Post-incident analysis may be more lucrative than real-time applications.	- There are many jobs-to-be-done, not just one. - Interconnections and complementarities of jobs-to-be-done create economies of scope. - Discovered insights into the operation of private organizations providing educational interventions.	- Defined the user requirements for a minimum viable product. - Redefined stakeholder groups and sharpened the value propositions for each group.	- Developed a sharper market segmentation by user needs and willingness to pay. - Identified new revenue triggers and pricing strategy. - Discovered new revenue opportunities around technology licensing.	- Defined the user requirements for a minimum viable product.	In progress.

An asterisk (*) indicates a target area that was added after implementation of the work plan was already underway.

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Recommended Reading

The author maintains a website of business model research and practitioner resources:

- steven.muegge.net/business-models

The following three books each provide further background on the development and application of one of the alternative business model frameworks of Table 2.

1. Johnson, M.W. 2010. *Seizing the White Space: Business Model Innovation for Growth and Renewal*.

- Book: tinyurl.com/ccu6u7p
- Website for the book: seizingthewhitespace.com

2. Chesbrough, H.W. 2006. *Open Business Models: How to Thrive in the New Innovation Landscape*.

- Book: tinyurl.com/8y5gp7s
- Website for the open innovation community: openinnovation.net

3. Osterwalder, A. & Pigneur, Y. 2010. *Business Model Generation*.

- Book: tinyurl.com/7t2gu33
- Website for the book: businessmodelgeneration.com

Additional Resources

A printable version of the business model worksheet in Box 1 can be found at: timreview.ca/article/545

About the Author

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User Frustrations as Opportunities

Michael Weiss

“*In the middle of difficulty lies opportunity.*”

Albert Einstein

Theoretical Physicist (1879–1955)

User frustrations are an excellent source of new product ideas. Starting with this observation, this article describes an approach that entrepreneurs can use to discover business opportunities. Opportunity discovery starts with a problem that the user has, but may not be able to articulate. User-centered design techniques can help elicit those latent needs. The entrepreneur should then try to understand how users are solving their problem today, before proposing a solution that draws on the unique skills and technical capabilities available to the entrepreneur. Finally, an in-depth understanding of the user allows the entrepreneur to hone in on the points of difference and resonance that are the foundation of a strong customer value proposition.

Introduction

Any business opportunity starts with a good understanding of the current or potential user of a product. As an entrepreneur, you need to understand what problems the user faces, and how you can use your skills and technical capabilities to solve them. It is critical to keep those two aspects of developing a new opportunity apart. On one hand, users are just looking for a solution to their problem. They are not interested in the technology underlying your solution. On the other hand, you can only solve problems that match your skills. Often, entrepreneurs make one of two mistakes: they either assume that their technical solution will “wow” the customer or they target an opportunity on which they cannot deliver, because they do not have access to the required skills and capabilities.

To learn about your users, you should answer these questions:

1. What problem are you solving for your user?
2. What frustrations do users experience with current solutions?
3. How are users solving their problem today?

4. What better ways are there to solve the user's problem? Do you have the required skills?
5. How is your solution different from other solutions on the market?

What problem are you solving?

If we could just ask customers what they need, developing new products would be simple. Traditional market research relies on customer input obtained through surveys and focus groups. However, users often cannot articulate their needs, and their imagination of what solutions can be provided to their problems is limited by what they have come to know. Asking customers about their needs will lead to incremental improvements, not new ways of solving their problems.

In order to understand what problem the user faces, you need to put yourself into the user's shoes. From the user's perspective, your product needs to address needs the user has. User needs come in two types. Needs that the user can articulate are also known as perceived needs. An example of a perceived need is a user looking for a faster portable scanner or one with greater memory capacity. Most needs, however, are difficult to articulate. For example, the user's experience

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with current products may limit their ability to imagine a different type of solution. These needs are called latent needs. An example of a latent need is that users really want to limit the number of gadgets they have to carry with them.

Continuing with the scanner example, we note that currently, most portable gadgets have a single purpose. So, an industrial designer may need to take a potpourri of gadgets wherever he goes, including a digital camera for taking photos, a voice recorder for conducting interviews or sampling sounds, a portable scanner to scan photos and articles, a sketchbook for capturing ideas when the inspiration strikes, and a collection of pencils of different strength. I happened to sit next to a well-known designer once at an event, when he emptied his bag on the table to make this very point. Our designer's latent need is: there are too many gadgets to carry, but if he leaves one of them at home, it may be the one he needs most. So, he has learned to live with this constraint; he is not content, but he lacks a viable alternative.

What frustrations do users experience with current solutions?

To discover latent needs, look for frustrations that the user experiences. They are often hiding behind workarounds that the users have adopted to make do with current solutions. Users may also simply be unaware of which alternatives are technically feasible and have come to expect the limitations of current products. Their experience with existing products also frames how they can articulate their needs (Leonard and Rayport, 1997; tinyurl.com/7qvfkad). Thus, for discovering latent needs, a different approach from surveying users is required.

User-centered design techniques can help elicit those latent needs (Holtzblatt and Beyer, 2012, tinyurl.com/bpu77ow). User-centered design takes the view that the user's needs can be best understood by observing the user in their work environment. It provides a set of techniques that cover the front end of product development – including who the users are and how they do their work today – to detailed user interface design. It starts with observation and inquiry in the user's work context. The goal here is to capture what users actually do and not what they self-report as doing. This stage provides insights into what prompts users to use existing products and may uncover unexpected ways that users are using them.

Some of the techniques available through user-centered design approaches include shadowing and work modeling (Stickdorn and Schneider, 2012: tinyurl.com/8796tr4; Katzen, 2011: tinyurl.com/6v6fut5). When shadowing users, product developers spend time with users in their environment and try to observe them in an unobtrusive manner. This allows developers to experience problems as they occur. Often the users involved may not recognize problems as such, or have accepted them as “how things work”. Work modeling involves mapping the users' activities into a visual representation of how they interact with the products they use. From this, the developer can derive problem areas and opportunities for improvement.

Intuit (intuit.com), the developer of the Quicken personal financial software, requires its developers to spend a few days each year shadowing new users using the software. From this exercise, not only does Intuit learn how to improve the documentation and usability of its software, it also gains insights into the environment in which users are using Quicken. One of the lessons for Intuit from its “Follow Me Home” program (tinyurl.com/32u7pxr) was that small business owners were using Quicken to keep their books. As a result of this observation, Intuit created the QuickBooks financial software product for small businesses, which allowed the company to enter a lucrative new market.

How are users solving their problem today?

Understanding how users help themselves when they face a problem also makes you aware of the alternative solutions available to them. Additionally, the Internet is an excellent resource for finding information about competing solutions, not only in terms of their features, but in terms of user feedback and the frustrations users experience using those competing solutions. Many entrepreneurs limit their attention to products that directly compete with their solution. Doing so, they fail to recognize what the user is trying to achieve, in other words, what job the user would be “hiring” their product to do (Christensen and Raynor, 2003: tinyurl.com/7n7x5rd; Christensen, 2006, tinyurl.com/mdazmc).

For example, if your product is a portable scanner, you might just be comparing it to other portable scanners on the market. However, your real competition may be far broader than originally conceived, but so are your solutions. A new solution to a problem that the customer faces may involve another type of technology or an

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alternative approach. Solutions competing with a portable scanner include copiers (if one is nearby), the user's memory (often unreliable), pen and paper (slow and tedious), as well as a camera-equipped smartphone (a very viable alternative, as we will see).

What better ways are there to solve the problem?

What you bring to the table as an entrepreneur are skills and technical capabilities. When you learn about the customer's problem, you are actually constantly looking for opportunities to match your skills and technical capabilities to the user's needs. This process enables you to imagine solutions that users cannot conceive, given that their experience is limited to products that exist. Users may not be able to imagine solutions that are within your reach. In other words, you are a peddler of possibilities.

For example, users like our industrial designer may need to scan documents on the go. Existing solutions to this problem have been cumbersome (e.g., are difficult to use, force the user to carry an extra piece of equipment, require battery power, produce low-quality results, require transferring scanned images to other computers). Using a smartphone as a scanner is an effective alternative. It is a device users already carry with them, so no extra equipment is required. The user already keeps it charged regularly. Smartphones have built-in cameras that are often of high-enough quality to capture a sufficient level of detail. The functionality of a scanner can be emulated by an application on the smartphone. The smartphone solution makes a trade-off between quality (high-resolution scans) and convenience (many devices in one).

How is your solution different from other solutions on the market?

However, it is not enough merely to solve the problem as effectively as other solutions. Your solution must excel in some dimensions. Look for points of difference that set you apart from your competition. In fact, if you are doing this well, what you want to emphasize are the points of difference where you demonstrate an intimate understanding of your customer. You can do this through a resonating focus on just the dimensions that matter most (Anderson et al., 2006: tinyurl.com/6tmrqv; see also Shankar, 2012: timreview.ca/article/525, in the February issue of the *TIM Review*). The time you spent earli-

er, observing users and trying to understand their latent needs, will pay off handsomely now. The better you understand your customer, the better you will be able to identify just what features and attributes of your product matter to them most, which is why they will want to buy the product from you rather than your competition.

The first company to offer a smartphone application that effectively turns a smartphone into a portable scanner demonstrated a superior understanding of one of the most pressing user needs. Rather than innovating, as its competitors did, on dimensions that customers were well-aware of, such as modifying the design of a portable scanner so it can operate independently from a computer, this company recognized something important that had eluded its competitors. It understood that, for many users, carrying a separate piece of equipment that they did not use regularly, and keeping it charged at all times, was a major nuisance. This understanding could only be obtained by close observation of users in their working environment. Armed with the knowledge of the frustration that existing solutions created, the company was able to recalibrate the trade-off between quality and convenience in its favour.

Conclusion

This article described an approach that entrepreneurs can use to discover business opportunities. In summary, to learn about your (current or potential) users, answer these questions:

1. What problem are you solving for my user?
2. What frustrations do users experience with current solutions?
3. How are users solving their problem today?
4. What better ways are there to solve the user's problem? Do you have the required skills?
5. How is your solution different from other solutions on the market?

Your answers to the first three questions will tell you whether the problem is big enough to become the foundation of a new business. Your solution needs to be a significant improvement over the solutions currently available to users on the market. Your answers to

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the fourth and fifth questions will tell you whether the opportunity you discovered is something that you can and want to act on. If there is no match with your skills or future goals, the opportunity may not be the right one for you. Finally, your answer to the last question will give you insights into why users will buy the solution from you. If you are a new player, you cannot build on an existing relationship with your users, but you need to demonstrate a level of understanding of your users' needs that surpasses the competition. Once you have the answers to these questions, you are well-prepared to create a compelling customer value proposition, which will be the centrepiece of your business opportunity.

About the Author

Michael Weiss holds a faculty appointment in the Department of Systems and Computer Engineering at Carleton University, and he is a member of the Technology Innovation Management program. His research interests include open source business models, collective innovation, mashups and end-user development, product line engineering, and business patterns. Michael has published over 100 papers in conferences and journals.

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Process Ambidexterity for Entrepreneurial Firms

Sonia D. Bot

“ *How wonderful that we have met with a paradox.
Now we have some hope of making progress.* ”

Niels Bohr (1885–1962)
Physicist and Nobel Laureate (1922)

Technology-based entrepreneurial firms must effectively support both mainstream exploitation and new-stream exploration in order to remain competitive for the long term. The processes that support exploitation and exploration initiatives are different in terms of logistics, payoff horizons, and capabilities. Few firms are able to strike a balance between the two, where mainstream exploitation usually trumps new-stream exploration. The ultimate goal is for the firm to operate effectively in a repeatable, scalable, and systematic manner, rather than relying on good luck and hoping either to come up with the next innovation or for the product to function according to its requirements.

This article builds on the author’s years of experience in building businesses and transforming medium and large-sized, entrepreneurial technology firms, leading large-scale breakthrough and sustained performance improvements by using and evolving Lean Six Sigma methodologies, and reviews of technology innovation management and entrepreneurship literature. This article provides a process-based perspective to understanding and addressing the issues on balancing mainstream exploitation and new-stream exploration in medium and large-sized entrepreneurial firms and extending it to startups. The resulting capability is known as process ambidexterity and requires disciplined, agile, and lean business management.

Introduction

Most leading firms are proficient at continuously evolving their mainstream business, namely through innovations in technology that add incremental value in order to remain competitive in a particular market space. In contrast, these same companies may find themselves struggling to achieve disruptive innovations that create new markets and value networks. Processes, and the underlying organizational structures and culture that support them, are a key component to this struggle.

Building upon the definition proposed by Lee and colleagues (2009, tinyurl.com/7socnp3), *process ambidexterity* is the firm’s capability for utilizing both process align-

ment and process adaptability, from the top level of the business through to the lower levels for each function. *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 describes the characteristics of mainstream exploitation and new-stream exploration. A description of sequential and simultaneous implementation approaches follows, where their lack of alignment and poor adaptation are identified as intrinsic sources of imbalance. The capability of process ambidexterity is introduced along with supporting mechanisms as a means to achieve balance.

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Characteristics of Mainstream Exploitation and New-stream Exploration

Mainstream exploitation focuses on initiatives that deliver payoffs in the near term (for example, within 12 months). Their mandates are associated with maintaining business strength as they relate to the firm's current market position. This includes incremental improvements to the existing product portfolio or solution such as adding new features, improving performance of existing functionality, improving quality, and reducing cost. The processes must support efficiency, productivity, and product quality to ensure the firm "does things right".

Conversely, *new-stream exploration* focuses on initiatives that deliver payoffs in the intermediate or long term. Their mandates are associated with the evolution of the firm to create new markets and options for growth. This includes breakthrough innovations, paradigm shifts, new products or solutions, and adapting to very strong competitive and market forces. The processes must support freethinking and experimentation while in an environment of very high uncertainty to ensure the firm "does the right thing".

Table 1 describes the dimensions where each approach operates and the demands they each need to address.

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

Dimension	Mainstream Exploitative Business	New-Stream Exploratory Business
Strategic Intent	Cost, profit, generate revenue from current operations	Growth, innovations that will provide revenue in the future
Competitors	Responding to current competitors	Anticipating future competitors
Investment Focus	Advancing current technologies, serving current customers	Exploring new, emerging technologies, creating new markets
Critical Tasks	Operations, efficiency, incremental innovation, refinement	Adaptability, new products, breakthrough innovation
Competencies	Operational	Entrepreneurial
Structure	Formal, mechanistic	Adaptive, loose
Controls & Rewards	Margins, productivity	Milestones, growth
Culture	Efficiency, low risk, quality, customers	Risk taking, speed, flexibility, experimentation
Employee Skills	Refine current skills and capabilities	Develop entirely new skills
Leadership role	Authoritative	Visionary, involved

*Adapted from O' Rielly and Lushman (2004; tinyurl.com/cj6arty) and Morris et al. (2010; tinyurl.com/cesk9iz).

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Very few firms are able to strike a balance between new-stream exploration and mainstream exploitation, especially with the increasing complexity and pressure to stay competitive. Typically, firms are prone to over-rotate on the tactical mainstream support at the expense of strategic innovation. This is particularly true for firms that are struggling to deliver on their mainstream business when they are caught short on time, funds, product functionality, and quality. The exploration of new-streams is often seen as a risky venture into the unknown, rather than a move that strengthens the business.

Implementation Approaches: Sequential and Simultaneous

Chen and Katila (2009, tinyurl.com/7vdzaud) pulled together a comprehensive summary of sequential and simultaneous implementations of mainstream exploitation and new-stream exploration, and then coupled each approach with the most suitable business environment. Although each approach may seem opposite in nature, they actually represent ends of a continuum, where implementations can reside within these boundaries.

In the *sequential approach*, mainstream exploration and new-stream exploitation are viewed as fundamentally conflicting activities. Exploration is viewed as an inefficient process, whereas exploitation is basically efficient. With the sequential approach, there are back-to-back periods of exploration followed by exploitation. The exploratory process, having lots of experimentation, precedes the replication process of exploitation. The sequential approach is more suited to stable and established environments that are characterized by significant periods of stability before having to address major change. For example, the semiconductor industry resonates with the sequential approach with its long and predictable product technology lifecycles, and by conditions that are relatively stable with the rare exception of disruptive events.

In the *simultaneous approach*, mainstream exploration and new-stream exploitation are viewed as activities that reinforce each other, and therefore must occur simultaneously. This reinforcement is based on mutual learning between the two, thereby more readily growing a learning organization. The simultaneous approach is more appropriate for dynamic environments. As conditions are constantly changing, firms that compete in these markets do not have the time to switch from exploration to exploitation because the window of opportunity is very short. For example, the smart-

phone, superphone, and tablet industries favour the simultaneous approach in which competing devices are steadily being introduced by a wide number of firms.

Lack of alignment and poor adaptation of these approaches are intrinsic sources of the imbalance between mainstream exploitation and new-stream exploration, where exploitation often trumps exploration in the continuum. Process ambidexterity is a fundamental capability underlying the effectiveness of execution of these approaches and determining when one approach outperforms the other in the continuum of the business. The next section of this article provides the mechanisms for achieving the balance between mainstream exploitation and new-stream exploration that is appropriate to the particular firm's environment.

Process Ambidexterity Mechanisms to Achieve Balance

Process ambidexterity requires disciplined, agile, and lean business management. This section presents an approach that supports process ambidexterity and is based on the following mechanisms:

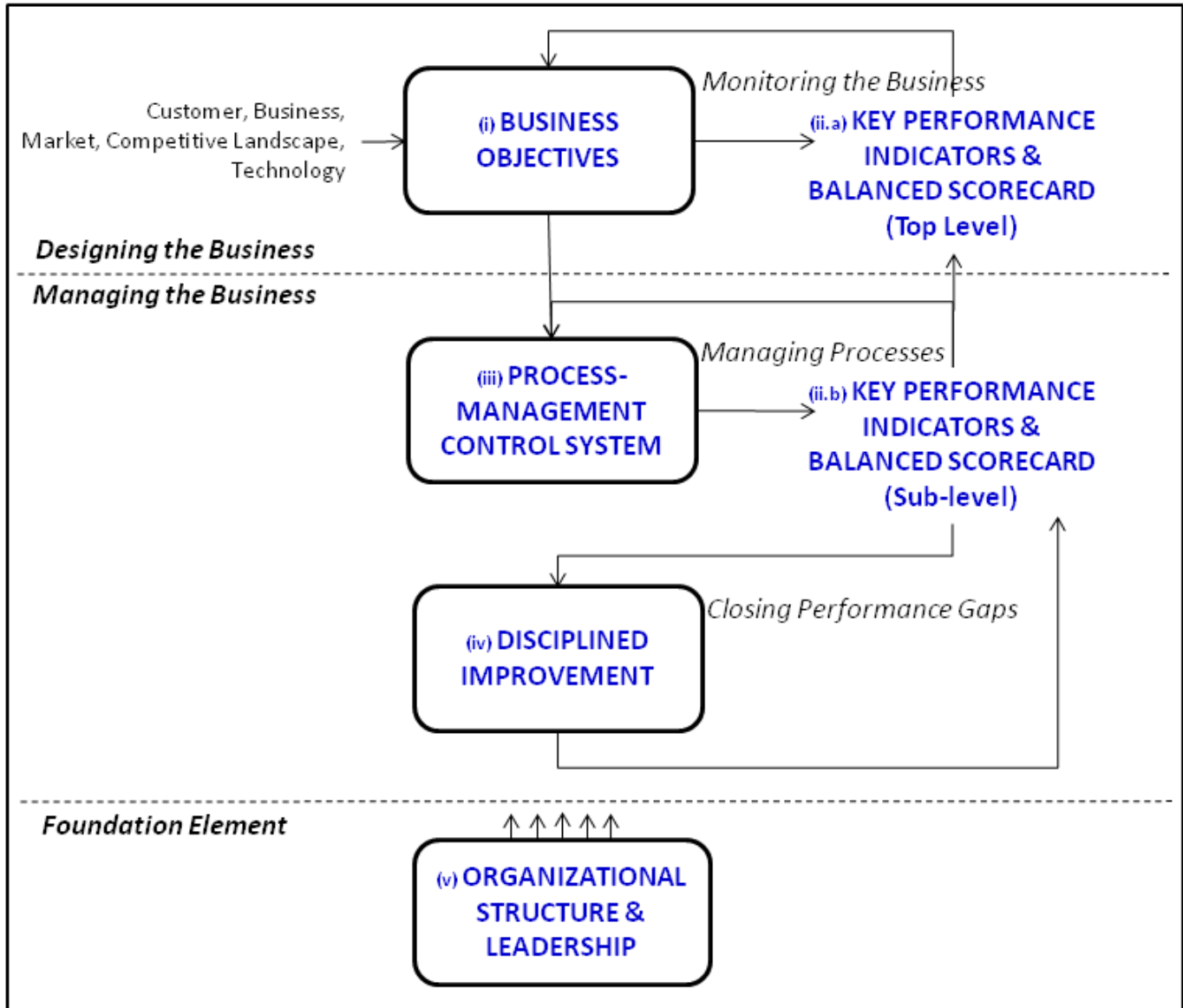
- i. Business objectives
- ii. Key performance indicators and balanced scorecard
- iii. Process-management control system
- iv. Disciplined improvement
- v. Organizational structure and leadership

At a high level, this systematic approach breaks out into *designing the business* and *managing the business*. In designing the business, the business objectives are developed. These objectives are measured by using "key performance indicators" and "balanced scorecards" at the top level. The indicators provide focus on what is important. In managing the business, process-management control systems are set up, and they signal what is not working. Performance gaps are identified, which can then be prioritized into disciplined improvement initiatives. The outcomes of the improvement initiatives are measureable and inherently reflected in the key performance indicators and balanced scorecards. Figure 1 illustrates that, throughout this cycle, organizational structure and leadership play a role with accountability based on clear ownership and commitment.

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Figure 1. Process ambidexterity mechanisms



Business objectives

Well-defined business objectives set the stage for what the firm needs to achieve and the parameters within which it needs to operate. This includes a synthesis of customer, shareholder, and employee feedback, ethnographic studies, market research, and competitive analysis. These objectives are cascaded top-down, where top-level leadership, management, staff, and partners are aware and aligned.

Key performance indicators and balanced scorecard

Key performance indicators are measures that are used to evaluate the current health of an organization over time. At the top level of the firm, the indicators quantify the firm’s strategy in terms of revenue, expenses, cash flow, and customer satisfaction. They provide a business-wide view at the highest level. The indicators at the top-level cascade and align with the hierarchy of sub-processes within the firm. At the sub-process level,

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indicators provide the state of health in the context of the sub-process. For example, a key performance indicator for the sub-process of new-stream exploration could be the number of patents filed over time. For the mainstream exploitation sub-process, indicators can include measures of quality, time-to-market, and budget adherence. Balanced scorecards present the key performance indicators in a concise report compared to the target value for each indicator. Balanced scorecards are tailored to the various levels in the organization. This helps set priorities, diagnose and solve problems, and plan for the future.

These key performance indicators are based on process, rather than function. They identify key business drivers. Through ongoing measurement, these key drivers can be controlled and improved. The indicators reveal how well critical requirements are met and predict future performance. Since these indicators are linked at all process levels, it becomes easier for employees throughout the firm to understand where the business is headed, understand what they need to do, and how each process contributes to achieving the business objectives.

Key performance indicators typically measure outcomes, as in the example above, the number of patents filed over time. However, more mature implementations include predictive indicators (i.e., ones that have been statistically proven to predict the outcomes). For example, the number of new ideas in the research funnel over time could be a predictive indicator for the outcome of the number of patents filed over time. Another example would be the defect density in software during integration testing as a predictive indicator of the volume of customer returns in the field.

When developing key performance indicators, and their associated balanced scorecards, one should focus on the vital few. The vital few, and not the trivial many, are only those indicators that are required to make sound decisions quickly. They are few in number (for example, from a couple to no more than a handful) and are different for every firm. Typical trigger questions to identify the vital few include: What do you really need to know to run your business? What issues use up most of the firm's resources? What do your customers care most about?

Implementing indicators in an ad hoc fashion and confusing them with diagnostic metrics used for analysis leads to indicators that are poorly designed and rarely

used, misleads the decision-making, and bogs down the tools and systems that support them. Instead, indicators should be treated in a similar way as product requirements. They must have a structured definition, be analyzed, designed, validated, and documented, and evolve as appropriate over time. A popular approach to achieve this is GQM+Strategies (tinyurl.com/6q3elrp), which is based on the "Goal Question Metric" paradigm. Furthermore, all indicators must be mapped to a specific step in the process.

Process-management control system

A process-management control system is the foundation for managing processes (such as alignment, adaptability, and performance to targets), focusing improvements, and sustaining the gains realized from improvement efforts. This is based on the continual measurement of process performance (using the key performance indicators and balanced scorecard) against critical business and customer requirements. The key processes in the firm should be documented from the top level though to the lower levels. For example, the top-level processes for a firm could be: "define strategy, develop products, acquire customers, deploy products, and support products and customers". Lower-level processes would expand on the higher level processes. For example: "develop products" would break down into the product development process steps (and most likely different ones for mainstream exploitation and new-stream exploration); "acquire customers" would break down into marketing and sales process steps.

Disciplined improvement

For improvement initiatives to succeed, they must be approached in a systematic and disciplined manner. Otherwise organizations get stuck in a vicious cycle, also known as a capability trap (Repenning et al., 2001; tinyurl.com/bcr6cw), where they can go on for years with ample goodwill to improve, yet not achieve, performance results. Typically, these efforts are not successful because they fail to both look at the dynamics of the end-to-end system and identify true root causes. Common methodologies that support disciplined improvement are Lean, Six Sigma, Design for Six Sigma, and Kaizen.

The Lean methodology focuses on the systematic removal of waste and reduction of cycle time in a process. Six Sigma deals with the reduction of operational variation and defects in a process. Design for Six Sigma, a newer methodology, is all about helping the organiza-

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tion create new products and services in the spirit of systematic innovation. Kaizen is a continuous improvement approach that is typically used for achieving *incremental* improvements. Lean and Six Sigma are tailored for achieving *breakthrough* improvements. Design for Six Sigma is used to create new defect-free processes, products, and services.

Although Lean and Six Sigma originated in the manufacturing area, their application to technology innovation management is in its infancy and continues to evolve, taking into account the characteristics of knowledge-based work, need for creativity, and the velocity of the business. Nonetheless, fundamental principles still apply: clearly defining the problem or opportunity; measuring the defects and waste and where they occur in the process; prioritizing customer requirements; analyzing the true root cause of defects and waste; analyzing alternative high-level process designs according to critical indicators; identifying and implementing solutions; validating solutions; and monitoring performance to ensure objectives are met and sustain.

Organizational structure and leadership

Organizational structure, including how the senior team manages it and the resulting culture, is critical to ensuring accountability that is based on the clear ownership and commitment that is necessary to systematically support the mechanisms presented above for process ambidexterity, which in turn affects the ability of a firm to foster and balance both mainstream exploitative and new-stream exploratory initiatives.

According to O’Rielly and Tushman (2004; tinyurl.com/cj6arfy), traditional organizational structures and their management are at high risk for impeding the balanced flow between these initiatives. For example, in a functional organizational structure, employees are grouped into departments according to their function (such as R&D, marketing, sales, manufacturing, and finance). The management is hierarchical, with clear lines of authority and reporting that lead ultimately to one top person. The new-stream exploitative teams are fully integrated into the organizational and management structure for the mainstream exploitative business.

O’Rilley and Tushman (2004) describe the structure and management of an ambidextrous organization where the mainstream exploitative and new-stream exploratory teams are organized as structurally independ-

ent units. Each team has its own processes, structures, and cultures. However, they are integrated into the same senior-management hierarchy. The structure and management of an ambidextrous organization is far superior in supporting both exploratory and exploitive projects. For example, in their study, O’Rilley and Tushman (2004) found that, when it came to launching breakthrough products or services, more than 90% of ambidextrous organizations achieved their goals, while none of the cross-functional or unsupported teams and a quarter of the functional designs produced real innovations. In the cases where breakthrough innovations were solely to replace existing products, ambidextrous organizations performed as well as functional designs. Furthermore, when traditional organizations moved to an ambidextrous structure, their performance increased substantially, and conversely, when ambidextrous organizations migrated to traditional structures, their performance decreased markedly.

O’Reilly and Tushman (2004) learned that ambidextrous organizations must have senior teams and managers who have the ability to understand and be sensitive to the needs of the very different types of businesses, and adapt appropriately. The firm’s senior team must be committed to operating ambidextrously, even if the members are not ambidextrous themselves. Resistance to ambidexterity at the top level of the organization cannot be tolerated. Lastly, it is crucial that the senior team relentlessly communicate a clear and compelling vision.

Implementing the mechanisms

Depending on the nature of the firm, these mechanisms can be implemented using agile, waterfall, or hybrid methodologies. The key is to do this in a systematic and disciplined manner. Keep this as simple and lightweight as possible. Focus on the vital few indicators and processes (quality over quantity) and prioritize improvement initiatives and interventions with a focus the Pareto Principle, that is, the 80:20 rule.

Since process ambidexterity is pervasive throughout the entire organization, buy-in, commitment, and consistency is critical throughout all the levels of the organization, from top-level executives to managers to staff. The top-level leadership must be fully engaged and actively support this. They must champion, lead by example, and remove roadblocks when required. Otherwise the risk of remaining stuck in the capability trap is high.

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Conclusion

A process-based perspective to understanding and addressing the issues on balancing mainstream exploitation and new-stream exploration in medium and large-sized, entrepreneurial technology firms has been presented. This article makes at least two contributions. First, it identifies process alignment and adaptation as intrinsic sources to balance mainstream exploitation and new-stream exploration. The second contribution is that this article provides a practical and real-world framework for enabling the continuous development of the capability for process ambidexterity. By building the capability of process ambidexterity through the proposed mechanisms, disciplined, agile, and lean business management occurs. This gives rise to alignment and adaptability, and then a shift to balanced mainstream exploitation and new-stream exploration.

The challenge for achieving exploration and exploitation balance is not restricted to medium and large-sized entrepreneurial firms. Startups are also faced with this challenge and often focus on new-stream exploration at the expense of mainstream exploitation. Over time, many will hit the wall, get stuck in a capability trap, and make no forward progress. Ideally, firms need to build the capability of process ambidexterity from the start and evolve it as the firm grows. This sets up the firm to scale more readily. Overall, process ambidexterity is a key capability that enables competitive advantage.

About the Author

Sonia Bot is a business executive that specializes in strategy and business execution for technology innovation and corporate entrepreneurship ventures. She has extensive experience in the high-tech industry, including business transformation and strategy, product management and delivery, and new venture creation within multinational technology companies. Her work experience includes Research In Motion, Nortel, Bell-Northern Research, IBM, and TransCanada Pipelines. She holds degrees in Computer Science with Systems Design / Electrical Engineering (BMath) from the University of Waterloo and Biomedical Engineering (MAsc) from the University of Toronto, and she is a certified Lean Six Sigma Master Black Belt.

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How Do Large Companies Manage Their Investments Across the Three Horizons?

Peter Carbone

“It is relatively easy to do product management, or to manage research on future products. A good general manager needs to be able to manage both at the same time.”

A Nortel executive
Circa 2007

Technical entrepreneurship continues to be important to a technology company's health and growth, even after it has successfully delivered its first product. It is essential to help the company deal with competitive forces and to renew its revenue stream. However, as the company grows, its entrepreneurial capability often becomes handicapped both by company culture as well as external pressures. The company must achieve the right mix of investment and level of attention across three time horizons of growth: immediate, imminent, and future. This balancing act requires a commitment to a strategic growth goal, appropriate tools, and leaders that can manage significant degrees of uniqueness in the resources that address each of these time horizons.

This article discusses some of the horizon-management challenges faced by top management teams of large companies and overviews some mechanisms and processes that have worked effectively. Large companies must overcome internal teams' divergent values and culture as well as significant external, short-term pressures being applied by their existing base of customers and markets. Discipline at the entry point to Horizon 3 (exploratory phase) and then a rapid transition to Horizon 1 (current operations) is the priority of any successful growth company.

Introduction

All companies are eventually faced with the reality that sustained growth can only come from continuous innovation. Changes in customer needs, competitive offers, and breakthrough opportunities all require a constant flow of ideas to cash. The “three horizons model” has been used to characterize the relative business maturity of investment, with Horizon 1 (H1) being focused on existing business, Horizon 2 (H2) on emerging business, and Horizon 3 (H3) on options for future business (Baghai et al., 2000; tinyurl.com/87bfmtu). It would seem quite straightforward to balance investments across the three horizons to ensure a continuous flow of innovation; however, many companies experience significant difficulty investing in the future. In this article, we will explore some of the more significant challenges in managing each of the horizons within a

large company and we will discuss some approaches that have been successful. Bell-Northern Research (BNR; tinyurl.com/6vrpyt3) and Nortel (tinyurl.com/24gm7a) were well known for successful innovation management, in particular prior to the dot-com bubble (c. 2000), and provide examples of how to address such challenges.

The skills, values, and effort required to address each horizon are fundamentally different, making collaboration between the respective teams and transitioning between horizons challenging. Table 1 summarizes some of the characteristics that impact investment decisions associated with each horizon.

Horizon 1 is the primary focus for the majority of the company because it deals with existing portfolios and customers and because it consumes most of their resources. H1 management tends to be very operational

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Table 1. Summary of horizon characteristics impacting investment

Horizon	Description	Characteristics impacting investment
H1. Immediate impact	Farming <ul style="list-style-type: none"> Current business portfolio 	<ul style="list-style-type: none"> Customer driven (e.g., feature requests) Competitor driven (e.g., to respond to an attack) Cost driven (e.g., for continuous improvement) Investor driven (e.g., stock price) Rarely innovation driven (except supply chain process, e.g., Dell)
H2. Short-term impact	Hunting <ul style="list-style-type: none"> New portfolio or portfolio elements New customers/segments 	<ul style="list-style-type: none"> Lead-customer driven (e.g., triggers deployment) First-to-market driven (e.g., Apple, RIM) Cost or feature differentiation Time urgency (e.g., time to market) New entry may involve mergers or acquisitions for time or feature advantage
H3. Long-term impact	Exploring <ul style="list-style-type: none"> Exploring potential new business opportunities looking for “the next big thing” 	<ul style="list-style-type: none"> Strategy driven (e.g., to support company direction) Talent driven (e.g., constrained/enabled by what the people can do, visionaries) Differentiation driven (e.g., “the next big thing”) Impact driven (e.g., “the art of the possible”) Tested outside of market (e.g., low cost)

and features traditional cost and profitability metrics. Horizon 2 is more entrepreneurial because it often deals with the introduction and development of new portfolios along with potential innovation for bringing these offers to new customers or markets. H2 initiatives often have only revenue or customer growth metrics. Horizon 3 is the highest risk and is often at odds with other company activities (e.g. it may obsolete an existing portfolio). H3 initiative metrics may be less tangible and include things such as supporting the brand, securing patents, and creating industry leadership. Product managers champion H1 initiatives, and researchers in R&D champion H3 initiatives. H2 initiatives are harder to resource, requiring operational leaders to take decisions as well as execution risks.

Managing Investment Challenges

Companies face complex challenges as they attempt to continuously renew their value proposition while defending current business. There are (at least) three fundamental aspects that impact a company’s decision process regarding horizon program management.

Strategy (shifting focus beyond H1 to leverage H2/H3)

The big challenges in H1 are dealing with momentum (proactively shifting to something new) and prioritization (of large successful portfolios). Strong founders that have personal strategy objectives and a unique ability to drive execution enable companies to more easily balance investment across horizons. Examples include Bill Gates’ decision to address the internet opportunity or Steve Jobs launching into a new smartphone market segment). However, most companies must use a top-down strategy to overcome short-term pressures, to resolve conflicts and facilitate re-prioritization of H2/H3. They can become distracted by the success (or failing) of current business and pay little attention to strategy beyond the next one or two quarters. Challenges that make it difficult for the CEO to ensure sufficient attention is paid to executing strategy decisions include management-by-committee approaches, internal conflicts resulting from divergent or competing portfolio elements or market offers (e.g., smaller, inexpensive switches for enterprises versus higher-capacity, redundant switches for carriers), or a lack of talent/investment to be able to “add anything

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new". Investment tagged as H2 or H3 has been found to be applied to feature development or incremental product evolution for current programs. For example, after the decision was made to absorb Nortel's research arm (BNR) into the respective lines of business, BNR's dedicated focus on "inventing the future", based on technical merit/breakthroughs and technical management was quickly displaced by a focus on low-risk, short-term, current-customer-driven business opportunities.

External forces (facts of life)

External forces place significant pressure on any company, but large public ones are particularly susceptible because they need to balance company/customer benefits. Also, to tradeoff short and medium/longer-term benefits requires effort to offset the natural focus on H1. The two largest sources of pressure are the investors and the customers. Investors are very focused on return and do drive the behaviour of a company. In the recent case of Research in Motion (RIM), investors drove a leadership change due to the perception of unfavorable results. In all cases, investors drive an operational focus with ongoing scrutiny of the company's finances (i.e., profit, costs, growth). This empowers H1 teams, the largest population of a company, to drive investment decisions, often at the expense of H2/H3 initiatives. The tactic of buying technology/companies further handicaps internal H2/H3 initiatives.

Customers may also be a major force towards H1 investment. Nortel had large customers who wanted to "strategically partner" with them to drive differentiated solutions (e.g., to develop custom features or specific standards development, or to influence the timing of technology deployment in their favour). These customers would gladly consume all of the R&D investment and development cycles to support their short-term strategies and it was very difficult to decline requests from these large, profitable customers in favour of making future bets.

Culture, motivation, and incentive

The culture of a company is reflected in its employee values and impacts the company's overall ability to rapidly create cross-horizon teams required to bring a flow of innovation to the market. In a company with significant customer interaction and H1 focus, there is little incentive to take risks on futures, so measurable targets and incentives to take on new things becomes mandatory to legitimize H2/H3 programs and attract the talent required to deliver them. The reward system in most

companies focuses on hitting sales targets, cost-reduction targets, or market-share targets. Successful general managers argue for incremental investment on their "sure thing" initiative versus wasting money speculating on something that was very high risk. In the early days, Nortel's Optical Network division (in the H2 stage) was losing money while racing to bring some breakthrough 10G technology to market. The switching team had many customer feature requests to satisfy and made the argument to starve the H2 program in favour of guaranteed H1 revenue.

Horizon Management Approaches

There are mechanisms that have been successfully used to balance investment across the horizons, manage within the horizons, and then manage transitions from H3 to H1. Below, we explore some of the mechanisms that have succeeded.

Managing H1 (farming)

All companies have processes to manage their market offer. Large companies have the following additional complexities: large and complex portfolios that compete for resources (e.g., Nortel played in 13 distinct segments); significant customers demanding attention (e.g., large Regional Bell Operating Companies had significant value-chain power due to their volume purchases); self-serving internal momentum and zeal for internal programs; and competition between portfolios (e.g. optical versus switching), making collaboration difficult.

To coordinate investment and execute top-down strategy, Nortel implemented a Portfolio Review Board to provide overall portfolio-management direction and investment allocation. It consisted of senior executives with accountability for results at a portfolio level (e.g. business unit presidents, CTO, CEO) and was led by the CTO as an impartial chair. The activities of the Portfolio Review Board were to:

1. Benchmark the portfolio objectively against the industry in terms of market share, sector growth, and competitive position. Key to doing this properly was to separate internally bundled portfolio elements to explicitly eliminate cross-subsidization that masked overall performance. In the case of the wireless portfolio, separating the profitable CDMA business from the unprofitable UMTS business facilitated appropriate decision making. This approach proved insightful to the executive team in that they gained a realistic, objective view of

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current business realities, which helped them to decide to exit small and less profitable segments and to deal more aggressively with portfolios that were dragging down the whole company.

2. Assess opportunities to enhance the portfolio performance (e.g., cost reduction potential, platform potential) with the objective to maximize the success of the portfolio. A more internally focused portfolio assessment explored revenue contribution, profitability, R&D efficiency/affordability, customer-revenue upside of changing investment profiles, and competitive impacts. This step identified the “stars and the dogs” of the portfolio.

3. Obtain feedback on any business impacts of changes (e.g., customer or competitor implications, internal portfolio cross-impacts, sale of asset value potential). This step identified potential external constraints on actions (e.g., in one case it resulted in decisions to sell businesses/products versus terminate them to protect existing customers). Product managers were consulted with an objective of minimizing surprises and starting the buy-in process for the changes. Since a larger group of people were now aware of the decision process and options, extra care was needed at this stage to prevent rumours from undermining decisions (e.g., key employees leaving, leaked intentions of sale impacting customer deals or portfolio valuation).

4. Implement decisions taken at the review board to increase or decrease investment, terminate programs, sell portfolio elements, etc. These decisions had to be executed quickly and efficiently. A senior executive was assigned the job of executing the decision, in many cases the president of a business unit. Small teams were assembled to assist in rapid execution. At this stage, care was needed to minimize the potential for disgruntled-employee actions that could undermine the business strategy (e.g., leaking plans to the market, creating customer confusion by positioning alternatives to the agreed strategy). Employees negatively impacted by the decision (e.g., who lose their job or lose status) needed to be engaged to avoid “misadventure”.

A small, dedicated team of analysts were assigned to provide market data, run scenarios to provide decision data, and run the Portfolio Review Board process. This team was independent of the various product groups and had to overcome the business unit’s reluctance to

surrender their total control over this corporate data. CEO and CFO support was required to ensure appropriate and timely information was available. This was done by the CEO participating in Portfolio Review Board meetings, and having the line-of-business presidents actively engaged in identifying and evaluating outcomes.

Managing H2 (hunting)

Managing emerging opportunities is often a challenge because it demands substantial investment in advance of securing revenue, and there may not be an internal champion at the executive or middle-management level willing to assume the risk. Additionally, H2 initiatives often are harassed by larger, successful programs for money (e.g. the optical versus switching scenario described earlier). These initiatives required empowered, senior executives to make the change and provide the opportunity for ambitious rising managers to shine. Nortel has numerous examples of extraordinary efforts required to launch H2 initiatives successfully. In one case, the CEO sent in a senior operational executive to trim the switching portfolio in order to fund the optical portfolio development. In another case, the CEO, concerned about the company’s dependence on a single portfolio (switching), made the decision to enter a new space (wireless). In both cases, the new portfolio grew to eclipse the incumbent portfolio, but could not have happened without executive intervention at the highest level. What is unique about a large company is that competition is often both external and internal, with internal competition needing explicit attention.

Factors that contributed to the success of H2 programs included:

- senior executive support, both in providing required financial and people resources, but also attracting talent to lead the H2 program. In some cases, this approach required special direct reporting to protect the unit and promotion incentives on successful outcomes to secure the right leaders.
- rapid growth (according to approved plan) for a new initiative (i.e., it needs to become big enough, fast enough to matter)
- conscious decisions to re-prioritize current programs and to provide affected teams with the support required to implement the plan.

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Managing H3 (exploring)

The spirit behind the investments in H3 is to renew the business and focus on the future, as opposed to evolving the present. To assure the integrity of the H3 funnel, it is necessary to establish explicit criteria that are used to determine H1 versus H3 opportunities. Table 2 provides some criteria that may be used for this purpose.

In order for H3 programs to be successful, different tactics have been used to overcome the natural risk aversion and momentum of H1 initiatives:

- CEO review of each horizon's programs separately, which placed peer pressure on executives (did not want to expose any lack of focus on the future).
- Setting strategic targets for investment for each horizon (for example 20%-60%-20% for H1-H2-H3 R&D investment) to reflect the strategic intent to invest in the future. This shifted the discussion from "what are you wasting money on", to the more constructive "what am I getting for my 20%?"
- Introduction of an executive incentive that required the unit to deliver a defined percentage of revenue from new products released in the last 12–18 months. In the

Nortel case described earlier, a strong executive leader tasked to support implementation of a corporate strategy (Fiberworld) intervened and shifted investment to support the emerging optical business, which ultimately grew to eclipse the switching business. Although there is always some gaming of the system and debate around definitions, one can shift investment and executive attention more towards H2 and H3 initiatives.

Two successful examples of H3 investment management were BNR's Capability Program and Nortel's Advanced Technology Program, both of which explored breakthrough domains. Both programs were structured similarly in a number of areas:

- An annual budget and full-time researchers provided the required continuity over years, which was necessary to identify and develop breakthroughs.
- The programs were reviewed by business executives but were managed by technical R&D executives/fellows.
- They provided a focal point for university research programs to ensure currency of research, to secure complementary insights from experts around the world, and to handle high-risk, disruptive investigation as insurance for potential disruption of internal programs.

Table 2. Horizon 3 criteria versus H1 criteria

Criteria	Considered for H3 Prioritization	Referred to Portfolio (H1)
Timing	<ul style="list-style-type: none"> • 18–36 months for commercialization • Disruptive to current business in shorter time/decision risk 	<ul style="list-style-type: none"> • Within 1–2 releases of current portfolio • Implementation risk
Disruption/New	<ul style="list-style-type: none"> • Not currently addressed by portfolio (technology, solution, business model) • Competitive with current portfolio • Not addressed in the market • Unknown potential, maturity, technical viability 	<ul style="list-style-type: none"> • Portfolio extension • Mandated by standards for evolution • Not separable business from portfolio • Required for existing business success • Sustaining technology investment
Capacity	<ul style="list-style-type: none"> • Have required competence/skills to assess • Meaningful effort within budget 	<ul style="list-style-type: none"> • Productization levels of investment • External sourcing known path forward
Leadership	<ul style="list-style-type: none"> • Program leader dedicated; team identified and available • Full-time program and resource commitment • Clear exit criteria; monetization plan • Project plan 	<ul style="list-style-type: none"> • Incremental to current business • Standards implementation

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- The small-but-stable budgets protected the initiatives from business perturbations; researchers spent their cycles on technical work rather than concerns over their jobs.
- Both programs were aligned and sponsored by business units, which facilitated the transition to H2.
- A core set of programs were exposed to customers for validation to demonstrate their synergy with the current portfolio and the suitability of their reach.
- The programs featured a “people exchange” between research and line programs. In some cases, researchers would transition with their program to a line R&D team to bring it to market and then return once it was delivered.
- Both programs were led by visionary researchers that participated in the business. The research executive (VP and CTO) participated in the business reviews of the business units to familiarize themselves with the strategy and needs of the business/customers, and, based on their unique perspective on technology, to offer advanced-technology solutions for the issues identified.

The BNR Capability program was sponsored by the President of BNR and operated by the Technology VP's who were aligned to the business units. This program executed a portion of the annual technology strategic plan. In addition to customer demonstrations of technology, strategy sessions focused on futures were held with key business leaders to expose them to new capability and to garner feedback on research.

Nortel's Advanced Technology Program developed a formal process for admitting initiatives into the funnel and for developing them through the funnel. There was a formal set of (patented) criteria that included focusing on market value, competitive value, viability/affordability, and timing. There was a relevance check only at the beginning, but the weighting of business criteria increased as the initiative was developed and required additional development investment.

Transitioning Between Horizons

Given the zero-sum budget of most companies, transitioning between horizons requires re-prioritization of existing programs, freeing of key resources, introduction of new players and processes, team building, shift-

ing accountabilities, etc. In the author's experience, this transition proved to be one of the most difficult things to do, as it required a number of people to take on new risks, managing the general manager's fear about impeding sales while customers wait for new portfolio, shifting program culture from research to delivery, and introduction/innovation around new delivery processes.

Success was largely affected by how quickly a transition could be made versus how much money was being spent in H2 or H3. The ability to rapidly transition from H3 to H1 required the company to respect and support the unique management in each horizon and to link the processes across a portfolio lifecycle.

Conclusion

Managing a scarce resource like investment is challenging for any company, however large companies have to address the additional complexities of satisfying current customers during a change, shifting internal momentum and priorities, as well as nurturing new initiatives during difficult market challenges. To manage across horizons, executive leadership must visibly and tangibly enable and support it. Managing across horizons requires large companies to:

- develop and execute a strategy to overcome distractions, to align teams, and to facilitate re-prioritization of existing programs
- make decisions based on accurate data on business performance
- establish and receive buy-in for clear targets for investments and results on a per-horizon basis
- assign strong leaders to champion initiatives (i.e., take decision and execution risks) and to manage across a diverse set of skills
- explicitly overcome H1 inertia

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About the Author

Peter Carbone is a successful executive known for his thought leadership, business acumen, and technology leadership. He is often called on to address new business and technology challenges. Peter is a pathfinder with a track record of creating innovative solutions, strategically managing technology and innovation, successfully launching and running new businesses, and leading business development initiatives. Peter has held CTO, R&D, and senior business positions in several high-tech companies, and he has led or been directly involved with several technology company acquisitions. Peter has been engaged as technical advisor to startups, is part of the faculty of an entrepreneur development program that has created >100 new companies, and has been on the boards of US-based Alliance for Telecommunications Industry Solutions (ATIS) and Coral CEA. He is past Vice-Chair of the Executive Committee of the Information Technology Association of Canada (ITAC) and Chair of an ITAC committee, which is focused on the Global Competitiveness of Canada's Knowledge Economy. Peter is also on the Advisory Board of the *Technology Innovation Management Review*.

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The Role of Universities in Technology Entrepreneurship

Jonathan Wells

“Engaging in innovation and entrepreneurship is the key for universities to stay relevant and to contribute to Canada’s economy and to the quality of life of Canadians.”

Sheldon Levy
President of Ryerson University

This article discusses the role that universities play in the process of technology entrepreneurship, where entrepreneurship is restricted to the process of launching and supporting small and medium-sized technology-based businesses. The article briefly discusses a few of the issues that influence a university’s participation in the process of entrepreneurship. Although there is no “one-size-fits-all” model, the article discusses various ways that Canadian universities may help entrepreneurs, including contract research, the provision of business parks, and sensible handling of intellectual property issues. Finally, the article suggests that the return on “investment”, for both the university and the province, is a difficult thing to measure – nevertheless, participation in the entrepreneurship process may result in some tangible and intangible benefits for both parties.

Introduction

The quotation above, recently made by the President of Ryerson University at a celebration of the NSERC Engage program (tinyurl.com/2fab8q8), is typical of the types of statement that Canadian universities expound in their public relations material. But can universities actually contribute to entrepreneurship teams? This article does not propose a definitive answer to these questions, but briefly discusses a few of the issues that influence a university’s participation in the process of entrepreneurship, specifically from the viewpoint of the university management.

The question of the degree of involvement that a university has in the entrepreneurial process may be considered important to the community as a whole, since universities are publicly funded bodies and there should be some consensus concerning the role of universities in the process. This article suggests that universities can help entrepreneurs in a number of ways, including contract research, the provision of business

parks, and sensible handling of IP issues. The discussion is restricted to the Canadian domain, with a brief comment on the situation in the United States.

For the purpose of this article, we will assume that an entrepreneur is defined as a person that undertakes a commercial activity for profit, having a personal stake in the outcome of that activity; entrepreneurship is the process of being an entrepreneur (Chambers Dictionary, 2007; tinyurl.com/885xfly). We will consider the term entrepreneurship in its colloquial usage of startups and small and medium-sized businesses that are relatively recently established. In theory, entrepreneurs can own, run, and develop businesses of any size – large venture capitalist business are entrepreneurs in the sense that they have assets at risk, and even very large privately held companies are entrepreneurial. Although large industrial/commercial entities and universities frequently partner and collaborate to undertake significant research projects, universities have a limited role in supporting businesses of this size through direct channels.

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A University's Duty to its Community

Canadian universities do not exist in a vacuum. Instead, every university is at the heart of its local community and as such may be considered to have a duty to contribute to that community by supporting business activity, particularly at a small scale. Of course, many universities are major employers within their regions and contribute to the local economy directly. A few explicitly state their mission to support the public good, such as the University of Alberta (tinyurl.com/7fufpwu) and Royal Roads (tinyurl.com/3n7m5z4). Many Canadian universities do not single out the process of economic development in the community as a concern. The website maintained by the University of Toronto – Canada's largest university – mentions on its Quick Facts page (tinyurl.com/4hphrg2) that it generates a healthy \$5.4 billion of economic impact in the Greater Toronto Area and that there have been 108 spinoff companies created. But, their mission statement does not refer at all to economic development within the city, at any scale (tinyurl.com/7kh2xmm). Many other mission statements are more aligned to supporting the community through opportunities for lifelong learning (read mature students and professional development programs) than they are with direct economic development (Kreber and Mhina, 2005; tinyurl.com/6mwhg8l).

To some extent, there is a cultural mindset in Canadian universities that separates academe from the business of trade. It is important to change this mindset if university administrations are to embrace the concepts required to support local startups and small and medium-sized businesses.

What Do Canadian Universities Do to Support Entrepreneurship?

Canadian universities do not exist to act as entrepreneurship drivers in their present form. Canadian universities exist primarily to teach academic subject matter to undergraduate students, a role that they carry out with various degrees of success. However, Canadian universities do not “teach entrepreneurship”, “do entrepreneurship”, or “support entrepreneurship” as a priority. The government ministries that oversee universities do not have any aspect of entrepreneurship as a core competency. The published role of the Ontario Ministry of Training, Colleges and Universities is restricted to the development of policy directions for universities and colleges, planning and administering policies related to basic and applied research, authoriz-

ing universities to grant degrees, and managing the funding of universities (tinyurl.com/7kgt33c). Career development is not mentioned, let alone entrepreneurship as a career choice. Anything that Ontario universities do to support entrepreneurship is an add-on activity from the government's perspective.

There is also confusion between “support for entrepreneurship” and “technology/innovation transfer”. There is certainly overlap between these areas; however in Canada, technology/innovation transfer tends to be considered more in terms of the intellectual property developed in university labs than as a direct business and selling opportunity.

Finally, the situation is made worse by the fact that Canadian universities are charities. While this sounds superficially a “good thing” – and for undergraduate teaching and basic research it is beneficial – the case for applied research and entrepreneurship is not so clear cut. Charities must be careful in how aggressively they can pursue for-profit business – this means that activities such as taking an equity stake in a startup business can be problematic. Licensing arrangements and spinoff organizations may be required in order for the university to keep a proper arm's length relationship. In Ontario, examples of such organizations include Parteq (parteqinnovations.com) and Communittech (communittech.ca).

Research into Entrepreneurship is Not Entrepreneurship

Knowledge of entrepreneurship in general may be advanced by academic work undertaken at universities. There is a substantial body of work in this area – Google Scholar (scholar.google.ca) reports over 59,000 articles with the word entrepreneurship in the title, with a steadily increasing number of these articles being published each year. The majority of these articles consider aspects of entrepreneurship from the perspective of organizational behaviour or in macroeconomic dimensions. This may be interesting, and even important, but papers of this type are not generally of much use to the individual entrepreneur who is trying to bring in the first paying customer for their business.

Of course, individual professors should continue to undertake academic research into entrepreneurship as they do now. But a university that publishes multiple papers on the nature of entrepreneurship is not necessarily supporting entrepreneurship in the community. These are two different paradigms.

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Subsidized Contract Research

One way that universities can contribute to entrepreneurship is through direct research. Often, university research is thought of as being conducted by professors for the benefit of professors and academics. However, many university research labs are capable of developing and conducting research on behalf of startup businesses. This can be vitally important for the startup company that simply needs that final piece of the puzzle to complete their innovative product (e.g., implementation of a new software algorithm or design and packaging of a new computer chip). In addition, universities (and colleges) have departments devoted to industrial design or prototype development. These activities can be well beyond the abilities of an entrepreneur working in their basement, but may be easily within the capabilities of the million-dollar laboratories found in university departments, which may be blessed with state-of-the-art equipment and instrumentation. Government-sponsored programs do exist to allow entrepreneurs to gain access to university labs, but these are rare and expensive. An example is the Applied Research and Commercialization Initiative program from the FedDev Ontario agency; although the program is now closed, there is information on the FedDev website: tinyurl.com/7qetygt.

Universities can undertake contract research on a purely commercial basis. However, this course is likely to be beyond the means of most startup businesses; overhead is charged by the university, and principle investigator fees may be levied, along with technician fees and instrument rental charges. These costs can make contract research at a university expensive. Thus, continued support is required for programs that allow small, low-cost projects to be undertaken in university labs at a subsidized rate, leading to improved lab utilization, additional opportunities for student projects, and real results delivered in a timely fashion to startup businesses.

University Support for Professors, Students, and Spinoffs

Canadian universities can, should, and do support entrepreneurial spinoff businesses, as Tony Bailetti (2011; timreview.ca/article/485) recently discussed in the *TIM Review*. Thousands of such businesses are reported as having been created over the years (Niosi, 2006; tinyurl.com/7j7xchs), but the exact number of startups and

spinoffs from Canadian universities can be difficult to measure, especially because the definition of spinoff is not universally agreed. The simple definition suggested by Cooper in his report for the National Research Council Canada (NRC; nrc-cnrc.gc.ca) on the impact of spinoff activity seems sensible and succinct. According to Cooper, a spinoff is: “A firm formed specifically to commercialize university owned and/or university researcher’s technology” (Cooper, 2000; tinyurl.com/7am2692).

The reported figures for the number of spinoff companies created by universities vary wildly. According to Statistics Canada, only 19 spinoff businesses were created in 2008 (2008; tinyurl.com/bpvrc97), which is down sharply compared to the 1990s. In contrast, many individual universities claim to have created more spinoffs by themselves than are reported nationally by StatsCan. Whether the statistics available actually match the true figures is difficult to ascertain, partly for reasons concerning intellectual property, as will be discussed in the next section.

The impacts of university spinoffs have been widely studied over the years, even though university spinoffs represent only a fraction of all new businesses created in the community. As mentioned earlier, intellectual studies of entrepreneurship and statistics tabulating spinoff activity are not of any general help to a new enterprise however important these data are for statistical purposes. What is clear is that there is a steady flow-through of businesses being launched from universities and it can be assumed that there is a commensurate requirement for support for these startups. It is not known how many spinoffs are created by students versus the numbers created by professors. We can see that universities are certainly involved in the creation of new businesses, and universities are an integral part of the entrepreneurship team in these cases. What is not so clear is the actual level of commitment by universities to this process.

Intellectual Property

About half of Canadian universities and hospitals reserve an interest in the intellectual property developed by their research staff; in the other institutions, the intellectual property is owned by its inventor (e.g. Statistics Canada, 2008; tinyurl.com/bpvrc97). Ownership of intellectual property is a significant issue when considering the university’s role in the entrepreneurship team, with consequences that vary across the spectrum.

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In the case where the inventor of a new technology owns the entire intellectual property associated with the product and wishes to commercialize it in a spinoff business, the university has no real incentive to assist in the process. The university will not receive any return on its investment of lab facilities, students, or other assistance provided to the entrepreneur. This scenario also is the case for a community-based startup – there is no obvious payback to the university from help rendered to a locally launched business.

At the other end of the spectrum (in Canada) the issue is the other way round; if the university owns all the intellectual property, as would normally be the case for product developed by an employee of a private company, then the incentive for the entrepreneur is sharply curtailed. Why would a hardworking entrepreneur work 100-hour weeks to see all the benefit accrue to the institution? For those Canadian universities that do follow this policy, the payback in royalties or licence fees appears to be modest.

The lack of sensible, fair, and consistent intellectual-property policies for spinoff and local businesses is a serious hindrance when adding the university to the entrepreneurship team.

Business Parks and Space

The university does have a role in helping startups with space and by providing a collaborative and conducive atmosphere for technology development and business creation. Several universities now have a “business park” or “incubator”. Examples include the Digital Media Zone at Ryerson University (digitalmediazone.ryerson.ca) and the Research Transition Facility at the University of Calgary (tinyurl.com/73gsgwk). Some of these environments are better supported than others and they have been established with varying amounts of seed capital; others operate on a small scale. Although it is now officially and strongly supported by the University of Waterloo, the VeloCity mobile-media incubator (velocity.uwaterloo.ca) was started by students and is still partially located in a student residence.

A University’s Role in an Entrepreneurship Team

So, what is a university’s role in an entrepreneurship team, given the various constraints on the university, such as intellectual property policy, funding, and space availability? Anecdotal evidence, taken in context with

some of the points raised above, suggests that a university’s ideal role is not to take ownership of businesses, nor is it to run businesses outside the university’s core competencies. Neither should the university replace the angel investors, and later the venture capitalists, who are key to the entrepreneurship process. Entrepreneurs, whether coming from the community or from within the university, do not require this. It is not the ideal role of a Canadian university to become a portfolio manager.

However, there are a number of practical measures that Canadian universities can take to help businesses launch successfully that will contribute to the local economy and that will fulfill the universities’ social obligations in this sphere. The same principles hold true whether the business is community based or a university spinoff.

1. Make the relevant intellectual property as easily available as possible. Open source concepts and public licences may have a role here.
2. Provide lab space and resources, including graduate students, for product research, development, and design. These measures are related to the issue of universities supporting their communities by making university resources available at favourable rates for startup research requirements.
3. Assist with traditional technology transfer activities such as the acquisition of patents.
4. Act as a “dating service” within the academic and business communities by introducing entrepreneurs to professors, students, and relevant community resources that may be able to help them.
5. Provide seed funding at the early stage to cover the development of prototypes, business plans, and market research projects.
6. Help to attract third-party funding. For example, a university may be able to help a new business acquire government grants, such as the Industrial Research Assistance Program (IRAP; tinyurl.com/7z5jhvv).
7. Provide subsidized collaborative space for new startups to develop their businesses in an atmosphere designed to promote business success in an incubator or business park.

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In summary, a Canadian university's ideal role in the entrepreneurship process is to support the creation of business on what might be considered as a provision-of-service basis.

Conclusion

In the end, we must ask: what does a Canadian university receive in return for this philanthropy, which may be heavily subsidized by the taxpayer? This is a difficult question to answer given that the payback may be tangible or intangible, may accrue to the university or to the province, and may be short term or long term.

Most obviously, the university may receive royalties (or even a capital gain, if an equity stake is sold) from the technology business or spinoff that it has helped to create. This tends to be the model used in the United States (see Box 1), but in Canada this process varies widely, and of course the new business has to be successful enough to generate sufficient cash flow to pay royalties or dividends. The exact level of return is not precisely clear, and according to Statistics Canada it is relatively low. According to their figures, only \$53 million in total was received by Canadian universities as income "generated from IP" in 2008 (tinyurl.com/bqf9bsm). The National Sciences and Engineering Research Council of Canada (NSERC; nserc-crsng.gc.ca) is the federal government's primary funder of technology and science research in universities; in the same year as universities received \$53 million through intellectual property, NSERC spent almost exactly the same amount on the Centres of Excellence for Commercialization & Research program alone, out of a total expenditure of around \$1 billion (tinyurl.com/89u2uml). Thus, royalty revenue is not a big contributor to university revenue streams in percentage terms.

In some cases, the university may generate goodwill with its local community, which is particularly likely if the university is providing assistance that would otherwise be simply too expensive for the entrepreneur to acquire; incubator space and access to labs and students are standout examples. This is undoubtedly a "good thing", but it is very hard to measure in objective terms.

Finally, one aspect that is often overlooked is that the university will hopefully generate a substantial level of goodwill with the individual entrepreneurs that it supports. A few of these entrepreneurs will become very

Box 1. The entrepreneurial culture of universities in the United States

It should be noted that this article applies primarily to Canadian universities, where the entrepreneurship culture is very restrained. The situation in the United States is somewhat different, with much more emphasis being placed on the entrepreneurial culture than in Canada. The largest entrepreneurial universities (e.g., MIT, Stanford) do generate large numbers of spinoffs and very large royalties. For instance, MIT estimates that well over 10,000 spinoffs have been founded by MIT alumni, with revenues in excess of \$300 billion USD. MIT takes royalties for all intellectual property developed at the university, and this policy is applied consistently. Overall, it is the culture that is different – institutions in the United States expect their faculty to produce commercializable output and this is strongly supported. For more information about MIT's Technology Licensing Office, see web.mit.edu/tlo/www/.

successful and may show their appreciation for the help they received in the early stages by providing philanthropic donations back to the programs that launched them.

For the province, the payback is less difficult to define as a public good, but it is still difficult to measure in purely fiscal terms. The primary payout for a province is of course increased employment, which translates not only into votes for the party that is in charge, but also into decreased benefit payments and increased tax revenues downstream. Increased foreign-exchange earnings are an additional benefit when Canadian startups make sales of products or services denominated in foreign currency. In addition, a growing business sold to a foreign buyer under an early-exit strategy generates a positive contribution to the balance of payments in the short term.

The final problem is attribution. In the case of a high-tech solution developed in a university lab and taken directly to market, it is easy to attribute the success of the overall business to the involvement of the university: no lab means no product, which means no business. However, when the university has provided

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something less direct – help with a grant application or some contribution of space, for instance – attribution is not so straightforward. There is really no practical way that we can tell whether the newly launched business would have succeeded anyway. We can guess that this type of assistance will shorten the time to market, but quantifying that is difficult.

Overall, the conclusion is that university involvement in the entrepreneurial process appears to be beneficial, but is not accurately quantifiable in terms of the resources committed to it.

About the Author

Jonathan Wells is Executive Director, Research Centre in Technology Innovation, at Carleton University in Ottawa, Canada. Jonathan comes from a background of software engineering, with experience in all sizes of high-tech business, from very small startups upwards to large multinationals. He founded and ran a small software development and consultancy business for several years and subsequently worked as a project manager for HP software development teams in New Zealand, later holding the position of CIO for the Meat Inspection Branch of the NZ Canadian Food Inspection Agency. Jonathan has an undergraduate degree in Physics and Computer Science and holds an MBA from the University of Canterbury, Christchurch, NZ.

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TIM Lecture Series: The Importance of Dealing with Risk for New Businesses

Tony Lackey

*“ So many people think, ‘It will never happen here.’ ”
The truth is that it can happen. And if it does, it will
happen at the worst possible time.*

Tony Lackey
Risk and Insurance Manager
Carleton University

The second TIM Lecture Series of 2012 was presented by Tony Lackey, Risk and Insurance Manager at Carleton University. Tony drew upon his extensive experience in insurance claims and risk management to demonstrate the key aspects of these topics for new businesses owners. The presentation was targeted at early-stage technology companies, but the key concepts can be applied more broadly. The event was held at Carleton University in Ottawa, Canada, on March 21, 2012. This report summarizes the presentation and its key messages, including important takeaways identified by audience members.

The TIM Lecture Series is hosted by the Technology Innovation Management program (TIM; carleton.ca/tim) at Carleton University. The lectures provide a forum to promote the transfer of knowledge from university research to technology company executives and entrepreneurs as well as research and development personnel. Readers are encouraged to share related insights or provide feedback on the presentation or the TIM Lecture Series, including recommendations of future speakers.

Summary

Tony Lackey began the presentation by defining risk and explaining the importance of risk management. Risk relates to uncertain events and outcomes; while there are many types of risk that will be encountered in a business, some have minimal impact and can be managed easily, while others may threaten the longevity of a business. Business owners should weigh the importance of potential risks by assessing the frequency and severity of events and then take action to mitigate the most important threats to the business.

Next, Tony discussed the top-10 risks that a new business will face:

1. Property losses
2. Liability losses
3. Business interruption
4. Key person losses
5. Injuries to employees

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6. Losses of electronic data and computer resources
7. Credit risk (e.g., customers that do not pay)
8. Employment practice risks
9. Contract risks
10. Supply chain risks

The presentation highlighted that risk-management principles and techniques can be applied broadly; they are worth knowing about and applying to both business and everyday life. In building the case for integrating a risk-management framework into a new business, Tony emphasized that: “Understanding the principles and processes for effective risk management will help a business owner make the decisions necessary to ensure the best possible outcome for the business.” He suggests the following steps in developing a risk-management framework:

Identify risks

A number of techniques can be used to identify risk, including brainstorming, surveys, examining reports and financial statements, envisioning worst-case scenarios, and benchmarking. Ideally, every business should make these activities part of an annual risk assessment.

Evaluate risks

Once the various risks have been identified, their importance can be evaluated and ranked based on the likelihood that each even will happen and the severity of the outcomes should it occur. The highest-ranked risks should attract the greatest amount of resources and planning effort. As part of this step, not only are the risks evaluated, but the company’s tolerance (or appetite) for risk can be established.

Identify and implement risk-management techniques

There are four basic categories of risk-management techniques, the details of which were discussed in the second half of the presentation:

1. Reduce the risk through preventative effort (e.g., smoke detectors, safety procedures).
2. Assume or retain the risk (e.g., opting for a high deductible on an insurance policy).
3. Combine the risk (e.g., insurance policies combine the risks – and premiums – of many organizations, of which only a small number make claims).

4. Transfer the risk (e.g., terms in a contract that specifies that the other party owns particular risks).

Monitor and improve the risk-management program

A risk-management program should be evaluated on an ongoing basis based on the results the program achieves. If the desired results are not being met, the program should be re-evaluated and the mitigation strategies should change.

In the final portion of the presentation, Tony revisited the top-10 risks that a new business will face and provided more detail about the specific risk management techniques that are relevant to each type. The discussion emphasized the following:

1. Mitigating against losses to company property through insurance and common sense
2. Selecting appropriate types of insurance and levels of coverage with the advice of insurance professionals
3. Understanding common insurance exclusions
4. Protecting intellectual property through copyright, patents, and trademarks
5. Protecting a new business from different types of liability
6. Interpreting common contract terms that relate to liability

Lessons Learned

1. A company’s risk exposure changes as it grows. The greatest amount of risk must be assumed in the company’s early-stages.
2. Risks are always present, but mitigation can lower either the severity or frequency of risks, thereby lowering the potential impacts to your company.
3. A fundamental way of evaluating risks is to multiply the likelihood that each event will occur by its severity. Mitigate risks that come up as most important.
4. Risks to a company’s reputation are paramount. Many other risks follow on from this one.
5. The moment of loss is not the time to start thinking about risk. Have a plan in place before something happens.

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6. A backup plan can provide peace of mind, the value of which should not be underestimated. Knowing you have a plan in place leads to increased confidence, which frees you up to pursue opportunities rather than stress about what might happen. With confidence you can focus on growing your business and making decisions.
7. An added benefit of putting together a solid risk-management plan is the capacity of the company to then take on further risk, which can help grow the business.
8. As a startup, you may encounter potential customers that are reluctant to enter into a contract with you because they fear you will go out of business. If they know you have a solid risk management plan in place, it can increase their confidence in you and therefore increase their willingness to do business with you.
9. Risk management is important and complex, but sources of advice are available. The decision of whether or not to pay for some of this advice (e.g., from lawyers) is a risk-management exercise in and of itself.
10. Risk management is an ongoing process. As the environment changes, the likelihood or severity of existing risks may increase or decrease, and new risks may appear.

About the Author

Tony Lackey is Manager of Risk and Insurance at Carleton University in Ottawa, Canada, where he also lectures in the Sprott School of Business. Prior to coming to Carleton, he spent over 18 years in the general insurance industry, the last four of which in the role of Regional Claims Manager at a large Canadian mutual insurance company. Tony also operating an independent consulting business where he offered technical audit services and developed claims systems. He has also held executive positions with several insurance and non-profit organisations. Tony holds a BA from Carleton University and the Certified Risk Manager (CRM) designation. He is also a Fellow of the Global Risk Management Institute and a Fellow Certified Insurance Professional. He is an active member of the Risk and Insurance Managers Society and is Past-President of the Ottawa chapter.

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Upcoming TIM Lecture: April 19, 2012



TIM Lecture Series: Next Generation Technology Challenges & Business Opportunities



Dave Thomas

Founder and Chairman, Bedarra Research Labs

Welcome to galaxy Future Tech, racing towards you!

On this brief tour you will get a very pragmatic opinionated view of the future including: the Internet of Things; mobility; cloud computing; NoSQL databases; BigData; functional programming; multi-core CPUs and GPUS with concurrent programming; new open source frameworks; event processing; loosely coupled occasionally disconnected; Web 3.0.; continuous delivery; augmented reality

Warning: Be prepared for absurd variety and complexity, there will be planets populated by software anarchists; mathematical, mobile, Xtremist end users; websters, cloudbees and cyborgs using bizarre languages, strange tools, and radical practices, many not even communicating RESTfully.

On return from our tour we will envision the world just a few years out. What skills and processes will be necessary to design, develop, and deploy across so many planets? Will objects, tables, open source, and agile, lean startups be so so? Most importantly where will the business opportunities be in this brave new tech world?

Details

When: Thursday, April 19, 2012
6:00pm to 9:00pm (ET)

Where: Room ME 3380
Mackenzie Building
Carleton University
1125 Colonel By Dr
Ottawa, Canada

Cost: Free

**Register Now
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About the Speaker

Dave Thomas has a wide spectrum of experience in the software industry as an engineer, consultant, architect, executive and investor (davethomas.net). He is the Founder and Chairman of Bedarra Research Labs (bedarra.com), a company specializing in emerging software technologies and applications. Bedarra provides virtual CTO and CEO, as well as directors, advisers, and business mentors to support new initiatives. He is also the Managing Director of Object Mentor (objectmentor.com), a company specializing in the training and deployment of agile and object-oriented software development methodologies.

Dave is best known as the founder and past CEO of Object Technology International Inc. (formerly OTI, now IBM OTI Labs), where he led the commercial introduction of object and component technology. The company is often cited as the ideal model of a software technology company and was a pioneer in agile product development with a process called "just-in-time software".

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Author Guidelines

These guidelines should assist in the process of translating your expertise into a focused article that adds to the knowledge resources available through the *Technology Innovation Management Review*. Prior to writing an article, we recommend that you contact the Editor to discuss your article topic, the author guidelines, upcoming editorial themes, and the submission process: timreview.ca/contact

Topic

Start by asking yourself:

- Does my research or experience provide any new insights or perspectives?
- Do I often find myself having to explain this topic when I meet people as they are unaware of its relevance?
- Do I believe that I could have saved myself time, money, and frustration if someone had explained to me the issues surrounding this topic?
- Am I constantly correcting misconceptions regarding this topic?
- Am I considered to be an expert in this field? For example, do I present my research or experience at conferences?

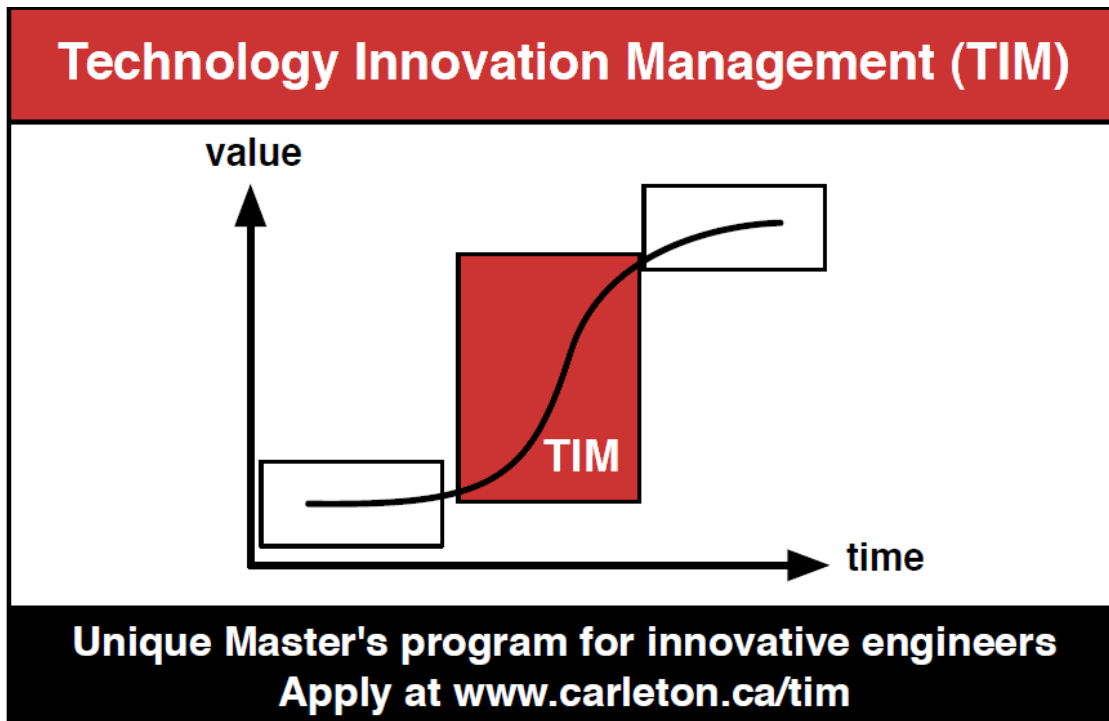
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When writing your article, keep the following points in mind:

- Emphasize the practical application of your insights or research.
- Thoroughly examine the topic; don't leave the reader wishing for more.
- Know your central theme and stick to it.
- Demonstrate your depth of understanding for the topic, and that you have considered its benefits, possible outcomes, and applicability.
- Write in a formal, analytical style. Third-person voice is recommended; first-person voice may also be acceptable depending on the perspective of your article.

Format

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6. Any quotations or references within the article text need attribution. The URL to an online reference is preferred; where no online reference exists, include the name of the person and the full title of the article or book containing the referenced text. If the reference is from a personal communication, ensure that you have permission to use the quote and include a comment to that effect.
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