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## Insights

Welcome to the August issue of the *Technology Innovation Management Review*. We welcome 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 community sector, and others – to bridge the gap between theory and practice. In particular, we focus on the topics of technology and global entrepreneurship in small and large companies.

We welcome input from readers into upcoming themes. Please visit [timreview.ca](http://timreview.ca) to suggest themes and nominate authors and guest editors.

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## About TIM



The TIM Review has international contributors and readers, and it is published in association with the Technology Innovation Management program (TIM; [timprogram.ca](http://timprogram.ca)), an international graduate program at Carleton University in Ottawa, Canada.

# Editorial: Insights

Chris McPhee, Editor-in-Chief

Welcome to the August 2016 issue of the *Technology Innovation Management Review*. The authors in this issue share insights on corporate entrepreneurship, digital transformation in communications service providers, co-creating user stories with stakeholders, audience commodification, and idea selection in innovation activities.

In the first article, **Kamal Sakhdari**, Assistant Professor in the Faculty of Entrepreneurship at the University of Tehran, Iran, seeks to understand why some firms are able to generate higher levels of corporate entrepreneurship than others. After critically reviewing the literature and then developing a framework that integrates previous research, Sakhdari recommends five potentially worthwhile avenues for future research to help managers foster corporate entrepreneurship.

Next, **Omar Valdez-de-Leon**, a Senior Consultant within the Global Consulting and Systems Integration practice at Ericsson, presents a digital maturity model for telecommunications service providers. Developed using the Delphi method with a panel of 10 experts from communications service providers, academia, and the industry analyst and consultant communities, the model integrates seven dimensions and five maturity levels. Telecommunications service providers can use this practical and detailed model to assess their progress along a digital transformation journey.

Then, **Anna-Greta Nyström**, **Miia Mustonen**, and **Seppo Yrjölä** from Åbo Akademi University, VTT Technical Research Centre of Finland, and Nokia Innovation Steering, respectively, present a case study into the value of co-creating user stories with industry partners as a means of enhancing sensemaking. This practical approach to understanding current and future market trends complements and builds upon the traditional, consumer-focused perspective on co-creation.

Next, **Datis Khajehian**, a lecturer in the Center for Communication, Media and Information Technologies in Aalborg University of Denmark, examines business

model innovation through audience commodification. As a means of changing the value-creation mechanism, audience commodification involves transforming the engagement and interactions of media audiences into commodities that then be sold on to advertisers, providing higher value than the current "view-based" model. Khajehian evaluated this approach through the construction of a prototype social dating platform to test the behavioural responses of users and their acceptance of a novel business model.

Finally, **Andrew N. Forde** and **Mark S. Fox** from the University of Toronto, Canada, propose an approach to idea selection in "front end of innovation" processes that emphasizes the formation of requirements for any idea that can be prioritized and measured against possible future worlds. Envisioning and quantifying possible future worlds based on key characteristics enables companies to calculate which "good ideas" are most likely to be successful and therefore are worthy of further development.

In September, we will be examining the theme of **Knowledge Mobilization** with guest editors **Kimberly Matheson**, Professor of Health Sciences and Director of the Canadian Health Adaptations, Innovations, & Mobilization (CHAIM) Centre at Carleton University in Ottawa, Canada, and **Cathy Malcolm Edwards**, Managing Director of 1125@Carleton.

For future issues, we welcome your submissions of articles on technology entrepreneurship, innovation management, and other topics relevant to launching and growing technology companies and solving practical problems in emerging domains.

We hope you enjoy this issue of the TIM Review and will share your comments online. Please contact us ([timreview.ca/contact](http://timreview.ca/contact)) with potential article topics and submissions.

**Chris McPhee**  
**Editor-in-Chief**

## Editorial: Insights

Chris McPhee

### About the Editor

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

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**Keywords:** corporate entrepreneurship, digital maturity model, digitization, user stories, co-creation, audience commodification, business models, front end of innovation, idea selection

# Corporate Entrepreneurship: A Review and Future Research Agenda

Kamal Sakhdari

**“ A man who reviews the old so as to find out the new ”**  
*is qualified to teach others.*

Confucius (551–479 BC)  
Teacher, editor, politician, and philosopher

The overarching theme of corporate entrepreneurship literature is to understand why some firms are able to generate higher levels of corporate entrepreneurship than others. While the extant literature has greatly advanced our understanding of entrepreneurial activities by established firms, less effort has been made to systematically review the literature to help us identify missing links and knowledge in prior studies. To address this gap, this article critically reviews previous important studies on corporate entrepreneurship and then develops a framework integrating previous research. Finally, the article suggests five potentially worthwhile avenues for future research.

## Introduction

Corporate entrepreneurship refers to entrepreneurial activities, such as innovation, venturing, and strategic renewal, within existing firms (Zahra, 1996). The idea behind corporate entrepreneurship goes back to the mid-1970s. It was first introduced by Peterson and Berger (1971) as a strategy and leadership style adopted by large organizations to cope with the increasing level of market turbulence. It took until the early 1980s for corporate entrepreneurship to become a separate research topic through the works of Burgelman (1983) and Miller (1983), and in particular when Pinchot's (1985) book on intrapreneurship was published (Christensen, 2004).

Different labels have been used to address the phenomenon of entrepreneurship within established firms, such as corporate venturing (Burgelman, 1983), intrapreneurship (Pinchot 1985), corporate entrepreneurship (Guth & Ginsberg, 1990), internal corporate entrepreneurship (Jones & Butler, 1992) and strategic entrepreneurship (Hitt et al., 2011). Nevertheless, based on evidence from special issues of journals, it appears that corporate entrepreneurship has gained the most attention as the main construct (Guth & Ginsberg, 1990; Phan et al., 2009). The considerable potential for corporate entrepreneurship to renew companies through innovation-based initiatives has led to increasing interest and research in how corporate entrepre-

eurship can be perpetuated within established companies (Corbett et al., 2013).

Prior research on corporate entrepreneurship has attempted to clarify the scope of this construct, its antecedents and outputs, and the boundary conditions of these links. Yet, less effort has been devoted to reviewing and organizing previous studies to identify our knowledge gaps and valuable paths for future research. In this vein, this article aims to systematically review and organize prior research following several steps. The review was restricted to papers published in top-tier journals spanning the period between January 1, 1990 and December 30, 2015. Several keywords were used to identify relevant articles including corporate entrepreneurship, intrapreneur, and organizational entrepreneurship. All relevant articles were identified and categorized using an integrative model. Under-investigated themes were also identified.

This article contributes to the corporate entrepreneurship literature by integrating prior studies on corporate entrepreneurship including the conceptualization, antecedents, and outputs. More importantly, it identifies missing links and knowledge in the extant literature and suggest paths for future research. The remainder of this article is structured as follows: first, the method is explained; then, the literature is critically reviewed and synthesized; finally, five future research paths are identified.

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Kamal Sakhidari

## Method

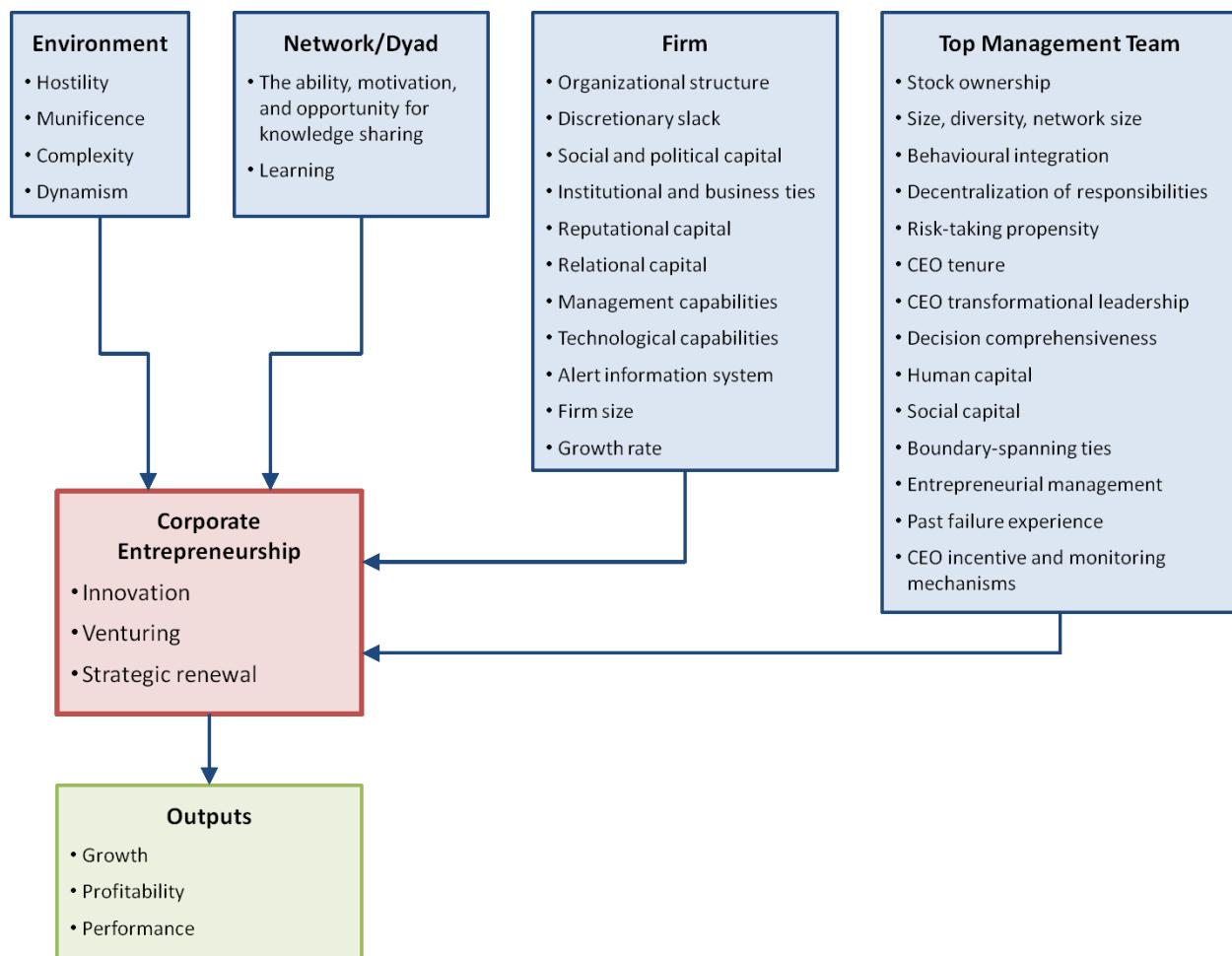
Following Shepherd, Williams, and Patzelt (2015), criterion sampling was used based on keyword searches in top management and entrepreneurship journals such as *Academy of Management Journal*, *Academy of Management Review*, *Administrative Science Quarterly*, *Journal of Management*, *Journal of Management Studies*, *Management Science*, *Organization Science*, *Strategic Management Journal*, *Journal of Business Research*, *Journal of Business Venturing*, *Entrepreneurship Theory and Practice*, *Strategic Entrepreneurship Journal*, and *Journal of Small Business Economics*. The initial inventory included papers possessing the keywords of corporate entrepreneurship, intrapreneur, and organizational entrepreneurship in their title, abstract, or keywords, and spanning the period from 1989 to the end of 2015.

## Literature Review

As shown in Figure 1, the relevant papers were categorized (discussed in the subsections below) into three main categories: i) papers conceptualizing corporate entrepreneurship, ii) papers about the antecedents of corporate entrepreneurship, which are categorized based on their levels of analysis entailing the team management, firm, network/dyad, and environment, and finally iii) papers focused on the outcomes of corporate entrepreneurship.

### *Corporate entrepreneurship: conceptualization and dimensionality*

Scholars have endeavoured to define the corporate entrepreneurship domain over the last few decades. There were initially mixed views on the scope of corporate entrepreneurship because it was not clearly differentiated



**Figure 1.** A model of corporate entrepreneurship's antecedents and outputs in the literature

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from the common phenomenon of innovation or new product development in firms (Corbett et al., 2013). Guth and Ginsberg (1990) were among the first scholars attempting to clarify the domain by introducing two categories of corporate entrepreneurial activities, namely business venturing and strategic renewal. Business venturing refers to "the birth of new business within existing organizations," and strategic renewal is defined as "the transformation of organizations through renewal of the key ideas on which they are built" (Guth & Ginsberg, 1990). Zahra (1996) then divides corporate entrepreneurship into three components of innovation, venturing, and strategic renewal. Innovation refers to "a company's commitment to creating and introducing products, production processes, and organizational systems". Venturing means "the firm will enter new businesses by expanding operations in existing or new markets." Strategic renewal concerns "revitalizing the company's operations by changing the scope of its business, its competitive approach, or both" (Zahra, 1996).

Other scholars have also categorized the domain of corporate entrepreneurship in different ways. However, the categories mostly lie within the three categories conceptualized by Zahra (1996). Covin and Miles (1999), for instance, propose four forms of corporate entrepreneurship entailing sustained regeneration, organizational rejuvenation, strategic renewal, and domain redefinition. Sustained regeneration refers to the continuous introduction of new products and services and new market entrance. Organizational rejuvenation is defined as changing internal processes, structures, or capabilities. Strategic renewal means the redefinition of a company's relationship with its markets and industry competitors by fundamentally changing the way it competes. These actions fundamentally reposition the firm in the market. Finally, domain redefinition is related to the creation of a new product-market arena that has not been recognized or actively exploited by other companies. Kuratko and Audretsch (2009) also add another category to the group: business model reconstruction. It refers to designing or redesigning a firm's core business model to enhance operational efficiencies or differentiate the company from its competitors in ways valued by the market. Similarly, Sharma and Chrisman (1999) define corporate entrepreneurship as "the processes whereby an individual or a group of individuals, in association with an existing organization, create a new organization or strategic renewal or innovation within that organization" They emphasize three main categories of corporate entrepreneurship encompassing corporate venturing, strategic renewal, and innovation in products and services.

Some scholars differentiate internal and external corporate venturing. In internal corporate venturing, new businesses reside within the internal boundaries of a firm, yet they may act as semi-autonomous entities (Morris et al., 2010). External venturing concerns "the creation of new businesses by corporations in which a corporation leverages external partners in an equity or non-equity inter-organizational relationship" (Schildt et al., 2005). Firms use governance modes such as corporate venture capital, non-equity alliance, joint ventures, and acquisitions for external corporate venturing. Corporate venture capital refers to the development of partnerships through investments in partners for financial and strategic purposes. Unlike corporate venture capital involving ownership in the relationship with partners, a non-equity alliance is concerned with the development of a new business with partners based on contracts. It also differs from joint ventures in that the latter leads to the formation of a new legal entity by partners for pursuing opportunities. Acquisition refers to the internalization of a new venture by purchasing the majority of the share capital of a venture (Schildt et al., 2005). Finally, licensing means gaining access to the knowledge, innovations, technologies, and discoveries of other firms in return for a fee (Yang et al., 2009).

Scholars also distinguish between domestic and international venturing (Yiu et al., 2007; Yiu & Lau, 2008; Zahra et al., 2000). International venturing is related to a firm's venturing activities for exploiting entrepreneurial opportunities outside its home market (Zahra et al., 2004). Undertaking international venturing activities is considered to be more difficult than domestic venturing (Yiu et al., 2007; Zahra & Hayton, 2008). This is mainly because firms in international markets are faced with the liability of foreignness arising from constraints, lack of knowledge of the target markets' institutional and business environments, and lack of legitimacy in foreign markets (Zaheer, 1995). International markets may also be more competitive than domestic markets (Etemad & Wright, 2003), which may make international venturing more challenging in particular for firms operating in developing countries (Yiu et al., 2007). Despite the difficulties, globalization and the existence of entrepreneurial opportunities in international markets have stimulated companies to undertake international venturing and expand internationally (Zahra & Hayton, 2008; Zahra et al., 2004).

Overall, the literature review shows that scholars have mainly focused on innovation, corporate venturing (domestic and international), and strategic renewal as the

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main components of the corporate entrepreneurship construct. This construct has been used both as a single meta-construct (Bojica & Fuentes, 2012; Heavey & Simsek, 2013; Heavey et al., 2009; Ling et al., 2008; Romero-Martínez et al., 2010; Simsek, 2007; Simsek & Heavey, 2011; Simsek et al., 2007; Simsek et al., 2009; Thorgren et al., 2012; Zhang et al., 2008) and as individual components (Yiu et al., 2007; Yiu & Lau, 2008; Zahra et al., 2000) in the literature. Yet, it is mostly used as a single meta-construct because these dimensions are supposed to be different, but complementary and mutually supportive concepts. For example, renewing the competitive approach may increase the benefits of venturing activities, and new product development may make strategic renewal activities more beneficial (Heavey et al., 2009; Simsek, 2007; Simsek & Heavey, 2011; Simsek et al., 2007). As such, "treating individual components of corporate entrepreneurship as independent ignores their potential complementarity" (Simsek & Heavey, 2011).

Corporate entrepreneurship encompasses the actual entrepreneurial acts or market-oriented results, and differs from constructs such as entrepreneurial orientation, which are "predispositions of firms with respect to their strategy-making processes, practices, and activities," that stimulate corporate entrepreneurship (Simsek & Heavey, 2011; see also Dess & Lumpkin, 2005). Intrapreneurship is more focused on the individual or team as intrapreneurs are defined as "those who take hands-on responsibility for creating innovation" (Sharma & Chrisman, 1999; see also Pinchot, 1985).

***Corporate entrepreneurship: antecedents and outputs***  
 Studies show that corporate entrepreneurship can play an important role in achieving higher levels of corporate performance (Yiu & Lau, 2008; Zahra, 1991, 1995), growth (Zahra, 1993; Zahra & Covin, 1995), and profitability (Covin & Slevin, 1991). A summary of the most important prior studies on the antecedents of corporate entrepreneurship is provided in Appendix 1. In terms of their level of analysis, as shown in Figure 1, these studies can be categorized into four groups:

1. *Top management team* (Behrens & Patzelt, 2015; Glaser et al., 2015; Hayton, 2005; Heavey & Simsek, 2013; Ling et al., 2008; Naldi et al., 2015; Simsek, 2007; Wang et al., 2015; Zahra, 1996; Zahra et al., 2000)
2. *Firm* (Behrens & Patzelt, 2015; Kellermanns & Eddleston, 2006; Nason et al., 2015; Simsek et al., 2009; Thorgren et al., 2012; Yiu et al., 2007; Yiu & Lau, 2008)
3. *Network/dyad level* (Turner & Pennington III, 2015)
4. *Environment* (Heavey et al., 2009; Romero-Martínez et al., 2010; Simsek et al., 2007; Zahra, 1991, 1993)

Previous research has mainly argued the origins of corporate entrepreneurship from the knowledge-based view (Grant, 1996), as summarized in Appendix 1. This view mainly considers knowledge as the most important and strategic resource in firms. The main premise of this theory is that corporate innovative activities are essentially a function of firms' capabilities to effectively combine and coordinate internal and external knowledge resources. Zahra (1991), for example, concludes that scanning, referring to formal efforts for collecting, analyzing, and interpreting data from the external environment, increases a firm's level of corporate entrepreneurship. Hayton (2005) argues that diversity of human capital in the top management team enhances corporate entrepreneurship by facilitating knowledge acquisition and triggering learning. Yiu and colleagues (2007) posit that firm-specific ownership advantages such as technological capabilities and business and institutional ties foster corporate entrepreneurship. Yiu and Lau (2008) suggest that a firm's political, social and reputational capital enhance the firm's engagement in corporate entrepreneurship. Simsek and colleagues (2009) argue that a company's alert information system increases corporate entrepreneurship by providing relevant information in a timely and pro-active manner. Thorgren and colleagues (2012) contend that relational capital among partners through knowledge transfer promotes corporate entrepreneurship. Finally, Heavey and Simsek (2013) conclude that the size, diversity, and network size of the top management team increase the level of corporate entrepreneurship.

## Discussion and Suggestions for Future Research

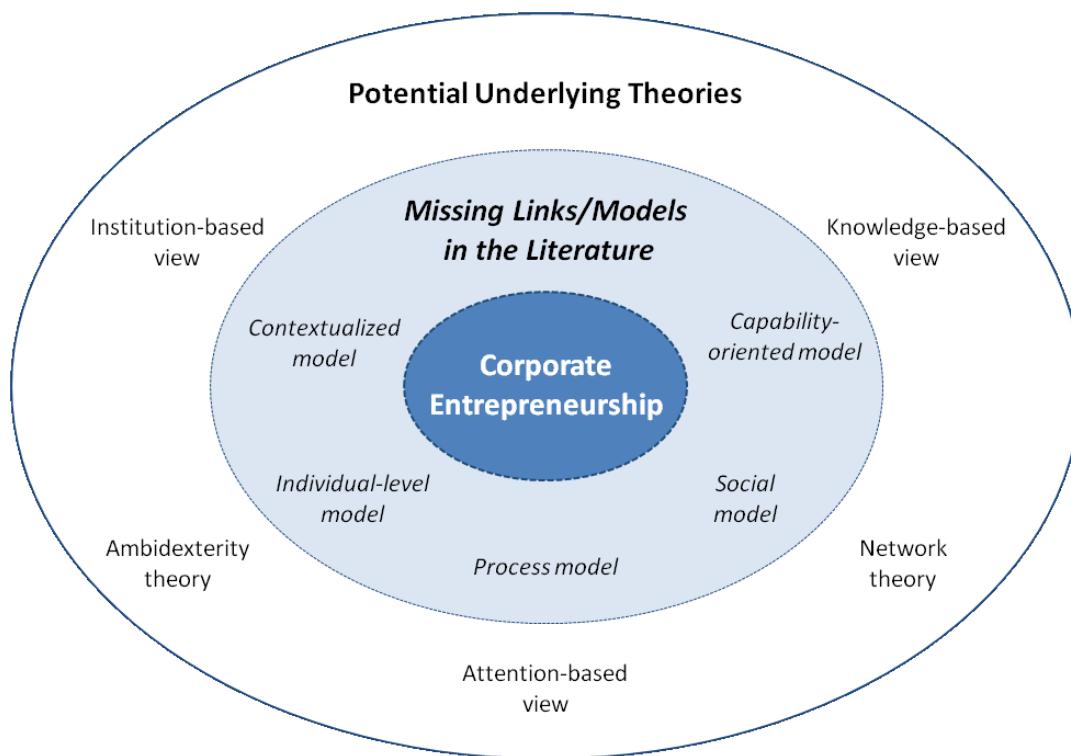
The critical literature review reveals that, despite significant insights provided by prior research, as shown in Figure 2, future research can address the following five research avenues, which build on the existing theoretical lenses.

### 1. Need for more capability-oriented models

Prior studies have mainly focused on top management team characteristics and actions (Heavey & Simsek, 2013; Ling et al., 2008; Simsek, 2007), structural factors (Burgers et al., 2009; Zahra, 1991), and business environment (Simsek et al., 2007; Zahra, 1993). This literature, however, has paid less attention to organizational

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**Figure 2.** Potential paths for future research

**capabilities.** The need to build linkage between unpacked capabilities and corporate entrepreneurship has been reinforced in more recent reviews and studies (Phan et al., 2009; Yang et al., 2009). Capabilities refer to the ability of a firm to combine different resources together and make them conduct advantageous tasks and activities (Grant, 1991). They are also defined as “complex bundles of skills and accumulated knowledge, exercised through organizational processes that enable firms to coordinate activities and make use of their assets” (Day, 1994). As the building boxes of capabilities are organizational routines and processes (Sarkar et al., 2009), they can better tease apart corporate practices though which firms can enhance their rate of corporate entrepreneurial activities. In particular, one of the main challenges firms face in undertaking corporate entrepreneurship is the generation of *new knowledge* (Teng, 2007; Zahra et al., 2009). Corporate entrepreneurship relies on new knowledge for doing things differently, or doing different things, manifesting in the forms of innovation in products and services, processes, systems, strategies, and markets (Teng, 2007). As such, knowledge-based capabilities, such as absorptive capacity (Zahra, 2015) or networking capabilities (Sakhdari et al., 2014a), for acquisition, integration, development, and exploitation of new knowledge can be as well important

as the structural factors, dominant in the literature, in explaining why some firms are more entrepreneurial than others. Moreover, corporate entrepreneurship is vying with ongoing business operations for catching corporate attention (Burgelman & Valikangas, 2005). Thus, from an attention-based view (Ocasio, 1997), a channelling mechanism to focus organizational capabilities on corporate entrepreneurship may be necessary (Sakhdari et al., 2014b) but is less theorized in the literature.

## 2. Need for more social models

Given that corporate entrepreneurial outputs are knowledge-intensive, firms need to develop new knowledge for pursuing corporate entrepreneurship (Teng, 2007). Scholars have traditionally focused on internal development of knowledge (Brouwer et al., 1993; Hoskisson & Hitt, 1988). However, internal development of new knowledge is accompanied by high resource and development expenses, high levels of risk, and timing issues (Eisenhardt & Schoonhoven, 1996; Teng, 2007). Recently, scholars have suggested sourcing new knowledge from other players in the market such as suppliers, customers, research centres, and competitors as a complementary and effective approach for companies pursuing corporate entrepreneurship (Sim-

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sek et al., 2003; Teng, 2007; Zahra et al., 2009). This research stream, which has recently gained more prominence, posits that innovative activities are mainly a function of firms' capabilities to effectively combine *internal* and *external* knowledge resources (Chesbrough, 2003; Grant, 1996; Kogut & Zander, 1992).

In this vein, scholars have addressed the importance of partnering relationships for filling a firm's knowledge gaps and undertaking corporate entrepreneurship. Yiu and colleagues (2007), for example, suggest that network ties with customers enhance corporate entrepreneurship and international venturing activities in firms. Rothaermel and Deeds (2006) contend that prior network experience helps firms to better benefit from their network ties for innovative activities. Researchers have also investigated the role of key players' social capital in external knowledge sourcing and the pursuit of corporate entrepreneurship. Heavey and Simsek (2013), for instance, show that the network size of top management teams has a positive impact on corporate entrepreneurship.

Prior studies hint at the importance of inter-firm relationships and external knowledge access in fostering corporate entrepreneurship. This literature, however, has adopted a static approach, and has done little to unpack networking capabilities for the formation and management of partnering relationships (Sarkar et al., 2009). Moreover, empirical results are mixed with regard to the impact of the number of business partners on corporate entrepreneurial activities, in particular in the context of developing countries and among smaller firms (Lin et al., 2014; Yiu & Lau, 2008; Wu, 2011). As such, investigating organizational and contextual moderators can be a compelling path for future research (Sakhdari & Farsi, 2016). Finally, recent studies have adopted a network/dyad level of analysis and argued how mechanisms for sharing knowledge in an organizational network can enhance corporate entrepreneurship (Turner & Pennington III, 2015). The literature lacks insights into how and why different sources of knowledge can be integrated (Kogut & Zander, 1992) at a network level to enhance corporate entrepreneurial activities. For example, Dyer and Hatch (2006) indicate that firm mechanisms for sharing knowledge with partners differentiate innovative performance of firms involved in different networks.

### 3. Need for contextualization

Institutions are formal (rules and regulations) and informal (norms and values) frameworks that affect the behaviour of individuals and firms by determining the

rules of the game (Peng, 2009). Apart from industry conditions and corporate capabilities, according to the industry-based perspective (Porter, 1980) and resource-based view (Barney, 1991), a firm's behaviour is also a reflection of its institutional frameworks or contexts. These frameworks can constrain or (if well developed) facilitate human and corporate behaviours (Peng, 2003; Peng et al., 2009). Institutional contexts vary based on their *levels of market orientation or development*. Institutional market orientation refers to the extent to which an institutional context adheres to free-market policies (Shinkle et al., 2013), as measured by the level of freedom in such areas as trade, investment, financial, business operations, and property rights (Kane et al., 2007).

Scholars have recently argued for the importance of different levels of institutional market orientation in action–output relationships. This stream of research suggests that firms need different capabilities and strategies for rationally pursuing their interests in different contexts with distinctive levels of institutional market orientation (Lin et al., 2009; Luk et al., 2008; Peng, 2003; Peng & Heath, 1996; Shinkle et al., 2013; Shinkle & McCann, 2014). Yet, less effort has been made in the literature of corporate entrepreneurship to contextualize corporate entrepreneurial activities. Yiu and Lau (2008), for instance, do not reach significant results for the impact of the number of network ties on corporate entrepreneurial activities in the contexts of developing countries and call for future research to further investigate these connections in the context of developing contexts. Similarly, more recent studies suggest that researchers should contextualize theorizing in entrepreneurship (Bruton et al., 2008; Hitt et al., 2011; Welter, 2011; Zahra, 2007) to highlight the boundary conditions of merging theories and models across different institutional contexts. Sakhdari, Burgers, and Davidsson (2014), for example, indicate that the impact of a firm's absorptive capacity on corporate entrepreneurship can be subject to the firm's institutional context.

### 4. Need for more process models

The literature on corporate entrepreneurship lacks process models of corporate entrepreneurial activities. There are two general approaches to corporate entrepreneurship. The first one is an output-oriented approach considering corporate entrepreneurship as a number of market results such as innovation in products and services and venturing (Simsek, 2007; Zahra, 1996). This approach, which is more dominant in the literature, is consistent with the common defini-

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tion of entrepreneurship as “new entry” (Davidsson, 2004; Wales et al., 2015). The second approach considers corporate entrepreneurship as a process entailing different phases (Burgelman, 1983; Hornsby et al., 1993). Process models can better tease apart the needed steps to enhance the levels of corporate entrepreneurship. Yet, there are very few process models explaining the process of corporate entrepreneurship. In particular, less effort has been devoted to theorizing the process of sub-dimensions of corporate entrepreneurship such as venturing and strategic renewal. For example, one of the rare process models of venturing is suggested by Burgelman (1983), and there is a dearth of research on process models of corporate entrepreneurship.

## 5. Need for more individual-level research

Although corporate entrepreneurship is in essence a firm-level construct, it manifests itself in the actions and behaviours of employees (Ren & Guo, 2011; Stevenson & Jarillo, 1990). In his seminal paper, Burgelman (1983) posits that corporate entrepreneurship mainly results from entrepreneurial behaviours undertaken by employees at lower levels of companies. Yet, surprisingly less attention has been given to the organizational mechanisms enabling firms to better stimulate entrepreneurial behaviours by their employees. In this vein, one path for future research can be investigating factors encouraging employees to disclose their underground ideas (Sakhidari & Bidakhavidi, 2016). Individuals at lower levels of firms, such as those operating in R&D departments, tend to undertake bootlegging behaviour to reduce uncertainty associated with their ideas (Masoudnia & Szwejczewski, 2012), show the technological and market potential of their ideas (Criscuolo et al., 2013), and establish legitimacy for subsequent resource acquisition (Kannan-Narasimhan, 2014). How firms can utilize the underground behaviours for corporate entrepreneurship is under-investigated in the literature of corporate entrepreneurship.

Another potential avenue for future studies is the way firms can mitigate *exploration-exploitation* tension at individual levels (Gibson & Birkinshaw, 2004). Indeed, a basic tension firms face is whether to attend their employees towards exploratory activities for future viability or in exploitative activities to ensure existing viability (March, 1991; Van de Ven & Engleman, 2004). Exploratory activities are mainly related to the development of new knowledge and capabilities whereas the

exploitative operations are more concerned with the utilization of current capabilities and stock of knowledge (Katila & Ahuja, 2002). These activities are competing with each other for organizational attention (Burgelman & Valikangas, 2005; Burgelman, 1983). Yet, firms need both exploratory and exploitative activities for higher performance and innovative activities: the so-called ambidextrous firms (Raisch et al., 2009; Jansen et al., 2005). Indeed, although exploration and exploitation can be viewed as trade-offs for firms (Gupta et al., 2006), the dominant view is that such activities are distinct, yet complementary, modes of activity (Hill & Birkinshaw, 2014). Accordingly, attention management concerning the allocation of employees' efforts and attention towards both exploratory and exploitative operations is proposed as the most essential step for boosting corporate entrepreneurship (Ren & Guo, 2011; Van de Ven, 1986). Yet, surprisingly less attention has been given to the contextual mechanisms enabling firms to mitigate the tension between exploration and exploitation at individual levels, which can be a compelling path for future research.

## Conclusion

Overall, the literature review presented in this article reveals that, despite a large body of informative research on corporate entrepreneurship, there is a dearth of research on more capability-oriented, social, contextualized, and process models and individual-level research of corporate entrepreneurship. The suggested paths for future research presented here may provide interesting insights into why some firms are more entrepreneurial than others.

## About the Author

**Kamal Sakhidari** is an Assistant Professor in the Faculty of Entrepreneurship at the University of Tehran, Iran. He received his PhD in Business and Entrepreneurship from the Queensland University of Technology (QUT) in Brisbane, Australia. His main research interests are corporate entrepreneurship, innovation management, institutional theory, and international business. He is also a member of the Australian Centre for Entrepreneurship Research (ACE) at the QUT Business School.

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# Corporate Entrepreneurship: A Review and Future Research Agenda

Kamal Sakhdari

## Appendix 1. Key studies on the antecedents of corporate entrepreneurship (Page 1 of 3)

Authors	Key Results	Antecedent	Theoretical Lens	Measure	Dimensions
Zahra (1991)	Scanning the business environment promotes corporate entrepreneurship by providing relevant knowledge of industry trends and changes.	Firm/environment	Knowledge-type lens	New survey scale	Meta-construct (innovation, venturing)
Zahra (1993)	Environmental hostility and hospitable business environment positively affect, and static environments negatively affect, corporate entrepreneurship.	Environment	Normative theory	New survey scale	Individual (innovation, venturing, renewal)
Zahra (1996)	There is a positive connection between executive stock ownership and long-term institutional ownership, and corporate entrepreneurship.	Top management team	Agency theory	New survey scale	Individual (innovation, venturing, renewal)
Zahra, Neubaum, and Huse (2000)	Executives and outside directors' stock ownership, being different persons and the medium size of the board positively influence corporate entrepreneurship.	Top management team	Agency theory	Adding international venturing	Individual (innovation, local and international venturing)
Hayton (2005)	Diversity of human capital in top management team (facilitating knowledge acquisition and triggering learning) enhances corporate entrepreneurship.	Top management team/firm	Knowledge-based view	Zahra (1996)	Individual (innovation, venturing)
Kellermanns and Eddleston (2006)	Willingness to change, generational involvement, and perceived technological opportunities increase corporate entrepreneurship in family business.	Firm	Entrepreneurial thinking	Zahra (1996)	Meta-construct (innovation, venturing, renewal)
Yiu, Lau, and Bruton (2007)	Firm-level ownership advantages (such as business and institutional ties) foster corporate entrepreneurship.	Firm/environment	Knowledge-based view	Zahra (1996), Zahra et al. (2000)	Individual (innovation, local and international venturing, renewal)
Simsek (2007)	Risk-taking propensity and pursuit of entrepreneurial initiative mediate the relationship between CEO tenure and performance.	Top management team	Upper echelons perspective	Zahra (1996)	Meta-construct (innovation, venturing, renewal)

# Corporate Entrepreneurship: A Review and Future Research Agenda

*Kamal Sakhdari*

## Appendix 1. Key studies on the antecedents of corporate entrepreneurship (Page 2 of 3)

Authors	Key Results	Antecedent	Theoretical Lens	Measure	Dimensions
Simsek, Veiga, and Lubatkin (2007)	Discretionary slack mediates the relationship between environmental perceptions and corporate entrepreneurship. The relationship between discretionary slack and corporate entrepreneurship is moderated by market sensing capacity.	Firm/environment	Organizational/agency theories	Zahra (1996)	Meta-construct (innovation, venturing, renewal)
Ling, Simsek, Lubatkin, and Veiga (2008)	CEO transactional leadership through enhancing top management team's behavioural integration, risk propensity, and decentralization affects corporate entrepreneurship.	Top management team	Leadership theory	Zahra (1996)	Meta-construct (innovation, venturing, renewal)
Yiu and Lau (2008)	Political, social, and reputational capital foster corporate entrepreneurship and relative performance.	Firm	Knowledge-based view	Zahra et al. (2000)	Individual (innovation, local and international venturing)
Simsek, Lubatkin, Veiga, and Dino (2009)	An entrepreneurial alert information system that provides relevant information in a timely and pro-active manner fosters corporate entrepreneurship.	Firm	Knowledge-based view	Zahra (1996)	Meta-construct (innovation, venturing, renewal)
Heavy, Simsek, Roche, and Kelly (2009)	Managerial uncertainty preference and environmental dynamism moderate the relationship between decision comprehensiveness and corporate entrepreneurship.	Top management team/environment	Strategic decision-making theory	Zahra (1996)	Meta-construct (innovation, venturing, renewal)
Romero-Martinez et al. (2010)	Privatization improves corporate entrepreneurship when firms are operating in highly competitive industries.	Firm/environment	Agency theory	Zahra (1996)	Meta-construct (innovation, venturing, renewal)
Thorgren, Wincent, and Örtqvist (2012)	Relational capital among partners through knowledge transfer promotes corporate entrepreneurship.	Firm	Knowledge-based view	Zahra (1996)	Meta-construct (innovation, venturing, renewal)
Heavey and Simsek (2013)	Top management team's size, diversity, and network size raise the level of corporate entrepreneurship.	Top management team/environment	Knowledge-based view	Zahra (1996)	Meta-construct (innovation, venturing, renewal)

# Corporate Entrepreneurship: A Review and Future Research Agenda

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## Appendix 1. Key studies on the antecedents of corporate entrepreneurship (Page 3 of 3)

Authors	Key Results	Antecedent	Theoretical Lens	Measure	Dimensions
Burgers and Covin (2014)	Structural differentiation affects corporate entrepreneurship, moderated by environmental dynamism and firm size.	Firm	Structural contingency theory	Zahra (1996)	Meta-construct (innovation, venturing, renewal)
Wei and Ling (2015)	CEO characteristics impact corporate entrepreneurship.	Top management team	Human and social capital theories	Zahra (1996)	Meta-construct (innovation, venturing, renewal)
Turner and Pennington III, 2015)	The greater the ability, motivation, and opportunity for knowledge sharing through enhancing learning in an organizational network can enhance innovation.	Dyad/network	Knowledge-based view	New scale	Single dimension of innovation
Glaser, Fourné, and Elfring (2015)	Top managers spanning ties increase exploratory innovation.	Top management	Social network theory	Jansen et al. (2006)	Single dimension of innovation
Nason, McKelvie, and Lumpkin (2015)	Firms of different sizes use corporate entrepreneurship for different purposes.	Firm	Resource-based view	Meta-analysis	Different dimensions (innovation, venturing, renewal)
Naldi, Achtenhagen, and Davidsson, (2015)	Different dimensions of entrepreneurial management differently affect SMEs' international venturing.	Top management/firm	Stevenson's theory of entrepreneurial management	Zahra et al. (2000)	Single dimension of international corporate venturing.
Behrens and Patzelt (2015)	Past project failure experience, the firm's growth rate, and hierarchical level impact managers' decisions on terminating corporate entrepreneurship projects.	Top management/firm	Attention-based view	Zahra (1996)	Corporate entrepreneurship projects (innovation, venturing, renewal)
Wang, Chung, and Lim (2015)	The alignment of CEO incentives with shareholder interests and adoption of CEO monitoring mechanisms will enhance international corporate entrepreneurship	Top management/firm	Agency theory	New scale	Single dimension of international corporate venturing.

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**Keywords:** corporate entrepreneurship, innovation, venturing, strategic renewal, established firms

# A Digital Maturity Model for Telecommunications Service Providers

Omar Valdez-de-Leon

**“An organization’s capabilities become its disabilities”**  
when disruptive innovation is afoot.

Clayton Christensen  
Professor, business consultant, and author  
In *The Innovator’s Dilemma*

Industries across the spectrum are being faced with a fundamental change: digital transformation. The telecommunications industry is no exception. For communications service providers, this transformation started some time ago with the emergence of so-called over-the-top (OTT) services such as WhatsApp and Skype. However, in spite of such transformation being underway, there is a lack of frameworks and tools to help communications service providers navigate such radical change. This article presents the findings of a research project to develop such a framework: the digital maturity model for telecommunications service providers. The model aims to offer a structured view of digital transformation that is specific to the context and challenges of the telecommunications industry and that can be used as a standard to help communications service providers benchmark themselves against peers or themselves as they advance their transformation. This article describes the need for the model and the methodology used to develop it, and it offers recommendations on how to use the model and further develop it as our understanding of digital transformation evolves.

## Introduction

Communications service providers are being faced with a deep transformation that is taking them from being providers of traditional communication services (e.g., voice, SMS) into providers of digital services (e.g., music, mobile TV, cloud services, Internet of Things). This digital transformation – the use of technology such as analytics, mobility, social media, and smart embedded devices to improve the performance or reach of an enterprise (Westerman et al., 2011) – also requires communications service providers to digitize the way they serve their customers throughout the entire customer lifecycle. Thus, the transformation is disruptive; it affects not only customer relationships, but internal processes and value propositions as well (Westerman et al., 2011).

A number of factors are identified as key drivers for digital transformation, including:

- Technological advancement: everything is being connected to the Internet or is being digitized. Examples of this include connected vehicles and the digitization of money.

- New breeds of firms providing digital services that utilize the infrastructure of communications service providers (e.g., mobile networks) yet appropriate most of the value generated. Examples include firms such as Spotify and WhatsApp.
- A change in customer expectations, which are being molded towards an always-connected, personalized lifestyle and digitized services.
- The commoditization of traditional communication services and consequent revenue flat-lining or outright decline (see Kendall, 2014).

Two examples help illustrate this transition: AT&T (att.com) in the United States and Rogers (rogers.com) in Canada. In 2013, AT&T launched a completely new service for home security monitoring, which has since become a case study on how to successfully move into digital services. In 2014, Rogers launched a program with the aim of transforming the customer experience by digitizing the entire customer lifecycle. Rogers has reportedly managed to drastically transform customer experience as shown by a significant increase in the

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number of customer interactions happening through digital channels, drastic improvements in customer satisfaction metrics, and reductions in customer complaints (Deloitte, 2016). However, these two examples appear to be exceptions rather than the rule, and most communications service providers are still struggling to figure out their transformation journey.

Such transformations go deep into every aspect of the businesses and operating models of communications service providers, yet there is a lack of tools and guidelines to help operators negotiate such change. Indeed, several researchers (e.g., Friedrich et al., 2015; Kuebel et al., 2014; Ovum, 2014) have shown that communications service providers are already committed and are taking steps towards digital transformation, but lack a clear path or guide. They all are taking divergent routes, in many cases changing course as they “try and learn” (Friedrich et al., 2015).

To navigate their digital transformation journey in a more confident and structured manner, these organizations look to existing frameworks, including seminal works in IT-enabled business transformation (e.g., Venkatraman, 1994) as well as more recent developments in digital transformation practice (e.g., Gerbert et al., 2015; McKinsey, 2015; Westerman et al., 2012). These frameworks offer a good structure and understanding of the digital challenge; however, they also tend to be too general and high-level in their coverage. The reason for this is likely to be that all have been designed to be generic in nature to apply to any industry. None of these models are specific to the telecommunications industry and as such are not designed to offer specific guidance to build a telecommunications-specific pathway to digital transformation.

A model that fills that gap is needed. Such a model should:

1. Offer a structured view of digital transformation.
2. Be comprehensive enough to cover all aspects of digital transformation.
3. Be specific to the context and challenges that communications service providers are facing.
4. Not only describe the current situation but also offer a view of what a more advanced, digital communications service provision looks like.

5. Be able to be used as an industry standard to help communications service providers benchmark themselves against peers or themselves as they advance their transformation.

The model presented here – the digital maturity model for telecommunications service providers – is intended to fill this gap. This article will first describe the methodology used to design and develop the model. Next, it will introduce the model, including its constituent dimensions and levels of maturity. Finally, the article will explain how it can be used in practice and further developed.

## Methodology

In developing the model, a three-stage approach was followed, based on the best-known practice in the development of these type of models (Becker & Knackstedt, 2009; De Bruin et al., 2005):

1. A clear definition of the scope of the model.
2. An initial design or architecture of the model.
3. An iterative approach to validate (with experts in the field) the design of the model.

### *Defining the scope*

From the outset, the focus of the model was very clear: the digital transformation of communications service providers. More specifically, the scope of the digital maturity model is to help communications service providers to identify their current position in a digital maturity scale and be able to define a vision and a plan for moving up that maturity spectrum.

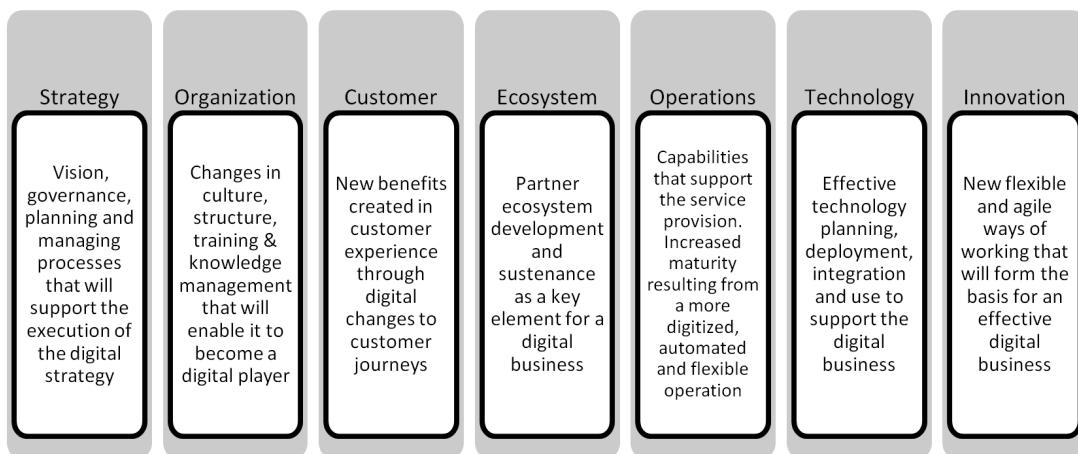
### *Designing the initial model*

The design stage began with a comprehensive review of the relevant literature, case studies from several industries, and interviews with subject matter experts. These activities formed the basis for the identification of a set of key elements of digital transformation, which in turn resulted in a multi-dimensional model. The seven dimensions that comprise the model are depicted in Figure 1.

A progressive, multi-staged approach to transformation was then integrated into the model. The objective was to go beyond a plain low–medium–high notion and create a maturity scale that was more nuanced (reflecting the actual challenge) and industry-specific –

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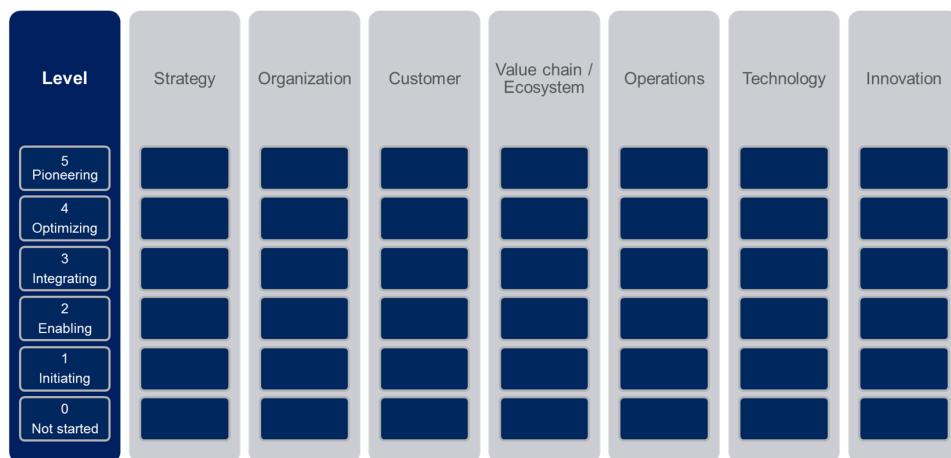
**Figure 1.** The initial structure and seven dimensions of the digital maturity model for telecommunications service providers

one that had high granularity without becoming too complex. Five levels of maturity were selected and integrated into the model skeleton, or outline, which included the seven dimensions (see Figure 2).

### *Detailing and validating the model*

Next, an initial set of characteristics for each element in the matrix was defined. This step included a review of existing literature, examination of other available models, and input from experienced practitioners in the subject matter. Once a first draft of the model was completed, the final step was to take this draft to an external group of experts for them to scrutinize, criticize, and help further develop into a fully-fledged maturity model.

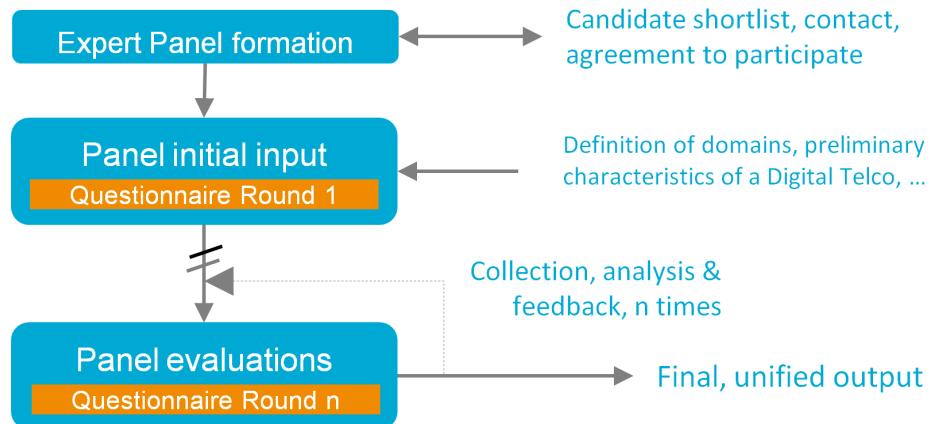
The Delphi method was used to complete the development of the model because of its distinct suitability in capturing expert input for new concept or framework development in areas where there is limited empirical evidence (Okoli & Pawlowski, 2004), as it is the case of digital transformation in the telecommunications industry. The method involves the recruitment of a panel of experts in the subject matter and the iterative polling of the panel via structured questionnaires. A number of polling rounds is performed until a consensus is reached (Figure 3). For this study, a panel of 10 experts was formed, including a mix of authorities that came from communications service providers, academia, and the industry analyst and consultant communities.



**Figure 2.** Initial outline of the digital maturity model for telecommunications service providers

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**Figure 3.** The Delphi method

## The Model

The outcomes of the Delphi study included:

1. The definition of an overall maturity model with clearly defined dimensions and levels of maturity (see Figure 4 and Appendix 1).
2. The establishment of a set of characteristics that digital communications service providers are expected to demonstrate at defined levels of maturity for each of the dimensions that comprise the model.

### Dimensions

The seven dimensions of the final model (refined and reordered through the model development process) are as follows:

1. *Strategy*: Representing the vision, governance, planning, and management processes that will support the implementation of the digital strategy.
2. *Organization*: Characterizing the changes in communications, culture, structure, training, and knowledge management within the organization that will enable it to become a digital player.
3. *Customer*: Focusing on customer participation and empowerment, as well as new benefits created in customer experience through digital transformation of customer journeys.
4. *Technology*: Representing the capabilities that enable effective technology planning, deployment, and integration to support the digital business.



**Figure 4.** The completed digital maturity model for telecommunications service providers showing a hypothetical organization's maturity levels for each of the seven dimensions

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5. *Operations:* Focusing on the capabilities that support the service provision. Increased maturity within this dimension demonstrates a more digitized, automated, and flexible operation.
6. *Ecosystem:* Signifying partner ecosystem development and sustenance as a key element for a digital business.
7. *Innovation:* Focusing on the capabilities that enable more flexible and agile ways of working that will form the basis for an effective digital business.

The dimensions aim to cover the vital areas of the business that are impacted and in turn impact digital transformation. As discussed above, the dimensions were the result of extensive research and insight from practitioners in the subject. Remarkably, throughout the study, two dimensions came up frequently as critical but were frequently underestimated in their importance in digital transformation: Ecosystem and Innovation. The importance of these two areas is ostensibly owing to the dynamic nature of digital technologies and the importance of continuous innovation, going beyond the boundaries of one single firm. For this reason, the two dimensions are distinguished from one another in the model.

## *Maturity levels*

Maturity in each dimension is assessed across five levels (plus a default level zero reflecting a state of inaction). In order of decreasing maturity, these levels include:

5. *Pioneering:* The organization is breaking new ground and advancing the state of the practice within the dimension.
4. *Optimizing:* The organization's digital initiatives within the dimension are being fine-tuned and used to further increase overall performance.
3. *Integrating:* The organization's initiatives are being integrated across the organization to support end-to-end capabilities.
2. *Enabling:* The organization is implementing initiatives within the dimension that will form the foundation of its digital business.
1. *Initiating:* The organization has decided to move toward a digital business and is taking initial steps in that direction.
0. *Not started:* The organization has not taken any steps to transform.

The levels represent the progression stages of a communications service provider in its digital transformation journey. Each level includes a set of characteristics (see full details in Appendix 1) that a business must demonstrate in terms of implementations, investments, or established capabilities in order to be situated at that particular level. Each level builds on the previous one. As the organization implements and integrates the various changes that are pertinent to its digitization journey, the maturity rating would rise across the applicable dimensions.

## *Use of the model*

The model aims to depict the level of maturity of a communications service provider at a given point in time. It also provides a vision of what a more mature digital business looks like. However, the model is not prescriptive as to what is the "best way" to move up in the maturity scale. It also does not suggest that Level 5 is a requirement for all organizations. Instead, it is an implementation model where the levels are a snapshot of the extent of implementation.

It is indeed of vital importance for each organization to define the level of maturity it wants to attain, in line with its business ambitions, context, resources, and timeline. The model can be used to define the current level of maturity, and as a guide through the transformation journey in the desired timeframe. The model can also be used as a benchmarking tool to evaluate an organization's own position against a competitor or a peer, or between operating companies within the same group. Finally, the model can be used to evaluate progress and to assess results of previous investments. In summary, examples of how the model can be used are as follows:

- to provide a structured view of current and target positions (e.g., where do we want to be in five years?)
- as a benchmarking tool
- to identify deficiencies in an area that may adversely affect the overall effectiveness of transformation efforts
- as a support tool to define next steps and priorities in digital transformation
- to assess whether the organization has properly prioritized and ordered implementation efforts, or whether it has "the cart before the horse"
- to assess or confirm results from previous investments

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## Conclusion

The digital maturity model described in this article was developed to help telecommunications service providers in their digital transformation journey. The motivation for developing such model originated from the clear absence of industry-specific tools available to guide such transformations. The resulting model is intended as a tool to gauge digital maturity at a particular point in time and to help develop a vision and a roadmap for digital transformation. It is recommended that practitioners adopt the model as a central component of a toolbox for digital transformation.

The model is intended as a tool to define current and target states of maturity; however, it is not prescriptive as to suggest a best way to achieve the target state. As such, it is suggested that complementary tools should be developed to help define the "best practices" and further develop the framework. For example, such best practices can be developed based on in-depth empirical evidence as more communications service providers embark on journeys of digital transformations, and as successes and failures become better understood and documented.

Finally, although the model was designed for telecommunications services providers, the framework may be of interest to other industries, especially those in services. Therefore, industry-specific adaptations are advised to make the model fit for the particular industry.

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- Dr. Mischa Dohler, Professor & Head of the Centre for Telecommunications Research, King's College London
- Richard George, Director of Digital, Eir
- Simone Bruschi, Head of Digital Banking - Retail, Banca Monte dei Paschi di Siena
- Simon Torrance, CEO of Metaflight, Senior Advisor at Analysis Mason and founder of Telco 2.0
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Omar Valdez-de-Leon

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## Appendix 1. Characteristics of the digital maturity model for telecommunications service providers (Page 1 of 7)

### **1. Strategy**

This dimension represents vision, governance, planning, and management processes that will support the implementation of the digital strategy.

#### Level 1 - Initiating

The organization has decided to move toward a digital business and is taking initial steps in that direction.

- S1.1 The organization has defined an initial digital vision, albeit at this point it is mostly "siloed" and focused on incremental operational improvements.
- S1.2 Some proof-of-concept projects have been authorized at a departmental level to experiment with digital tools (e.g., self-service apps).

#### Level 2 - Enabling

The organization is implementing initiatives within the dimension that will form the foundation of its digital business.

- S2.1 A digital strategy that incorporates most elements of this digital maturity model is signed-off at CxO level.
- S2.2 Formal investments aligned to the digital strategy have been approved.
- S2.3 Digital leadership have been appointed to drive transformation
- S2.4 Budgets are incorporating digital targets.

#### Level 3 - Integrating

The organization's initiatives are being integrated across the organization to support end-to-end capabilities.

- S3.1 A common digital strategy is shared across the whole organization at all levels.
- S3.2 Investments have been authorised at CXO level for overall digital transformation.
- S3.3 Digital initiatives are being implemented across the organization, including cross-departmental projects.
- S3.4 Budgets, key performance indicators and performance metrics across the organization include a digital element, including common (inter-departmental) targets.
- S3.5 First set of digital services are in the roadmap/delivered, including partnerships with digital vendors (e.g., fleet management, IaaS).
- S3.6 Digital revenues are now being specifically recorded, although these might not yet be particularly large.

#### Level 4 - Optimizing

The organization's digital initiatives within the dimension are being fine-tuned and used to further increase overall performance.

- S4.1 Digital strategy is well developed and drives the organization's direction and investments.
- S4.2 Digital is a core competence in the organization.
- S4.3 New business models are being implemented with pure digital elements.
- S4.4 Digital strategy is being shared and reviewed with all stakeholders, including external partners.
- S4.5 Digital strategy is no longer owned by a dedicated team but it is an inherent part of activities across the organization
- S4.6 New digital services are becoming a significant share of total revenues (~ 5%).

#### Level 5 - Pioneering

The organization is breaking new ground and advancing the state of the practice within the dimension.

- S5.1 The digital strategy has for some time been driving management and investment decisions.
- S5.2 The organization is now capitalizing on previous investments and transformation efforts to generate completely new revenue streams based on digital capabilities and digital business models.
- S5.3 Digital businesses provide sufficient revenue streams to enable continued investment in new digital initiatives.
- S5.4 Digital services account for a significant (>10%) share of total revenues.

# A Digital Maturity Model for Telecommunications Service Providers

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## Appendix 1. Characteristics of the digital maturity model for telecommunications service providers (Page 2 of 7)

### 2. Organization

This dimension focuses on changes in communications, culture, structure, training, and knowledge management within the organization that will enable it to become a digital player.

#### Level 1 - Initiating

The organization has decided to move toward a digital business and is taking initial steps in that direction.

- O1.1 The organization has articulated the need for digital transformation.
- O1.2 The need for digital competencies has been identified and a general development plan is being defined.
- O1.3 Initial investments are being made to develop digital competencies, including training programmes.
- O1.4 Recruitment of select "experts" to bring needed skills is ongoing, often in isolated teams.

#### Level 2 - Enabling

The organization is implementing initiatives within the dimension that will form the foundation of its digital business.

- O2.1 The organization has a vision for digital transformation, which begins to drive change towards a digitally-savvy workforce.
- O2.2 Digital units/teams are being created to explore digital opportunities.
- O2.3 Training and compensation schemes are being adapted to align with the digital strategy.
- O2.4 Digital services are supported by a specific sales team.

#### Level 3 - Integrating

The organization's initiatives are being integrated across the organization to support end-to-end capabilities.

- O3.1 Management is continuously communicating the digital strategy and advances in its implementation across the whole organization.
- O3.2 Digital strategy is driving corporate change, including organizational structure and key performance indicators.
- O3.3 Digital initiatives incorporate people from several functions and departments, as well as external partners.
- O3.4 Performance and compensation systems across the organization incorporate digital elements.
- O3.5 Global processes are set to promote the transfer of global/central digital knowledge towards the Operating Businesses (OpCos).

#### Level 4 - Optimizing

The organization's digital initiatives within the dimension are being fine-tuned and used to further increase overall performance.

- O4.1 Digital is fully embedded in the corporate culture.
- O4.2 Digital capabilities are well developed and partnerships are continuously formed to access new ones.
- O4.3 A well-defined personnel development strategy is in place, including when to train, outsource, or acquire digital capabilities.
- O4.4 Key performance indicators for sales are now mainly driven by digital services.

#### Level 5 - Pioneering

The organization is breaking new ground and advancing the state of the practice within the dimension.

- O5.1 Collaboration with other ecosystem partners is well established, generating service innovation that is ahead of competition.
- O5.2 The organization is flexible and easily adapts to changes in the market in a more agile way than competitors.
- O5.3 The organization is focused on digital innovation.

# A Digital Maturity Model for Telecommunications Service Providers

Omar Valdez-de-Leon

## Appendix 1. Characteristics of the digital maturity model for telecommunications service providers (Page 3 of 7)

### **3. Customer**

This dimension focuses on customer participation and empowerment, as well as new benefits created in customer experience through digital transformation of customer touch points.

#### Level 1 - Initiating

The organization has decided to move toward a digital business and is taking initial steps in that direction.

- C1.1 Basic self-help tools (e.g., online portals, forums) are available to customers.
- C1.2 Initial pilots of new digital tools such as self-service apps and social media support are being conducted.
- C1.3 Initiatives and requirements to expand customer interaction beyond basic app-based self-support have been identified.
- C1.4 Basic e-commerce capabilities are being implemented to drive calls to purchase online.

#### Level 2 - Enabling

The organization is implementing initiatives within the dimension that will form the foundation of its digital business.

- C2.1 An omni-channel vision has been fully articulated (although not necessarily completely executed).
- C2.2 New digital customer engagement tools are being implemented supporting the customer lifecycle.
- C2.3 Customer experience and usage data is actively collected and used to assist customer support and service improvements.
- C2.4 New digital services (typically from third parties) are being made available to customers, albeit not yet as part of an integral "multi-product" service.

#### Level 3 - Integrating

The organization's initiatives are being integrated across the organization to support end-to-end capabilities.

- C3.1 An omni-channel vision is well under-way throughout customer-facing operations (e.g., from physical shops through to online to mobile and call centres).
- C3.2 Customers can not only access support and information; service self-configuration tools are also available across channels.
- C3.3 Customer experience and usage data is routinely collected across all channels and shared across organizational functions (e.g., marketing, product management, customer support, network operations).
- C3.4 Customers can bundle new digital services with traditional services.

#### Level 4 - Optimizing

The organization's digital initiatives within the dimension are being fine-tuned and used to further increase overall performance.

- C4.1 Customer experience management has moved from reactive to proactive including automated actions (e.g., next-best action, personalized promotions).
- C4.2 Data analytics are being extensively used to improve customer value, including development of new services offerings, promotions, and branding.
- C4.3 Digital tools and systems are enabling full customization of services at the individual customer level, including third-party products.
- C4.4 Initial tests of data-driven dynamic are ongoing.

#### Level 5 - Pioneering

The organization is breaking new ground and advancing the state of the practice within the dimension.

- C5.1 Dynamic pricing is being used to maximize customer value through full personalisation and flexibility.
- C5.2 Machine learning and other advanced tools are being used to identify consumption trends and to develop new services and pricing strategies that are entirely new to the industry.
- C5.3 New (including non-traditional telecommunication) digital services are being developed based on deep knowledge of customer (e.g., advanced analytics) and are, from inception, fully integrated across all touch points (e.g., one screen/app/bill for all services).

# A Digital Maturity Model for Telecommunications Service Providers

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## Appendix 1. Characteristics of the digital maturity model for telecommunications service providers (Page 4 of 7)

### 4. Ecosystem

This dimension focuses on partner ecosystem development and fostering as a key element for a digital business.

#### Level 1 - Initiating

The organization has decided to move toward a digital business and is taking initial steps in that direction.

- E1.1 The organization has developed a preliminary ecosystem strategy for digital services.
- E1.2 Programs and key assets (e.g., people, technology platforms) have been identified that will form the basis for a digital ecosystem.
- E1.3 Resources (e.g., people and funding) are being allocated to develop a digital ecosystem.

#### Level 2 - Enabling

The organization is implementing initiatives within the dimension that will form the foundation of its digital business.

- E2.1 An ecosystem strategy, as part of a wider digital product strategy, has been signed-off by senior management.
- E2.2 An initial group of partners has been on-boarded, albeit with limited integration of products and capabilities (e.g., on a re-seller model).
- E2.3 Tools and systems are being put in place to support a closer integration of partners, including service enablement platforms, APIs, and preferred pricing structures.

#### Level 3 - Integrating

The organization's initiatives are being integrated across the organization to support end-to-end capabilities.

- E3.1 The ecosystem strategy has evolved to focus on developing a two-sided model whereby value is created for both end customers and partners.
- E3.2 Integration with partners goes beyond basic product bundling or re-selling, including some resource sharing (e.g., joint market channels).
- E3.3 Investments in integration capabilities are being made to facilitate fast and efficient partner service development.
- E3.4 The organization is integrating partner services and capabilities to enhance existing products.

#### Level 4 - Optimizing

The organization's digital initiatives within the dimension are being fine-tuned and used to further increase overall performance.

- E4.1 The ecosystem strategy has moved towards a digital marketplace where users can integrate services from various ecosystem parties.
- E4.2 Dedicated teams are in place to help develop partner capabilities (e.g., designating marketing resources to help partners to develop their promotions and go-to-market strategies).
- E4.3 Investments in integration and development capabilities are being made to not only enable but accelerate and reduce costs of service creation by partners in ecosystem.
- E4.4 Data flows across the ecosystem partners for product/service optimization.

#### Level 5 - Pioneering

The organization is breaking new ground and advancing the state of the practice within the dimension.

- E5.1 The ecosystem is mature and it starts producing innovations that cross organizational boundaries.
- E5.2 Products and services developed and launched in partnership with ecosystem partners are leading the market and are based on data-driven customer knowledge shared across partner organizations.
- E5.3 The organization is developing new revenue streams and business models that incorporate ecosystem partners from inception through to launch and operation.

# A Digital Maturity Model for Telecommunications Service Providers

Omar Valdez-de-Leon

## Appendix 1. Characteristics of the digital maturity model for telecommunications service providers (Page 5 of 7)

### 5. Technology

This dimension is focused on the capabilities that enable an effective technology planning, deployment, integration, and use to support the digital business.

#### Level 1 - Initiating

The organization has decided to move toward a digital business and is taking initial steps in that direction.

- T1.1 A digital-specific, IT architecture is being developed.
- T1.2 Efforts to define required transformation of IT architecture have been started.
- T1.3 Some initial pilots are planned to test new digital tools and platforms.

#### Level 2 - Enabling

The organization is implementing initiatives within the dimension that will form the foundation of its digital business.

- T2.1 A digital-specific IT architecture has been defined and changes to enterprise IT are ongoing to align it to target architecture. Tactical IT investment plans are aligned to target architecture.
- T2.2 Platforms are being deployed to support digital services (e.g., an Internet of Things, or IoT, platform).
- T2.3 An integral API and security strategy for supporting third-party services has been defined.
- T2.4 Support systems are being implemented to support digital services (e.g., flexible charging and billing).
- T2.5 There is a process to evaluate IT investments based on their alignment to the digital strategy of the organization.

#### Level 3 - Integrating

The organization's initiatives are being integrated across the organization to support end-to-end capabilities.

- T3.1 Digital enterprise IT architecture has been largely implemented, including consolidation of stove-pipe systems into platforms for support of omni-channel and third-party services.
- T3.2 Third-party services are being integrated and supported by digital enterprise IT architecture and related tools.
- T3.3 Processes across the organization (e.g., customer support, partner onboarding) are aligned to digital IT architecture.
- T3.4 Analytics technologies are being implemented to facilitate data collection and sharing across functions.

#### Level 4 - Optimizing

The organization's digital initiatives within the dimension are being fine-tuned and used to further increase overall performance.

- T4.1 End-to-end processes supporting digital services are being optimized by leveraging the digital enterprise IT architecture.
- T4.2 Integration tools are deployed to reduce time and costs of integration of third-party services.
- T4.3 Digital IT architecture supports business agility through flexible tools and supporting processes.
- T4.4 Analytics technologies are being used for optimization of services and processes.
- T4.5 Automation of processes using real-time data processing is being used for proactive decision making across the organization.

#### Level 5 - Pioneering

The organization is breaking new ground and advancing the state of the practice within the dimension.

- T5.1 Technologies such as advanced data analytics underpin innovation processes across the organization, from new service development through to service assurance to customer support.
- T5.2 Automation throughout the organization drives superior performance (e.g., speed, reliability, ARPU, NPS) compared to industry peers.
- T5.3 Tools using technology such as machine learning are implemented and used across the organization (and even to ecosystem partners) for predictive activities (e.g., service reliability, user consumption trends) that support digital business innovation.

# A Digital Maturity Model for Telecommunications Service Providers

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## Appendix 1. Characteristics of the digital maturity model for telecommunications service providers (Page 6 of 7)

### **6. Operations**

This dimension focuses on the capabilities that support the service provision. Increased maturity within this dimension demonstrate a more digitized, automated, and flexible operation.

#### Level 1 - Initiating

The organization has decided to move toward a digital business and is taking initial steps in that direction.

- O1.1 Investments to automate key operations that support digital services (e.g., service provisioning, charging, and billing) are being evaluated.
- O1.2 Improvements in network visibility and automation are being evaluated.
- O1.3 Initiatives to update key business processes to support digital services have been identified.

#### Level 2 - Enabling

The organization is implementing initiatives within the dimension that will form the foundation of its digital business.

- O2.1 Systems to support and automate digital services are being implemented.
- O2.2 Advanced analytics are being deployed for service assurance improvements.
- O2.3 Systems and processes to collect and analyze customer usage data are being deployed.
- O2.4 Processes and policies to better support digital services are being designed and implemented in some key areas of the organization (e.g., ordering, fulfilment, partner management).

#### Level 3 - Integrating

The organization's initiatives are being integrated across the organization to support end-to-end capabilities.

- O3.1 Automation of end-to-end processes is being implemented to support digital services..
- O3.2 Network data is being actively collected, including user- and partner-contributed data, to improve network visibility and to assist expansion planning.
- O3.3 Processes and systems are in place to support integration of third-party digital services.
- O3.4 Network, customer, and other usage data is being collected and combined to provide visibility of end-to-end processes across the organization.
- O3.5 Digital services are implemented and deployed jointly with traditional ones, and they share processes.

#### Level 4 - Optimizing

The organization's digital initiatives within the dimension are being fine-tuned and used to further increase overall performance.

- O4.1 Automated processes are being optimized to improve efficiency and reduce costs of designing, provisioning, and supporting of digital services, including partner services.
- O4.2 Real-time network, customer, and usage data is being combined and analyzed to optimize service reliability as well as key processes (e.g., customer support).
- O4.3 Some real-time, automated decision making is being implemented in the service provision of digital services (e.g., if the event of service failure, send job order and customer-personalized message).

#### Level 5 - Pioneering

The organization is breaking new ground and advancing the state of the practice within the dimension.

- O5.1 Full observability of service and usage data is now driving innovation within the organization, including dynamic offerings to both customers and partners.
- O5.2 Automated end-to-end processes ensure real-time data flows across functions for improved planning and decision making.
- O5.3 Real-time, automated decision making is fully implemented in the service provision of digital services.

# A Digital Maturity Model for Telecommunications Service Providers

Omar Valdez-de-Leon

## Appendix 1. Characteristics of the digital maturity model for telecommunications service providers (Page 7 of 7)

### 7. Innovation

This dimension focuses on the capabilities that enable more flexible and agile ways of working that will form the basis for an effective digital business.

#### Level 1 - Initiating

The organization has decided to move toward a digital business and is taking initial steps in that direction.

- I1.1 A need to develop a more agile and innovative organization has been identified.
- I1.2 The organization is developing a strategy for digital innovation across functions.
- I1.3 Some initial changes are being made to the way digital services are developed with a focus hitherto on incremental improvements.

#### Level 2 - Enabling

The organization is implementing initiatives within the dimension that will form the foundation of its digital business.

- I2.1 A digital innovation strategy has been developed with focus on agile development and open and data-driven innovation processes.
- I2.2 Investments in digital technologies are aligned to innovation strategy and activities.
- I2.3 New processes are being implemented to foster digital innovation.
- I2.4 Investments in people development for digital innovation are underway.

#### Level 3 - Integrating

The organization's initiatives are being integrated across the organization to support end-to-end capabilities.

- I3.1 Open innovation with external parties including partners, users, and others has been implemented to support digital innovation.
- I3.2 Data (including service, customer, and usage) is shared across the organization (and to partners) to support innovation.
- I3.3 Metrics and key performance indicators specific to digital innovation and partner integration are being implemented.

#### Level 4 - Optimizing

The organization's digital initiatives within the dimension are being fine-tuned and used to further increase overall performance.

- I4.1 Innovation in new digital services is mature, with clearly defined targets, processes, and performance metrics.
- I4.2 Time to market of new service propositions is being reduced through well-established innovation processes.
- I4.3 Customer and partner co-creation of new services is used to advance innovation and reduce costs of development.

#### Level 5 - Pioneering

The organization is breaking new ground and advancing the state of the practice within the dimension.

- I5.1 The organization is breaking new ground in the way it innovates, establishing innovation processes that are new to the industry.
- I5.2 The organization is recognized in the industry as leader in digital innovation.
- I5.3 New digital services launched in the last 3 years account for a significant share of total digital revenues (e.g., >30%)

# Co-Creating User Stories: A Tool for Making Sense of Business Opportunities

Anna-Greta Nyström, Miia Mustonen, and Seppo Yrjölä

*“The real goal of using stories is shared understanding.”*

Jeff Patton  
Product manager and designer  
*In User Story Mapping*

This article discusses co-creation as a means of sensemaking among business-to-business actors, and presents a case study from the information and communications sector, in which the aim is to understand current and future media consumption and behaviour. We propose to expand the notion of co-creation in such a way that it also recognizes interaction and sensemaking between different stakeholders within an industry or sector, compared to the current view, in which the focus is on the consumers' role in co-creation activities. Stakeholder co-creation entails jointly creating meaning of a chosen complex phenomenon by using practical tools, such as narratives in the form of user stories. Sensemaking is a narrative process and can thus be used in combination with practical facilitation tools in order to co-create user stories or other stories, and in other contexts.

## Introduction

Predicting and making sense of the future is a complex endeavour – impossible, yet at the core of every organization's developmental work. The mobile communications sector is preparing the transition from 4G to 5G, aware of possible shifts in trends and media consumption as end users will be able to access greater speed and capacity. Over the decade, we have witnessed the exponential growth of wireless communications with a vast range of diverse devices, applications, and services requiring connectivity. In particular, the number of mobile broadband subscribers and the amount of data used per user is set to grow significantly over the coming years. Recent research points at trends such as increased mobile streaming on demand, increased mobile media consumption on the go, and a visible rise in artificial intelligence and the Internet of Things (IoT) (cf. Ericsson Consumerlab, 2015). Thus, actors are trying to understand the business context within which they operate in order to make decisions on future investments.

The search for clues and signs of future trends relates to a process of sensemaking (cf. Weick, 1995; Weick et al., 2005). Sensemaking is about the process that culmin-

ates in interpretation (Craig-Lees, 2001): a social process where meanings become shared and turned into a so-called collective mind. Sensemaking thus requires interaction and communication between individuals and actors. Individuals co-create stories and narratives of the reality and surrounding context in which they exist. Co-creation of stories and alternative realities becomes a tool for making sense of a complex world. However, little is known of how firms jointly engage in a process of co-creation, and how activities along the process aid firms in identifying business opportunities, among other things. The aim of this article is, therefore, to provide insight into co-creation as a means of sensemaking, and to provide practical tools for co-creating a shared view of business opportunities.

The remainder of this article is organized as follows. We first discuss sensemaking and how it can be facilitated and enhanced through co-creation activities. We then present the data used for our analysis and the results from an empirical study of co-creating user stories within a project consortium aiming at understanding ongoing trends in media consumption, and investigating both technological and political enablers needed to facilitate those trends. We conclude by discussing our findings and their implications for theory and practice.

# Co-Creating User Stories: A Tool for Making Sense of Business Opportunities

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## Sensemaking through Co-Creation

Weick (1995) argues that sensemaking exists and can be examined; sensemaking is a process in which an individual cognitively applies cultural constructs, makes sense of an inter-organizational interaction event, and ascribes meaning to it (Ivanova & Torkkeli, 2013). Sensemaking allows us to cope with enormous complexities and gives us the opportunity to turn circumstances into a situation, which we can understand explicitly in words (Bean & Hamilton, 2006; Weick et al., 2005). Sensemaking focuses on the interplay between interpretation and action (Mills, 2003; Weick et al., 2005). Without action, there is no sensemaking (Weick, 1995). The notion of action and its importance in the sensemaking process is elaborated further by Czarniawska-Joerges (1992), who states that sensemaking depends more on shared actions and less on, for example, shared goals.

Similarly, interpretation and meaning-making are at the core of "creation", or the culture of co-creation (Ind & Coates, 2012). Meaning is always co-created. Ind and Coates (2012) note that co-creation has emerged due to the coincidence of several developments, such as the mainstream adoption of Internet technologies, the orientation towards services and experiences, a more open approach to innovation, and the growth of social, collaboration, and customization technologies. Researchers often refer to co-creation as *value* co-creation (cf. Saarijärvi et al., 2013). Alves and colleagues (2016) identify research streams on co-creation, such as service theory (cf. Vargo & Lusch, 2006), innovation studies (cf. Saarijärvi et al., 2013), many-to-many marketing (cf. Bogers et al., 2010), postmodern marketing defining consumers as prosumers (cf. Bendapudi & Leone, 2003), and consumer culture theory. However, common to these research strands is a focus on the consumer as one part in the co-creation process. Even though Ind and Coates (2012) note that co-creation has become a widely used term to describe a shift in thinking from the organization as a definer of value to a more participative process where people and organizations together generate and develop meaning, the focus of researchers is seldom co-creation between organizations in an attempt to structure and make sense of the surrounding business context, changing consumption habits among end users, potential business opportunities, changing business models, etc.

Research on co-creation in a business-to-business setting is scarce. An exception can be found in industrial

network theory, where value co-creation is studied in buyer-seller relationships or business network constellations (cf. Ford, 2011; Hyötyläinen et al., 2011). Co-creation has so far focused on exploiting consumers and other stakeholders who offer their time and intellect for the benefit of organizations. In a business-to-business setting, stakeholders should be engaged in a reciprocally useful way; answers or insights are not existing somewhere and waiting to be discovered, as Ind and Coates (2012) put it. Rather, they have to be discovered with others. It is the process of co-creation and the co-discovery through interaction that generates new ways of seeing the world. Thus, sensemaking materializes in co-creation of meaning; sensemaking can be considered a process of co-creation and vice versa, co-creation can be considered a process of sensemaking. In order to study the phenomenon further, we propose the notion of *stakeholder co-creation* in order to shift focus from co-creating with consumers to co-creating among business-to-business actors, in other words, representatives of industry actors co-create a shared view of the world, current business settings, phenomenon, etc.

## Case Study: Co-Creating User Stories

We use a qualitative research approach in order to study stakeholder co-creation. We chose a project consortium in Finland as the case study for researching sensemaking through co-creation, namely "The Future of UHF" ([fuhf.turkuamk.fi](http://fuhf.turkuamk.fi)), which is financed by the Finnish Funding Agency for Innovation, Tekes, from 2015 to 2016. The project partners represent research institutions, mobile network manufacturers, mobile network operators, broadcast network operators and broadcasters, as well as technology developers. The consortium is unique given that the participants cover different parts of the mobile communications ecosystem. The scope of the project is to study supplemental downlink (SDL) technology, which is based on 4G mobile networks, and to offer a solution to a problem with the networks' frequencies and their limited capacities. The technology enables mobile operators to transfer video content to consumers on the same spectrum band without disturbing the normal TV operations and enables flexible use of ultra-high frequency (UHF) for media and mobile broadband. This approach allows for more efficient utilization of spectrum and for the broadcasters to better reach their increasingly mobile audience. The project thus explores how to fulfill 5G needs and requirements.

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One of the activities in the project is a bi-monthly facilitated workshop with a specific theme. During 2015 and the first half of 2016, nine whole-day workshops were held. Among these workshops, we focus on three in which user stories were jointly created for internal use in the project and as a basis for upcoming topics within the project: future scenarios and business models. During the workshops, notes were taken continuously. The materials produced (post-it notes, hand-written stories, drawn pictures, etc.) were stored and categorized according to: i) which one of four user stories it related to and ii) which actor the individual who produced the material represented. As the main source of data, we use the outcome of the workshops: the co-created user stories.

## *User stories as narratives*

User stories as a concept can be found mainly within information systems and computer sciences, where they relate to different stages of system development and are used in determining system requirements. A user story consists of a few sentences in the everyday language of the end user and has the goal of capturing the essence of part of the work a user does or needs to do (with the system) (cf. Dimitrijevic et al., 2015; Jeffries, 2001). The INVEST model depicts user stories as: i) independent, ii) negotiable, iii) valuable to users and customers, iv) estimable, v) small, and vi) testable (Cohn, 2004). User stories are business oriented (Trkman et al., 2016), and typically they follow a template designed for contributing to programming, system, and software development projects. However, Lucassen and colleagues (2016) point out that user stories are limited in terms of improving quality and there is a lack of empirical studies on their use and effectiveness.

In our case study, user stories were, together with future scenarios, one of the main topics during a number of workshops in 2015. A researcher facilitated the workshops and prepared tasks and tools for the workshop participants. Co-creating user stories was one of the tasks given to the participants. Four user stories, representing "Paul", "Rita", "Minnie", and "John" as fictional users or consumers, were developed jointly and summarized in text by the facilitator (see Boxes 1 to 4). The facilitator asked each workshop participant to individually write stories on the four fictional users or consumers, answering the questions: i) who? (person), ii) what? (action), iii) where? (location, situation), iv) when? (time), and v) why? (motive). After this, the participants were paired together in order to develop the stories collaboratively. These stories were written and

drawn on large sheets of paper to make the stories visible when subsequently presented to the whole group. The whole group then further developed the user stories. From the facilitator's perspective, the structure follows the method of *me-we-us*, in other words, ideation individually, in pairs, and, finally, in groups.

## Findings and Discussion

The case study features the information and communications sector and a consortium working together in developing technology that aids the transition from 4G to 5G. The participants co-created four user stories: more than 50 individual narratives were presented, discussed, compared, and transformed into shared understandings of the current user of mobile devices. The participants had to interpret the ideas of competing actors and collaboratively discover the user stories, their contexts, and their features. Given that sensemaking comprises both past experiences and expectations of the future, the co-created user stories also act as representations of the future by expressing unmet customer needs and possible shifts in behaviour. For instance,

### **Box 1. Paul's story**

Paul is 68 years old and lives with his wife. He has been retired for three years. He has an active social life, exercises several times a week, and travels with his wife.

#### *Media behaviour in general*

Paul appreciates routines and his media usage has remained the same throughout the years. Last year, Paul's children bought him a tablet, and Paul also replaced his old mobile phone with a smartphone. The new devices have changed Paul's everyday life and the way he consumes media. Paul also has a laptop, which he uses frequently. However, Paul does not want to give up TV and radio.

#### *Devices used and for what purpose*

- Laptop: for practical tasks such as paying bills, buying tickets, etc.
- Tablet: for reading newspapers and novels, and watching TV shows
- Smartphone: for calling, following real-time news and map services (navigation)
- TV: for regular TV watching, mostly sports
- Radio: the radio is always on at home, even when nobody is actively listening

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the increased use of smartphones and apps with movie features pose capacity challenges for mobile broadband networks. The discussions during the workshops quickly turned towards the enabling of mobile broadband networks and how they should support diverse personalized uses, services, and applications besides offering voice and data. Drawing up these fictional users and how they use mobile devices for various purposes allowed the participants to relate end-user personas and scenarios to regulatory and technology issues. A key point is to allow the participants to discuss, share, and debate ideas and thoughts, guided by a facilitator who keeps the time schedule, helps summarize the discussion, and assures results.

## Box 2. Rita's story

Rita is a 45-year old single mother with two boys, 8 and 10. She works as a secretary in a multinational corporation. Most of Rita's time is dedicated to the children and running the household; she does not have much time for herself and own hobbies.

### *Media behaviour in general*

Rita's everyday life is structured around her two boys and their hobbies, running the household, and her work. Mobile devices and services facilitate her life. Her laptop is usually at the office. Rita bought a tablet a few years ago, which she uses frequently. She also uses her smartphone frequently. She wants her boys to be able to reach her at all times; they also have smartphones. It feels like her boys learn new technology much faster than she does, but she tries to keep up with the latest apps in order to understand what the boys are talking about.

### *Devices used and for what purpose*

- Laptop: for work, paying bills, watching movies, and shopping
- Tablet: used mainly at home in the evenings, while waiting or commuting, for managing practical tasks, watching movies and TV shows, reading news, shopping, and following social media sites
- Smartphone: for calling, reading news, receiving offers, and navigating
- TV: in the evenings, Rita watches TV with her boys.

The user stories were later on used as starting point for creating future scenarios of UHF. It was therefore important that all stakeholders accept and understand the collaboratively created user stories, as the sensemaking processes continue in the project with new topics. Stakeholder co-creation provides an opportunity to expand and form perceptions of ongoing trends. Stakeholder co-creation in the case study refers to *meaning-making between industrial partners* without the involvement of end users in the process. Stakeholder co-creation may, however, be a step towards engaging with end users and including them as stakeholders in the co-creation of, for instance, more versatile user stories or specific services featured in the user stories.

## Box 3. Minnie's story

Minnie is 32 years old and is single. She is a career woman who works as a social media strategist at a large company. She has an active social life, travels, and plays sports.

### *Media behaviour in general*

As a social media strategist, Minnie keeps herself up to date with work at home and while travelling. She multitasks by using several devices simultaneously and has developed quite regular routines or "checking habits". Minnie feels she must be reachable at all time. Her most important tool is the laptop, which she always carries with her. The smartphone is also actively in use, as it is a simple way of staying up to date. Minnie's work requires a functioning Internet connection, for updating blogs and social media sites, and for uploading and downloading video clips and pictures. In her free time, Minnie uses different media services, especially to manage her life.

### *Devices used and for what purpose*

- Laptop: for work; reading news, blogs, and vlogs; creating networks (LinkedIn); booking trips and hotels; listening to music (via Spotify); and watching movies
- Tablet: she carries the tablet along, but uses it seldom. She uses apps such as Netflix, Spotify, and blogs.
- Smartphone: Minnie is an active user of WhatsApp, Facebook, Twitter, and Instagram. The smartphone functions as a physical calendar, booklet for making notes, etc.

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## Box 4. John's story

John is 14 years old and lives with his parents and two siblings. He goes to school, plays ice hockey two times a week, and enjoys playing computer games and spending time with friends.

### *Media behaviour in general*

John is what they refer to as "digi-native", and he uses his smartphone and content services daily (at school, with friends, while waiting on the bus, etc.). John uses the family tablet and laptop at home, mostly for schoolwork. In his free time, John plays computer games and actively participates in discussion forums related to these games. John also uses his smartphone for playing games. John would like to have the latest smartphone model, just like all of his friends. They demonstrate and recommend to each other the latest and coolest apps. John uses the smartphone for sending messages (also during lessons at school). John appreciates the fact that his teachers use online material and games in their teaching. John never listens to the radio; he wants to decide himself what kind of music he listens to, where and when.

### *Devices used and for what purpose*

- Laptop: John uses the family laptop for doing schoolwork
- Tablet: John uses the family tablet sometimes when playing games late in the night
- Smartphone: actively used for playing games, watching videos on YouTube, and communicating with his friends using WhatsApp. Calls are made mostly using Skype.

## Conclusions

From a managerial point of view, sensemaking can be viewed as an approach where actors, or stakeholders, representing different positions in the industry value network, are invited to an event or workshop, in which they co-create representations of their business context. Sensemaking can thus be used in combination with practical facilitation tools in order to co-create user stories or other stories, and in other contexts. The facilitation tools depend on the aim of the workshop or event, and should activate the participants (e.g., service design tools such as customer journey mapping, scenario writing, collective mind maps, open spaces, and world cafés).

Based on lessons learned developing the case study described in this article, we offer managers three recommendations for co-creating user stories among stakeholders:

1. Use a facilitator to aid the co-creation process and goal-setting.
2. Facilitate interaction and communication by using activation tools.
3. Create the user stories in multiple steps, allowing all participants to individually create stories, which are then collectively developed further.

From a theoretical point of view, and based on the case study, we propose the concept of *stakeholder co-creation*, by which we refer to *co-creation carried out in a business-to-business setting among industry partners*. Through stakeholder co-creation, industry actors aim at making sense not only of business opportunities and industry-related events, but also of the end user per se. Currie and Brown (2003) suggest that we can collectively make sense of our social world through jointly negotiating narratives, or stories. Stakeholder co-creation addresses this issue by shifting focus from the exploitation of consumers in developmental and sensemaking processes to the interaction and sensemaking process among business-to-business actors.

Research on creative processes among business-to-business actors is scarce. In terms of the current case study, it is limited as it studies merely one consortium and stakeholder co-creation based on user stories as the overall topic. We call for more detailed descriptions and analyses of stakeholder co-creation processes and suggest using individual stories as data for content analysis. The dialog between individuals and group conversations become data for qualitative analysis, when taped and transcribed. Also, co-creation in different settings offers a research theme to explore further; combined with new perspectives, co-creation as a concept should be broadened and developed further into sub-categories, such as stakeholder co-creation.

# Co-Creating User Stories: A Tool for Making Sense of Business Opportunities

Anna-Greta Nyström, Miia Mustonen, and Seppo Yrjölä

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# Co-Creating User Stories: A Tool for Making Sense of Business Opportunities

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**Keywords:** user stories, co-creation, sensemaking, business-to-business

# Audience Commodification: A Source of Innovation in Business Models

Datis Khajeheian

**“***If you create incredible value and information for others...  
and you always stay focused on that service, the financial  
success will follow.***”**

Brendon Burchard  
Author and motivational speaker

This article reports on a research project aimed at developing a business model by changing the value-creation mechanism. The essence of this change is to persuade customers to perform actions in favour of the service provider. Such actions include responding to advertising clips to unlock value. The business model was generated from the concept of audience commodification and is based on the idea of looking at users as a source of a tradeable asset in business-to-business markets. Here, attention and actions are the assets that users pay to access the proposed value. The research includes two phases of surveys and experimentation. In the first phase, the tendency and acceptance level of users towards watching advertisements to unlock value are measured. In the next phase, a platform prototype is developed to test and understand user actions towards receiving value. The sample includes 52 users of different nationalities who were seeking relationships on an online dating platform. Results revealed that users accept advertising and will perform requested actions if they can perceive the delivered value. Practical implications of this research include insights to help move away from the current “view-based” advertising model toward new models of partnership with users in the value-creation process. This research may also stimulate further research into developing sustainable business models based on advertising revenue.

## Introduction

Information as the basic product of media is increasingly available for users, easily and mostly free (James, 2012). The volume of media products and services now offered by many media service providers has changed the base of economics in the media industry from being based on scarcity to being based on abundance (Darr & Jürgen, 2008; Masiello & Whitten, 2010). Owing to this change, *audience attention* becomes a scarce commodity and not an information and media product (Falkinger, 2008). This trend produces a challenge for media companies and enterprises to reach their target, and it requires them to search for new business models to deliver value and generate profit (Chesbrough, 2007; Johnson et al., 2008; Morris et al., 2005).

There is a shift toward content being free, and business models based on subscription and pay-per-view are ex-

periencing difficulties attracting customers. One example of this competition can be seen in the business of online dating. The proliferation of dating sites compels companies to seek new market segments and try to attract new niche audiences. Most such platforms mainly follow the subscription-based model as the major business model for premium dating services. While time, attention, and energy are the resources that every advertiser seeks, users of dating services spend a lot of time and efforts to find and connect to potential partners. The abundance of those resources in dating platforms as well as the emotional nature of their proposed value have given this industry potential for generating money from other business models. Thus, this industry was chosen as the focus of a research project facilitated to develop a dynamic business model through value-system innovation. The author, who is an entrepreneur and scholar, managed this research to develop a workable business model for a dating platform. In the face of

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tough competition and increasing difficulties in attracting users in the online dating industry, this research phase asks:

*"How can a dynamic business model be formed based on direct trade-offs of the attention and value between customers and businesses?"*

This article is structured as follows. First, the literature on audience commodification and business models are briefly reviewed. Next, the methodology is described, including the construction of a prototype social dating platform to test the behaviour of users and their acceptance of the business model. Then, the results are analyzed and the practical implications of the findings are discussed. Finally, conclusions are provided.

## Literature Review

### *Audience commodification*

The concept of audience commodity originates from the political economy of communication. It was a political issue discussed by Smythe (1977) to show that western Marxist analyses have neglected the economic and political significance of mass communications. Some authors, from the field of political economy of communication, have stressed the processes of accumulation as the creator of commodification that forced humans to sell their labour power for wages (Murdock, 2011; Prodnik, 2012). Many authors in the field study commodification with a critical perspective (Fuchs, 2012; Smythe, 1981; Suddaby & Greenwood, 2001).

Smythe applied Marx's idea of media as a means of communication. In referring to advertisers, he suggested that, "What they buy are the services of audiences with predictable specifications who will pay attention in predictable numbers and at particular times to particular means of communication. As collectivities, these audiences are commodities. As commodities, they are dealt with in markets by producers and buyers (advertisers)" (Smythe, 1977). In essence, his theory suggested that media industries are based on the transformation of audiences into commodities that can be sold on to advertisers (Arvidsson & Bonini, 2015).

The concept expands to studies on business models based on how Google considers users as a commodity for advertising. Kang and McAllister (2011) argue that Google generates value from advertising by its extensive and transformative commodification of users and its unique features as an advertising venue, intensifying the commodification of its users as compared to tradi-

tional media. In contradiction with many critics of audience commodification in the political economy of communication, the success of Google in generating revenues introduced us to an innovation in business development (Osterwalder & Pigneur, 2010).

Many researchers argue that commodification can be used as a tool for value generation (e.g., DiZerega, 2004; Fleissner, 2006; Thorén, 2011). They argue that new technologies increase the power of media giants and businesses to commodify audiences and to sell them to advertisers. Among these researchers, Manzerolle (2010) proposes the phrase "prosumer commodification" to explain participation of users in this process, too. Hearn (2008) has a critical perspective and debates about self-commodification under variety of digital labour practices. In any case, by using new technologies, users perform actions that make themselves easier to commodify by businesses. Some researchers such as Jennes (2014) oppose the negative sense of audience commodification by introducing "audience empowerment" and argue that digital technology can also enable users in dealing with the surrounding environment.

### *Business models*

According to Morris, Schindelhutte, and Allen (2005), there is no generally accepted definition for the term "business model". The diversity in definitions "poses substantive challenges for delimiting the nature and components of a model and determining what constitutes a good model. It also leads to confusion in terminology, as business model, strategy, business concept, revenue model, and economic model are often used interchangeably. Moreover, the business model has been referred to as an architecture, design, pattern, plan, method, assumption, and statement" (Morris et al., 2005). A simple definition of business model comes from Stewart and Zhao (2000), who define it as a statement of how a firm will make money and sustain its profit stream over time. According to Osterwalder and Pigneur (2010), a business model describes the rationale of how an organization creates, delivers, and captures value. In a more detailed explanation, Chesbrough (2010) defines a business model by the following characteristics: "It articulates the value proposition; identifies a market segment and specify the revenue generation mechanism; defines the structure of the value chain required to create and distribute the offering and complementary assets needed to support position in the chain; details the revenue mechanism(s) by which the firm will be paid for the offering; estimates the cost structure and profit potential (given value proposition and value chain structure); describes the posi-

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tion of the firm within the value network linking suppliers and customers (including identifying potential complementors and competitors); and formulates the competitive strategy by which the innovating firm will gain and hold advantage over rivals." Although different researchers argue that there is limited attention to a definition of business model (Chesbrough, 2007; Falkinger, 2008; Zott & Amit, 2008), the different definitions agree on an important point: a business can create value and earn income.

All in all, the business model holds promise as a unifying unit of analysis that can facilitate theory development in entrepreneurship (Morris et al., 2005) and businesses (Chesbrough, 2007). Technology by itself has no single objective value and the economic value of a technology remains latent until it is commercialized in some way via a business model (Chesbrough, 2007). Even strategy making and strategy implementation, which are very important factors in success of companies (De Mare et al., 2015; Radomska, 2015) depend on the business model of a company, which determines the strategy to follow.

Business model innovation allows companies to develop and innovate to stay competitive. Through better understanding of how customers might be used or involved in business model innovation, there is much to gain for companies wanting to innovate their business model (Ekdahl & Sandell, 2014). Various types of business models have been introduced and applied by different companies and businesses. A dynamic business model is a contingency-based issue, and every enterprise should select a business model that suits its characteristics. No one universal model of sustainability can be applied successfully to different types of organizations: the right choice is closely related to nature of the company's strategy (Radomska, 2015). However, in the era of rapid advances in technology and change in competitive advantages, sustainability is an important subject in the design, selection, and implementation of a business model. There are efforts in identifying sustainable business models (Hawrysz and Joachim, 2015; Radomska, 2015). Finding a sustainable business model requires consideration of different factors, including customers behaviour. Any behaviour is contingent on a perceptual filter that influences a customer's behaviour as well as other resources (Falkinger, 2008). A sustainable and durable business model should be based on this perception from value (Chesbrough & Rosenbloom, 2002; Dubosson-Torbay et al., 2002; Hedman & Kalling, 2003; Osterwalder, 2004; Rappa, 2004; Week, 2000; Zott et al, 2011).

## Methodology

For this study, the author built a real prototype of a social dating platform to test the behaviour of users and to understand how they accept persuasion derived from the business model. The main function of this platform was for the users unlock profiles by performing actions requested by the platform. For example, suppose that a user (or "dater") wants to contact another user through their profile to start a conversation. In typical dating websites or applications, they must pay a subscription, but in this platform, subscription has been replaced with actions that directly or indirectly generate income for the company that is behind the product. For example, a user can receive points by performing certain actions, such as watching an advertising clip of 30 seconds, and they can then use these points to unlock a target profile. This mechanism replaces the subscription revenues with advertising incomes. Moreover, this solution enables media (the dating platform in this case) to provide more effective tools for advertisers. For instance, in this platform, if users answer questions at the end of an advertising clip, they gain extra points. Correct answers to questions that are related to the brand name and product features, confirm to advertisers that the clip has been seen and the audience has gained knowledge about the product.

Magretta (2002) proposed that a business model must pass two critical tests: the narrative test and the numbers test. From her perspective, a narrative test passes successfully when the story makes sense and the numbers test passes successfully when the expected profit and loss statement adds up. The researcher tested the narrative by discussing this business model in an internal seminar with some university-based experts. The experts confirmed that the mechanism and logic of this business model make sense. For the numbers test, the product has to be commercialized and is under development. The prototype and user test phase described here was used as a preliminary numbers test.

The sample includes a group of users with common characteristics of being single and having at least one account in one online dating website or mobile application. The researcher announced the test period for the developed product in three ways: by social connection with his students, friends, and connections; by inviting potential users to participate in three different workshops and seminars in which the idea was presented; and by announcing the test period on Facebook, Twitter, Google Plus, LinkedIn, and his personal website.

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These sources yielded 52 volunteer testers, 14 of whom agreed to test the product in the presence of the researcher or his assistant. In the observed sessions, the researcher was able to ask questions that generated data beyond the actions that registered in the system, such as information about what might persuade users to perform certain actions, what value might encourage them to reveal personal data, etc.

The research was performed in two phases over a period of two weeks. In the first phase, the 52 users completed an online questionnaire that measured the specific amounts of advertising clips they were willing to watch in exchange for points and credits to unlock contacts. The questionnaire asked users about which different actions they felt would acceptable to unlock their selected profiles. For example, it asked whether the user would agree to follow the instruction of a clip and perform a survey in referring website to obtain points; or it asked whether the user would agree to act as social tie for a friend and to endorse them for a date by performing a puzzle challenge. This phase was designed to understand the mindset and mental acceptance of users towards behaving in a particular way (according to the wishes of the service provider) to receive value.

The second phase was an experiment conducted in the Danish App Lab at Aalborg University of Copenhagen, Denmark. For this phase, a copy of a platform that was originally developed for social dating was purchased, and two volunteer developers customized it according to the requirements of the experiment. For example, to personalize the platform for this research, a points-for-action system was added to enable the awarding of points to users for completing actions such as watching advertising clips, which could then be "spent" to unlock and view the profiles of other users (potential partners).

Fourteen users were asked to use the prototype platform and search for interesting matches. When they found interesting profiles, they were encouraged to try to contact them. The mechanism of the platform was to provide two options for contacting the owners of profiles: by paying a monthly fee (the typical model for most dating websites) or by earning and spending points. The points could be earned by watching advertising clips; for example, by watching the full 30 seconds of an advertising clip, a user would receive 30 points. Points could then be spent, for example, to send a message to a contact, which would cost 20 points. Also, actions that boost the user profile cost more, such as

requesting recommendations and endorsements from social connections, or requesting matchmaking from common friends. By this choice of mechanism, users have the option to spend money or sell their time and attention to earn the same value.

Data was collected through a back-end managerial panel that recorded user interactions, such as what criteria they have searched, which profiles they have viewed, what advertising clips they have watched and for how long they watched them, how they have spent credits, and so on. At the end of the second phase, this information was retrieved from managerial panel and analyzed. Interpretation of findings was done by comparing what the users previously expressed in the questionnaire to their subsequent actions when using the prototype. The data included information about their actions as well as the time, energy, and attention they spent to receive value.

### Findings and Analysis

The survey conducted in the first phase of the research shows most of users did not wish to be treated as commodity when the strategy has been expressed explicitly in those terms. But, when they were offered opportunities to do something to receive a specific value, they considered it and expressed that they may do it. When they were asked, "Would you agree to sell your attention by watching a clip and answering related questions in exchange for an amount of money that exceeds your usual hourly working income?", 92% of respondents answered "yes" or "possibly yes".

The prototype tested in the second phase of the research provides insight for developing more sustainable business models. The analysis of users' actions shows that they are willing to trade their attention for the value and consider it as a trade-off (Box 1). If the value is not perceived as sufficient, users will not sell their attention. Users who did not find their match or an interesting profile did stop the test and did not continue thereafter. But, those who found an interesting profile were encouraged to behave in such a way as to obtain the value. In addition, they expended efforts to unlock "extras" to improve their profiles and to receive social approval, which increased their chance of acceptance by the respective user.

The findings of the experiment, derived from an analysis of the information extracted from the managerial panel, show that the business models designed by a focus on a trade-off of value and attention may be con-

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## Box 1. Main actions performed by test users on the prototype dating platform

**Action:** *Test users searched voluntarily for advertising clips, then they watched the clips and answered the embedded questions to receive points.*

In traditional advertising, users ignore clips easily or grudgingly tolerate them. On the prototype platform, they receive points by voluntarily watching clips. This model changes their impression of the clips and influences their behaviour. The benefit for a service provider is higher revenues from advertisers who value the users' higher level of engagement with their messages.

**Action:** *Test users performed deliberate actions and watched more advertising to unlock more features for improving their profiles and to increase their own "value" on the platform.*

In traditional dating platforms, users complete their profile and wait for contact by another user who finds them interesting. Here, users have the possibility to increase their "value" and to be seen by more potential partners. Again, selling attention leads to success in the market.

**Action:** *Test users acted as human engines of matchmaking by introducing users they know to possible partners; this approach works better than algorithms that find matches based on user questionnaires.*

In traditional subscription models, payment provides possibly unlimited contacts. The result is a lower rate of response, because many users cannot be sure that they are not part of bulk messages from premium accounts. Here, unlocking every profile costs points. This "cost" prevents bulk messages and requires users to sell their attention to receive points and then spend the points to unlock a limited number of profiles. Thus, users select profiles to contact based on their perceived "value".

sidered as more sustainable models for companies with advertising-based revenue models. Current models such as "freemium", "free for advertising", and "embedded advertising" can be promoted by a change in focus of value delivery. Users should be presented with a clear value proposition for doing something that will benefit the deliverer of that value. Watching an advertising clip fully and responding to the message is one way for service provider to generate income and to return the value. It is a business model based on mutual benefit and straightforward value provision.

## Conclusions

In business model generation, "value" and "customer" are considered as two central blocks. The base of any business model is to deliver value to the customer and to generate revenue. Also in many businesses, especially those in the media industry, a business model is multi-sided and has to serve two different groups of customers: advertisers and audiences. Large audiences encourage advertisers to spend more. Thus, in multi-sided business models, direct revenue is generated from advertisers, but it depends on audience size. In-

novation in business models can be based on finding new and more efficient ways of communication between customers and advertisers.

Using these results, the theory of audience commodification and Google's best practice can provide insight for developing a dynamic business model for the businesses that use multi-sided approaches. The prototype online dating platform tested in this study received strong positive feedback from test users in comparison with the typical free or subscription-based models in the marketplace today. Most users expressed willingness to use a product with such a business model and to "sell" their attention and action in exchange for value in the form of unlocking and contacting a selected profile.

One contribution of this research is to suggest self-commodification as a type of audience commodification. Although in the political economy of communication, industry and the media are blamed for the commodification of customers, here customers offer themselves as a commodity to receive value from businesses that sell higher-value advertising opportunities. The next step of

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the research would be based on details of value that customers agree to create for service providers, such as response to advertising clips and the possibility of purchasing or sharing the advertising to their network of friend.

The results show that the business model that is based on audience commodification may be an alternative for current advertising-based models in many social media services. Further, the results may lead companies to deliver value as a customer's partner instead of seller. From the perspective of innovation, this proposed business model is an incremental innovation in business model generation. It is not an addition or removal or change in the logic of business models, but it is a change in value system innovation by a clear trade-off of requested action and value delivery (Table 1).

Time is the critical resource in our era. The competition is focused on holding the attention of users. Some platforms such as Facebook and Instagram are closed ecosystems that are designed to keep user inbound (Derakhshan, 2015). A dynamic business model should be "time based" to exploit the power of the time that users spend for the service and to increase the time they spend inside the platform. The provision of perceived value creates an exchange between user and media, which increases the access of media to advertisers based on multi-sided business model. Also, advertisers seek maximum efficiency from their advertising

budgets. The number of page visits, the number of attendees at promotional events, and the volume of sales, are examples of the measures used to assess budget efficiency (Sissors & Baron, 2010). In this research, the dynamic business model maximizes engagement in an advertiser's messages by target customers, therefore it benefits advertisers. From the other side, this business model enables customers to sell their time in exchange for perceived value. Such business models improve interactions with media by advertisers and customers, and also advance the current business models towards more value-driven and user-centric mechanisms of revenue generation.

These conclusions are based on interpretation of findings from a questionnaire and a small sample of users testing a prototype online dating platform. The number and characteristics of respondents, the period of time, the questions in the questionnaire, and possible actions available in the platform, the pervasiveness of research, and also the level of completeness of the business model are limited and this limitation affects the generalization of findings. However, this research is an effort to test the possibility of creation a new business model based on a direct trade of value from business by attention and action from users. The approach will be tested further in subsequent phases of the research project, and hopefully it will also encourage others to study the value of audience commodification as a source of innovative business models.

**Table 1.** Types of value received by the beneficiaries

Beneficiary	Types of Value Received
Customers	<ul style="list-style-type: none"> <li>• Unlocking of premium value</li> <li>• Ability to pay with an abundant resource (attention) instead of a scarce resource (money)</li> <li>• Opportunity to sell something of value: attention and value</li> </ul>
Advertisers	<ul style="list-style-type: none"> <li>• Engaged customer attention</li> <li>• Audience interaction</li> </ul>
Service Providers	<ul style="list-style-type: none"> <li>• Opportunity to provide users with value (without paying them)</li> <li>• Creation of a high-demand offering to advertisers</li> <li>• Development of a customer engagement program</li> </ul>

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# Audience Commodification: A Source of Innovation in Business Models

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# A Proposed Approach for Idea Selection in Front End of Innovation Activities

Andrew N. Forde and Mark S. Fox

**“When you can measure what you are speaking about, and express it in numbers, you know something about it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts advanced to the stage of science.”**

William Thomson, 1st Baron Kelvin (1824–1907)  
Mathematical physicist and engineer

Current research indicates that the idea evaluation processes of many firms are ad hoc or intuitive, with very few firms having defined methods. We propose a new approach to select the best ideas to pursue amidst different probable versions of the future. In support of "front end of innovation" processes, the approach emphasizes the formation of requirements for any idea that can be prioritized and measured against possible future worlds. This approach is currently conceptual; future work will develop the approach into a methodology that can be tested using real-world problems. This article will be relevant to those who are exploring novel methods and approaches to selecting the best idea within their particular domains.

## Introduction

Idea generation appears to be a simple task, and in many ways, it is. Anyone can have a new idea that fundamentally changes a technology, a society, or the world at large. Equally, anyone can have an idea that offers no value. Without acting on these ideas, how can we know whether an idea will change the world or just be another failed attempt to reach an objective? The reality is that we cannot. Instead, this article begins to conceptualize a method to evaluate ideas across a set of varying alternative futures or possible worlds.

Idea generation is the first step in virtually all innovation processes. Companies are formed and new products are made because a seemingly great idea was identified. Publishers may consider hundreds of manuscripts, few of which, after further development, make it to print. Organizations developing new branding may create dozens of alternatives and select the top ideas to refine. Software or technology firms developing a new product may propose many ideas before selecting one for production. Generating ideas that lead to innovation processes plays a critical role in a firm's success.

Even as organizations put more resources into the innovation process, 80-90% of new product launches fail (Görs et al., 2012). Apple, a technology company, uses their own innovation framework (Apple's New Product Process) that consists of the following front-end activities: i) ideation, ii) product start-up, iii) prototyping, iv) and group evaluation (Busche, 2014). However, even with this innovation process, Apple arguably has not produced any disruptive technology since the iPod. The Apple Watch, the 12-inch MacBook, and the iPad Pro have been described as "products without purpose" (Wilcox, 2016).

There is no shortage of novel ideas at IBM, which has an annual R&D budget of \$6 billion and generated 6,180 U.S. patents in 2011 alone. To decide which ideas should be taken through their innovation process, they follow a series of steps that can be distilled to the following:

1. Generate ideas and use collaborative tools to solicit feedback from stakeholders.
2. Take the top ideas and establish compelling customer offerings.

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3. Evaluate the ideas deemed worth piloting.
4. Run a pilot project.
5. Start production.

They also use idea marketplaces such as online open innovation "jams". Additionally, they created an innovation lab that has funded 25 projects to the prototype stage from 400 ideas submitted (Quitzau, 2013). Yet, even with these processes, IBM has experienced ongoing decline in new product growth over the last 16 quarters (Fox, 2016).

Why do such established and resource-rich companies continue to struggle turning innovations into successes? To answer this question, we focus on the front end of innovation activities (FEoI), which can be separated into three operations (Kempe et al., 2012):

1. *Enrichment*: developing raw ideas
2. *Evaluation*: estimating the likelihood that the ideas can reach their goals
3. *Selection*: choosing an idea to execute

Research has already identified that FEoI activities are the most important stages of innovation processes and that successful outcomes are linked to the quality of the FEoI (Cooper, 1988; Elerud-Tryde et al., 2011). Generating new ideas, selecting the best ones, and taking them through the innovation process has considerable failure rates and high costs (Buyukozkan & Feyzioglu, 2004). The disparity between innovations that win and those that lose in the market are predominantly due to the quality differences in front end of innovation activities (Stevanovic et al., 2012). The existing literature is silent on the evaluation of the ideas, especially when there is a large set that must be assessed. If an evaluation methodology can be established to deal with the complexity of determining the likelihood of an idea reaching its objective then, selecting and executing the best idea will lead to an increase in successes.

Despite the work that has been done to improve back end of innovation processes and execution, innovation success rates have not increased in any measurable way. Companies and organizations continue to encounter the same dilemma: they require a reliable and repeatable idea-evaluation method for selecting ideas.

According to William Thomson's words in the opening quotation to this article, until an idea can be measured and expressed numerically, our knowledge on the subject will be limited. Innovation is still a hubristic process. Until the difficult work of figuring out how to measure and express this complex process numerically is done, deep understanding cannot occur and major improvements cannot be made. This is not to imply that a fully quantifiable solution exists. However, we aim to redress the commonly accepted notion that the front end of innovation is mysterious and cannot be managed. We seek a quantifiable mechanism to sharpen a very hazy idea-evaluation process.

## Background

The study of innovation is still in its infancy precisely because there has been a lack of research in quantifying idea evaluation (Elerud-Tryde & Soonvald, 2011). Measurement theory, the study of assigning numbers to objects and phenomena (Roberts, 1985), as it relates to innovation management, has focused on the back end's output performance (Adams et al., 2006). This is due to the fact that back-end processes (i.e., production and marketing) are easily identified and organized with budgets, personnel, and repeatable processes. Studies by Kettunen, Ilomäki, and Kalliokoski, (2007) and Kim and Wilemon (2002) indicate that the FEoI has generally been left unstructured and uncontrolled whereas the back end has been structured. Many practitioners rely on heuristics and tacit knowledge to evaluate ideas because the necessary components are difficult to quantify. Most people have a tendency to place disproportionate weight on specific pieces of information they use to govern their thought process (Bonabeau, 2003). The human brain is known for injecting familiar patterns into new situations even when they are inappropriate (Bonabeau, 2003). Once this occurs, a bias is formed and new information is adjusted to reflect what the person believes to be true (Loosemore, 2013). For example, when estimating the cost of a new design innovation, people assume that the cost will be the same as an older design that was similar. The reason why this approach does not work is because, when innovation processes are executed, there is no guarantee that the same agents (decision makers) involved will interpret the variables the same way every time. Eschewing this notion allows visionaries such as Elon Musk to redefine industries. Elon did not assume that the cost of building a rocket would be the same as rockets that came before him. Looking at the design of rockets from first

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principles allowed Musk to drastically decrease the cost to build and deliver cargo more effectively than established companies such as Boeing and Lockheed Martin (Anderson, 2013).

Over the last twenty years, the semantics of innovation has become progressively abstract as the word and its signifiers become increasingly intangible and unbounded (Moldaschl, 2010). We have not been able to improve FEoI techniques in any measurable way because there is little empirical evidence to guide academics or organizations towards activities that contribute positively to front-end performance (Markham, 2013). We lack a theory that can predict the outcome of an innovation cycle or determine which ideas are better suited towards specific future outcomes thereby reducing the risk of the innovative process. Current approaches in rating an idea are generally motivated by specific situations (e.g., how to cut wait times for buses during rush hour times) (Kudrowitz & Wallace, 2013). By introducing an approach that treats idea evaluation as a quantifiable process, we hope to contribute some ideas that may lead to a deepening of knowledge and providing practical and effective tools for practitioners to achieve greater success in selecting ideas for innovation.

## Approach

Idea evaluation and selection is a problem that takes place in the present. Implementing all ideas to determine the best one is impractical and it remains impossible to select ideas from the future; thus hindsight is not a viable decision-making tool. Instead, we can attempt to predict the future and assess how well a given idea will perform within it. Given the number of variables at play, it is better to come up with a limited set of possible worlds against which to assess the quality of ideas. We are creating an idea evaluation method that analyzes possible worlds to select the idea with the highest likelihood of successfully reaching its objectives.

To represent a possible world, its characteristics must first be defined. A characteristic is composed of a property value pair tied to a particular world. It asserts that a property has a specific value within that world. Given a set of worlds, each one will differ by at least one characteristic from every other world. We can represent a future world as a set of properties extracted from general categories. For example, the environment is a general category, climate is a property of the world, and temperature, precipitation, humidity, and UV indexes are sub-

properties of climate. These properties remain incomplete without a viable way to distinguish them among different worlds. Nearly every version of the future will have a climate, therefore, in order to characterize them, a value must be associated with these properties.

The next step is to determine the requirements of the idea. These requirements will be a set of world characteristics that maximizes the idea's chance of success. The idea's requirement will be divided into two parts: the characteristic's numerical value and the characteristic's importance to the idea.

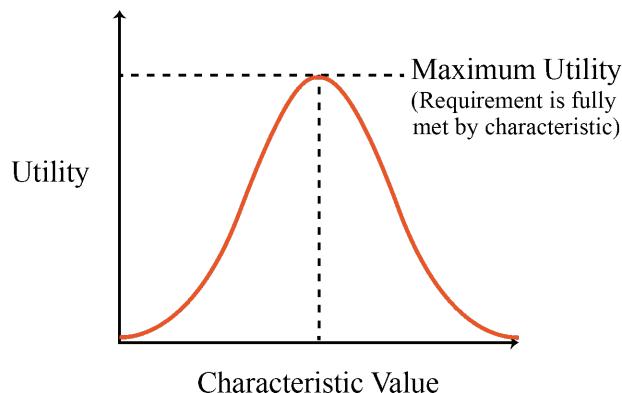
Finally, we need a method to measure the world's ability to satisfy the idea(s). To do this, we use an artificial construct from mathematics called a *utility*. A utility is a numerical value used to represent the amount of benefit that is achieved through the implementation of an idea. A world better suited for a particular idea will allow that idea to yield a higher utility than that of a world that does not meet the idea's requirements. Utility is used to allow the evaluator to measure the likelihood that the idea will reach its objective. All ideas have a corresponding world where their implementation is best suited, though; the probabilities of those worlds existing are independent to the idea.

As the value of the characteristics change from one world to the next their proximity to the requirements also change. For example, suppose that a certain idea has the highest likelihood of success if the prime business rate has a value of 2.5%; one of the idea's requirements will be that the prime business rate is 2.5%. This implies that the idea's utility is maximized in a world with a prime business rate of 2.5%. However, it is quite possible that other worlds with less than ideal values can return a positive utility, even if the returned utility is less than optimal. If no conditions are minimally met, the utility becomes 0. Consider a world where the interest rate is 3% instead of 2.5% as stipulated by the requirement. It is likely that the idea will still be useful. Figure 1 shows this representation and depicts the utility of the idea as the interest rate value changes.

The goal is to select the idea that has the highest utility across the most probable worlds. Just because an idea may be great, the conditions necessary for its successful outcome is based on how the future unfolds, and that is independent of the idea. For example, the iPod was successful because consumers were moving away from portable CD devices. Because the likelihood of consumers making the shift away from portable CD devices

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**Figure 1.** The utility value of an idea across characteristic values

was greater than the likelihood that consumers would continue using portable CD devices, the iPod was the best product for Apple to pursue. The unfolding of different futures has associated probabilities, and we want to select the idea that performs best (has the highest utility) in the most probable versions of the future.

In the next section, we illustrate the key aspects of this approach through an example scenario.

## Example Scenario: Innovation in the Oil and Gas Industry

In the present world of low oil prices, recovery of heavy crude oil and bitumen from the Canadian Oil Sands based on steam-assisted gravity drainage (SAGD; [tinyurl.com/zlacrean](http://tinyurl.com/zlacrean)) is no longer economically viable (Findlay, 2016). Even when oil prices were high, SAGD was only applied in the best quality oil sand reservoirs, leaving lesser quality reservoirs commercially unviable. Due to the further decline of oil prices, new high-tech ideas for in situ recovery are necessary to maintain profitable operation.

In this example scenario, let us suppose that an engineer introduces Idea A. The profitability of Idea A is dependent on the following requirements:

1. The prime business rates remain at 2.5%.
2. The price of oil remains above \$25 a barrel.
3. Oil sand production is not banned by the government due to environmental concerns (Binary choice 1/0).

Another engineer introduces Idea B. Idea B is dependent on the following requirements:

1. The cost of steel drops to US\$280/tonne.
2. The price of oil reaches at least \$46 a barrel.
3. Surface oil sands can still be found (probability range).

In order to select either Idea A or Idea B, four steps need to take place:

1. We compute the probability of each possible world occurring based on the likelihood of the characteristics being true. Given that we do not know what the future will be, we establish a set of possible worlds and determine their associated probabilities of being realized. To do this, we use the following equation to calculate the chance of each of the worlds characteristics occurring according to the variables defined in Table 1:

$$p(W_m) = p_1(C_{1m}) * p_2(C_{2m}) * \dots * p_n(C_{nm}) = \sum_{i=1}^n p_i C_{im}$$

For simplicity, we will assume that only one future version of the world is possible: either it will satisfy idea A or it will satisfy idea B. In reality, there will be a number of worlds to evaluate (Figure 2), though the exact number will differ from problem to problem.

To calculate the probability of each characteristic being realized we will have to make predictions from the available data or use predictions from a trusted source. In this example we use data from the World Bank. According to the *World Bank Group's Commodity Markets Outlook* (2016) the price of oil is esti-

**Table 1.** Variables and definitions used to formulate the possible future worlds

Variable	Definition
$U^A$	Utility of idea A across all possible worlds A
$U_{W_m}^A$	Utility of idea A in World $m$
$\Omega_n^A$	Requirement $n$ for idea A
$W_m$	Possible World $m$
$U_{W_m}^{\Omega_n^A}$	The Specific Utility set by the $n^{th}$ Requirement of idea A in World $m$
$C_{nm}$	World characteristic $n$ in world $m$
$w_n$	Requirement weight; $0 \leq w_n \leq 1$

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ated to be \$41/barrel in 2016 (World Bank, 2016). According to the Bank of Canada prime business rates will remain at 2.7% (Bank of Canada, 2016), and it is very unlikely that oil sand production will be banned in the near or distant future. The price of steel is expected to be US\$365/tonne (World Bank, 2016), and the oil sands that remain are considered difficult oil. This information shows that the most probable possible world has the following characteristics:

1. Oil is \$41/barrel
2. Prime business rates are 2.7%
3. Oil sand production continues but is difficult (non-surface)
4. Steel is US\$365/tonne
5. Oil sand production is not banned

Therefore, the world with these characteristics is most likely to occur. In practice, probabilities ( $p_1 \dots p_n$ ) would be assigned to each characteristic to determine the probability of the world occurring.

2. We compute the utility of an idea in a particular world as a function of the requirement and its associated world characteristic weighted to the probability of that particular world occurring:

$$U_{Wm}^A = p(W_m) \cdot \sum_{i=1}^{|n|} w_i f(C_{nm}, \Omega_n^A)$$

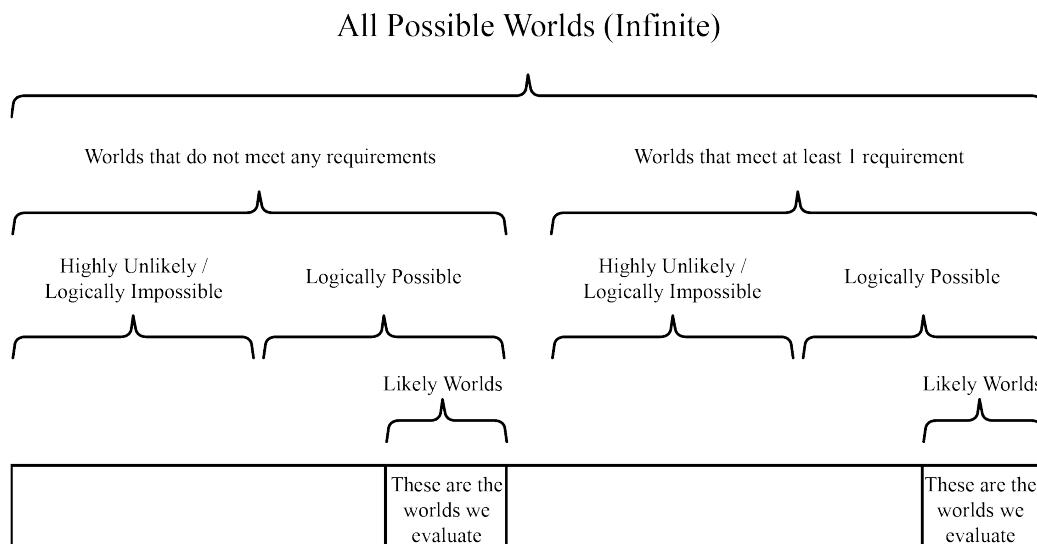
To determine the utility of the idea within a particular world, we will have to create a function that can compare the requirements to the characteristics of the world and return a numerical value based on how well the world satisfies the requirements. Each requirement is weighted by importance such that the utility reflects the ideas hierarchy of needs.

Based on the information from step 1, there is a higher likelihood that each requirement of idea A will be met in the most probable world. This yields a higher utility than idea B given that the world necessary for idea B to be successful has a lower probability of being true. The utility will be described by a numerical value. The higher the utility, the higher the value.

3. We find the expected value of the ideas utility by summing all of the utilities from each possible world:

$$E[U^A] = \sum_{m=1}^{|m|} U_{Wm}^A$$

After calculating the utility of each idea in each possible world, we will determine the ideas expected utility, which will give us the expected performance of the idea based on the possible worlds that may occur.



**Figure 2.** Visual representation describing worlds to evaluate

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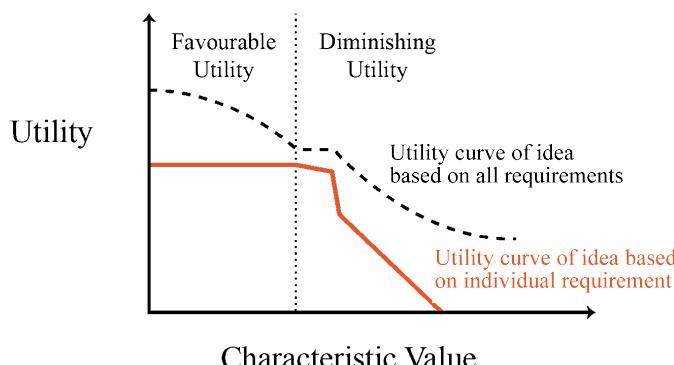
This is an important step because we do not know which world will realize. By calculating the expected utility, we will determine the best idea to select based on the range of possible futures most likely to occur.

- Finally, we select the idea. Because there was only one world in this example, the expected utility is the same as the calculated utility for that world. Idea A is most suitable for the possible world most likely to occur. Thus, idea A has the highest utility and should be selected ahead of idea B.

The oil sand example simplified the utility function by only considering five requirements. In reality, an idea has many requirements and the utility is determined by the totality of those requirements being satisfied. Most of the literature on idea evaluation that we found considers 4–8 criteria before making a decision (e.g., Girotra et al., 2010; Gutiérrez et al., 2009; Martinsuo & Poskela, 2011). A major part of our future research will be spent identifying a methodology to determine the criteria necessary to form the correct amount of requirements necessary to calculate an idea's utility.

Using our example, the price of oil per barrel should remain greater than \$25 in order for idea A to be successful, however, this is only the second of three requirements. If one requirement is not satisfied, the idea's utility will be reduced. If the world's characteristics are unable to meet any of the idea's requirements, such as is the case with idea B, the idea's utility within that particular world tends towards zero. Figure 3 illustrates how an idea's utility, when tied to numerous requirements, responds to different world characteristics.

Many of the variables that are used to model the likelihood of characteristics being true are stochastic in nature. Though not everything is quantifiable,



**Figure 3.** Example of the individual and collective effect of a single requirement on the utility of an idea

everything has probable outcomes. It is not necessary to model every aspect of the future to determine the necessary requirements for success.

Through our future research, we will create software that takes input from the decision maker and performs the necessary calculations to determine the utilities of the ideas. This is how our approach will be easily used by any decision maker to evaluate and select ideas within any domain.

## Conclusion

In the early part of this century, attention has focused on exploiting ideas to generate innovations (Dooley & O'Sullivan, 2001). Significantly less attention has been paid to identifying the best ideas (Rindasu & Mihajlovic, 2008). Our approach is best suited for ideas being applied to innovation processes that are tied to specific objectives, such as radical (breakthrough) innovation, transformational (disruptive) innovation, market creation, and competitor disruption. Each one of these innovation types requires a detailed understanding of both the idea and the sort of world it will be applied to. Ideas and subsequent worlds that are better defined allow for better data collection because the decision maker knows what it is they are looking for. This approach may find itself useful in the generation of ideas by improving the quality of the best ideas by having the decision maker consider what ideas are likely to work well in some future world.

Given the novelty of this approach within the context of front end of innovation activities and the innovation process in general, we do not yet have direct evidence that this approach is feasible. However, available research indicates that people typically consider too few factors in forecasting and therefore, unfortunately, often produce rather simplistic analyses of possible outcomes (Dörner & Schaub, 1994). By evaluating ideas through a possible-world framework, we aim to enhance FEOI activities enough to reduce the number of failed innovation projects.

We present this approach at an early stage of development to encourage practitioners and decision makers to consider how calculating an idea's utility as an expected value across future worlds can lead to a rigorous approach in front end of innovation activities to improve the success rate of innovation processes. We also seek to generate, discuss and debate the best way to refine and test this approach, and to build relationships with organizations that wish to use their experiences and

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data as early users of our method. We are currently working with the innovation department at The Hospital for Sick Children in Toronto, Canada, to conduct historical recreations and analyses to develop our methodology. Using historical empirical data on the end-to-end innovation activities undertaken by the hospital to differentiate successful ideas from failed ideas will allow the performance of our function to be tested by finding the deviation of real-world behaviour with the expected results predicted by it. Of course, we will not know what the real future looks like until it arrives, so front end of innovation activities cannot benefit from hindsight directly. However, hindsight from past innovation activities can play an important role in developing methodologies to help organizations select the most promising ideas and in improving our ability to predict the future worlds in which those ideas will come to fruition.

## About the Authors

**Andrew N. Forde** is a PhD student in Industrial and Information Engineering at the University of Toronto, Canada. His research focuses on using possible-world analysis and engineering ontologies to establish utility functions that can accurately predict the usefulness of an idea in the future. His work is being co-sponsored by Mathematics of Information Technology and Complex Systems (MITACS) and a Toronto-based technology firm, IMC.

**Mark S. Fox** is the Distinguished Professor of Urban Systems Engineering at the University of Toronto, Canada. He is a Professor of Industrial Engineering with a cross appointment in the Department of Computer Science, Director of the new Centre for Social Services Engineering, and Head of the Enterprise Integration Laboratory. Dr. Fox received his BSc in Computer Science from the University of Toronto in 1975, and in 1983 received his PhD in Computer Science from Carnegie Mellon University in Pittsburgh, United States. In 1979, he was a founding member of the Robotics Institute of Carnegie Mellon University as well as the founding Director of the Intelligent Systems Laboratory within the Institute. He is a past AAAI councillor and co-founder of the AAAI Special Interest Group in AI in Manufacturing. Dr. Fox has published over 200 papers.

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**Keywords:** idea selection, innovation, front end of innovation, FEoI, possible worlds, multi-criteria decision making, stochastic models, real options

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