

Editorial: Technology Commercialization and Entrepreneurship

Chris McPhee, Editor-in-Chief

Ferran Giones and Dev K. Dutta, Guest Editors

From the Editor-in-Chief

Welcome to the January 2019 issue of the *Technology Innovation Management Review*. This month's editorial theme is **Technology Commercialization and Entrepreneurship**, and it is my pleasure to introduce our guest editors: **Ferran Giones** from the University of Southern Denmark and **Dev K. Dutta** from the University of New Hampshire in the United States.

For future issues, we are accepting general 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. Please contact us (timreview.ca/contact) with potential article topics and submissions, and proposals for future special issues.

Finally, we invite you to attend **ISPIM Connects Ottawa** (ispim-connects-ottawa.com), which will be held in Ottawa, Canada, from April 7–10, 2019. ISPIM Connects Ottawa is a three-day event that will bring together world-renowned innovation managers, researchers, and business and thought leaders to share insights on specific local and global innovation challenges as well as general innovation management hot-topic. The TIM Review and its associated academic program at Carleton University, the TIM Program (timprogram.ca), are proud to be the local hosts of the event in collaboration with other partners.

Chris McPhee
Editor-in-Chief

From the Guest Editors

This special issue explores research questions at the intersection of *technology commercialization* and *entrepreneurship*. Specifically, our intent was to invite articles that examine the overlaps and complementarities between these two activities. In combination, technology commercialization with entrepreneurship brings to fruition the process of introducing into a market a new tool or a new application for an existing tool (Markman et al., 2008) and the venture-creation process to exploit an entrepreneurial opportunity (Davidsson, 2015).

Not all startups are led by technology entrepreneurs (Bailetti, 2012; Giones & Brem, 2017a; Wallin et al., 2016). However, in disruptive environments, we increasingly notice the adoption of digital technologies to implement startup business models (von Briel et al., 2018; Westerland et al., 2014) or organizational structures (Nambisan, 2016). So, in the end, technology commercialization and entrepreneurship often become intertwined in a complex process of co-evolution, resulting in the emergence of new technologies as well as entrepreneurial activity (Giones & Brem, 2017b).

Take, for instance, the developments around some recent digital technologies such as social media and blockchain. Some entrepreneurs have engaged in developing applications and then bringing them to the market with a focus on overcoming the technology commercialization challenges; others have utilized these new technologies as external enablers for their new venture ideas (Davidsson et al., 2018). A similar pattern can be observed relating to clean-tech (Bjornali et al., 2017), nanotech (Woolley, 2014), or the drone industry (Giones & Brem, 2017b). Interestingly, micro-level dynamics between promising technologies and entrepreneurs can contribute to the successful creation of ecosystems (Spigel & Harrison, 2017), with significant regional impact, leading even to the emergence of new industries (Alvarez et al., 2015; Forbes & Kirsch, 2011).

In order to provide an informed perspective and useful insights to researchers and practitioners, we have organized the contributions in this special issue within a

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framework integrating technology commercialization and entrepreneurship. Our objective is to make this framework a reference for future researchers and practitioners intending to examine these issues further.

Bringing together technology commercialization and entrepreneurship

The intersection of technology commercialization and entrepreneurship captures a scenario where entrepreneurs, potentially, have an advantage over established players when bringing novel technologies to market. Novelty is an advantage, even if it also makes survival harder (Hyytinen et al., 2015).

From the viewpoint of *technology commercialization*, these are often situations where there either is an emergent technology without a clear application or market, or there is a technology that is new to a specific market or industry. Emerging technologies include new promising insights from science and engineering that are being developed as tools that could potentially change the current state of the art (Rotolo et al., 2015). At the other extreme, existent technologies repurposed for new applications in new markets are defined as technology exaptations (Andriani et al., 2017; Andriani & Cattani, 2016). They are often the more prevalent form of technology commercialization among digital entrepreneurs who recombine existent technologies for a new use. Therefore, we propose to divide the technology commercialization axis between “emerging technology innovations” and “exapted technologies and digital innovations” as being, a priori, sources of substantial differences in the technology commercialization process (see Table 1).

From the intersecting viewpoint of *entrepreneurship*, we know that founder characteristics and the new venture’s team composition have an influence on the identification of an idea and its exploitation as an opportunity (Klotz, et al., 2013; Unger et al., 2011). We also know the ways in which the business model (Foss & Saebi, 2017), the firm’s strategy (Gans et al., 2018), the strategic orientation and learning (Dutta & Crossan, 2005; Dutta & Hora, 2017), and the ecosystem where they are embedded (Drori & Wright, 2018; Kohler, 2016; Mian et al., 2016), can make a difference. Finally, we also know that there are overarching institutional, network, and societal elements that can have an impact on technology entrepreneurship activities, for instance, the regulation approaches (Gurses & Ozcan, 2015) or regional innovation policy choices (Clayton et al., 2018; Sorenson, 2018). Thus, we divide the entrepreneurship

axis (see Table 1) using three broad levels that include micro-, meso-, and macro-level components of the phenomenon.

The juxtaposition of these two viewpoints generates the opportunity to identify specific research areas that can contribute to advances in both domains by identifying practice-oriented problems (i.e., What should I consider in my specific situation?) and academic research problems (i.e., How could I introduce technology commercialization challenges in my entrepreneurship research?). We have added, only for illustrative purposes, possible research questions or scenarios that can inspire future work on the topic (see Table 1).

This special issue of the TIM Review takes the first steps towards addressing these research gaps. The articles in this issue introduce perspectives from managers leading their organizations, new firms (startups), and maturing firms (SMEs). The articles show how digitalization has permeated the different decision-making spheres across a diversity of contexts. The interplay of technology commercialization and entrepreneurship processes goes beyond the growth pains of high-tech firms. At the same time, the diversity of contexts and cases included in the special issue capture the complexity of the phenomenon and the relevance this has for technology entrepreneurs and innovation managers.

First, **Andrew G. Earle**, **Michael J. Merenda**, and **J. Matthew Davis** from the University of New Hampshire in the United States explore the case of a technology venture in the “green energy” industry to identify tools that entrepreneurs can use to overcome new venture development transitions. The authors address the question of “how do entrepreneurs navigate key transition points in the phases of the technology commercialization process?” They focus on the case of an emerging technology from the entrepreneur’s perspective (micro-level). Their findings highlight the non-linearity of emerging technology commercialization, emphasizing the value of taking “strategic pauses” that allow the firm to pivot or explore new partnerships. The authors also introduce suggestions on how tech firms can prepare to more effectively navigate these transitions.

In the second article, **Christopher Svensson**, **Jakob Udesen**, and **Jane Webb** from Chalmers University of Technology, Sweden, study how fintech startups and incumbents build legitimacy in the financial ecosystem. The authors explore the perspective from the viewpoints of both new entrants (15 fintech startups) as well

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Table 1. A practice-oriented research framework for technology commercialization and entrepreneurship

Entrepreneurship Technology Commercialization	Micro-Level (Entrepreneur and team)	Meso-Level (Firm and ecosystems)	Macro-Level (Region and policy)
<i>Technologies with an uncertain market:</i> Emerging Technology Innovations	<ul style="list-style-type: none"> • When and how do scientists and inventors develop emerging technological innovations? • How do individual biases, learning, or preferences impact the exploitation of emerging technologies? • When do teams outperform individuals in the search for the “next big thing”? • To what extent could the hype surrounding radical new technologies reduce or stymie low-tech or generic entrepreneurial activity? 	<ul style="list-style-type: none"> • How can the tensions and challenges of the new venture development in disruptive environments be modelled? • What are the antecedents and consequences of market strategy choices with regard to emerging technologies? • How do entrepreneurial ecosystems contribute to the development of emerging technology-based entrepreneurship? 	<ul style="list-style-type: none"> • How can policy makers balance their current economic initiatives and also facilitate the adoption of unproven and risky emerging technologies? • When does public funding contribute to the future growth of new technology-based entrepreneurship? What makes a promising technology from the policy or regional perspective? • Are there rules, or innovation policy instruments, that favour the creation of new entrepreneurial ecosystems?
<i>Technologies for new market application:</i> Exapted Technologies and Digital Innovations	<ul style="list-style-type: none"> • How do individual digital competences (of the founder or CEO) enhance the firm capabilities to generate digital innovations? • How does the digitization of organizational processes and systems change the individual and team entrepreneurial activities? • To what extent does exapted innovation attract different types of individuals (i.e., though reduced failure costs or social stigma)? 	<ul style="list-style-type: none"> • How do firms capture attention and build legitimacy in contexts characterized by “information overload”? • How can growth models capture the differences across new venture’s business models, innovation platforms, or ecosystems? • How do partnerships with established players accelerate growth? Are there any detrimental effects? 	<ul style="list-style-type: none"> • How do product-technology life-cycles reconcile with technology knowledge spillovers to new markets/industries? • How can policy makers (possibly) contribute to the generation of new industries while maintaining their regions’ knowledge-based advantages?

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as the incumbents (established financial firms) in terms of their response to regaining their organizational legitimacy. The focus is on one of the fascinating digital innovations using a firm perspective (meso-level). Their findings expand the implications of legitimacy theory in contexts where regulatory frameworks mediate the social and economic impact of digital innovations. The authors provide specific insights as to how new digital entrepreneurs can build legitimacy in highly regulated and competitive contexts.

Next, **Manon Enjolras**, **Mauricio Camargo**, and **Christophe Schmitt** from the Université de Lorraine, France, investigate the effects of technology intensity on the growth and internationalization of SMEs. The authors explore the consequences of technology commercialization from a firm perspective by answering the question: Does an SME's high technology intensity result in high innovativeness and export performance? The authors build on the observation of nine different SMEs with different levels of technology intensity and innovation types to extract potential profiles that connect technology commercialization outcomes and innovation. The findings suggest that a long-term implication for firms with high technology intensity is that they sustain a focus on product innovations, looking for "the next big thing" using emerging technologies. In contrast, firms with low technology intensity are more prone to specializing in process innovations, looking at options to recombine existing technologies to find solutions that address existing problems. The authors discuss the implications of such configurations for the long-term growth and internationalization of the firms.

Then, **Saheed A. Gbadegeshin** from the University of Turku, Finland, investigate how digitalization has changed the technology commercialization processes in the life sciences industry. The author explores this question from the angle of new drugs, medical devices, and e-health companies. The article takes a firm, ecosystem and regional perspective into account (meso-level and macro-level) to explore how digitalization changes the technology commercialization of digital innovations and emerging technologies in a specific in-

dustry (life sciences). The participation of a diversity of firms and stakeholders allows Gbadegeshin to extract common and specific insights. Common to the different types of technology commercialization processes is that lower costs and higher flexibility lead to more iterative processes and adoption of agile business model approaches across the industry. The article also presents specific examples of the downside of digitalization, for instance, related to cybersecurity or hacking threats.

The final article, by **Maksim Belitski** and **Bain Liversage** from the University of Reading in the United Kingdom, describes how digital technologies and e-leadership skills influence the development of SMEs. The authors use the context of an emerging economy to study how transformation and e-leadership in SMEs can help to create and capture value using digital technologies. The article takes the perspective of the SME manager (micro-level) to identify what e-leadership capacities contribute to the exploitation of digital innovations. The authors use a mixed-methods approach (interviews and a survey) to gather insights on what it means to introduce transformational e-leadership and how this can have an impact on the development and growth of the SME. They discuss how the study findings extend the impact of digitalization beyond technology commercialization and entrepreneurship, noting that, as firms mature, it becomes necessary to realign the new technologies' potential with business strategy.

Taken together, the contributions to this special issue of the TIM Review provide a first step to address the research opportunities at the intersection of technology commercialization and entrepreneurship. They provide a sample of perspectives with different units of analysis and a rich combination of research methods. The international background of the authors as well as their respective studies indicate the interest in the topic as well as its relevance at a global scale, highlighting practice-oriented responses to what is a complex but promising and growing area of research.

Ferran Giones and Dev K. Dutta
Guest Editors

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About the Editors

Chris McPhee is Editor-in-Chief of the *Technology Innovation Management Review*. Chris holds an MASc degree in Technology Innovation Management from Carleton University in Ottawa, Canada, and BScH and MSc degrees in Biology from Queen's University in Kingston, Canada. He has 20 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.

Ferran Giones is an Assistant Professor at the University of Southern Denmark in Sønderborg. He received his PhD from La Salle – Ramon Llull University in Barcelona, Spain. His research field is technology entrepreneurship, where he explores how and when technological progress transforms into entrepreneurial activity, and how this entrepreneurial activity results in sustainable organizations and innovative ecosystems.

Dev K. Dutta is an Associate Professor of Strategic Management and Entrepreneurship in the Management Department at the University of New Hampshire in the United States. His research and teaching focus on the intersection of entrepreneurship and innovation, especially the way these concepts apply at the firm and ecosystem levels. Dev has over 25 research publications in his field in peer-reviewed journals as well as books, book chapters, and research monographs. He also holds national certifications as an academic coach and facilitator in technology entrepreneurship, innovator mindset, lean launch pad, and design thinking (MIT and Stanford D-School). Before joining academia, Dev worked for 15 years as a corporate strategy consultant for several large Indian IT multinationals.

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Citation: McPhee, C., Giones, F., & Dutta, D. K. 2019. Editorial: Technology Commercialization and Entrepreneurship. *Technology Innovation Management Review*, 9(1): 3–8.
<http://doi.org/10.22215/timreview/1207>



Keywords: technology, entrepreneurship, commercialization, startups, ventures, SMEs, innovation, management, framework, legitimacy, technology intensity, internationalization, digitalization, e-leadership

Academic Affiliations and Funding Acknowledgements



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- *The TIM Review is published in association with and receives partial funding from the TIM program.*