Insights

Welcome to the November issue of the Technology Innovation Management Review. We invite your comments on the articles in this issue as well as suggestions for future article topics and issue themes.

Image credit: Ricardo Gomez - Red Tiles Illustration - Unsplash (CC BY)

Carleton UNIVERSITY

www.timreview.ca

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 to suggest themes and nominate authors and guest editors.

Contribute
Contribute to the TIM Review in the following ways:
• Read and comment on articles.
• Review the upcoming themes and tell us what topics you would like to see covered.
• Write an article for a future issue; see the author guidelines and editorial process for details.
• Recommend colleagues as authors or guest editors.
• Give feedback on the website or any other aspect of this publication.
• Sponsor or advertise in the TIM Review.
• Tell a friend or colleague about the TIM Review.

Please contact the Editor if you have any questions or comments: timreview.ca/contact

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), an international graduate program at Carleton University in Ottawa, Canada.

Editorial: Insights

Stoyan Tanev, Editor-in-Chief, Gregory Sandstrom, Managing Editor

Welcome to the November issue of the *Technology Innovation Management Review*. This issue consists of a mixture of "Insights" into artificial intelligence, innovation management, AI innovation and maturity, living labs, stakeholder participation, situated practice, health technology, multidisciplinarity, digitally enhanced teamwork, sustainability, trade secrets, confidential information, criminal law, economic espionage, small and medium-sized enterprises, entrepreneurship, transnationals, immigrants, migration, and diaspora entrepreneurs.

The issue starts like "The Beginning of a Beautiful Friendship" with a collaborative effort by **Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht & Daniel Gillblad** on "Integrated AI and Innovation Management". The paper draws attention to the incoming and near future transformative and innovative power of Artificial Intelligence (AI) technologies, specifically as they relate to managing innovation. It explores transition in how to integrate AI into current workplace systems, and how to guide specifically the AI transition process in a way that aims to enable optimisation and incremental innovation, then potentially forward-looking radical business innovation. The authors present an AI innovation maturity index and model according to the ISO 56002 international standard of innovation management systems. They intend the index "to be used as a compass, map, and tool", in a way that "enables joint sense-making around best practices needed to holistically integrate AI into organisations, thereby enabling and accelerating innovation" (pg. 15).

Next up, **Samuel Schrevel, Meralda Slager & Erwin de Vlugt** describe a first-person direct participation and team interpretation effort, in their "'I Stood By and Watched': An Autoethnography of Stakeholder Participation in a Living Lab". Their encounter with situated practice in a psychogeriatric care experiment with health-related technology covers a range of broad and specific issues. One question they raise regards "how to facilitate the meaningful participation of stakeholders in science and technology?" (pg. 19). The author's experience in a "living lab" environment together with employees and university students who were recruited as part of a project to deal with dementia patients in a nursing home, provides insights on the "dos and don'ts" of stakeholder participation and engagement. The project's teaching lessons reflect both the time pressure and expectation for results, as well as

how shifting the responsibility of participants mid-project can impact outcomes. The paper documents an exercise in how to facilitate meaningful innovation in a way that ensures motivated stakeholder participants. The authors note that while the technological solution reached was unsatisfactory, that nevertheless they "created a culture where stakeholder participation became a topic of interest and importance" (pg. 27).

Following that, **Essi Ryymin, Laura Lamberg & Annukka Pakarinen** show "How to Digitally Enhance Collaboration: Multidisciplinary Research Team Ideation for Technology Innovation". While ultimately recommending that they be "paired with face to face discussion and non-digital interaction", the authors promote collaboration and digitally enhanced teamwork through "digital platforms [that] may offer impactful, process accelerating support during the kick-off phase of multidisciplinary technological innovations" (pg. 31). As background for the paper, the authors conducted eleven one-on-one semi-structured interviews with researchers involved in a smart and sustainable bioeconomy development project in Finland, as well as holding a collaborative ideation workshop with researchers working in the field of smart vertical farming and sustainability. Their conclusions include a view of "relational agency" in multidisciplinary collaborative practices, as a way of "working individually while also synchronously on idea prioritisation" (pg. 37), and that also "encourages not only the development of new technology, but broader socio-technical transitions and better management of the contextualisation and implementation of technological innovation" (ibid).

Matt Malone addresses security risks and challenges that especially high-tech companies face, in the subsequent paper reporting on "Criminal Enforcement of Trade Secret Theft: Strategic Considerations for Canadian SMEs". The paper provides targeted consideration of regulations to protect the trade secrets and confidential information of small and medium-sized enterprises in Canada from economic espionage. With a background in criminal law, enforcement, the author highlights "passage of a recent criminal law by the Canadian federal government, section 391 of the Criminal Code, [which] creates a powerful new tool for innovative SMEs to report, investigate, and prosecute theft of trade secrets" (pg. 40). The paper elaborates on the protections and uses of this law, and "explores strategies for SMEs in Canada to use section 391 to protect their trade secrets, navigate the legal environment during

Editorial: Insights

Stoyan Tanev & Gregory Sandstrom

theft of a trade secret, and remediate such theft" (pg. 40). The author notes that "Section 391 is a powerful instrument for SMEs in Canada to protect their IP" (pg. 45).

The issue closes with **Supriya Singh, Punit Saurabh & Nityesh Bhatt** "Demystifiying the Meaning of Transnational Entrepreneurship". Their specific focus is on "Indian transnational entrepreneurs in comparative perspective", wherein entrepreneurship functions as a phenomenon associated with migrating and immigrating entrepreneurs. The paper ultimately points to the Indian entrepreneurial diaspora as an example use case. The authors aim to refine prior definitions of "transnational entrepreneurship" through a study of secondary literature the considers different mobility types. They distinguish between a "home country" and a "host country" and define their terms according to how entrepreneurs act as "go-betweens", thereby enhancing economic development in more than one jurisdiction at the same time. Their contribution of a basic "framework" that may help in the classification process of distinguishing between "transnational entrepreneurs" and "international entrepreneurs".

The TIM Review currently has Calls for Papers on the website for Upcoming Themes with special editions on *"Digital Innovations in the Bioeconomy"* (February 2021) and *"Aligning Multiple Stakeholder Value Propositions"* (April 2021). For future issues, we invite general submissions of articles on technology entrepreneurship, innovation management, and other topics relevant to launching and scaling technology companies, and for solving business practical problems in emerging domains such as artificial intelligence and blockchain applications in business. Please contact us with potential article ideas and submissions, or proposals for future special issues.

Stoyan Tanev
Editor-in-Chief
Gregory Sandstrom
Managing Editor

Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship

Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht and Daniel Gillblad

> " *Technological change defines the horizon of our material world as it shapes the limiting conditions of what is possible and what is barely imaginable. It erodes assumptions about the nature of our reality, the "pattern" in which we dwell, and lays open new choices.* "
>
> Shoshana Zuboff

There is a growing consensus around the transformative and innovative power of Artificial Intelligence (AI) technology. AI will transform which products are launched and how new business models will be developed to support them. Despite this, little research exists today that systematically explores how AI will change and support various aspects of innovation management. To address this question, this article proposes a holistic, multi-dimensional AI maturity model that describes the essential conditions and capabilities necessary to integrate AI into current systems, and guides organisations on their journey to AI maturity. It explores how various elements of the innovation management system can be enabled by AI at different maturity stages. Two key experimentation stages are identified, 1) an initial stage that focuses on optimisation and incremental innovation, and 2) a higher maturity stage where AI becomes an enabler of radical innovation. We conclude that AI technologies can be applied to democratise and distribute innovation across organisations.

Introduction

The adoption of Artificial Intelligence (AI) in business is accelerating. According to McKinsey, 58% of organisations embedded at least one AI capability into a process or product (Cam, 2019). By integrating AI into business holistically across an organisation, it gains the potential to create competitive advantages and strengthen organisational innovation capabilities (Cockburn et al., 2018; Fountaine et al., 2019; Prem, 2019; Raisch & Krakowski, 2020).

However, very few organisations (including businesses, public sector and NGOs) today have seen widespread adoption of AI (Fountaine et al., 2019), and limited research is currently available on how using AI can support specific challenges related to innovation management (Prem, 2019). Existing models of AI in organisations have not integrated the technical, organisational, and ethical aspects of business, nor have they addressed how AI integration is intertwined with innovation management. According to the authors of this article, the strategic integration of AI and innovation management in organisations go

hand-in-hand, mutually complementing and enabling each other. The following questions are thus explored in the article: What does the journey towards trustworthy integrated AI in organisations look like? And second, how could integrating trustworthy AI act as an enabler for innovation management systems?

Traditionally, for complex issues such as sustainability or general-purpose technologies like AI, frameworks are used to create structure and to decompose aspects into specific categories and maturity stages. These frameworks serve an essential role in educating management, creating clarity, improving the ability to act, and accelerating adoption. A number of AI maturity frameworks have been published (see Figure 1) that typically cover specific aspects of AI integration in business, but do not holistically integrate the technical, organisational, and ethical aspects in a comprehensive way. In this paper, we propose an AI Innovation Maturity Index (AIMI) as an attempt to rectify this.

We consider different elements of innovation management systems according to the international standard ISO 56002, and examples of how AI

Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship
Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht and Daniel Gillblad

technologies could be used to support and augment them. These were explored regarding how to increase organisational innovation capability. The paper focuses specifically on the application of AI at various levels of AI maturity and its implications for democratising and distributing innovation, increasing diversity, interdisciplinary and cross-functional collaboration, building a learning organisation, strengthening capacity for foresight activities, and embracing uncertainty in organisations.

Theoretical Background

AI and organisations: current practice and challenges
Many large multinational consulting firms tout significant potential for AI technologies. At the same time, AI is still in an early commercialisation phase, with only 8% of firms today seeing widespread AI adoption across the organisation (Fountaine et al., 2019). Limited empirical work has been published on challenges related specifically to AI and innovation management (Prem, 2019). A key pattern in adopting AI symbolises a separation between incremental use cases that optimise the existing business processes, and products along with transformational use cases that shift an organisation, its products and sometimes the market. Influenced by the "innovation and ambition matrix" (Nagji and Tuff, 2012), and inspired by the notions defined by Laszlo and Zhexembayeva (2011) in their work on "embedded sustainability", we refer to the two ends of the AI spectrum as bolt-on and integrated AI.

Bolt-on AI is implemented in existing business processes and products through projects in non-critical areas, which are relatively independent of other parts. It focuses predominantly on optimising existing processes, risk management, and short-term return on investment, to enable incremental innovation of the existing business. In contrast, *integrated AI* considers a company's core domain area and becomes deeply integrated with the overall organisational purpose and strategy. It is long-term oriented and strategic, focusing on a company's wider ecosystem, with an aim to create value across a broader market. The latter type of AI sets the groundwork for transformational or radical innovation.

Larger business organisations struggle with broader AI integration partly due to cultural and organisational barriers (Fountaine et al., 2019). Many large, rigid, hierarchical systems have low levels of flexibility and adaptability where employees with innovation competence and mindset become limited to specific parts of an organisation, rather than spread effectively across the system. Managers rarely understand that while they need cutting-edge technology, the ways they align it with their organisation's culture, structure, and ways of working is equally important (Fountaine et al., 2019). Unsurprisingly, some studies show that start-ups have a vital role to play in both the application and deployment of AI innovations in companies as they are considered to be the leaders and main competence carriers in AI technology (Prem, 2019).

Fountaine et al. (2019) suggest that large organisations need to go through various shifts to enable the scaling up of AI, such as moving: 1) from silos towards more interdisciplinary collaboration, 2) from experience-based, leader-driven decision making to data-driven decision making at the front line, and 3) from rigid and risk-averse to an agile, experimental and adaptable mindset and ways of working (Fountaine et al., 2019).

Existing AI maturity frameworks
The 'maturity model' concept was introduced in 1986 by Carnegie Mellon with its "capability maturity model" (Paulk, 2009). Since then, a widespread adoption of maturity models has taken place for process optimisation, innovation management, and digital transformation. Such maturity models are most prevalent in domains that are inherently complex, requiring a systematic, and structured approach. More recently, digital maturity models (DMMs) have proliferated, driven in part by "Industry 4.0" (Teichert, 2019). Just as Teichert found with the early DMMs, in this research we have seen that existing AI-specific models are developed primarily by practitioners rather than in academia.

While a complete review of AI frameworks is outside the scope of this article, in Figure 1 thirteen representative examples are shown. Some of the top patterns found in existing frameworks include:

Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship
Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht and Daniel Gillblad

1. Frameworks tend to focus near-exclusively either on technical aspects of AI integration or on strategic and organisational considerations. This means there is a lack of models that holistically integrate technical, organisational, and innovation management perspectives.

2. Some frameworks re-formulate existing digital transformation models, but without addressing specific needs related to the development or implementation of AI.

3. Other frameworks focus exclusively on the ethical, legal, and social or technological robustness aspects or, alternatively, these aspects appear as one of separate dimensions, rather than integrated by design.

4. Several models have bolt-on rather than integrated AI as the end goal, sometimes framed as "enterprise cognitive computing", defined as improving business operations by automating repetitive tasks (Tarafdar et al., 2019). These frameworks concentrate on the more technical and operational dimensions, while frameworks looking at more integrated AI use cases focus more on strategy and organisation.

Innovation Management and AI

Current research
Current research lacks a systematic overview of how AI can support different elements of the innovation management system. While discussions occur on how to integrate AI into an organisation's products, features, and services, which can be both incremental or radically new, AI is also used to enable innovation during the process of developing new products and services (Cockburn et al., 2018). AI methods have been successfully applied for complexity and knowledge management in order to increase flexibility, and in more traditional applications, including process optimisation and automation, for increased efficiency and quality in product and service development (Raisch & Krakowski, 2020). AI can strengthen innovation capability by increasing an organisation's ability to sense changes in the environment and predict what might happen next (Cockburn et al., 2018). An example would be predicting drug candidate selection by bringing together a vast array of previously disparate clinical and biophysical

Model	Focus Areas
AI Hierarchy of Needs - Monica Rogati (Rogati, 2017)	Data, tech
AI Maturity Model (Alsheibani et al., 2019)	Technologies & tools, data structure, people, organisation
The AI Maturity Playbook: Five Pillars of Enterprise Success (Etlinger, 2018)	Strategy, data science, product & service development, organisation & culture, ethics & governance
Catalyst Fund - AI Readiness Toolkit (Catalyst Fund, 2018)	Data, technologies,operations & general management, skills, ROI
Element AI (Element AI, 2019)	Strategy, technology & data, people & organisation, governance
Ethics Guidelines for Trustworthy AI (European Commission, 2019)	Ethics
Kaleido Insights - AI Readiness (Groupman, 2018)	Strategy, people, data, infrastructure, ethics
Microsoft - Landing AI Maturity Model (Microsoft, 2019)	Strategy, culture, organisation,capabilities
MMC Ventures - The AI Playbook (MMC Ventures, 2019)	Strategy, people, data, development, production, regulation & ethics
Oracle Data Science Maturity Model (Oracle, 2018)	Strategy, roles, collaboration, methodology, data awareness, data access, scalability, asset management, tools, deployment
Ovum (now Omdia) - How to Achieve AI Maturity and Why It Matters (Pringle et al., 2018)	Strategy, organisation, data, technology, operations
PwC Ethical AI Toolkit (PwC, 2019)	Ethics
The University of Chicago - Data Maturity Framework (UC, 2018)	Data, tech, organisation

Figure 1. Overview of AI maturity models and frameworks

Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship
Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht and Daniel Gillblad

data, thereby fundamentally reshaping the function of idea generation in the innovation process of drug discovery (Ibid.).

Prem (2019) interviewed experts in Austria on the current use of AI in companies and suggests that while the range of applications is quite wide, the emphasis is currently on incremental improvements, with some examples of more radical innovation that would not be possible without AI, such as automation of sign language translation. Despite the potential for AI to radically innovate business models, current businesses are still focusing often on quality improvements rather than transforming business models.

Other challenges and barriers exist when it comes to integrating AI in organisations to strengthen their innovation capability. A lack of talent haunts IT fields in general, but even more so when it comes to AI experts (Loucks, 2018; Prem, 2019). Low AI competence and knowledge persists among managers, creating unrealistic expectations and disappointment around what is possible with AI, its costs, and how long it takes to develop innovative solutions (Prem, 2019). Credibility and trust in AI have also been widely questioned by management due to unexplainable learning systems, and lack of clarity around managers' responsibility for the smart and autonomous systems' behavior and possible legal implications that may arise from it (Ibid.)

Innovation Management System Framework
We use the "innovation management system" framework developed by the international standard ISO 56002 in this article to discuss how a more holistic integration of trustworthy AI could support different aspects of innovation management (see Figure 2).

Seven key components make up the ISO 56002 framework. The *"Innovation Context of the Organisation"* includes: a) scanning and analysing external environment, b) scanning and analysing internal environment, c) monitoring and understanding the needs of different stakeholders, d) promoting innovation culture, and e) developing collaboration internally and externally by building an innovation ecosystem.

The *"Innovation Leadership"* aspect involves: a) the development of innovation vision, strategy, and policy, b) defining innovation roles and responsibilities, and c)
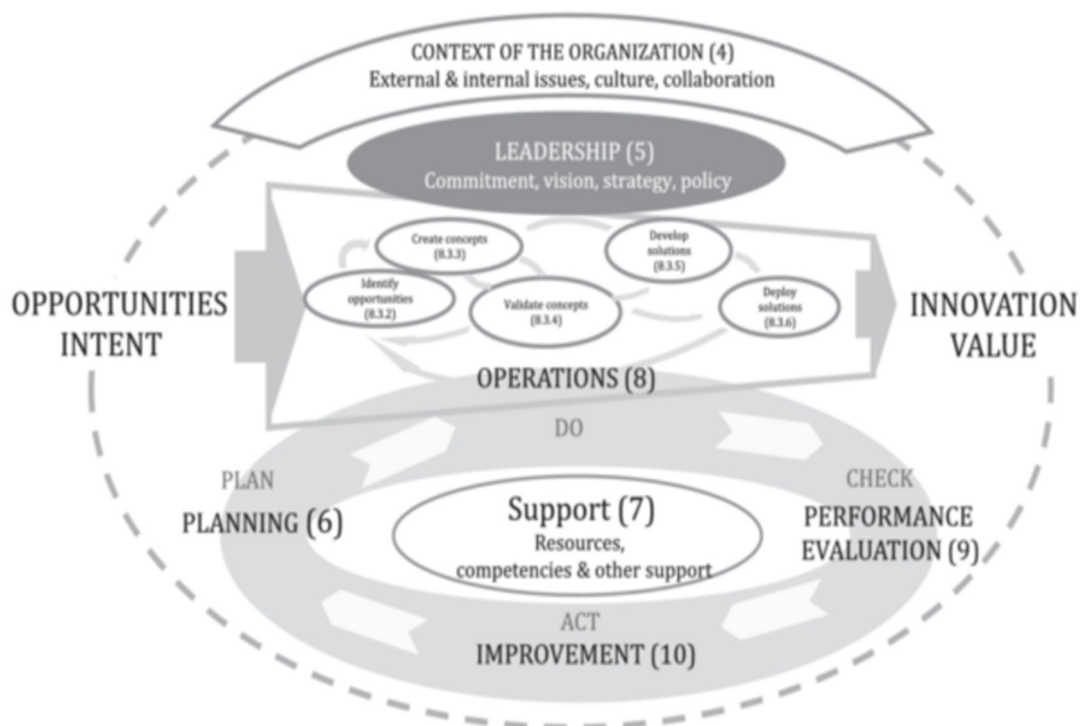

Figure 2. Innovation Management System, ISO 56002

Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship
Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht and Daniel Gillblad

the organisation supporting innovation. A company's innovation leadership thus needs to perform the *"Planning"* of innovation objectives, innovation portfolio and organisational structures that support innovation. *"Innovation Operations"* focuses on innovation initiatives and processes.

"Innovation Support" successfully guides the implementation of innovation management systems, including people, knowledge management, time, financial resources, physical and virtual innovation infrastructure, tools, methods, and competences. The last two parts of the innovation management system refer to *"Performance Evaluation"* and continuous *"Improvement".* Later in the Discussion section of this article, we suggest how AI could act as an enabler of various elements within the innovation management system presented here, with the support of the newly constructed AIMI.

Methodology

The development of our AIMI was influenced by the maturity model development framework proposed by de Bruin and Roseman (2005). Our approach consisted of three sequential and iterative research phases.

Step 1: Define Scope - Analysis of existing models and literature
To define the scope of our framework, we analysed existing models related to AI adoption and innovation. This was augmented with a literature review, including research papers and articles discussing AI integration. The background research included consideration of digital transformation maturity literature (Teichert, 2019), as well as design and development principles for maturity models (de Bruin and Roseman, 2005; Mettler 2009). While sparse academic research exists relating directly to AI maturity and its adoption path, we included Alsheibani and Messom's (2019) 'research-in-progress' maturity model in the review of existing frameworks. For the central notion of "trustworthy integrated AI", we chose the guidelines developed by the European Commission (2018).

Given how new this domain is, we found few academic research papers specifically about AI maturity models. A rare exception was a work-in-progress paper by Alsheibani and Messom (2019). This revealed a need to complement the current research with practitioner reports and best practices guides (Groupman, 2018; Ng, 2018; MMC Ventures, 2019; among others).

Finally, to broaden our insights into innovation management capabilities and the applicability of AI as it matures, we conducted a review of innovation frameworks (among others, Crossan and Apaydin, 2010; Bozic Yams, 2017; Tidd & Bessant, 2018; ISO 56002, 2019) and innovation readiness assessments, including the Berkeley Innovation Index (Sidhu et al., 2016) and the KTH Innovation Readiness Level (2015).

Additionally, we reviewed work on sustainable innovation management and strategy as a good proxy for AI innovation, due to its general purpose qualities that require actions affecting whole organisations and ecosystems (McEwan and Schmidt, 2007; Laszlo et al., 2011).

Step 2: Design - Iterative model design
In this phase, the critical dimension of what represents maturity, rather than how maturity can be measured, was defined. This approach is recommended in newer domains where there is little evidence of what represents maturity (de Bruin and Roseman, 2005). Inspired by the work of Laszlo and Zhexembayeva (2011), we studied bolt-on AI and integrated AI notions, which were used to map maturity behaviours and the necessary capabilities to build a baseline of a mature AI business system (Mettler, 2009).

Given the complexity of the domain, any model must be able to tell a simplified, rather than merely simple story. Thus, a stage-gate approach is required to provide additional layers of detail, in the form of dimension components and subcomponents. This enables more granular maturity assessments for distinct areas (de Bruin and Roseman, 2005).

We reviewed the following multi-dimensional, staged innovation maturity frameworks: KTH Innovation Readiness Level (2015), Berkeley Innovation Index (Sidhu, 2016), and Capability Maturity Model Integrated, (CMMI Institute 2020). The prevalent, underlying entropy in many of the models did not suit a holistic approach to AI maturity. Instead, we developed a converging interwoven design with "trustworthy integrated AI" at the center. That is, the model introduced in the article proposes convergence, by design, towards robust, ethical, and legal AI that is embedded within virtually all dimensions of an organisation.

Step 3: Interviews with domain and subject matter experts
We interviewed a cross-functional group of fourteen

Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship
Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht and Daniel Gillblad

experts one-on-one. The interviewees included innovation managers, senior public sector employees, AI researchers, data scientists, and AI leads within companies, as well as business leads, including one CEO and several CEO advisors. The interviews gave insights and understanding around how organisations are currently adapting AI, as well as how it is being augmented with their innovation management system. The authors also utilised their own broad industry experience in the AI, business strategy and innovation management sectors (among others, including Google, Ericsson, Spotify, GE and Northvolt).

Results

AIMI - AI Innovation Maturity Index

We developed an AI Innovation Maturity Index© (AIMI) to provide a comprehensive framework, specifically designed to strive towards the goal of achieving trustworthy integrated AI. This framework combines the essential organisational, strategic, and technical conditions necessary for AI-based innovation, while also incorporating the central requirements for ethics, legality, and robustness.

The Dimensions of AI Innovation Maturity
The AIMI framework consists of six interconnected and interdependent dimensions, seen in Figure 3. A seventh dimension of "trustworthiness" was incorporated across the framework, interdependent with the six main dimensions. To create legal ethical systems that provide

Figure 3. AI Innovation Maturity Index (AIMI)

Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship
Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht and Daniel Gillblad

long-term durable value to citizens and that can be scaled successfully, this dimension needs integration "by design" (EC, 2019). To grow, organisations must develop maturity across all dimensions based on "design principles". The seven dimensions shown are not mutually exclusive and should be viewed as enabling each other.

The *Strategy* dimension is concerned with the vision, value creation, and governance of an organisation. Specifically, it addresses the ability to align and integrate AI into the broader business context, by defining problem-oriented use-cases and business objectives. In short, it provides the "why" for "what" AI activities organisations undertake.

The *Ecosystems* dimension is about the level of collaboration, communication, and impact that an organisation achieves with its internal and external stakeholders, partners, and collaborators. As a complex subject, organisations need to develop a common understanding, vocabulary, and storytelling around AI both internally and externally. Communication quality helps as an important indicator of maturity. Successfully integrating AI requires cooperation across the organisation from strategy to data collection and technology, with similar cooperation needed externally.

The *Ecosystems* dimension is strongly linked to Strategy. Notwithstanding AI, digital maturity often drives dramatic changes in organisations' business ecosystems, making them larger, more complex, and even more critical to business strategy. Ecosystems enable organisations to respond to, and exist in, an increasingly digital environment. Organisations must make conscious strategic decisions about what role they intend to have in the wider ecosystem, whether it be as an observer, a participant, or an orchestrator, which in itself defines maturity in this dimension.

The *Mindsets* dimension is concerned with the behaviour, culture, and systems within organisations. The mindset orientation of leadership, and their nurturing of an innovation and growth mindset will determine the degree to which an organisation can succeed in its AI endeavours. The AIMI framework defines Mindsets as the mental orientation and intangible capabilities that create the organisational conditions for sustainable development through integration of AI.

The *Organisation* dimension includes the people, skills,

structures, processes, and operations aspects. It is effectively about how a business can organise itself for integrating AI. The Organisation plays an important role in hiring, training, educating, and upskilling employees' AI skills. The organisational elements are also critical to fostering a mindset of growth, cross-functional collaboration, and more distributed decision making. From a process and operations point of view, this dimension also covers the tools that reduce friction in internal and external collaboration. The Organisation can partly be considered a tangible representation of the Mindsets.

The *Data* dimension is central for AI, as data represents the underlying fuel for most AI algorithms. It is also essential for evaluating the performance of machine learning algorithms, thereby enabling companies to make data-informed decisions. Data can also be a source of competitive advantage via the self-reinforcing virtuous circle of data (Ng, 2018), and sustainable data dominance, with data-enabled learning network effects (Hagiu and Wright, 2020). Briefly, this dimension is concerned with data preparedness, data strategy, and data-driven decisions made inside an organisation.

The last dimension is *Technology*, often called "data infrastructure" among technical practitioners. It represents a company's software and hardware systems, processes and design principles enabling data, analytics, and thus, potential for AI development and deployment. Technology for AI needs to be scalable, support multiple diverse use cases, and enable fast iteration. Good technology selection and data sets allow for internal data democratisation - the ability for less technical users to themselves create insights from data. The *Data* and *Technology* dimensions together represent a company's ability to physically create and operationalise AI applications.

Stages of AI Maturity
The progression to trustworthy integrated AI typically has five stages, from foundational to integrated. It represents growth in AI competency and of the organisational mindset towards a more integrated, systems-of-systems, transformative innovation approach. This mindset of growth is important for an organisation's long-term; not just for AI-enabling innovation, but also for a company's sustainability and other complex technological innovations. The process of AI maturation and organisational mindset growth enable each other.

Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship
Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht and Daniel Gillblad

Foundational	Experimenting	Operational	Inquiring	Integrated
General curiosity about AI, limited understanding of it and its applicability to the business / industry.	Less hype around AI. Beginnings of a mindset change in the organization. Developing an understanding of the iterative / experimental process needed for developing AI.	Strategic and organisational alignment, including governance, occurs to scale proven AI use cases.	The business understands the transformational power of AI for the organization / market / industry and develops the necessary strategic orientation and mindset capacities.	Trustworthy Integrated AI is at the core of the business strategy with the capacity to develop new applications and business models and affect the markets and ecosystems.
Some grassroots efforts or small-scale, opportunistic use-cases are likely driven by self-motivated individuals and tend to focus on short-term ROI (efficiency gains, risk reduction), often linked to internal processes rather than the core organization domain.	Move from limited understanding and competence to building their first relevant AI applications, small data science/AI teams and initial data infrastructure.	Investments increase and a solid data infrastructure is in place with a small central team working with AI and analytics/decision support.	Innovation-based product and business strategy exploration gains momentum. The organization becomes more external and future-facing with regards to the ecosystem and R&D	The organization reaches a self-transforming stage - able to learn, evaluate, adjust, invest in the future. It can experiment and explore at multiple levels from strategy to technology.
Little to no data and data infrastructure nor data-driven experimentation culture.	May not have a clear AI strategy and experiments are not directly linked to top-line business strategy. More deliberate planning is underway but the organisation is still siloed with differing goals, resources and vision.	Speed of iterative experimentation increases, backed by knowledge, data and technology. Virtuous cycle of data is activated. There is a transactional approach with the wider ecosystem, where needed, to operationalise current use cases and identify possible new means of value creation.	Organization develops its own external ecosystem with academic partners, other companies, diverse types of specific as well as open-ended collaborations.	Significant and continuous R&D investment enables experimentation, risk-taking and feasibility evaluations, now with clearer systematic understanding of how it shapes future value-creation.

Figure 4. AI Innovation Maturity Index (AIMI)

The five stages of maturity are *Foundational, Experimenting, Operational, Inquiring,* and *Integrated.* A summary of the stages is provided in Figure 4.

Stages of Maturity Descriptions
It is beyond the scope of this article to discuss all the patterns and anti-patterns of each stage. We present only their main features in Figure 4 and a brief characterisation below.

Foundational Stage: This stage is characterised by a limited understanding of AI. A nascent curiosity may surround it, but with no clear grasp of the relevant and useful cases and applications. Some opportunistic bolt-on AI use cases may have started with a focus on return on investment. In more digital organisations, some grassroots efforts from the technical employees have taken place to get simple AI projects going. But, generally, no real AI specific budget or process exists at this point.

Experimenting Stage: At this stage, an organisation builds capabilities to execute on more straight-forward AI applications. These include technical capabilities, people capabilities (including hiring and learning), and developing a more experimental mindset. A key feature

of this stage is discovering, cleaning, and making usable any data the organisation has, as well as instrumenting existing systems to get more quality data. This is an "action" stage, with a focus on a few specific projects based on identified internal needs.

Operational Stage: Here, organisations have a few scaled AI use cases, and the technical and organisational capacity to keep them going. They can start reaping the benefits of built-up knowledge and capacity around AI to create new applications with higher speed. They have good internal analytics and quality data that can be applied to multiple use cases. At this point, organisations tend to move from a business optimisation approach to an outward and forward-looking innovation strategy and mindset. Awareness of the importance of the external ecosystem and engagement with it becomes increasingly common.

Inquiring Stage: At this point, major shifts in the leadership mindset and strategic orientation take place. The organisation understands that AI is not just a technology, but the basis for bigger organisation/market/industry transformations. Innovation-based product and business strategy exploration occurs and gains momentum, backed by

Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship
Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht and Daniel Gillblad

capabilities developed in the previous stages. The organisation becomes more external- and future-facing with regards to the ecosystem and R&D. Structurally, the business may be moving towards self-organised, flexible teams, driven by a common sense of purpose.

Integrated Stage: Very few organisations today have reached this stage. Examples would include companies such as Google, Amazon, and Baidu, whose competitive advantage derives from AI and the associated "virtuous circle of data", that reinforces their existing business, and creates possibilities for further business innovation and transformation. Furthermore, the enabling structures, processes, technologies, and operations are in place to accelerate their AI agility, supported by an understood sense of purpose and strategic alignment centred on value creation and purpose.

While theoretically possible, existing companies (not AI startups) tend to have difficulties moving toward integrated AI (Fountaine et al., 2019) and more complex data-driven business behaviours. This usually first requires building up both technical and organisational capabilities and knowledge with bolt-on AI applications. While there is some fluidity, our findings from interviews and workshops with companies in Sweden show that most companies today are in the early phase of AI development, using a bolt-on AI approach.

Discussion

AIMI & Innovation Management System
AIMI and innovation management system (IMS, ISO 56002) models include many shared elements, from strategy, leadership, culture, processes, organisation, ecosystem, and more. To fully exploit the potential of AI and to reach higher inquiries and integrated levels of maturity, general conditions for innovation in organisations need to be met. At the same time, integrating trustworthy AI into organisations can support various aspects of the innovation management system and increase the overall innovation capability of an organisation. Strategic implementation of AI and innovation management in organisations thus go hand-in-hand and can mutually complement and enable each other.

In Figure 5, we mapped several elements of the innovation management system according to ISO 56002, and give examples of how AI technologies could be used to support and augment those elements to increase organisational innovation capability. In general, four

recurring topics can be observed.

1. First, AI technologies can be applied to *democratise and distribute innovation across organisations*, instead of centralising it within a specific function or department. This can be done by using AI to automate routine tasks, thereby freeing up employee time for more innovation, and repurposing their work towards innovation as a core activity. By building a data-driven organisation, employees can use AI-supported systems for more informed decision-making. To reach their greater potential of democratising innovation with the help of AI, organisations need to reach higher levels of AI maturity, such as are found at the Inquiring and Integrated stages. While the automation of work tasks and business processes, along with data-driven decision-making are starting to happen at earlier stages already, it is usually either optimisation (and not innovation) driven, or limited to a specific part of an organisation.

2. Second, integrating trustworthy AI into organisations can *increase diversity, cross-functional and interdisciplinary collaboration*. This is achieved by enabling more diverse talent recruitment and team formation with respect to human resources. AI technologies can be applied to break down organisational silos, by building recommendation systems that match individuals and teams with interesting potential collaborators from within an organisation and outside of it, depending on the challenge they are addressing. AI systems can even be used to assess the innovation potential of external partners from a wider innovation ecosystem, as a way to optimise investments in external collaborations. Here again, bolt-on AI approaches might be used for specific functions (such as HR recruitment) in early maturity stages. Nevertheless, the full potential of AI will only be reached at the higher Inquiring and Integrated maturity stages as innovative culture and flexible organisational structures more fully merge with AI across an organisation.

3. Third, AI technologies can be applied to *increase organisational capacity for sensing future potentialities*. Organisations can move from a reactive to more proactive mode based on AI-supported predictions that help organisations become aware of signals of change in stakeholder behavior and macro trends, thus enabling them to better identify possible future needs. Consequently, organisations can become better at embracing risk-taking and uncertainty, reaching higher

Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship
Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht and Daniel Gillblad

Innovation context	Innovation leadership	Innovation operations	Innovation support	Innovation performance
Scan external environment AI can be used to scan large amount of macro data & trends, industry & competitors' data, identifying pain points, in-time recognition of customer/stakeholder needs and prediction of future needs **Scan internal environment** AI can be used to scan internal data and processes, supporting alignment with org values (e.g. to increase inclusion, participation & diversity) **Innovation culture** AI can be used to understand culture/ identify patterns in human behavior that would not be seen through common questionnaires (for example, pattern identification in analyzing internal communication) **Innovation ecosystem** AI can be used to support matchmaking with the right innovation partners, assessing their innovation capability	**Innovation vision and strategy** With improved AI-supported sensing of weak signals of change, organization can become better at sensing future possibilities and possible new lines of business, developing a better data-driven innovation vision and strategy **Organization for innovation** Data-driven organization can democratize innovation and enable a more non-hierarchical organization with distributed and innovative data-driven decision-making on all levels. AI could be used to enable more cross-functional interdisciplinary teams and support a matchmaking and recommendation system within organization depending on the type of problem/challenge people work with. **Innovation roles** AI can be used on one hand to act as assistant to innovation managers better support them in their work through data and insights, and on the other hand it can help them distribute innovation work and capacity across organization by enabling each employee to become better at identifying pain points and needs of stakeholders they interact with, spotting signals of change that create opportunities for innovation within their own expert domain. **Innovation portfolio** AI can be used both for tracking different ideas and their development status in organization, for merging or connecting them, and as a support to evaluate innovation potential of different ideas.	**Identifying opportunities** Data-driven product and service development through identification of pain-points, needs and opportunities with complex AI analytics. **Concept creation & validation** AI can be used to go beyond tunnel vision in innovation process, identifying unexpected correlations between different concept ideas and broadening concepts by connecting them to other fields. **Solutions development** AI can be used for verification and testing of solutions, analyzing trouble reports, and proactively predicting possible failures/defects **Solutions deployment** Through virtuous cycle of data, you can enable continuous improvement of products and services with iterative loops of feedback data and fast improvements	**Attracting & retaining talent** AI supported talent recruitment tools can be used to increase diversity and create a better fit, which increases also retention **Knowledge management** AI can be used for automating and optimize KM, e.g. automated note taking in meetings and making personalized knowledge sharing recommendations **Time & budget for innovation** AI can release extra time and financial resources for innovation work by automating more routine tasks and freeing up more resources for innovation which can thus become a core task of everyone in organization **Physical & virtual infrastructure/ Innovation methods & tools** AI supported innovation tools which can augment human creativity with insights from analyzing complex and diverse sets of data **Innovation competence development** AI can be used to enable personalized learning (adjusting timing and training methods to specific needs of employees)	**Measure/evaluate performance** AI can be used to track complex sets of innovation performance related data, not only analyzing what´s happening today but predicting what might happen tomorrow to better manage potential risks and embrace uncertainties, increasing potential for radical innovation **Plan and act for improvement** With the help of predictive analytics, a more proactive (instead of reactive) approach to continuous development of innovation system is enabled, helping organization not only incrementally improve its IMS, but potentially disrupt it

Figure 5. Mapping AI support to different aspects of the Innovation Management System

Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship
Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht and Daniel Gillblad

levels of ambidexterity, complementing incremental innovation with more radical innovation. At earlier stages of AI integration, bolt-on solutions can be used for specific functions, like predictive AI analytics in business intelligence or marketing, while the ability to realise the future potential of AI will be distributed across organisation only at the later Inquiring and Integrated stages.

4. Lastly, AI technologies can *support the development of a learning organisation*, where learning is personalised and adjusted to the needs, preferences, and learning styles of each employee. Some aspects of knowledge management (like taking notes at meetings and systematising knowledge documentation) can be automated with personal recommendation systems used to only share knowledge that is relevant and interesting for individual employees. This stimulates creativity and continuous desire for learning. When adopting AI, bolt-on applications might first be tested to automate certain parts of a company's knowledge management and to introduce personalised learning for some employee development programs. A more broadly developed learning organisation enabled by AI will only happen at later stages where AI is embedded and interlinked with innovation, together with adopting a data-driven learning mindset and culture across the organisation.

Despite the potential future impact of trustworthy integrated AI on various aspects of innovation management systems, most organisations are currently in either the Foundational or Experimenting maturity stages of AI integration, running ad hoc pilot projects or applying AI in a single business process (Fountaine et al., 2019). We believe that organisations need to move towards the Inquiring and Integrated stages in order to start increasing not only incremental innovation, but also to strengthen organisational capacity for more radical innovation with AI as the enabler. The result could be AI-driven innovation, that supports new ways of adaptive organising based on distributed decision-making, and innovative business models that introduce completely new lines of business.

We find it interesting to address the question of how the role of innovation management might change in organisations as they reach higher levels of trustworthy AI integration. We see glimpses of this in some AI-driven start-ups today, run by a new generation of progressive leaders that fully embrace the possibilities of human-machine augmentation and self-organisation, where innovation management as an organisational function is

not needed anymore, because continuous innovation has become both a core skill and business for everyone in the organisation. Some of these AI-driven start-ups have the potential to become true disruptors and successfully challenge established incumbent businesses by appealing to lower-end, unserved, or underserved consumers, and then migrating to a mainstream market (Christensen et al., 2015). Since incumbents often focus on improving their products and services for their most demanding and profitable customers, they tend to ignore the needs of others (Ibid.). AI systems can enable disruptors to identify the unserved or underserved customers, test their proposals and market offers quickly, and through instant feedback loops, respond in-time to customer needs. On the other hand, incumbents could use AI-driven foresight to detect potential disruptors earlier. They could use data-driven foresight techniques to detect new market niches and start developing new product cycles more quickly than is possible today. AI technologies could consequently prevent a company from overlooking unserved or underserved market segments, and help them respond faster to new emerging customer needs.

Conclusion

This article has aimed to build on previous literature and develop a more comprehensive view of the complex relationship between integrated AI and innovation management. It raised important questions around how integrated AI may affect the role of innovation management in the future and how it can increase an organisation's innovation capability. It demonstrated the need for two different experimentation stages: first, an initial AI adoption level that strengthens an organisation's capacity for optimisation and incremental innovation (from Foundational to Operational stages); and following that, one where organisations reach Inquiring and Integrated AI maturity levels that drive more radical or disruptive innovation. As this is still an emerging area, the article introduced what we call an AI Innovation Maturity Index (AIMI) framework. This framework can be used to systematically support the integration of AI into innovation management systems and is designed to increase an organisation's capability for radical innovation.

We intend AIMI to be used as a compass, map, and tool. It enables joint sense-making around best practices needed to holistically integrate AI into organisations, thereby enabling and accelerating innovation. For business and public sector organisations, the framework

Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship
Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht and Daniel Gillblad

shows which aspects they need to develop (often in parallel), what the journey might look like for them, how well they are doing so far, and what types of help they should engage at different stages of maturity to derive the most value. For innovation management researchers and practitioners, AIMI offers suggestions on how AI can be used in various ways as an innovation enabler, helping to move organisations from incremental towards more radical innovation.

The AIMI model needs to be tested more widely in practice to fully demonstrate its value and application opportunities. For this, an assessment tool could be developed to support the model and enable systematic evaluation of a company's current AI maturity status, thus assisting with strategic planning for AI integration.

We believe that integrating trustworthy integrated AI into organisations can serve to support various aspects of the innovation management system (ISO 56002, 2019) as well as increasing the overall innovation capability of an organisation. AI technologies can be applied to democratise and distribute innovation across organisations, to increase diversity, cross-functional and interdisciplinary collaboration, to strengthen organisational capacity for sensing future potentialities, and to support the development of a true learning organisation. Strategic implementation of AI and innovation management in organisations go hand-in-hand. Thus, we believe that further exploration of their integration could mark the beginning of a beautiful friendship.

References

Alsheibani, S. and Messom, C. 2019. Towards an Artificial Intelligence Maturity Model: From Science Fiction to Business Facts. *Paper presented at the Twenty-Third Pacific Asia Conference on Information Systems*, China. Available at: http://www.pacis2019.org/wd/Submissions/PACIS2019_paper_146.pdf.

Bozic Yams, N. 2017. Integrated Model of Innovative Competence. *Journal of Creativity and Business Innovation*, 3: 140-169.

Cam, A., Chui, M., and Hall, B. 2019. Global AI Survey: AI proves its worth, but few scale impact. *McKinsey Company*. Available at: https://www.mckinsey.com/featured-insights/artificial-intelligence/global-ai-survey-ai-proves-its-worth-but-few-scale-impact, accessed March 2020.

CMMI Institute. 2020. *Capability Maturity Model Integration*. Available at: https://cmmiinstitute.com/learning/appraisals/levels, accessed March 2020.

Catalyst Fund. 2018. AI Readiness Toolkit. *Tech Startups 101 website*. Available at: https://www.techstartups101.com/ai-readiness-toolkit, accessed June 2019.

Christensen, C.M., Raynor, M. and McDonald, R. 2015. What is disruptive innovation? *Harvard Business Review*, December Issue.

Cockburn, I., Henderson, R. and Stern, S. 2017. The Impact of Artificial Intelligence on Innovation. *National Bureau of Economic Research, Working Paper No. 24449*, JEL No. L1. Available at: http://www.nber.org/papers/w24449.

Crossan, M. M. and Apaydin, M. 2010. A Multi-Dimensional framework of Organizational Innovation: A Systematic Review of the literature. *Journal of Management Studies*, 47(6): 1154-1191.

de Bruin, T., and Roseman, M. 2005. Understanding the main phases of developing a maturity assessment model. *Proceedings of the 16th Australasian Conference on Information Systems*, Australia 2005.

Element AI. 2019. *AI from exploring to transforming: Introducing the AI Maturity Framework*. Available at: https://www.elementai.com/news/2019/exploring-to-transforming-introducing-the-ai-maturity-framework, accessed June 2019.

Etlinger, S. 2018. The AI Maturity Playbook: Five Pillars of Enterprise Success. *Altimeter@Prophet Research Report*, December.

European Commission (EC), High Level Expert Group on Artificial Intelligence. 2019. *Ethics Guidelines for Trustworthy AI*. Made public April 8, 2019. Available at: https://ec.europa.eu/futurium/en/ai-alliance-consultation.

Fleming, N. 2018. How Artificial Intelligence is Changing Drug Discovery. *Nature*, 557: S55-S57.

Fountaine, T., McCharty, B. and Saleh, T. 2019. Building the AI-Powered Organization. *Harvard Business Review*, July-August issue: 63-73.

Groupman, J. 2018. AI Readiness: Five Areas Businesses Must Prepare for Success in Artificial Intelligence. *Kaleido Insights Research report.*

Hagiu, A. and Wright, J. 2020. When Data Creates Competitive Advantage. *Harvard Business Review*, January-February Issue. Available at https://hbr.org/2020/01/when-data-creates-competitive-advantage, accessed April 2020.

Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship
Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht and Daniel Gillblad

International Organisation for Standardization (ISO) 56002. 2019. *Innovation management – Innovation management system – Guidance.*

KTH 2015. *Innovation Readiness Level.* Stockholm: KTH. Available at: https://kthinnovationreadinesslevel.com, accessed in 2019.

Laszlo, C. and Zhexembayeva, N. 2011. *Embedded Sustainability: The Next Big Competitive Advantage.* Greenleaf Publishing.

Loucks J., Davenport T., Schatsky D. 2018. State of AI in the Enterprise. *Deloitte Insights Report.*

Mettler, T. 2011. Maturity Assessment Models: A Design Science Research Approach. *International Journal of Society Systems Science*, 1/2(1/2): 81-98.

Microsoft. 2019. *AI Readiness Assessment Tool.* Available at: https://info.microsoft.com/ww-landing-ai-maturity-model-website.html, accessed September 2019.

MMC Ventures. 2019. *The AI Playbook: The step-by-step guide to taking advantage of AI in your business.* Available at: https://www.ai-playbook.com, accessed November 2019.

McEwan, C. and Schmidt, J. 2007. Mindsets in Action: Leadership and the Corporate Sustainability Challenge. *Avastone Consulting Report.*

Nagji, B. and Tuff, G. 2012. Managing Your Innovation Portfolio. *Harvard Business Review.* Available at: https://hbr.org/2012/05/managing-your-innovation-portfolio

Ng, A. 2018. *AI Transformation Playbook: How to lead your company into the AI era.* Available at https://landing.ai/ai-transformation-playbook, accessed July 2019.

Oracle. 2018. *A Data Science Maturity Model for Enterprise Assessment.* Available at https://blogs.oracle.com/r/a-data-science-maturity-model-for-enterprise-assessment-part-1, accessed September 2019.

Paulk M.C. 2009. A History of the Capability Model for Software. *ASQ Software Quality Professional.* Volume 12, Issue 1.

Prem, E. 2019. Artificial Intelligence for Innovation in Austria. *Technology Innovation Management Review.* Volume 9, Issue 12: 5-15.

Pringle, T. and Zoller, E. 2018. How to Achieve AI Maturity and Why it Matters. *Ovum TMT Intelligence Report.*

PricewaterhouseCoopers (PwC). 2019. *PwC Responsible AI Diagnostic.* Available at: https://www.pwc.com/gx/en/issues/data-and-analytics/artificial-intelligence/what-is-responsible-ai.html, accessed September 2019.

Raisch, S. and Krakowski, S. 2020. Artificial Intelligence and Management: The Automation-Augmentation Paradox. *Academy of Management Review.* https://doi.org/10.5465/2018.0072, accessed March 2020.

Rogati, M. 2017. The AI Hierarchy of Needs. *Hacker Noon.* Available at: https://hackernoon.com/the-ai-hierarchy-of-needs-18f111fcc007, accessed 2017.

Sidhu, I., Goubet, J-E., and Pries, C. 2016. *Berkeley Innovation Index: An Approach for Measuring and Diagnosing Individuals' and Organizations' Innovation Capabilities.* Sutardja Center for Entrepreneurship & Technology at University of California, Berkeley.

Teichert, R. 2019. Digital Transformation Maturity: A Systematic Overview of Literature. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 67(6): 1673-1687.

Tarafdar M., Beath C.M., and Ross J. 2019. Using AI to Enhance Business Operations. *MIT Sloan Management Review*, Summer.

Tidd, J. and Bessant, J.R. 2018. *Managing Innovation: Integrating Technological, Market and Organizational Change.* Wiley.

The University of Chicago (UC). 2018. *Data Maturity Framework.* Center for Data Science and Public Policy.

Zuboff, Shoshana 2019. *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power.* New York: Public Affairs.

Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship
Nina Bozic Yams, Valerie Richardson, Galina Esther Shubina, Sandor Albrecht and Daniel Gillblad

About the Authors

Nina Bozic, PhD, Senior Researcher in Innovation Management and the Future of Work, RISE — Research Institutes of Sweden Nina has a PhD in Innovation Management and 16 years of experience working as an innovation enabler and explorer, both in companies and public sector organizations. After starting her career as a management consultant at Deloitte and building an entrepreneurship centre CEED Slovenia, she moved to Sweden where she continued her work as an innovation consultant and participatory action researcher, working with organizations, such as Nacka, Eskilstuna and Västerås municipalities, ABB, Electrolux, Ericsson, GodEl and others. In the last two years she has been researching the future of work, and how we can integrate innovation management with other disciplines, such as AI, new models of organizing, and future studies to prepare organizations for the future in a more holistic way.

Valerie Richardson, AI Strategist & Partner at Gradient Descent. Valerie is an experienced leader and advisor in digital disruption and transformation with over 20 years at Google and General Electric, helping companies in multiple industries solve strategic and operational problems in an integrated way across multiple technology domains. Her expertise includes defining digital strategies and developing digital operating models with a focus on providing practical solutions to complex technology challenges for executives. She has a specific interest in emergent technologies, including AI and IoT. Valerie most recently led a digital division of General Electric, advising large industrial operations on how to implement cloud-based enterprise IoT software, data analytics, machine learning and AI to increase productivity, reduce costs and improve competitiveness.

Galina Esther Shubina, AI Technologist & Partner at Gradient Descent. Galina spent 16 years in the tech industry, over a decade of it at Google as a software engineer, data scientist and manager working on everything from ML-based advertising products to highly scalable distributed systems (four years in Silicon Valley). She spent the last 6 years working on AI strategy: alternating between building her own data and AI teams and strategy consulting on how to integrate data and AI into companies. In her last corporate job, she built the software and AI team for the electrical battery start-up, Northvolt. She is the founder of Women in Data Science - Sweden, a community of 700+ women in the field of data science, machine learning, AI and data analytics.

Sandor Albrecht, PhD, Ecosystem Builder, RISE — Research Institutes of Sweden & WALP. Sandor is a community builder and change driver. He is passionate about innovation and technology incubation. Currently, he is at the Knut and Alice Wallenberg Foundation and RISE Computer Science, working with people that explore new ways of connecting human beings, industries and technologies, all in the pursuit of making it more secure and enjoyable to work and live in a sustainable world. He worked at Ericsson for twenty years in Hungary and Sweden as a leader in product development and corporate research. He was the founder and head of Ericsson Garage, Ericsson's global innovation and incubation platform. He received his Master of Science in Electrical Engineering from Budapest University of Technology and Economics in 1993, and his PhD from the same institution in 2004. He also holds a Master of Applied Science from the University of British Columbia in Canada and a Master of Business Administration from Central European University Business School, Budapest, Hungary.

Daniel Gillblad, RISE - Research Institutes of Sweden and AI Sweden. Daniel is Director of AI Research at RISE, Research Institutes of Sweden and co-director for Scientific Vision of AI Sweden. He has a background in AI, machine learning, data analytics and their practical applications, and has for many years been working with digital- and research strategies in industry and academia. He holds a PhD in Machine Learning and a MSc in Electrical Engineering, both from KTH, Royal Institute of Technology in Stockholm, and has lead research projects, groups and laboratories for almost 15 years. Daniel is an appointed member of the Swedish government advisory board on Digitalization, and has initiated, co-ordinated and co-edited the Swedish AI agenda.

"I Stood By and Watched": An Autoethnography of Stakeholder Participation in a Living Lab

Samuel Schrevel, Meralda Slager, Erwin de Vlugt

" *It's still magic even if you know how it's done.* **"**

Terry Pratchett
A Hat Full of Sky

An emerging and innovative way of organizing projects in health technology and innovation is the so-called "living lab". Because of their characteristics, living labs may provide a solution to a very old problem: how to facilitate the meaningful participation of stakeholders in science and technology? In this article, I (we use a first-person perspective in the paper) aim to contribute to the literature by providing an account of my experiences as a participation researcher with stakeholder participation in a living lab in the Netherlands. I participated in a yearlong project on ensuring freedom for residents in a closed psychogeriatric ward. Using three key moments from that experience, I illustrate why participation was the intention, but was harder to achieve in practice. Participation processes and living labs are situated in specific social and physical contexts. I discuss the "situatedness" of living labs and propose to reconceptualize them as "situated practices": the value of a living lab lies in the processes of work it conducts on specific innovations situated in its local context. A key conclusion is that providing narrative descriptions of living lab projects, with attention to situatedness and stakeholder participation, can provide invaluable examples, insights, and inspirations for other researchers in the field.

Introduction

An emerging and innovative way to organize projects in health technology and innovation has arisen, called a "living lab". Living labs are small public-private partnerships where multiple stakeholders, including end-users, collaborate around shared challenges in a real-life setting (Geenhuizen, 2014; Westerlund et al., 2018a; Westerlund et al., 2018b; Hossain et al., 2019). Some authors conceptualize and define living labs according to their methods, processes, business model, or outcomes (Veeckman et al., 2013; Hossain et al., 2019). Even though no consensus on a single definition of "living labs" has yet been reached, this useful definition is provided by Westerlund and Leminen (2011):

"They [living labs] are physical regions or virtual realities where stakeholders form public-private-people partnerships (4Ps) of firms, public agencies, universities, institutes, and users all collaborating for creation, prototyping, validating, and testing of new technologies, services, products and systems in real-life contexts."

In other words, the formerly prominent "university laboratory" has been moved, or is in the process of being moved, either physically or virtually. Two major benefits of this have been described in the literature that apply to the use case at stake in this research, that is, the wards of a nursing home. Firstly, contextual and situational factors both come to be understood as part of the innovation process, making it more responsive to the

"I Stood By and Watched": An Autoethnography of Stakeholder Participation in a Living Lab   *Samuel Schrevel, Meralda Slager, Erwin de Vlugt*

changing demands of stakeholders in their context. Secondly, because of the real-life setting, close collaboration with, and meaningful participation[1] by relevant stakeholders may be facilitated.

As such, living labs may become a solution to a very old problem: how to facilitate the meaningful participation of stakeholders in science and technology? Dell'Era and Landoni (2014) suggest that living labs operate between the methodologies of "user-centred design" and "participatory design". Other authors write about "co-design" and "co-creation" (Almirall et al., 2012; Brankaert & den Ouden, 2017; Schuurman & Protic, 2018). All these methods share as a common feature the active participation of end-users in the innovation process. This meaningful participation of stakeholders holds a claim as one of the pillars of successful living labs (Hyysalo & Hakkarainen, 2014).

The motivations for stakeholders to participate in living labs are diverse and depend on the type of stakeholder. Companies and organizations usually participate to design, test, refine, or implement their products and services (Leminen & Westerlund, 2012; Schuurman et al., 2016). End users, according to Leminen et al., (2014), may assume various roles in the process; for example, a 'tester' contributes to new technologies by testing prototypes, whereas a co-creator is an active participant in the design or implementation of a technology. However, the motivations of end-users to participate, and the way in which they were actually involved, often remain implicit in literature (Leminen et al., 2012; Leminen, 2013; Schuurman et al., 2015).

Nevertheless, some authors provide more detailed descriptions of end-user or stakeholder participation in living labs. Hyysalo and Hakkarainen (2014) stress that user participation within living labs does not happen effortlessly or automatically. Swinkels et al. (2018) discuss how, over time, patient perspectives became of secondary importance, eventually favoring the perspectives of professionals. In such cases, the 'participation potential' of living labs is accepted as a given, intrinsic characteristic of the methodology. The process of stakeholder participation, as a guide or inspiration for living labs, nevertheless remains sparsely published in the living lab literature.

In this article, I aim to contribute to the living lab literature by providing an account of my experiences as

a participation researcher and stakeholder in a living lab in the Netherlands. The living lab Care Robotics (LLCR) falls under the umbrella of the Medical Delta: a consortium of public and private organizations and knowledge institutes in the Delta region of the Netherlands (Medical Delta, 2019). The LLCR aims to improve the wellbeing of patients and quality of care through meaningful technological innovation mainly within elderly care. It works to achieve this through close collaboration between universities, care organizations, SME's, and the end-users in projects where technologies are designed, tested, and implemented in a real-life setting. The strong focus on meaningful knowledge circulation necessarily involves researchers, lecturers, and students from associated knowledge institutes. In this sense, the active participation of all stakeholders, including lay persons, is itself central to the goals and methodology of the LLCR.

My Role as a Researcher

I[2] am a postdoctoral researcher at a university of applied sciences. I have a background in participatory research and patient participation. With that expertise I am involved with the living lab Care Robotics to facilitate the participation of 'end-users' in a number of projects within the living lab. As a participation researcher, the promise of living labs appeals to me as well. For the first time, the context of health care delivery has been acknowledged as essential for meaningful innovation and technology. Within the patient participation tradition, it is commonly accepted that the context wherein people live, get sick, receive treatment and care is essential for understanding their perspectives. This promise of literally moving innovation towards the context where it will be applied, sparked my interest. Are living labs finally the "magic bullet" that will facilitate meaningful and significant participation of patients in healthcare innovation?

I chose to participate in this project specifically in order to facilitate participatory processes in the living lab. During the year, I attended all of the project's meetings, advised on participatory methods, conducted interviews and observations, and presented intermediate findings to the project team. Additionally, because of the LLCR desire for strong knowledge circulation, students from several programs were involved at all stages. For most of these student projects, I was the main supervisor.

My observations presented in this article are the result of

"I Stood By and Watched": An Autoethnography of Stakeholder Participation in a Living Lab   *Samuel Schrevel, Meralda Slager, Erwin de Vlugt*

ongoing qualitative analysis of all documents created during this year, including meeting transcripts, observation notes, and student reports. I wrote this article as a case study where the LLCR and the project were the objects of my qualitative exploration. This way of working bears close resemblance to the basic tenets of Participatory Action Research.

In this article, however, I would like to share my perspectives and reflections on the project and extrapolate them into lessons learned for the future. I will first provide a summary of the chronological course of events after which I will reflect on three key moments that illustrate why participation may be the intention, but is more complicated to achieve in the process of a project.

Project Background

Before the project began, the board of the care organization established four pillars on which future innovation projects should rest. One of those pillars was "care for freedom".

It is commonly acknowledged that the experience of freedom increases the wellbeing of people who receive home care or live in nursing homes (Scherder et al., 2010). Specifically, in psychogeriatric care, restrictions in freedom for those who develop the urge to wander may be detrimental. These residents may experience lower quality of life, become agitated or even aggressive, and negatively influence the happiness of those living and working in the ward. This problem is often described as "unrest", the state where multiple residents become agitated.

Ensuring freedom in a closed psychogeriatric ward is complex. Without proper supervision, residents may wander off, get lost, or fall and injure themselves. This project aimed to increase the freedom for residents given the current characteristics of the facility. These specific problems of this facility were known, and experienced, by all layers in the organization. However, no actual research was done involving the experiences and perspectives of all relevant stakeholders. To further explore this problem, collaboration with the LLCR was initiated. The project was kickstarted by a funding voucher from the Medical Delta. For this voucher, a project proposal was written where the core problem was identified as how to balance the tension between ensuring freedom for residents whilst

safeguarding their safety.

Three guiding principles were defined for the course of the project:

- All relevant stakeholders should participate in the project in a meaningful way

- The focus should be on exploring the problem and its context

- The focus should not be on possible technological solutions.

Chronological Course of Events

A summary of the chronological course of events can be found in Table 1. Since this project aimed for meaningful participation of all relevant stakeholders, a project team with a broad diversity of stakeholders was established. Included as part of the team were two ward managers, the location manager, the innovation manager, the geriatric psychologist, and three researchers (of whom I was one) from the university of applied sciences. The project team met regularly, on average every other week, to maintain close supervision on the projects' progress.

The first step by the project team was to create a student project for ten weeks (group 1). The students explored the perspectives of all relevant stakeholders on the issue of freedom given the facility's characteristics. A group of students started with a ten-week project for this step. Under the supervision of researchers (SS and RdeV), the students conducted semi-structured interviews with various stakeholders, and did participatory observations of both day and night shifts at the closed psychogeriatric ward. Their results were eventually presented to the project team, and the project team used them to move on to the next stage.

Since no new key insights surfaced from this stage of exploration, the project group brainstormed the best way forward. The brainstorm sessions resulted in two shared insights. First, only a few residents develop the urge to wander. These residents can then get agitated and cause unrest among others in the wards. Thus, if these residents can be moved to a more attractive environment, both their wellbeing and the wellbeing of the residents and employees on the wards can potentially be restored. Following this idea, part of the main building of the facility was selected to be

"I Stood By and Watched": An Autoethnography of Stakeholder Participation in a Living Lab   *Samuel Schrevel, Meralda Slager, Erwin de Vlugt*

redesigned to be attractive for residents with dementia who develop the urge to wander.

Second, we developed a shared narrative about the "courage to experiment" without being paralyzed by the fear of risk and failure. This narrative became a new guiding principle for the project's future. These two ideas were discussed in eight semi-structured interviews with the project team, as well as with employees from both the psychogeriatric wards and the facility's central building.

The project for student group 2 consisted of two steps. First, the students observed residents and talked with them to explore what they like doing or liked doing when they were younger. Second, using this information, they then redesigned part of the central building, and participated by wandering around with residents with dementia to see whether they liked the new situation. Drawing from my background in participatory research, I coached the students on

working together with employees and residents and advised them on how to share decision making power. Eventually, with the help of the student findings, we were then able to do "small experiments" at the facility to see how our ideas worked out in practice.

End Result: A television screen?

One of the end results of the project can be found in Figure 1. A television screen was bought for the facility to experiment with interactive technology in an attempt to make the new ward more attractive to residents with dementia. Using imagery from their past, the idea was that this screen could serve as a "pleasant distraction" for residents to decrease their urge to wander and lower their levels of agitation. As can be judged from the image, however, a sharp contrast exists between the assumed possibilities of the screen, and the crude reality of day-to-day health care delivery. While a good idea from the project perhaps in theory, the television screen did not turn out to be useful in practice.

Figure 1. An "interactive" television screen, as end result of the project. The Dutch notice states: "No channels installed. Select 'install' and press 'OK' to install TV-channels."

"I Stood By and Watched": An Autoethnography of Stakeholder Participation in a Living Lab   *Samuel Schrevel, Meralda Slager, Erwin de Vlugt*

Table 1. The project's chronological course of events and their main outcomes

Event	Start Date	Summary
Start of the project	Summer 2017	The topic of the project was determined by the organization: ensuring freedom for people with dementia. A project proposal was written and submitted to the Medical Delta. A funding voucher was granted to kickstart the project. Guiding principles of the project were: 1) the active participation of all stakeholders, and, 2) the initial focus should not lie on technological solutions.
Key moment: Setting the stage	Spring 2018	The project group was brought together, consisting of a variety of stakeholders or their representatives. The project group designed the goals, scope, and methods of the project. Healthcare staff and residents were not involved at this stage.
Student Group 1	Spring 2018	Using the project group's problem definition, the students conducted various interviews and observations. No new insights emerged as our analysis was framed by the initial problem definition. In hindsight, the problem definition did not resonate with experiences on the work floor.
Brainstorm sessions	Winter 2018/2019	A location was pinpointed to be redesigned for people with the urge to wander. A focus was placed on the "courage to experiment". For future projects, focus should be on trying out new ideas on the work floor, without being paralyzed by fear for failure or risk.
Key moment: Removing key players	Spring 2019	To speed up the process, ward managers were removed from the project group. They were representatives for health staff, and linchpin to the work floor. The incoming students (group 2) would become the new linchpin. Removing them created a disconnect between the project group and the work floor.
Student group 2	Spring 2019	Using the ideas and experiences from residents and healthcare staff, the students designed ideas to make the facility more attractive for people with dementia. After that, they carried out small experiments to explore whether this actually resonated with these residents.
Key moment: Reclaiming the stage	Spring 2019	Even though technology was not supposed to be at the center of the project, it gained increasing support from the project group. Under time pressure, "courage to experiment" changed into "pressure to experiment", and thus interactive technology became the major focus of the project.
End result: Television screen	Summer 2019	Eventually, a television screen was bought and put up in the facility. In hindsight, everyone agreed that this end-result did not resonate with the initial desire of the organization: ensuring freedom for people with dementia.

Using three key moments below, I aim to provide an explanation for this. The first part of the answer is that the idea of interactive technology as a possibility was explicitly discussed at the start of the project. It was just decided that it should not be the starting point. In other words, this idea was surreptitiously present during the entire project, it just resurfaced later in the project. A second important observation is that the project focus shifted unnoticedly from "freedom for people with dementia" to the "residents with an urge to wander". This was a key shift in thinking that impacted the project's outcomes.

Setting the Stage

The first student project assignment was written in tandem with the innovation manager and two ward managers from the facility. This assignment concealed a pre-existing perspective on the issue: the building itself prevents employees from ensuring freedom for their

"I Stood By and Watched": An Autoethnography of Stakeholder Participation in a Living Lab   *Samuel Schrevel, Meralda Slager, Erwin de Vlugt*

residents. For example, the assignment for the first student project mentioned:

A mismatch emerged between the ideas of the developers of the facility, and the possibilities of employees to deliver care. Residents live in small, closed wards and cannot move freely. Employees often work in isolation because one ward will usually have one health worker. Therefore, it is more difficult for employees to ensure the freedom and safety of their residents.

This excerpt from the project's texts illustrates that a shared perception was held regarding the problem at that moment. As the students started their interviews with stakeholders, the project group expected to get a better sense of the problems the work floor experienced. However, no new insights emerged immediately, and instead all of our preconceptions were reproduced by our participants. In hindsight, this can be easily explained. Our stakeholders were consulted on subjects that we predefined in the project assignment: the contrast between "freedom" and the building's "restrictions" .

However, careful analysis of the interviews with health professionals showed a different perspective on the situation. They felt restricted in multiple aspects of delivering care. Most of these exchanges revolved around issues that were either desirable or undesirable for their residents. They talked about continuity of care, visiting a local restaurant, taking a walk outside, and the importance of seeing familiar faces. This showed a different dichotomy: restrictions caused by the building, rules and regulations versus the delivery of 'good care'.

For example, consider the following quotation:

> *"Well, our staff has a lot of tasks at the moment, administration is increasing and things are getting more and more busy, but that takes time away from the residents, you know, attention for the residents. I would like to have more attention for my residents and spend less time on administration (practical nurse)."*

The actual sentiments of employees on the work floor clearly did not revolve around the single issue of ensuring freedom alone. They instead explained that they were happy with their work when their residents

are happy. They reflected on how the residents could achieve this wellbeing, and how oftentimes this was hampered. In other words, their struggle revolved around their perspective on "good care" and the extent to which they felt they were able to deliver it. In sum, the project group never diverted from their initial perspective on the issue. As a result, my view is, to put it bluntly: residents and healthcare staff were only consulted3, but not actually heard. To be clear, their perspectives were indeed expressed and made explicit, but interpreted through our framework, and therefore had no influence on the direction of the project.

Removing Key Players

Before student group 2 started, the ward managers served as an important part of the project group. They functioned as a linchpin with healthcare staff on the wards. Their role was twofold. First, they set up meetings for interviews with staff members and planned observations at the wards. They also informed employees about the project's process. Second, they were able to bring to the table perspectives, ideas, and reservations from the employees. Moreover, being experienced health professionals, they were able to steer the project group towards ideas that would likely have higher chances of success in a nursing home setting. In practice, they turned out to represent the healthcare staff in the project.

Up to then, the project had resulted in new insights and the construction of a narrative shared by all members of the project group. However, as the project's end-date drew closer, the pressure to deliver concrete results increased. The group reached consensus that these results could be achieved by experimenting with our ideas in the real-life setting of day-to-day practice. In other words, the courage to experiment changed due to pressure to experiment.

To facilitate experimentation, the project needed closer supervision, which demanded greater flexibility from the project group. Together with the ward managers, the project group decided to move on with a smaller project group, in which the ward managers would no longer be present. A pragmatic argument was laid out: it proved difficult to schedule meetings with all project group members due to different schedules in the nursing home and at the university. Moreover, this decision made sense since close collaboration with healthcare staff would already be at the center of the

"I Stood By and Watched": An Autoethnography of Stakeholder Participation in a Living Lab   *Samuel Schrevel, Meralda Slager, Erwin de Vlugt*

activities. The 'experiments' would thus be carried out by the students from group 2, making them the new linchpin with the work floor.

During an evaluation meeting with the group 2 students, they discussed how the experiments were more difficult than expected for them to perform in reality:

> *"I remember stepping into the ward and told them that I was here to bring the residents to the other location for our observations. And she was like: "okay, you can take these residents outside"; and she pointed at people in wheelchairs. But that was not the point ... I don't know whether they expected us to go outside for a walk with the residents for fun. Then you have to set your boundaries, but maybe they weren't up to date with our project (bachelor of nursing student)."*

Multiple issues soon became apparent. To the students it was unclear with whom to make appointments or to plan observations and interviews. Moreover, people on the work floor were not aware of their presence, nor the reason for them being there. Looking back, the ward managers were the linchpin with the work floor, who should not have been cut out of the process. In previous projects they both communicated with the employees and were also their voice during the project's group meetings. Removing them from the project group distanced the project group from the work floor.

Reclaiming the Stage

I should return here to remind that the idea of adding an interactive screen to the ward was discussed from the start of the project. During initial conversations, potential technological solutions to the problem of freedom in a restricted place were discussed abundantly. We decided to abandon the focus on technology to instead facilitate an open exploration of the problem, and also give space to our stakeholders to come up with possible solutions. However, as the pressure to deliver results increased, the idea of interactive technology as a potential solution resurfaced.

As described above, the focus of the project moved towards making the target location more attractive to residents with the urge to wander. Combined with

pressure to produce results, the need to make rapid decisions increased as the schedule progressed as well. This resulted in a top-down management process where the project group made all the decisions.

From the interview excerpt shown below, we can distill that the students would have preferred a different course of action than what was eventually taken:

> *"Student 1: I have another bottleneck … [The organization] had a steering role in the project, how shall I put it?*
>
> *Student 2: well, that we weren't completely free, that we were controlled a little.*
>
> *Student 1: we had the executive role, and they had the decision-making role. Looking back, we should maybe have voiced our opinion more strongly.*
>
> *Interviewer: can you give an example?*
>
> *Student 1: well, probably about the television. A lot of ideas were discussed [with residents and employees], also for the patio. We should have said that we would have liked to focus on something else, but it was already decided that the TV would come first.*
>
> *Student 2: We saw more potential in the patio. But it was also quite unclear what we were going to do for [the organization] and what they expected from us. Eventually we had the meeting where they said: "ok, go and observe some people, four days a week, and carry out this many interviews". We did not have freedom in that.*
>
> *Interviewer: looking back, would you have done things differently?*
>
> *Student 1: we talked about that in class. As a group of students, we found it very hard to say what we wanted, because you don't want to be put at a disadvantage you know. The same that an intern would not say to his employer that he is not doing things the right way."*

These reflections by the students of group 2 provide an important insight into the dynamics of the project group. The first thing that should be addressed is the power imbalance that the students described. They felt

"I Stood By and Watched": An Autoethnography of Stakeholder Participation in a Living Lab   *Samuel Schrevel, Meralda Slager, Erwin de Vlugt*

'out of place' to go against the ideas of the project group. Thus, they consented to the television screen. In this case, the power imbalance was probably reinforced by the pressure to deliver results pushing the students into more of an operational role. They came to feel that they just had to carry out tasks that were set out for them. In the end, the students did not feel there was enough space to express their ideas to the project group, or to help steer the project towards another, perhaps more successful course of action.

This was a crucial moment during the trajectory of the project. The students were supposed to be the spokespersons for the employees and residents. Moreover, they were expecting to be involved in the decisions that were being made during the project. However, the decision making solely happened by the project group members, and focused on pre-existing ideas. In retrospect, this was the moment when the project took a turn away from health staff and residents, and instead started going its own way.

The enthusiasm to accept technology as a real solution provides an excellent example for these situations. The television screen seemed to wait for the perfect moment when the project group would adopt it. After being put up, the screen played a central role in the immediate projects to follow. It continued to spark hope in various people around the organization, as can be judged from the following quotation:

> *"We collectively confirmed that the first floor of the facility would become the center of activities. We have to create a challenging environment. ... We already purchased a television ... and the students would explore how we can make the environment attractive for residents, so that they are challenged to be more active"*

The question I keep asking myself with the benefit of hindsight is: what would have happened if we would have started with the screen getting installed in the first place? Would the situation not have been better off that way? Maybe, then the screen would have been properly integrated into the ideas of the organization. The problem with those questions, and those hopes, is that apparently even I fell prey to the appeal of technology. Even I, along the way, lost sight of the core issue of the project: ensuring freedom for elderly with dementia living at a closed psychogeriatric ward. This insight of what was lost gave me a feeling that the project had failed, as if, for a year, I had achieved nothing. At key moments, when important decisions were made during the project, I had simply gone with the flow of the group, bowing to the promise of technology. In other words, I stood by and watched.

Discussion and Conclusions

In this autoethnography, I described my experiences with stakeholder participation in a living lab to contribute to the literature on living labs. I used three key moments to show that the project's progress combined with the promise of technology were together the driving force behind crucial project decisions. Thus, even for me as a participant researcher, it proved difficult to facilitate active and meaningful participation of stakeholders in the project. I will elaborate on this issue first and conclude the discussion with a suggestion to conceptualize living labs as situated participatory practices.

Stakeholder participation, especially focused on end-users, is central to the living lab literature. However, as Schuurman et al. (2015) argue, this participation is only implicitly present in the literature, yet is rarely explicitly elaborated on. Even then, users oftentimes are more like passive participants in testing or validating prototypes (Leminen et al., 2015). One notable exception is the study by Logghe and Schuurman (2017), where action research was used to facilitate participation. Other examples highlight issues regarding end-user participation. In a qualitative case study comparison, Franz et al. (2015) demonstrated a deficit in the traditional co-creation methodology, as the project team was responsible for most decisions about defining the problem, as well as selecting stakeholders and methods. Hyysalo and Hakkarainen (2014) show that collaboration between designers and users is often a hard and frustrating process. They conclude that user involvement should have started at the outset of the project. Both of these examples resonate with my experiences in the project above. The initial framing of the problem happened with the project team only and no other stakeholders involved, which influenced the process later on. In conclusion, stakeholder participation seems to be at the core of the living lab methodology. Yet through studies by those who address it, signals show that it may not happen as naturally as it seems.

A possible explanation may be the focus of living labs

"I Stood By and Watched": An Autoethnography of Stakeholder Participation in a Living Lab   *Samuel Schrevel, Meralda Slager, Erwin de Vlugt*

on end-results. Many publications take an instrumental perspective on living labs as a means to create impact or meaningful and successful innovations (van Geenhuizen, 2013; Schuurman et al., 2016; Keyson et al., 2017). Hossain et al. (2019) categorize living lab outcomes mainly as making contributions to innovations. In this sense, the success of a living lab depends on its ability to boost innovations. In our project, I observed that as time went on the pressure to deliver tangible results increased. The decision to remove certain stakeholders from the project group was made to speed up the process and deliver results in time. The time pressure thus created a dynamic that favoured a push for tangible results at the expense of active stakeholder participation. Swinkels et al., (2018) showed a similar dynamic where the focus gradually shifted towards improving eHealth technology and away from active patient involvement, mainly because patient involvement was more time consuming than initially expected. Stakeholder participation processes can often be complex and time consuming and require hard work (Hyssalo & Hakkarainen, 2014). It may therefore be tempting when pressured to shift focus to the end results, even though participation is at the heart of the living lab methodology.

In sum, I elaborated on two barriers to meaningful stakeholder participation in this project. First, not all stakeholders participated from the outset of the project, and therefore the motivations and needs of staff members and residents were excluded from the project's design. This resulted in dissonance between the perspectives of employees and the project group regarding the problem definition. Second, under time pressure combined with a desire for tangible results, more stakeholders were excluded as time passed from actively participating in the project. This all set the stage for an end-result that, in hindsight, seems ridiculous: a television screen.

In this sense, from the perspective of living labs seen as being facilitators for meaningful innovations, one could conclude that the project was a failure. However, the project's value still lies in the hard work of the individuals who participated, rather than in the technological artifact itself. The meaningful end result can thus be seen as a shared understanding of the process that lead to the television screen. The shared understanding, however, was is not having found a suitable solution for the problem, and thus gaining a

shared new perspective that could help on future projects. In the end then, it can be argued that in fact I did not (just) stand by and watch; instead, I was part of an exploratory process that inspired real change in organizational culture. We created a culture where stakeholder participation became a topic of interest and importance.

In the previous paragraph I suggested that value can also be derived from the living lab process itself. For example, Janssen et al. (2015) claim that the value of new innovations is due to "continuous work on developing, adapting, implementing and translating innovations". We believe this shows it is important to realize that stakeholder participation processes depend on their specific context and the individuals who participate. Living labs, where people work on innovations, can thus be conceptualized as situated practices. The notion of 'situated practice' was originally defined as "the part of pedagogy that is constituted by immersion in meaningful practices within a community of learners who are capable of playing multiple and different roles based on their backgrounds and experiences" (The New London Group, 1996). Nowadays the term is applied to other fields than pedagogy, relevant examples being technology studies (Orlikowski, 2000), and design (Paton & Dorst, 2011; Crompton, 2019). In these contexts, situatedness describes how meaning or value is dependent on the social, historical, and physical context. Such an approach is central to living labs that aim to provide a 'real-life setting' that includes contextual factors relevant both to the innovation itself and to the stakeholders (Coorevits & Jacobs, 2017; Hossain et al., 2019). In situated practices, the innovation process itself is a source of meaning and value. As noted earlier, the value of the chosen television screen itself was understood as being limited; however, through our work it became a vehicle for mutual learning and meaningful changes in the organizational culture of a closed psychogeriatric ward.

Along the same line, we can more clearly view stakeholder participation as a situated process. For example, the students' struggles to get in touch with employees, and their reservations to suggest alternative ideas, resulted from the dynamics of that specific time and context. Their role as spokespersons for the work floor was shaped by these dynamics. Similarly, Hyysalo and Hakkarainen (2014) state, "the

"I Stood By and Watched": An Autoethnography of Stakeholder Participation in a Living Lab   *Samuel Schrevel, Meralda Slager, Erwin de Vlugt*

question is whether the parties engaged in living lab collaboration are willing to go through all the work needed to create the specific and particular relationships by which the relevant information can be made visible and transferred to the other party". Dedding and Slager (2013) draw focus to this aspect by defining participation as a "situational and interactive process", wherein 'participation' is revealed as a situated practice, an act of doing.

To conclude, we believe that the focus on living labs as situated participatory practices has analytical benefits in that it draws focus to the process of the work around participation and on the context in which it happens. These benefits may help researchers, and other stakeholders, to better understand how value and meaning is, or is not, produced in living labs. Furthermore, we believe it helps provide insight into stakeholder motivations and needs to participate in living lab projects, as well as ways in which meaningful participation is facilitated or hindered. Additionally, meaning and value can be broadened into topics like stakeholder learning and changes in organizational culture. In line with Hakkarainen and Hyssalo (2013), our hope is that in the near future other scholars will publish open and honest, even sometimes difficult accounts of their work on stakeholder participation within living labs. Providing such narrative descriptions of living lab projects, as we have tried to do in this paper by analyzing them as situated participatory practices, may provide invaluable examples, insights, and inspiration for other researchers in the field.

Notes

1. In this article we define "participation" as "a situational and interactive process in which all stakeholders in research and/or policy are in dialogue, doing justice to the lived experiences, knowledge and competences of all actors, especially individuals whose daily life and body are at stake, in all phases of the process, aiming for improvements in quality of care and a more inclusive society." This is an official translation from the definition in Dedding and Slager (2013).

2. In this article I use the active forms of "I" and "we". In the text, "I" refers to my (main author) own personal observations or decisions, while "we" refers to decisions made by the project team, as well as our collective interpretations and conclusions from this project.

3. The term "consultation" for a level of participation in this context was coined by Arnstein (1969), which she incorporated into a ladder for citizen participation in governmental projects. The higher on the "rungs" of the ladder, the more power is transferred to citizens. According to Arnstein (1969), consultation that asks citizens for their opinions and perspectives can be considered as a form of "tokenism", where no "real" power is transferred to those who are consulted, and decision-makers can still ignore the opinions and perspectives of citizens.

Acknowledgements

Funding

References

Almirall, E., Lee, M., & Wareham, J. 2012. Mapping Living Labs in the Landscape of Innovation Methodologies. *Technology Innovation Management Review*, 2(9): 12-18.
http://doi.org/10.22215/timreview/603

Arnstein, S.R. 1969. A Ladder Of Citizen Participation. Journal of the American Institute of Planners. *Journal of the American Institute of Planners*, 35(November 2012): 37-41.
https://doi.org/10.1080/01944366908977225

Brankaert, R., & den Ouden, E. 2017. The Design-Driven Living Lab: A New Approach to Exploring Solutions to Complex Societal Challenges. *Technology Innovation Management Review*, 7(1): 44-51.
http://doi.org/10.22215/timreview/1049

Coorevits, L., & Jacobs, A. 2017. Taking Real-Life Seriously: An Approach to Decomposing Context Beyond "Environment" in Living Labs. *Technology Innovation Management Review*, 7(1): 26-36.
http://doi.org/10.22215/timreview/1047

"I Stood By and Watched": An Autoethnography of Stakeholder Participation in a Living Lab   *Samuel Schrevel, Meralda Slager, Erwin de Vlugt*

Crompton, A. 2019. Inside Co-production: Stakeholder meaning and situated practice. *Social Policy and Administration*, 53(2): 219-232. https://doi.org/10.1111/spol.12466

Dedding, C.W.M., & Slager, M T. 2013. *De rafels van participatie in de gezondheidszorg: van participerende patiënt naar participerende omgeving*. Amsterdam: Boom Lemma uitgevers.

Dell'Era, C., & Landoni, P. 2014. Living lab: A methodology between user-centred design and participatory design. *Creativity and Innovation Management*, 23(2): 137-154.

Franz, Y., Tausz, K., Thiel, S., & Yunus, M. 2015. Contextuality and Co-Creation Matter%: A Qualitative Case Study Comparison of Living Lab Concepts in Urban Research. *Technology Innovation Management Review*, 5(12): 48-55. http://doi.org/10.22215/timreview/952

Geenhuizen, M. van. 2014. Critical factors in health innovation in cities%: from ivory tower to living lab. *Int. J. Global Environmental Issues*, 13(June 2013): 258-280. https://doi.org/10.1504/IJGENVI.2014.064508

Hakkarainen, L., & Hyysalo, S. 2013. How Do We Keep the Living Laboratory Alive? Learning and Conflicts in Living Lab Collaboration. *Technology Innovation Management Review*, 3(12): 16-22. http://doi.org/10.22215/timreview/749

Hossain, M., Leminen, S., & Westerlund, M. 2019. A systematic review of living lab literature. Journal of Cleaner Production, 213: 976-988. https://doi.org/10.1016/j.jclepro.2018.12.257

Hyysalo, S., & Hakkarainen, L. 2014. What Difference Does a Living Lab Make? Comparing Two Health Technology Innovation Projects. *CoDesign*, 10(3-4): 191-208. https://doi.org/10.1080/15710882.2014.983936

Janssen, M., Stoopendaal, A.M.V., & Putters, K. 2015. Situated novelty: Introducing a process perspective on the study of innovation. *Research Policy*, 44(10): 1974-1984. https://doi.org/10.1016/j.respol.2015.06.008

Keyson, D.V, Morrison, G.M., Baedeker, C., & Liedtke, C. 2017. Living Labs to Accelerate Innovation. In D. V Keyson, O. Guerra-Santin, & D. Lockton (Eds.), *Living Labs: Design and Assessment of Sustainable Living*, Cham: Springer International Publishing: 55-61. https://doi.org/10.1007/978-3-319-33527-8_5

Leminen, S. 2013. Coordination and Participation in Living Lab Networks. *Technology Innovation Management Review*, 3(11): 5-14. http://doi.org/10.22215/timreview/740

Leminen, S., Nyström, A.-G., & Westerlund, M. 2015. A typology of creative consumers in living labs. *Journal of Engeneering and Technology Management*, 37: 6-20.

https://doi.org/10.1016/j.jengtecman.2015.08.008

Leminen, S., & Westerlund, M. 2012. Towards innovation in Living Labs networks. *International Journal of Product Development*, 17(1-2): 43-49. https://doi.org/10.1504/IJPD.2012.051161

Leminen, S., Westerlund, M., & Nyström, A.-G. 2012. Living Labs as Open-Innovation Networks. *Technology Innovation Management Review*, 2(9): 6-11. http://doi.org/10.22215/timreview/602

Leminen, S., Westerlund, M., & Nyström, A. G. 2014. On becoming creative consumers - user roles in living labs networks. *International Journal of Technology Marketing*, 9(1): 33. https://doi.org/10.1504/IJTMKT.2014.058082

Logghe, S., & Schuurman, D. 2017. Action Research as a Framework to Evaluate the Operations of a Living Lab. *Technology Innovation Management Review*, 7(2): 35-41. http://doi.org/10.22215/timreview/1056

Medical Delta. 2019. *Creating real-life experimental environments*. https://www.medicaldelta.nl/en/living-labs.

Orlikowski, W.J. 2000. Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations. *Organization Science*, 11(4): 367-472. https://doi.org/10.1287/orsc.11.4.404.14600

Paton, B., & Dorst, K. 2011. Briefing and reframing: A situated practice. *Design Studies*, 32(6): 573-587. https://doi.org/10.1016/j.destud.2011.07.002

Scherder, E.J.A., Bogen, T., Eggermont, L.H.P., Hamers, J.P.H., & Swaab, D.F. 2010. The more physical inactivity, the more agitation in dementia. *International Psychogeriatrics*, 22(8): 1203-1208. https://doi.org/10.1017/S1041610210001493

Schuurman, D., De Marez, L., & Ballon, P. 2016. The Impact of Living Lab Methodology on Open Innovation Contributions and Outcomes. *Technology Innovation Management Review*, 1(6): 7-16. http://doi.org/10.22215/timreview/956

Schuurman, D., Marez, L. De, & Ballon, P. 2015. Living Labs%: a systematic literature review. *Open Living Lab Days 2015*, proceedings. URL: http://hdl.handle.net/1854/LU-7026155

Schuurman, D., & Protic, S. 2018. Living Labs versus Lean Startups: An Empirical Investigation. *Technology Innovation Management Review*, 8(12): 7-16. http://doi.org/10.22215/timreview/1201

"I Stood By and Watched": An Autoethnography of Stakeholder Participation in a Living Lab   *Samuel Schrevel, Meralda Slager, Erwin de Vlugt*

Swinkels, I.C.S., Huygens, M.W.J., Schoenmakers, T.M., Nijeweme-D'Hollosy, W.O., Velsen, L. van, et al. 2018. Lessons learned from a living lab on the broad adoption of eHealth in primary health care. *Journal of Medical Internet Research*, 20(3): 1-10. http://doi.org/10.2196/jmir.9110

The New London Group. 1996. A pedagogy of mutliliteracies: designing social futures. *Harvard Educational Review*, 66(1). https://doi.org/10.17763/haer.66.1.17370n67v22j160u

van Geenhuizen, M. 2018. A framework for the evaluation of living labs as boundary spanners in innovation. *Environment and Planning C: Politics and Space*, 36(7): 1280-1298. https://doi.org/10.1177/2399654417753623

Veeckman, C., Schuurman, D., Leminen, S., & Westerlund, M. 2013. Linking Living Lab Characteristics and Their Outcomes: Towards a Conceptual Framework. *Technology Innovation Management Review*, 3(12): 6-15. http://doi.org/10.22215/timreview/748

Westerlund, M., & Leminen, S. 2011. Managing the Challenges of Becoming an Open Innovation Company: Experiences from Living Labs. *Technology Innovation Management Review*, 1(1): 19-25. http://doi.org/10.22215/timreview/489

Westerlund, M., Leminen, S., & Habib, C. 2018. Key Constructs and a Definition of Living Labs as Innovation Platforms. *Technology Innovation Management Review*, 8(12): 51-62. http://doi.org/10.22215/timreview/1205

Westerlund, M., Leminen, S., & Rajahonka, M. 2018. A Topic Modelling Analysis of Living Labs Research. *Technology Innovation Management Review*, 8(7): 40-51. http://doi.org/10.22215/timreview/1170

About the Authors

Dr. Samuel Schrevel works as a researcher and senior lecturer for the bachelor program of Nursing at the Hague University of Applied Sciences. He has a background in qualitative methods in health research. He earned his PhD at the VU-University in 2015 on the experiences and desires of adults with Attention Deficit Hyperactivity Disorder with the Dutch mental health system. His current research focuses on the participation of patients and health care staff in health innovation.

Dr. Meralda Slager is a health scientist and works at The Hague University of Applied Sciences as senior researcher and Education manager in Nursing. Her main interest and area of research is participative health care, involving how patients are able to participate in research, policy-making, and in the quality of healthcare. She has published various articles and books on this topic. Furthermore, her services are regularly sought as a consultant in connection with participation issues. Currently, she works on health technology and robot care. How health professionals next to patients are involved in the development and innovation of health care, and how novel products are made in tandem together with them, instead of only for them, are central questions in her research.

Prof. Erwin de Vlugt studied Mechanical Engineering at the Delft University of Technology, where he was employed for twelve years as a researcher and associate professor in Biomechanics and Biorobotics. He has also worked in the Rehabilitation Medicine unit at the Leiden University Medical Centre on the development of diagnostic devices for clinical decision making. Prof. de Vlugt earned his PhD on human-machine interaction focusing on the role of the human proprioceptive system (human movement sensors) during different movement tasks. A passion for robotics and their resemblance to the human musculoskeletal system prompted him to start applied research developing healthcare devices based on user needs. He was appointed head of the Technology for Health research group at The Hague University of Applied Sciences in September 2015. Prof. de Vlugt is co-founder of the Medical Delta Living Lab Care Robotics, which provides a real-life setting for elderly care to accelerate meaningful technological innovations.

How to Digitally Enhance Bioeconomy Collaboration: Multidisciplinary Research Team Ideation for Technology Innovation

Essi Ryymin, Laura Lamberg & Annukka Pakarinen

" *The future is built on the flow of new ideas.* "

Paul Meyer

In this paper we examine the potential of digital platforms for managing multidisciplinary collaboration and particularly the ideation processes of multidisciplinary research and development in the case of technology-supported vertical farming. The article draws on research data from semi-structured interviews and a collaborative workshop that was conducted with researchers representing biological, digital, and technological domains. The results of this research indicate that digital platforms may offer impactful, process-accelerating support during the kick-off phase of multidisciplinary technological innovations. A digital platform can support ideation and the prioritisation of ideas and can be especially fruitful when paired with face to face discussion and non-digital interaction.

Introduction

As the Earth's temperatures rise, biodiversity is plummeting, soil nutrients are being lost, and the world population keeps growing. The need for fundamental changes in the agri-food sector now seems undeniable. Technological advancement has often been touted as a solution on the road to sustainability, and in recent decades the conversation has been enriched by frameworks such as the socio-technical transitions approach (Geels, 2011, 2019). According to this approach, sustainability transitions rely on taking a systemic outlook to change: technological advancement is key, but so also is restructuring social meanings, consumer behavior, policies, business models, and so on (Geels, 2019). This requires the involvement of multiple actors in different fields of life — scientists in various disciplines, policymakers, educators, and industry alike.

The introduction and development of new technology creates opportunities and challenges for research much beyond the obvious fields of engineering. In the case of the agri-food sector, innovations such as vertical farming have fostered research and development that brings together researchers across disciplinary boundaries. When knowledge about socio-ecological problems is incomplete, multidisciplinary (or transdisciplinary) research can be used to address problems and seek solutions that hold important implications for those affected by them (Norris et al., 2016, referring to Pohl & Hirsch Hadorn, 2007). "Multidisciplinarity" has thus become necessary to understand the complex nature of ecological sustainability problems, to experience various contributions from different disciplinary backgrounds, and to offer a more complete corresponding set of tools (for example, technical, behavioral, individual, and organisational) for addressing and preventing sustainability challenges in real-life.

However, practicing multidisciplinarity can be very challenging. Researchers from different backgrounds must learn to understand and appreciate each other's perspectives (Schoot Uiterkamp & Vlek, 2007). Previous research has identified a long list of challenges associated with multidisciplinary research (Ramadier, 2004; Schoot Uiterkamp & Vlek, 2007; Pohl & Hirsch Hadorn, 2008). An especially challenging problem arises in framing the research and research problems (Lang et al., 2012).

How to Digitally Enhance Bioeconomy Collaboration: Multidisciplinary Research Team Ideation for Technology Innovation   *Essi Ryymin, Laura Lamberg & Annukka Pakarinen*

For this study, our interest was to investigate multidisciplinary collaboration of a research team tackling sustainability issues in the agri-food sector. With this aim in mind, the objective was to investigate a digitally-supported ideation workshop as a method for the definition of research ideas in a multidisciplinary team. The context of the study was a development project of smart and sustainable bioeconomy delivered in a higher education institution. The project's strategic goals called for responding to the need for sustainable food production, while addressing the megatrends of digitalisation and climate change. The development project aimed at creating multidisciplinary sustainable innovations through data-driven knowledge creation in the bioeconomy. The higher education institution researchers and network of bioeconomy companies worked in close transdisciplinary co-operation during the project.

Our specific focus of interest was on a multidisciplinary team of researchers, which was researching and developing "smart vertical farming". Vertical farming is a novel practice that is expected to supply food to cities sustainably or with value-added biomass for the industry (Al-Chalabi, 2015). The higher education institution recently started a sustainability-oriented research project on vertical farming, which included implementing data analysis in optimising biomass production in controlled conditions at a container farm. Research in a controlled cultivation environment enabled various possibilities for the participants. This ranged from finding solutions to fight against hunger in a changing climate, to optimising plant growing conditions in order to help aid in transition from the current fossil economy to a biobased economy, by producing specific biobased compounds for further products.

The significant goal of the smart vertical farming project is to create digitalized measurements, including for IoT (Internet of Things)-based data collection, analysis, and interpretation in analysing, monitoring, and optimising the vertical farming production chains. The project brings together multiple research interests and competences in the life sciences, technology, digital services, and the field of education to investigate the research area of sustainable and smart bioeconomy.

The first phase of the smart vertical farming project was the building of a collaborative research team and setting of agreed-upon research ideas and interests. Essential in this phase is that a real-world challenge is translated into a prominent research idea, a boundary object, that is both researchable and allows for the re-integration of insights from different scientific bodies of knowledge (Lang et al., 2012).

Multidisciplinary Teamwork and Collaborative Ideation in a Digital Age

Several authors have recognised challenges in knowledge sharing and joint endeavours when working on a complex object of research activity in multidisciplinary collaboration (Ramadier, 2004; Schoot Uiterkamp & Vlek, 2007; Pohl & Hirsch Hadorn, 2008; Lang et al., 2012).

Edwards (2010, 2012) developed a compelling theoretical concept called "relational expertise" for analysing and conceptualising collaboration between experts. By relational expertise Edwards means a form of expertise that augments one's specialist expertise and makes responsive collaboration possible. Relational expertise involves the ability to take into account the standpoints of other collaborators, recognise what matters to them when working on an project, make visible to them what matters for you, jointly expand the interpretation of the task, and calibrate responses so that experts can work on it together (Edwards, 2017). Relational expertise enables greater relational agency, wherein people are able to work together on complex activities (Edwards 2010, 2012, 2017). Relational agency involves expanding upon singular interpretations of a phenomenon by bringing to bear the different expertise or conceptual resources offered by work collaborators. This expansion means that more relevant aspects of phenomenon can be recognised and worked on (Edwards, 2017).

Fong (2003) introduced a model of knowledge creation within multidisciplinary project teams that places primary emphasis on processes, rather than outcomes. In the model, five processes of knowledge creation are identified and intertwined: 1) boundary-crossing, 2) knowledge-sharing, 3) knowledge generation, 4) knowledge integration, and 5) collective project learning. Below we expand on each of these processes in the model.

First, crossing boundaries successfully requires personal conversations among team members. Visualised objects of activity, such as shared drawings, can help with team interaction. Second, knowledge-sharing creates benefits when project team members

How to Digitally Enhance Bioeconomy Collaboration: Multidisciplinary Research Team Ideation for Technology Innovation   *Essi Ryymin, Laura Lamberg & Annukka Pakarinen*

come from different knowledge domains. In such cases, they are more likely to discuss their unique knowledge and distinct information, than among those who possess knowledge or information in common. Third, in the process of knowledge-generation, creative teams aim to generate new or emerging knowledge vital for innovation. Fourth, knowledge integration combines differing perspectives and integrates knowledge from various disciplines in the decision-making process. Team members bring different sets of assumptions about optimal ways to proceed in their teamwork, thereby prioritising diverse values and perspectives, which ultimately aim to best meet the current challenges. In the fifth process of collective project learning, professionals learn from the projects they engage. Here, support for the problem-solving and reflection processes of the team and team members is important. Through these interwoven processes, new or emerging knowledge can be created within a project team, likewise existing knowledge can be combined to form new insights (Fong, 2003).

Vick and colleagues (2015) studied a variety of university research teams engaged in collaborative innovation, looking at how their information culture influences knowledge creation. They found that multidisciplinary teams emphasise interpersonal relations and encourage the presentation of information in a common language to promote better understanding among members from different disciplines (Vick et al., 2015).

Paulus, Baruah, and Kenworthy (2018) studied collaborative ideation in organisations. They found that although theoretical perspectives regarding collaborative ideation often suggest positive outcomes, the actual interaction processes that happen in groups may not be well- structured for the impactful sharing of ideas and their further development. For instance, in face-to-face group settings only one person can effectively share ideas at one time. This limits the similar opportunity for others in that same time frame. A highly recommended alternative is to use a digital method for exchanging ideas. Many platforms are now available with user processes that allow participants to generate ideas in real time, and to examine and respond to ideas shared by others. These systems also allow for voting and collectively deciding on best ideas. Digitally supported methods tend to be more efficient in generating a higher volume of ideas with the help of an online community, compared with using one-way only speaker method (Dennis et al., 2019).

Various modifications to traditional brainstorming have been made based on digitally mediated communication, for instance, brainwriting and electronic brainstorming. These methods have advantages over face-to-face brainstorming, such as opportunities to contribute ideas simultaneously. Further, ideas can be easily recorded this way, with little to no risk of dominance by one or a few participants (Yagolkovskiy, 2015). Kerr and Murthy (2009) found that participants using computer-mediated communication platforms perform significantly better on divergent brainstorming tasks than those interacting face-to-face. Contrary to traditional brainstorming, the decision quality was also higher when made digitally in large computer-mediated groups, and the groups generated more alternatives.

According to Korde and Paulus (2017), the most effective brainstorming process is one that involves variation in individual and group ideation; a kind of hybrid brainstorming. Variation leads to the best performance in terms of number of ideas generated and enhances the cognitive perspective of group creativity. Also, Jensen and co-authors (2018) studied both face-to-face (physical) and digital (online) collaborative ideation, and they argue that collaborative ideation can successfully be supported digitally. The next step in improving the technological setup for collaborative ideation does not, however, require an either-or scenario. Instead, it should bring the best of the two worlds, physical and digital, together.

Helping to work towards this goal, we set as an objective for this study to investigate two lines of inquiry: firstly, the expectations of researchers, and secondly, the results of digitally collaborative ideation. We thus posed the following research questions: What were the expectations from the multidisciplinary researchers of smart and sustainable bioeconomy, regarding their reciprocal collaboration? And what were their expectations for the smart vertical farming project? Additionally, the study assesses how a digital platform was implemented with an aim to enhance the collaborative ideation process of research ideas in the smart vertical farming project. Hence, we asked: what were the results of the digitally enhanced collaborative ideation, and what value did the digital platform provide to the ideation process? In answering these questions, we reflected on the impact of the digital platform, by assessing feedback from the researchers as well as comparing the results of ideation to the researchers' initial expectations.

How to Digitally Enhance Bioeconomy Collaboration: Multidisciplinary Research Team Ideation for Technology Innovation   *Essi Ryymin, Laura Lamberg & Annukka Pakarinen*

Data Collection and Methodological Approach

The data in this study comes from eleven (11), one-on-one semi-structured interviews with researchers involved in a smart and sustainable bioeconomy development project, and a collaborative ideation workshop with six (6) researchers focusing on smart vertical farming. Five of the six participants of the vertical farming workshop also belonged to the interviewed eleven researchers, while one of the six did not. The interviewees broadly represented biological science, digital, and technological domains, whereas the backgrounds of the workshop participants ranged across different sub-disciplines of the life sciences (for example, bioprocess and automation engineering, horticulture, environmental engineering, chemistry).

The key themes covered in the interview process were the interviewees' expectations related to multidisciplinary collaboration between researchers from different domains, along with their expectations, especially for the newly launched smart bioeconomy project. In the collaborative ideation workshop, participants explored and discussed their research ideas concerning smart vertical farming. The interviews and the workshop were recorded, transcribed, and analysed. Additionally, the activities of workshop members in the digital platform were archived in the platform's database and analysed. The study used qualitative analysis to gain insights into the expectations of project partners towards multidisciplinary co-operation. The collaborative character of the workshop offered another advantage for analysing group discussion, knowledge sharing, and using a digital platform in research idea framing. The qualitative data analysis included selecting relevant texts for further analysis related to the theoretical framework and previous research. Specific attention was paid to so-called "repeating ideas" (Auerbach & Silverstein, 2003). In the last phase, coherent categories were grouped into more abstract themes and concepts.

Results

Researcher Expectations
Our analysis of interview data revealed several expectations for multidisciplinary co-operation and smart vertical farming. The themes identified in the interviews are summarised in Table 1.

The interviewees expected multidisciplinary collaboration to generate new solutions for wicked problems involving sustainability, especially in carbon binding towards preventing climate change. In the context of smart vertical farming, the interviewees predicted new solutions for climate-friendly food

Table 1. Expectations of interviewees for multidisciplinary collaboration and smart vertical farming

Expectations	Multidisciplinary Collaboration	Smart Vertical Farming
Solutions for Sustainability	New solutions to wicked problems of sustainability, especially carbon binding in prevention of climate change by combining different scientific approaches.	New solutions for climate-friendly food production to fight against hunger and energy-savvy, controlled cultivation of plants.
New Competences	New competences in data-driven, smart bioeconomy by combining different scientific approaches.	New competences in smart vertical farming especially in optimising growing conditions.
Strategic Development of Scientific Research	Novel, innovative, and attractive research profile in smart and sustainable bioeconomy.	New brand and recognisability in smart vertical farming research and development.
Involvement of Companies and Stakeholders	Benefits and new, sustainable business opportunities to bioeconomy companies and stakeholders.	New solutions for companies' needs, e.g. in sustainable food or value-added products.

How to Digitally Enhance Bioeconomy Collaboration: Multidisciplinary Research Team Ideation for Technology Innovation   *Essi Ryymin, Laura Lamberg & Annukka Pakarinen*

production that fights against hunger, and for the energy-savvy, controlled cultivation of plants. One interviewee argued that smart vertical farming could give answers to famines in Africa by practical food plant development, while others also considered the importance of medical plants, organic cosmetics, and colours for sustainable businesses.

Quote 1:

> *"It [vertical farming] is linked to urbanisation and to the fact that there is less land available for farming and, to how we can produce food locally, close by to the end use. That's energy efficient."*

Almost in all cases, the interviewees reported that they foresee new competences being developed through multidisciplinary collaboration, especially in data-driven measurement and the novel uses of smart technology in sustainable bioeconomy. Along with concrete development projects, multidisciplinary collaboration was considered to provide significant learning processes for the researchers from different domains.

The smart vertical farming project was novel to all participants. Some interviewees believed that the research team would need to establish its learning process from the very basics. They also mentioned that it is important to involve not only the researchers, but also the higher education institution students in this learning process.

Quote 2:

> *"Speaking of vertical farming, which is one of the sub-projects [of the smart and sustainable bioeconomy development project], it is something totally new to us. We just received the container system during the summer. There's nothing there yet, we are only just starting the first farming experiments."*

Quote 3:

> *"For instance, I was just introducing our research unit to our students on different campuses last spring, and on every campus, I asked students what we could grow in the vertical farming freight container."*

All interviewees suggested that multidisciplinary collaboration in smart and sustainable bioeconomy strengthens the strategic development of scientific

research and the research profile of the institution. There were also comments about increasing the amount of scientific publications, becoming an attractive research partner in smart and sustainable bioeconomy nationally and internationally, and finding new research funding sources for the current topics.

Quote 4:

> *"We will position ourselves in a new way, to a new position, which is, in regard of competences and research credits, higher, better. So, we will create a new kind of research profile [in smart and sustainable bioeconomy]. This will be the leading edge in our research, [for] the next three years."*

Considering smart vertical farming, the interviewees wished to develop brand new data gathering methods for optimising the growing conditions of plants, and to become a recognised research partner in data-driven vertical farming. However, the research ideas related to vertical farming were in this phase still preliminary, as well as quite incoherent and fragmentary.

Some interviewees argued that it is very important to get partnered with bioeconomy companies and businesses, and to develop new solutions for their practical problems, as well as new business opportunities in regional markets. This view was echoed by other interviewees who emphasised the possibilities of vertical farming project especially to generate practical solutions for regional companies in need of plant production. One interviewee also suggested developing an application for bioeconomy companies to use.

Quote 5:

> *"A company receives developmental support from us [for] which the aim can be a pilot project, [or] an innovative method. It can be a prototype, a process, an operating model, it can be a service, whatever it is. This is what a company will get, and we will get a research advantage."*

Results of Digitally Enhanced Ideation
The six (6) multidisciplinary researchers from the smart vertical farming project participated in a collaborative ideation workshop that aimed to help frame and prioritise their research ideas. The workshop was divided in three phases: 1) face-to-face group discussion and ideation of research interests, 2) individual implementation of a digital platform in prioritising

How to Digitally Enhance Bioeconomy Collaboration: Multidisciplinary Research Team Ideation for Technology Innovation *Essi Ryymin, Laura Lamberg & Annukka Pakarinen*

research ideas, and 3) concluding discussion of the prioritised ideas and their practical implementation. One of the six participants could unfortunately not participate in phases 2 and 3.

The digital platform used to implement the workshop was Innoduel (n.d.), which was designed to support synchronous group decision making. Innoduel was chosen because of its promising qualities in speeding up the challenging and divergent processes of collaborative decision making. A preliminary brainstorming session for the researchers had been organised earlier, before the researchers later had the opportunity to organise and rank the 20 ideas they had come up with in the prior session. Innoduel was thus used in this workshop setting to assist in continuing the earlier work, which had produced abundant ideas, but lacked prioritisation regarding which ideas ought to be moved forward.

The Innoduel platform uses an application that enables a process of collecting and voting on large or small group ideas online. The participant is invited to join a digital arena, where they can see whether a new post answers a particular question the session facilitators have created before, or can vote on existing answers. All answers will eventually end up on the arena's ranking list. However, only answers that have appeared in *voting mode* six times or more will be ranked. Answers that have been shown in *comparison mode* less than six times will be displayed below the ranking list in a random order. As a result, the participants get a prioritized list of answers (Innoduel, n.d.). The platform can be used synchronously in short-term face-to-face meetings to support shared group decision making. It can also be used individually and virtually for long-term data gathering projects, for instance, by geographically dispersed companies.

In this case study, the workshop participants were invited to an Innoduel session to answer shared questions. In this case, the questions involved the 20 research ideas brainstormed earlier, and to vote for their preferred ideas. The session was organised during the face-to-face workshop. At the beginning of the Innoduel session, the workshop participants were given an opportunity to add more research ideas, and altogether four (4) new research ideas appeared on the agenda. In the next phase, the 24 research ideas faced off against each other in randomly formed pairs in the digital arena, wherein the participants were asked to choose their preferred answer. Before voting on each answer, the participants discussed the voting criteria, framed by

reference to the project's goals, and the research strategy of the higher education institution. Several qualities and values were identified as being meaningful for research ideas and decision-making in the debate, most importantly its sustainability, innovativeness (novelty), feasibility, usefulness, and scalability.

As a result of the voting, Innoduel offered a prioritised list of all the research ideas. The ranking order was based on the win rate percentage for answers in the digital arena. With Innoduel's ranking algorithm, the participants didn't have to go through every possible answer permutation to find the ranking order. Instead, the final ranking order reflected the collective opinion represented of all participants.

The five most popular research ideas that emerged from the Innoduel prioritization were, 1) Growing arctic plants in a controlled environment, including the use of new compounds, vitamins and food plants, 2) Antimicrobial ingredients in plants, 3) How cultivation conditions effect plants when optimising some properties, like plant antioxidants, 4) Organic colours, and 5) Growing functional molecules suitable for space travel.

Overall, the workshop members expressed satisfaction regarding the workshop's results. When asked for feedback immediately after using the Innoduel tool, several participants expressed satisfaction over seeing their research ideas ranked in a concrete list form. Moreover, most were happy to see what shape the "top list" had taken. Some stressed that the ranked result reflected a snapshot of the specific, quite small group gathered at that time. Two of the researchers expressed regret that research ideas with an explicit climate and sustainability focus had not made it into the top 5. This was perhaps somewhat surprising, given the relatively more prominent focus sustainability issues had received in the researcher expectations as surveyed in the interviews. However, the researchers also voiced that the tool had pushed them towards choosing concrete and practical ideas over more abstract ones, which could explain the lower ranking of many more abstract climate-oriented proposals.

While participants viewed the digital platform as a convenient tool to help move from diverging ideation towards a convergence of sorts, some tense discourses emerged in the group concerning specifically the practical implementation and fundamental values behind the research ideas (Lamberg et al., 2020). For

How to Digitally Enhance Bioeconomy Collaboration: Multidisciplinary Research Team Ideation for Technology Innovation *Essi Ryymin, Laura Lamberg & Annukka Pakarinen*

instance, some interviewees argued that research interests should primarily support long-term sustainability goals with societal impacts, while others stressed the short-term results and need for immediate benefits for local businesses. In line with the conclusions of Schoot Uiterkamp and Vlek (2007), practicing multidisciplinarity, besides its great benefits, also appeared to be quite challenging and complicated.

The workshop participants in our research worked together on a complex object of activity, refining their joint research interests and ideas on smart vertical farming. Our qualitative analysis of the group discussion suggests that the participants, following the idea of Edwards (2010, 2012, 2017), exercised *relational agency* in their endeavours to expand their interpretations of research ideas. They did this by bringing to bear the various expertise and conceptual resources offered by colleagues from different disciplinary domains in the workshop. In their joint ideation, participants recognised further aspects of research as possibilities to work on. Their wider interpretations of the research possibilities drew on the strengths of collaborators from the different disciplines.

The workshop members *crossed disciplinary boundaries* in collaborative ideation, *shared knowledge* from their unique informational standpoint, and *integrated knowledge* by combining perspectives from various disciplines in the ranking process supported by the Innoduel platform. The intertwined processes during the workshop echoed three phases out of Fong's (2003) five processes of knowledge creation: boundary-crossing, knowledge-sharing, and knowledge integration. An interesting question for the implementation phase of the research remains: will there also be processes in new knowledge generation and collective project learning that arise for the smart vertical farming project later?

Keeping the number of workshop participants small seemed to increase opportunities for participants to contribute to discussion. It also generated more chances to tap into a broad diversity of perspectives, as Paulus, Baruah, and Kenworthy (2018) suggested. Interestingly, the method of sharing ideas in Innoduel, working individually while also synchronously on idea prioritisation, also deepened the knowledge sharing experience in face-to-face group discussions. Similar to what was highlighted by Jensen et al. (2018), combining the best of the physical and digital worlds seemed in our observations to enhance the ideation process of a

multidisciplinary team, while supporting the team in framing and prioritising their research interests.

Conclusions

Contemporary challenges of ecological sustainability demand multidisciplinary collaboration. Our results indicate that multidisciplinary collaboration offers multi-voiced alternatives to research, technological development, and innovation processes, as well as opportunities for exercising relational agency. However, in practice, several challenges remain, for instance, building room for collaboration between researchers and deciding on a "shared object" (Alrøe & Noe, 2014) or research idea.

We find it important that multidisciplinary actors be offered support in building relational agency. As relational agency develops between actors, more relevant aspects of the phenomenon under investigation can be recognised and worked on. This encourages not only the development of new technology, but broader socio-technical transitions and better management of the contextualisation and implementation of technological innovation. At its best, digital support combines group expertise and individual competence to create new viewpoints and unforeseeable solutions.

The results of this paper indicate that digital platforms may offer an impactful, process accelerating support in the kick-off phase of multidisciplinary technological innovations. The use of digital prioritization by ranking through voting may be particularly helpful when needing to shift conversations away from the abstract to a more practically oriented level. The selection process of voting forces participants to make choices between an abundance of alternatives. We thus believe that digital platforms can support ideation and the prioritisation of ideas, in a way that can be especially fruitful when paired with face to face discussion and non-digital interaction.

Acknowledgments

How to Digitally Enhance Bioeconomy Collaboration: Multidisciplinary Research Team Ideation for Technology Innovation   *Essi Ryymin, Laura Lamberg & Annukka Pakarinen*

References

Al-Chalabi,%M. 2015. Vertical farming: Skyscraper%sustainability? *Sustainable Cities and Society*, 18: 74-75. %https://doi.org/10.1016/j.scs.2015.06.003%

Alrøe, H.F., & Noe, E. 2014. Second-order science of interdisciplinary research a polyocular framework for wicked problems. *Constructivist Foundations*, 10(1): 65-76.

Auerbach, C., & Silverstein, L.B. 2003. *Qualitative Data: An Introduction to Coding and Analysis*. New York University Press: ProQuest Ebook Central.

Dennis, A.R., Minas, R. K., Williams, M. L. 2019. Creativity in Computer-Mediated Virtual Groups. In P.B. Paulus & B.A. Nijstad (Eds.), *The Oxford Handbook of Group Creativity: Innovation through Collaboration*. Oxford University Press.

Edwards, A. 2010. *Being an Expert Professional Practitioner: The Relational Turn in Expertise*. Dordrecht: Springer.

Edwards, A. 2012. The role of common knowledge in achieving collaboration across practices. *Learning, Culture and Social Interaction,* 1(1): 22-32.

Edwards, A. 2017. Relational Expertise: A Cultural-Historical Approach to Teacher Education. In Peters, M.A., Cowie, B. & Menter, I. (Eds)., *A Companion to Research in Teacher Education,* Singapore: Springer: 555-567.

Fong, P.S.W. 2003. Knowledge creation in multidisciplinary project teams: an empirical study of the processes and their dynamic interrelationships. *International Journal of Project Management*, 21: 479-486.

Geels, F.W. 2011. The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions*, 1(1): 24-40. DOI: 10.1016/j.eist.2011.02.002

Geels, F.W. 2019. Socio-technical transitions to sustainability: a review of criticisms and elaborations of the Multi-Level Perspective. *Current Opinion in Environmental Sustainability*, 39: 187-01. DOI: 10.1016/j.cosust.2019.06.009

Innoduel (n.d.). *Employee engagement and decision making made easy.* Retrieved September 8, 2020 from https://www.innoduel.com/en/product

Jensen, M.M., Thiel, S., Hoggan, E. & Bødker, S. 2018. Physical Versus Digital Sticky Notes in Collaborative Ideation. *Computer Supported Cooperative Work*, 27: 609-645.

Kerr, D.S., & Murthy, U.S. 2009. Beyond brainstorming: The effectiveness of computer-mediated communication for convergence and negotiation tasks. *International Journal of Accounting Information Systems*, 10(4): 245-262.

Korde, R. & Paulus, P.B. 2017. Alternating individual and group idea generation: Finding the elusive synergy. *Journal of Experimental Social Psychology*, 70: 177-190.

Kuhn, T.S. 1962. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.

Lang, D.J., Wiek, A., Bergmann, M., Stauffacher, M., Martens, P., Moll, P., Swilling, M. & Thomas, C.J. 2012. Transdisciplinary research in sustainability science: practice, principles, and challenges. *Sustainability Science*: 7, 25-43.

Lamberg, L., Ryymin, E., Paavola, S., Vetoshkina, L. 2020. *Value Discussions in Interdisciplinary Research: Facilitating Problem Definitions in Bioeconomy.* Manuscript in preparation.

Norris, P.E., O'Rourke, M., Mayer, S.A. & Halvorsen, K.E. 2016. Managing the wicked problem of transdisciplinary team formation in socio-ecological systems. *Landscape and Urban Planning*, 154: 115-122.

Paulus, P.B., Baruah, J. & Kenworthy, J.B. 2018. Enhancing Collaborative Ideation in Organizations. *Frontiers in Psychology*, 9: 2024.

Pohl, C. and Hirsch Hadorn, G. 2007. *Principles for Designing Transdisciplinary Research*. München: oekom verlag.

Pohl, C. & Hirsch Hadorn, G. 2008. Methodological challenges of transdisciplinary research. *Natures Sciences Sociétés*, 16(2): 111121.

Ramadier, T. 2004. Transdisciplinarity and its challenges: The case of urban studies. *Futures*, 36(4): 423-439.

Schoot Uiterkamp, A.J.M., & Vlek, C.A.J. 2007. Practice and outcomes of multidisciplinary research for environmental sustainability. *Journal of Social Issues*, 63(1): 175-197.

Vick, T.E., Nagano, M.S. & Popadiuk, S. 2015. Information culture and its influences in knowledge creation: Evidence from university teams engaged in collaborative innovation projects. *International Journal of Information Management*, 35: 292-298.

Yagolkovskiy, S.R. 2015. Creativity in Face-to-Face and Computer-Mediated Brainstorming. Psychology. *Journal of the Higher School of Economics*, 12 (4): 184-191.

How to Digitally Enhance Bioeconomy Collaboration: Multidisciplinary Research Team Ideation for Technology Innovation   *Essi Ryymin, Laura Lamberg & Annukka Pakarinen*

About the Authors

Dr. Essi Ryymin holds a PhD in Educational Sciences from the University of Tampere (TUNI, 2008). She had held several educational specialist, project manager and R&D manager positions in the public and private sector in competence development and the digitalization of education. She currently acts as Principal Research Scientist in Häme University of Applied Sciences and leads the Future Work Research & Development Team with a focus and interest on exploring transforming work, future skills of professionals, and continuous learning. Her works have been published in international journals such as *E-learning and Education, Computer & Education,* and *International Journal for Cross-Disciplinary Subjects in Education.*

Laura Lamberg holds a master's degree in Political Science from the University of Helsinki (2018). Lamberg works as a project researcher at the HAMK Edu research unit at Häme University of Applied Sciences. Her current research interests cover a scope of the social studies of science and technology, interdisciplinary collaboration, sustainability transitions, and social complexity. Lamberg began PhD studies at the University of Helsinki in 2020. Her academic accomplishments have been recognized by the Academy of Finland (1st place in Viksu Science competition in 2012), and the University of Helsinki (best master's thesis award for Political Science in 2018).

Dr. Annukka Pakarinen holds a PhD in Environmental Solutions in Agriculture and a master's degree in Chemical Engineering. She has expertise in utilizing and treating (physical, chemical, enzymatic, etc.) plant and waste based raw materials in biofuel production. Currently she works as the Director of HAMK Bio research unit, closely following the field of Bioeconomy from primary production to value added refining and smart solutions. She has also been the founder of a start-up company in the field of circular economy.

Criminal Enforcement of Trade Secret Theft: Strategic Considerations for Canadian SMEs

Matt Malone

" As IP theft remains hard for firms to detect, much less obtain legal redress for, their incentives are to rely more on their own efforts to conceal trade secrets and less on patents that entail public disclosure. New estimates suggest that trade secret theft is between 1% and 3% of GDP, meaning that the cost to the $18 trillion U.S. economy is between $180 billion and $540 billion. "

Report of the Commission on the Theft of American Intellectual Property (2017)
The National Bureau of Asia Research

Many innovative small and medium enterprises (SMEs) face unique challenges in protecting their intellectual property (IP). Potential theft of trade secrets is a key feature of these challenges, which arises often in the context of disputes related to employee mobility. Despite the risks these challenges pose, SMEs often confront significant resource barriers in protecting themselves from trade secret theft. The passage of a recent criminal law by the Canadian federal government, section 391 of the *Criminal Code*, creates a powerful new tool for innovative SMEs to report, investigate, and prosecute theft of trade secrets. It also comes with specific considerations and risks that innovative SMEs should examine and contemplate. This article explores strategies for SMEs in Canada to use section 391 to protect their trade secrets, navigate the legal environment during theft of a trade secret, and remediate such theft.

Introduction and Background

Many innovative SMEs have a fraught relationship with intellectual property (IP). Lacking adequate financial resources, the formalistic mechanisms of IP protection can act as both temporal and financial cost barriers to legal redress when IP theft occurs (OECD, 2010). Minimal recourse to legal resources also prevents these actors from executing an IP protection plan with the same sophistication as their larger commercial counterparts (Cabeca & Chaperot, 2017.) SMEs may also lack a nuanced understanding of IP and human resources law, and thus remain vulnerable to certain pitfalls when operating against larger, resource-rich competitors, especially across multiple legal jurisdictions (OECD, 2010; Brant & Lohse, 2013.). Although IP cannot supplement solid knowledge and business fundamentals, it can be disproportionately vital

to the promise of growth and success for SMEs (French, 2010; Friesike, 2011.) For many of them, IP is in fact the crown jewel of their enterprise. The success for these SMEs is "underpinned by effective exploitation of intellectual assets" (Brant & Lohse, 2013.)

In short, IP is a serious issue for SMEs, in particular, for innovative SMEs that have the potential to contribute to long-term technological innovation. These business entities generally prefer more informal methods of protecting their IP (Kitching & Blackburn, 2003.) The doctrine of "trade secrets", which eschews formal registration, is a common type of legal protection for such companies, one that combines low cost with potential permanent duration in legal protection for technologies that are not susceptible to reverse engineering or public knowledge. Yet trade secrets have specific drawbacks related to the costs associated with

Criminal Enforcement of Trade Secret Theft: Strategic Considerations for Canadian SMEs   *Matt Malone*

their effective investigation and litigation in the case of theft. Various IP protection models have been established to address the IP needs of SMEs, such as IP clinics and pro bono programs (Cabeca & Chaperot, 2017). However, the limitations of these models have also been highlighted (Dahl & Phillips, 2018), given that they are often not well-equipped to respond to investigation and litigation, as trade secret theft requires.

Thus, tensions over IP can arise that create unique challenges for innovative SMEs regarding theft of their trade secrets. Disputes over theft of trade secrets have been growing in recent years (Almeling, et al., 2010). This appears to be particularly true in two contexts that SMEs are prone to encounter by their very nature. The first situation involves the hiring by a competitor of an employee from an innovative SME (or an employee leaving an innovative SME to start a directly competitive enterprise). In such scenarios, trade secret theft may occur as the employee deploys not only their unique skills and talents, but also makes use of trade secrets from the SME that they left. The second common situation pertains to mergers and acquisitions, where a SME may enter discussions with a larger company, only to find that confidential circumstances in the discussion were breached, resulting in the misappropriation of trade secrets. Of course, these scenarios are not exclusive. However, both scenarios place an innovative SME into a position and posture where it is necessary to prosecute trade secret theft. And both may not only be harmful to a SME, but potentially destructive to the business. In sum, the stakes of potential trade secret disputes where an innovative SME must prosecute trade secret theft are of critical significance for how their business is conducted.

This article addresses the challenges faced by SMEs in navigating these tensions by examining a powerful new instrument for the enforcement of IP rights that stands to supplement the inherent resource shortcomings of SMEs in Canada – namely, section 391 of the Criminal Code. Section 391 offloads from SMEs who experience trade secret and confidential information theft the investigatory and prosecutorial responsibilities associated with seeking legal redress for these harms, and allocates these responsibilities to the state. In doing so, it provides a significant instrument in the defense and remediation of Canadian IP theft. At the same time, significant risks and specific considerations are involved in seeking assistance from law enforcement authorities when making a complaint under the aegis of section 391, which this article probes. Finally, this article provides

practical advice to SMEs in Canada seeking to file a complaint under section 391.

The New Section 391 of the Criminal Code of Canada

Given the resource obstacles noted above, innovative SMEs have historically tended not to be predisposed to seek legal redress when trade secret theft occurs. However, the federal government recently revised the *Criminal Code of Canada* to provide an important new tool for innovative SMEs that experience trade secret theft: section 391. This new section sets forth that "[e]veryone commits an offense who, by deceit, falsehood or other fraudulent means, knowingly obtains a trade secret or communicates or makes available a trade secret" (Crim. Code, sec. 391). Section 391 defines a trade secret as "any information that is not generally known in the trade or business that uses or may use that information; has economic value from not being generally known; and is the subject of efforts that are reasonable under the circumstances to maintain its secrecy" (Ibid). Further clarification is given to note that information is not a trade secret when it was "obtained by independent development or by reason only of reverse engineering."

The main elements of an offence under section 391 include:

- The defendant obtained, communicated, or made available a trade secret;

- The defendant knowingly acted by deceit, falsehood or other fraudulent means; and

- The information was a trade secret.

Section 391 was passed as part of an omnibus bill implementing the USMCA (effective since July 1, 2020), which required that all signatory parties "shall provide for criminal procedures and penalties for the unauthorized and willful misappropriation of a trade secret" (USMCA, art. 20.71). At the time of signing the USMCA, the United States of America already had a similar provision on the books in the *Economic Espionage Act*, which criminalizes economic espionage by a foreign entity, as well as commercial theft of trade secrets by a private party (U.S. Code, Title 18§ 1832 et seq). Although Canada has had economic espionage as a criminal offense on the books for years, under the auspices of the *Security of Information Act*, it had lacked

Criminal Enforcement of Trade Secret Theft: Strategic Considerations for Canadian SMEs   *Matt Malone*

an equivalent offense to the commercial theft of trade secrets between private actors where there was no foreign economic espionage element. Section 391 of the *Criminal Code of Canada* now fills this legal vacuum, though to the present date of writing this paper, section 391 has not yet been used in Canada.

Significance of Section 391

What section 391 promises to do for innovative SMEs is not insignificant. It offers them investigatory and prosecutorial powers from the federal government to address instances of theft of trade secrets, providing them with resources that were previously only available to larger commercial actors that already possessed them. In doing so, section 391 gives innovative SMEs an opportunity to level the legal playing field.

In the past, the only available recourse for innovative SMEs in cases of trade secret theft were civil law remedies, such as filing for a breach of confidence, breach of fiduciary obligations, or breach of contract. This was resource-intensive to investigate and successfully litigate. In tackling a breach of confidence, courts in Canada always enjoyed "ample jurisdiction to fashion appropriate relief out of the full gamut of available remedies, including appropriate financial compensation", which it was believed would put "the confider in as good a position as it would have been in but for the breach," as well as the option of filing for injunctions (Cadbury, 1999.)

However, disputes over a breach of confidence pose practical challenges for SMEs as a legal instrument. If a dispute goes to court, one concern for SMEs is dealing with judges that are potentially incapable of understanding the technological and scientific issues at hand without the aid of expensive expert analyses to assist them. Moreover, the fact-intensive nature of trade secret disputes renders the remedies in such matters somewhat unpredictable. Because such disputes turn on factual questions (for example, defining the trade secret and the alleged misappropriation), discovery and litigation can drag on well past the summary judgment. All these factors breed uncertainty – and come with high legal costs. In sum, a breach of confidence is a resource-intensive form of legal protection that does not easily invite innovative SMEs to avail themselves of the law. Section 391 removes these resource burdens and presents far fewer resource obstacles, making the responsibilities of investigation and prosecution incumbent on the state.

Another significant change in the law is that section 391 alters the constitutive elements and punishments for theft of trade secrets. A breach of confidence is a three-part test that requires a party bringing forward an allegation of trade secret theft. The party must prove: 1) the subject matter at hand had a quality of confidence to it, 2) that it was imparted in circumstances obliging confidence, and 3) that it has been the subject of an unauthorized use to the detriment of the party who originally communicated it in confidence (Coco, 1969; Lac Minerals, 1989). If a party can prove these elements, it can generally obtain damages and/or an injunction. However, proving "unauthorized use" is a challenging standard. On the other hand, Section 391 only has an "intent" requirement that combines with a guilty act of "knowingly obtain[ing] a trade secret or communicat[ing] or mak[ing] available a trade secret" (Crim. Code, sec. 391). Finally, there is a difference in the resulting penalties with the new code. Whereas a breach of confidence may have brought a winning party damages and/or an injunction, liability under section 391 comes with punishment of committing an indictable offense bearing "imprisonment for a term not exceeding 14 years", or summary conviction for which the penalty is a fine of not more than $5,000 or term of imprisonment not exceeding six months or both (Ibid; Crim. Code, sec. 787).

Given the obstacles to prosecution presented by a breach of confidence case, many Canadian companies have instead historically litigated trade secret theft in the United States, if they could find some kind of nexus with that jurisdiction. In the United States, unlike in Canada, the federal government and nearly every state have statutes that permit private parties to bring a cause of action against other private parties. The federal statute provides a different and lower standard than the breach of confidence in Canada (U.S. Code, Title 18 §%1832 et seq.). The same is true of US state-level statutes (UTSA, s. 1). Perhaps for this reason, many Canadian companies often avail themselves of American rather than Canadian law. For example, in 2018 Bombardier Aerospace filed suit against Japan's Mitsubishi Heavy Industries Ltd. for theft of trade secrets related to certifying regional jets. The underlying theft occurred in Quebec. But Bombardier did not file in Quebec or even in Canada. Rather, it filed in the Western District of Washington, the location of Aerospace Testing Engineering & Certification Inc., a third-party working with Mitsubishi on the certification of a 90-seat regional jet (Layne, 2020.) The case was notable for Bombardier's strategic decision not to file in Canada (and not to avail the

Criminal Enforcement of Trade Secret Theft: Strategic Considerations for Canadian SMEs *Matt Malone*

company of home turf advantage), but rather instead to go on the offensive against theft of trade secrets in a less familiar foreign jurisdiction.

Methodology

Having canvased the IP challenges facing SMEs and the changes wrought by section 391, this article suggests that section 391 of the *Criminal Code* addresses many of these challenges. The article now proffers practical considerations, insights, and tools for SMEs that may consider or benefit from enforcing their legal rights under the auspices of section 391. Given the challenges for SMEs to protect their IP, and the significance of section 391, this paper reflects on two main strategic considerations: 1) strategic considerations that SMEs should take when deciding whether or not to lodge a complaint under the auspices of section 391, and, 2) if they decide on making a formal complaint, clear guidelines as to how it can be articulated, documented, and filed (along with preparatory steps that a SME should take if it decides to do so). In both of these areas, the article presents a comparative analysis with similar statutory laws in the United States, as well as practical litigation events in recent years as a way to understand legal trends.

Examining the Strategic Implications of Section 391

The Canadian federal government has not yet given indication of what types of matters it intends to prosecute under section 391. But if the American example provides any lessons, innovative SMEs suspecting that theft has occurred under the auspices of a foreign actor will likely have the most success in convincing the federal government to take up prosecution. In the United States, prosecutorial guidelines advise government attorneys that are considering to file charges under the *Economic Espionage Act*, that "[t]he criminal enforcement of IP rights plays a critical role in safeguarding U.S. economic and national security interests … our national security interests can be undermined by foreign and domestic competitors who deliberately target leading U.S. industries and technologies to obtain sensitive trade secrets that have applications in defense, security, or critical infrastructure" (Pros'g IP Crimes, 2020).

In the United States, the announcement of a "China Initiative" in December 2018, which sought to oppose Chinese misappropriation of intellectual property, coincided with a spike in prosecutions under the *Economic Espionage Act* (China Initiative, 2018). The U.S. Department of Justice noted that 60 per cent of all trade secret theft cases brought during this time had "at least some nexus to China" (China Initiative, 2018; Morton, 2019). Although some observers may be inclined to view such actions as a particular obsession of current President Trump's administration, it is notable that in 2011 President Obama's administration released a document on the *Administration Strategy on Mitigating the Theft of U.S. Trade Secrets*, which laid the groundwork for the future China Initiative, including the appointment of specialist attorney generals at each of the 97 U.S. Attorney Offices to prosecute theft of trade secrets (Administration Strategy, 2013).

The existence of a national security dimension is not the only factor that will go into whether a country's federal government will prosecute such theft. The U.S. Department of Justice has created guidelines for economic espionage that specifically identify the following "discretionary factors" in determining whether or not to bring forward charges: "(a) the scope of the criminal activity, including evidence of involvement by a foreign government, foreign agent or foreign instrumentality; (b) the degree of economic injury to the trade secret owner; (c) the type of trade secret misappropriated; (d) the effectiveness of available civil remedies; and (e) the potential deterrent value of the prosecution" (DOJ Manual, 2018). One notable Canadian practitioner of trade secret law recently opined that the federal government should develop similar prosecution policies to these, as a form of guidance to actors in the private sector (Courage, 2020).

These considerations aside, in Canada there are several important risks inherent in reporting theft of trade secrets to law enforcement. Although law enforcement has powerful investigatory and prosecutorial tools (and at no cost to the reporting party), reporting trade secret theft as a crime has potential downsides. Some of these are ancillary, such as potential bad publicity, while others are more essential, including the loss of control over proceedings when law enforcement assumes control to investigate and the Crown (i.e., government attorneys) prosecutes. Delays can also be a major issue. As even the Supreme Court of Canada noted in *R. v. Jordan* (2016): "a culture of complacency towards delay has emerged in the criminal justice system" (R. v. Jordan, 2016). Given that time is often a crucial consideration for innovative SMEs – including being one of the reasons in the first place that they resort to "trade secret" status for assets, rather than going for patents, which require a

Criminal Enforcement of Trade Secret Theft: Strategic Considerations for Canadian SMEs *Matt Malone*

lengthy registration process – such attitudes may discourage SMEs from seeking out the assistance of law enforcement and the Crown.

A supplementary concern is the confidentiality of the proceedings. As noted above, one concern of trade secret litigation is that it can thwart the discovery process during litigation (i.e., the period when parties in a lawsuit make available to one another all relevant evidence). Such can occur if the discovery process were used not to locate and prove instances of misappropriation, but rather to locate trade secrets themselves, as a fishing expedition. Another major concern for SMEs is that, in Canadian government-led prosecutions, the Crown has specific disclosure obligations. As in the United States, where confidentiality is not wholly guaranteed in light of the 5th Amendment and *Brady* obligations, in Canada legal precedent requires that "the Crown is under a general duty to disclose all relevant information" to the defense (R. v. Stinchcombe, 1991). Additionally, innovative SMEs may reasonably doubt the Crown's ability to safeguard and keep information confidential. For example, in 2019 it was revealed that the RCMP's Director General of National Intelligence was arrested (case still ongoing) on charges of allegedly communicating confidential information (Tunney, 2020). Similarly, in 2020 the Revenue Canada website was subject to a notable data breach (Patel & Ling, 2020).

Finally, although it is an obvious point, a further important consideration for an innovative SME when considering to ask the federal government to prosecute trade secret theft is confirming the existence of trade secrets. Such lawsuits can sometimes be used by companies as battering rams to discourage innovation– something courts seek to discourage through measures like cost and fee awards in civil cases. Although this consideration may not entirely translate to the criminal law, filing a false report carries significant penalties (Crim. Code, s. 140) Thus, somewhat similar dynamics play out as in cost and fee awards. A prerequisite of most civil litigation is that the trade secrets at the heart of the dispute be identifiable, so as to allow a court to assure that the dispute is not meritless (and also that the dispute is not, in fact, just a strategy to force a party to disclose their trade secrets through litigation techniques like the discovery process). It also allows the defense to proffer defenses, such as reverse engineering or public knowledge. Thus, any entity contemplating litigation should confirm that their claim has a solid good faith basis before filing the complaint.

Further, a party is more likely to obtain the support and interest of law enforcement authorities if the allegation of misappropriation of trade secrets is specific and narrow, rendering the complaint more easily susceptible to verification (as opposed to a making a kind of laundry list accusation).

Responding to Trade Secret Theft with Section 391

Despite the existence of section 391, the Canadian federal government has thus far provided little guidance to victims of trade secret theft. Section 391 has not come accompanied with meaningful guidance as to how companies, and in particular, innovative SMEs – may avail themselves of the law. This differs markedly from the situation in the United States, where the Department of Justice published (2013) *Reporting Intellectual Property Crime: A Guide for Victims of Copyright Infringement, Trademark Counterfeiting, and Trade Secret Theft.* This DOJ guideline urges victims of trade secret theft to fill out a victim checklist with many useful instructions, including:

- Background and contact information

- Description of the trade secret

- General physical measures taken to protect the trade secret (including the existence of confidentiality and non-disclosure agreements, computer infrastructure descriptions, document controls, and employee controls)

- Description of the theft of trade secrets

- Background on whether civil proceedings have been filed (Rep'g IP Crime, 2013)

This checklist then instructs victims to provide a copy to a federal law enforcement official (Ibid). Helpfully, the checklist also includes reproductions of the language of relevant legal provisions. The Canadian federal government does not offer such guidelines, but now that the underlying criminal law is effectively the same, an innovative SME that has been the victim of trade secret theft can borrow the DOJ checklist and use it to conduct their forensic analysis of trade secret theft. Upon completion of the report, they can provide it to the RCMP or a police force jurisdiction where the innovative SME is located, in the same way that they would report any criminal offense. In addition to such measures, basic

Criminal Enforcement of Trade Secret Theft: Strategic Considerations for Canadian SMEs   *Matt Malone*

steps should be taken once an SME becomes aware of a trade secret theft to preserve evidence, in particular any records that have monitored the transmission of data and tracked employees that may document the theft.

Finally, although this paper has focused on measures from the perspective of taking a defensive posture towards IP, which is relevant for a SME suffering theft of trade secrets, such entities should also be alert to the concern that section 391 may be mobilized against them. As one practitioner noted: "Disputes between companies and their departing employees or former business collaborators can also be very polarized and intense, making it further difficult to judge the facts well enough at the outset to decide whether to lay charges" (Courage, 2020). Thus, companies should undertake careful measures to avoid potential theft to their trade secrets, including through employee training on best practices handling any information that may be susceptible to such designation.

Conclusion

Section 391 is a powerful instrument for SMEs in Canada to protect their IP. It makes up for many resource deficiencies that they experience, in particular vis-à-vis their larger competitors. However, recourse to section 391 comes with specific advantages and disadvantages that this paper has laid out for SMEs to contemplate. Further, this paper has provided practical advice for initiating a complaint under section 391.

Innovative SMEs should take seriously the important measures they put in place to protect their trade secrets. Routine audits are an important way for such companies to think on a regular basis about how they govern and restrict access to information, including what employment policies they have in place, and how employees are trained to protect such information. Business measures like this are of central importance in court. While these prophylactic measures can go a long way in preventing the misappropriation of trade secrets, in the event that something is stolen, they also form important pillars in building a case for prosecution by helping harness evidence to build a persuasive legal narrative. If theft of a trade secret occurs, a SME should undertake immediate steps to preserve whatever evidence of it they have available to them.

This article addressed the challenges that Canadian SMEs face in protecting their IP due to resources deficiencies. It focused on a recent solution to these deficiencies presented by section 391 of Canada's *Criminal Code.* It took into account considerations for SMEs when turning to this new legal protection, including advantages and drawbacks to enforcement, and devised a practical suggestion of utilizing the checklist prepared by the DOJ as a tool to report relevant information to the RCMP, or police force in another jurisdiction (or even simply to make a record for themselves) in the event of trade secret or confidential information theft. Going forward, in addition to the federal government developing tools that are specifically designed for SMEs to assist effective enforcement, further research will be needed to examine the ways in which such enforcement should be structured, expanded, and also limited to maintain a robust innovation environment in Canada.

References

Almeling, D.S., Snyder, D.W., Sapoznikow, M., McCollum, W.E., & Weader, J. 2010. A Statistical Analysis of Trade Secret Litigation in Federal Courts. *Gonzaga Law Review*, 45:2: 291-334.

Brant, Jennifer, and Lohse, Sebastian. 2013. Enhancing Intellectual Property Management and Appropriation by Innovative SMEs. International Chamber of Commerce. *Innovation and Intellectual Property Research Paper No. 1.*

Cabeca, John, and Chaperot, Ivan. 2017. SMEs and Patents in the United States. *Les Nouvelles - Journal of the Licensing Executives Society*, Volume LII, No. 4.

Cadbury Schweppes Inc v FBI Foods Ltd. 1999. *1999 CanLII 705* (SCC) at para 61, 167 DLR (4th) 577.

Canada. *Criminal Code, RSC.* 1985, c C-46, s. 391.

Canada. *Criminal Code, RSC.* 1985, c C-46, s. 787.

Canada. *Security of Information Act*, R.S.C., 1985, c. O-5, s. 19.

Coco v. A.N. Clark (Engineers) Ltd. 1969. *R.P.C. 41* (Ch.).

Courage, Noel. 2020. *The Past and Future of Canada's Criminalization of Trade Secret Theft – Part II.* March 3, 2020. Bereskin and Parr.

Dahl, Cynthia, and Phillips, Victoria F. 2018. Innovation and Tradition: A Survey of Intellectual Property and Technology Legal Clinics. *Clinical Law Review*, 25:95.

Criminal Enforcement of Trade Secret Theft: Strategic Considerations for Canadian SMEs   *Matt Malone*

French, D.J. 2010. Why Intellectual Property Will Not Save the Canadian Economy. *Open Source Business Resource.*
http://timreview.ca/article/396

Friesike S. 2011. Profiting from Innovation by Managing Intellectual Property. *PhD thesis.* University of St. Gallen.

Kitching, John, and Blackburn, Robert A. 2003. Innovation, Intellectual Property and Informality: Evidence from a Study of Small Enterprises and Some Implications for Policy. *University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship.*

Lac Minerals Ltd v International Corona Resources Ltd. 1989. *2 SCR 574, 1989 SCJ No 83.*

Layne, Nathan. 2018. Bombardier sues Mitsubishi jet program over trade secrets. *Reuters.*

Macdonald, Stuart and Lefang, Bernard. 2003. Worlds Apart: Patent Information and Innovation in SMEs. *University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship.*

Morton, Mindy. 2019. *Why Companies Should Care about Increasing Criminal Enforcement of Trade Secret Theft.* Procopio LLP.

Obama, Barack. 2013. President of the United States. *Administration Strategy on Mitigating the Theft of Trade Secrets.* February 2013.

OECD. 2010. *Innovative SMEs and Entrepreneurship for Job Creation and Growth: 'Bologna + 10' High-Level Meeting on Lessons from the Global Crisis and the Way forward to Job Creation and Growth.* OECD Publishing, Paris.

Patel, Raisa and Philip Ling. 2020. CRA shuts down online services after thousands of accounts breached in cyberattacks. *CBC News.*

R. v. Jordan. 2016. *SCC 27* (CanLII) at para. 40, [2016] 1 SCR 631.

R. v. Stinchcombe. 1991. *1 CanLII 45* (SCC), [1991] 3 SCR 326.

United States Department of Justice. 2013. *Reporting Intellectual Property Crime: A Guide for Victims of Copyright Infringement, Trademark Counterfeiting, and Trade Secret Theft.* Computer Crime and Intellectual Property Section.

Tunney, Catherine. 2020. New charges claim RCMP official 'intentionally' shared operational information back in 2015. *CBC News.*

Uniform Law Commission. *Uniform Trade Secrets Act*, s. 1, para. 2.

United States-Mexico-Canada Agreement, art. 20.71.

United States Code. *Title 18 §1832 et seq.*

United States Department of Justice. 2018. *Attorney General Jeff Session's China Initiative Fact Sheet.*

United States Department of Justice. 2018. *China Initiative.*

United States Department of Justice. 2015. *Prosecuting Intellectual Property Crimes.* 4th Ed. Office of Legal Education for United States Attorneys.

United States Department of Justice. 2018. *Department of Justice Manual*: Section 9-59.100.

About the Author

Matt Malone is a Canadian-trained lawyer with an interest in law and technology. He has practiced trade secret law in Silicon Valley for several years. Prior to that, he worked at the Centre for International Governance Innovation, Bombardier Aerospace, and the Centre for Intellectual Property Policy. His research has been published in various peer-reviewed journals, including *The Advocates' Quarterly, Canadian Class Action Review,* and *Canadian Intellectual Property Review.*

Demystifiying the Meaning of Transnational Entrepreneurship: Indian transnational entrepreneurs in comparative perspective

Supriya Singh, Punit Saurabh, Nityesh Bhatt

" Ultimately, each transnational firm strives for its own advantage, and is supported in that effort by the state power wherein it resides, or at least where its main shareholders are domiciled. "

- Herbert Schiller

Migration of people from one geographical location to another, within or outside a country, has a major role to play in the socio-economic development across the globe. 'Migrants' and 'immigrants' that showcase entrepreneurial traits and are valued in both home and host countries. Transnational entrepreneurs are often studied in various cross-national entrepreneurial research streams, like international entrepreneurship, immigrant entrepreneurship, thus causing ambiguity in the existing definitions. This paper contributes a specific definition of "transnational entrepreneurship", based on secondary research, which takes into account different mobility types. It emphasizes the importace of this construct for developing transnational entrepreneurial typologies. The authors propose a 'framework of transnational entrepreneurship' in the paper.

Introduction

People have several motives for migrating. These vary from business opportunity exploration, work/employment, education, marriage, safety, and fear. The World Migration Report (2018) estimated the rate of internal migration (people migrating within their own country) at 740 million globally. Many have an aspiration and dream of migrating to some developed region or foreign land to seek better opportunities. The home country of this paper's authors, India, has also had a rich history of migration and immigrants.

O 'Leary (2019) summarizes human population migration as "the movement of a person or groups of people from one place to another with the intention of settling temporarily or permanently in that new location", whereas internal migration refers to "migration within the borders of a country". A cursory view of ancient manuscripts, literature, and excavations, highlights the prominent reasons behind migration; mainly as a result of a war, unrest, partition, famine, flooding, and outbreak of a life-threatening disease. In recent times, migration and immigration can also be attributed to searching for a business, job, or career

opportunity. Other important factors influencing migration can also be attributed to a pattern of development, social structure, seasonal pattern, inter-regional disparity, socio-economic disparity, displacement & deforestation, lack of employment opportunities, survival, wage differentials, education, and marriage (Srivastava & Sasikumar, 2003).

Migration has impacted international trade and globalization to a considerable extent, boosting bilateral relations between nations. At times, illegal migration/immigration has led to conflict situations leading to wars, while controlled and legal migration/immigration has positively contributed to the development of both the regions, both in the country of origin and the end-destination. Many migrants continue to maintain business connections with their home nations or states. Various typologies are used for internationally working entrepreneurs, such as self-initiated expatriate entrepreneurs, diaspora entrepreneurs, immigrant or migrant entrepreneurs, ethnic entrepreneurs, expatpreneurs, and trailing spouse entrepreneurs (Yokoyama & Birchley, 2020). Given the multiple definitions, meanings, and synonyms catering to transnationalism, transnationals,

Demystifiying the Meaning of Transnational Entrepreneurship: Indian transnational entrepreneurs in comparative perspective

Supriya Singh, Punit Saurabh, Nityesh Bhatt

transnationalism, and transnational entrepreneurs, in this paper we highlight some definitions given to bring clarity to this topic.

Our research is organized as follows. The first section identifies and summarizes key insights from literature review concerning 'transnationalism' and 'transnational entrepreneurship'. The following section addresses the research methods used. Subsequent sections discuss the key finding that comprises a new framework for 'transnational entrepreneurship', along with providing a checklist that can be used for clarifying terms. Further, we make a distinction between TEs (transnational entrepreneurs) and IEs (international intrepreneurs) based on Forbes magazine's India's rich list of 2018. The paper then offers concluding thoughts and implications.

Summary of Insights from Literature

Transnationalism & Transnational Entrepreneurs (TE)
This section discusses the key perspectives provided by prominent authors on transnationalism and transnational Entrepreneurship.

Gammage (2006) defined 'transnationalism' as a "novel outlook or reflection on 'diaspora policies' that aims at inspiring and managing the connection of 'expat communities' in the actions that contribute to the economic progress of the origin countries". Rangel-Ortiz (2008) considered it as "an advancement in understanding of the immigrant adaptation and acculturation between two countries and a contemporary way of exploring the social, political, cultural and economic association that the immigrants build and retain to connect the country they hail from and the one they have migrated to".

Contrary to Gammage's definition, Portes et al. (1999) refer to 'transnationalism' as "the economic initiatives of transnational entrepreneurs who mobilize their contacts across borders in search of suppliers, capital and markets". Gammage's views nevertheless were earlier stated by Schiller et al. (1992), considering it as "a process by which migrants, through their daily activities and social, economic, and political relations, create social fields that cross national boundaries". Drori and colleagues (2006) summarized TE as "an immigrant engaged with entrepreneurial undertaking in at least two or more socially embedded environments concurrently, contributing to the home and host economies".

These definitions of 'transnationalism' discuss the role

of immigrants and expat communities, along with their ensuing socio-economic contribution.

Transnational Entrepreneurship
'Transnational entrepreneurship' has grown as a topic of interest. For Lin & Tao, 2012, transnational entrepreneurs are individuals driven by 'pure survival strategy' to engage in cross-border actions to accomplish their basic social and economic needs. However, when TEs work between a host country and their home country (Chen & Tan, 2009), they tend to migrate and reside at a new destination, yet keep a consistent link with the country, where they belong to (Brzozowski et al., 2014).

Landolt et al. (1999) introduced four types of transnational enterprises - circuit firms, cultural enterprises, ethnic enterprises, and return migrant micro-enterprises. According to Terjesen and Elam (2009), TEs can internationalize directly and play an intermediary role for local businesses involving economic, social, cultural, and symbolic capital. Adiguna & Shah, (2012) concluded that global family-owned ventures are more likely to find favor with the definitions of "transnational entrepreneurship" proposed by Mustafa and Chen (2010) who refer to a "transnational family and kinship networks" of immigrant entrepreneurs. This provides the necessary grounding to utilize and access resources across borders, while also allowing them to participate in cross-border business undertakings (Mustafa & Chen, 2010). Chen (2018) indicated the importance of 'entrepreneurial human capital' for success in the Chinese and Australian contexts, highlighting the human resource dimension of transnational entrepreneurs.

Chen and Tan (2008) found that entrepreneurs in general build upon prospective opportunities in the international domain through connections locally and distributed globally. However, strict immigrant policies serve to stifle networking that could benefit entrepreneurs. Wahlbeck's (2018) study on Turkish entrepreneurs in Finland highlighted the difficulty of strict and restrictive immigrant policies, while exploring possibile transnational ties. Urbano et al. (2011) concluded that "social networks, immigrants' perceptions of the entrepreneurial culture and opportunities in the host society" play a vital role in accelerating the development of transnational entrepreneurial activities. In the host country, "tolerance, openness, recognition and validation of credentials" from the country of origin, along with

Demystifiying the Meaning of Transnational Entrepreneurship: Indian transnational entrepreneurs in comparative perspective

Supriya Singh, Punit Saurabh, Nityesh Bhatt

government services are considered as supporting factors that help diaspora entrepreneurship (Nkongolo-Bakenda & Chrysostome, 2019). With bifocal orientation, TEs maintain personal and professional relationships in two different geographical spaces while operating their enterprises (Manimala et al., 2019) . Thus, a host of factors impact the success or failure of transnational entrepreneurship.

Transnationals often promote international trade and business across the globe. Yeung (2002) confines TEs in three inter-related characteristics that describe the entrepreneurial process: (1) control of resources, (2) capabilities in strategic management, and, (3) abilities to create and exploit opportunities in different countries. Several scholars have included both immigrant and ethnic entrepreneurs under the banner of transnational entrepreneurs that maintain operations and business presence in the home as well as host countries (Brzozowski et al., 2014). Terjesen & Elam (2009) concluded that the majority of TEs belong to immigrant communities and tag transnationals as "mediators" who practice entrepreneurship, that is extended across borders.

The socio-relevancy of TEs seems to appear due to the heavy participation of immigrant entrepreneurs in boosting business practices between the country of origin and the host country (Portes et al. 2002; Bagwell 2015; Wang & Liu, 2015). Chen (2018) however contents that an entrepreneur need not be an immigrant, but that instead anyone with "cross border experiences and business interests" counts as a TE. In short, the multiple meanings of "transnational entrepreneurship" contribute to ambiguity.

Overlapping streams of TE
The concept of transnational entrepreneurship is still vague and contested (Yokoyama & Birchley, 2020). Confusion and ambiguity persist in the transnational entrepreneurship literature, due to the overlap and connection between the terms.

- International Entrepreneurs (IEs): IEs engage in cross-border entrepreneurial undertakings. They find, act, assess, and manipulate opportunities across domestic borders to produce quality goods and services (McDougall & Oviatt, 2000). The literature has previously connected IE with TE (Drori et al., 2006; Drori et al., 2009; Adiguna & Shah, 2012; Manimala et al., 2019; Yokoyama & Birchley, 2020).

- Immigrant Entrepreneurs are the people who choose to settle down in a foreign place for a long or short duration to gain better business opportunities and experiences. When foreigners reside in a host country and create a venture, they are termed as "immigrant entrepreneurs". Thus, the entrepreneurial activities executed by immigrants in a country are referred as immigrant entrepreneurship (Aldrich & Waldinger, 1990). Several studies, including by Drori et al. (2006), have interlinked immigrant entrepreneurs with TE.

- Ethnic Entrepreneurs (EEs): Entrepreneurs whose group membership is tied to a common cultural heritage or origin (Honig et. al, 2010) are sometimes known as "ethnic entrepreneurs". The ethnicity of an entrepreneur depicts their cultural belongingness and connectivity with a particular community based on ethnic lines. EEs have being linked with TEs by Drori et al. (2006, 2009), Adiguna and Shah (2012), Honig (2019), and Manimala et al. (2019).

- Returnee Entrepreneurs (REs): Scientists and engineers that return to their home country to start a new venture after several years of business experience and/or education abroad are called "returnee entrepreneurs" (Drori et al., 2009).

Additional terms, like "diaspora entrepreneurs" and "migrant entrepreneurs" have not been described in detail, but are linked with TE. Below in Table 1 we gathered multiple definitions from the literature.

TE research focuses on the importance of cross country business activity (Portes et al., 2002). Transnational diaspora entrepreneurship can generate opportunities for the diaspora and the societies in which they operate, serving as an example of "making globalization good" (Dunning, 2004) and have a profound impact on the economic and social development of their home countries (Kuznetsov, 2006). Ma et al. (2013) point to the importance of enquiring about the relationship between the countries' cultures.

Key Findings: Transnational Entrepreneurship Framework

Need for a distinct Transnational Entrepreneurship Framework
Multiple transnational entrepreneurship frameworks already exist (Chen & Tan, 2009; Drori et al. 2009, etc.).

Demystifiying the Meaning of Transnational Entrepreneurship: Indian transnational entrepreneurs in comparative perspective

Supriya Singh, Punit Saurabh, Nityesh Bhatt

Table 1. Perspectives of Transnational Entrepreneurs and Transnational Entrepreneurship

Author (s)	Year	Perspectives or Definition
Yeung	2002	"A social actor capable of bearing risks and taking strategic initiatives to establish, integrate, and sustain foreign operations."
Drori, Honig, & Ginsberg	2006	"Immigrants simultaneously engage in two or more socially embedded environments and maximize their resource base."
Chen & Tan	2009	"May involve immigrants' border-crossing entrepreneurial activities between the host country, the home country, and /or a third country."
Patel & Conklin	2009	"By concurrently engaging in two or more socially embedded environments, TEs can creatively and efficiently develop and deploy their resource bases to exploit comparative advantages."
Drori, Honig & Wright	2009	"Specific set of entrepreneurs who migrate from one country to another, concurrently maintaining business-related linkages with their former country of origin and currently adopted countries and communities."
Riddle, Hrivnak & Nielsen	2010	"Migrants and their descendants who establish entrepreneurial activities that span the national business environments of their countries of origin and countries of residence."
Honig, Drori & Carmichael	2010	"Social actors who enact networks, ideas, information, and practices for the purpose of seeking business opportunities or maintaining businesses within dual social fields, which in turn force them to engage in varied strategies of action to promote their entrepreneurial activities."
Brzozowski, Cucculellib & Surdej	2014	"Indicates immigrant business engagement not only in the host country, but also in the country of origin."
Bailetti	2018	"A cross-border investment to acquire, combine, and recombine specialized individuals and heterogeneous assets to create and capture value for the company under conditions of institutional distance and uncertainty."
Alexandre, Salloum & Alalam	2019	"Encompasses both immigrant and ethnic entrepreneurs who maintain regular cross-border operations, maintaining an economic presence in (at least) their host and home economies."

According to Krishna and Subrahmanya (2016), studies on transnational entrepreneurship can be understood from the individual perspective, firm-specific dimension, and macro-economic perspective. Bailetti (2018) focused on capturing and creating value, cross-country investments, and institutional distance between business settings, while Manimala et al. (2019) emphasized people who initiate business from a host country and expand it to their home country. Portes et al. (2002) thought it suitable to call TE's as "self-employed immigrants", while Drori et al. (2009) referred to TEs as "social actors" working in dual fields. Given the multiple definitions and contradictions, we felt that a framework was needed to address and bring various perspectives together. We propose to explain transnational entrepreneurs in between the home, host,

and other countries as a unique contribution proposed as part of a "Transnational Entrepreneurship framework".

We present a framework that defines TE at the intersection of domestic, immigrant, and international entrepreneurship. We found, however, that migration is not observed well enough to create a distinction between TEs and others related concepts. One of the major distinctions that our proposed framework shares with the other related frameworks discussed above is the mobility patterns of entrepreneurs. It shows the potential value of migration with TEs from other typologies. Further, we illustrate from the Indian perspective is demonstrated due to its relevance and application.

Demystifiying the Meaning of Transnational Entrepreneurship: Indian transnational entrepreneurs in comparative perspective

Supriya Singh, Punit Saurabh, Nityesh Bhatt

A Transnational Entrepreneurship Framework

Our transnational entrepreneurship framework discusses various types of movement (movement within and outside the country, movement from home and host country) of entrepreneurs that might categorize an individual as a TE. Further, it also establishes distinct ways to separate TEs from other existing definitions, including the place or location where a venture is launched to grow beyond the borders of the country. This is aptly demonstrated in figures 1-3 given below. However, studies on figuring out the appropriate typology of transnationals are thin in the available TE literature.

Our framework highlights the types and nature of mobility that an individual might undertake to start the journey of entrepreneurship. This falls under various meanings at different stages of their business. The type of migration that an entrepreneur attempts positions them as a TE, while there are diverse types of entrepreneurs with international connections. The framework therefore identifies TEs according to unique dimensions.

TEs can also be interlinked with many cross-national entrepreneurial practices. Thus, our framework focuses primarily on entrepreneurs' nationality and residence, which helps distinguish TE with other typologies. Many researchers (Drori et al., 2006; Patel & Conklin, 2009; Alexandre et al., 2019), have highlighted the existence of entrepreneurs in two or more economic spaces. Keeping this context in mind, our framework draws connections with the home, host, and other countries. Further, each mobility type is named as per the movement and expansion of an individual's entrepreneurial activities. Our framework was created after considering various perspectives (Drori et al., 2006; Chen & Tan 2009; Patel & Conklin, 2009; Drori et al., 2009; Riddle et al., 2010; Brzozowski et al., 2014; Alexandre et al., 2019). It offers a simple approach to transnational entrepreneurship based on data regarding nationality, place of business incorporation, and spread of business beyond borders, which can be relatively easily gathered. Thus, our framework provides a way of understanding various key constituents of TEs.

Relevance of the framework for India and other nations

Our TE framework particularly helps when labelling TEs that have a higher rate of migration within as well as internationally. For instance, some developing countries like Indonesia, Nepal, Pakistan, Nigeria, Africa, India, and China, fit well under this framework. In India, for example, much of the population resides in rural areas. Hence, people migrate to urban areas for a better life, with career and business opportunities. Additionally, due to a lack of business options, migration within India is often observed (people from a less developed state like Uttar Pradesh moving towards more developed cities and states like Gujarat and Maharashtra), while the rate of foreign migration is also very high. The main scope of our framework is driven by the co-existence of different types of mobility found in India. Nigerians in Europe and America (Ogbuagu, 2013), Africans in China (Bischoff, 2017), and Chinese in Australia (Chen, 2018) offer additional similar examples.

India's large population and relatively limited domestic opportunities has given rise to mass international
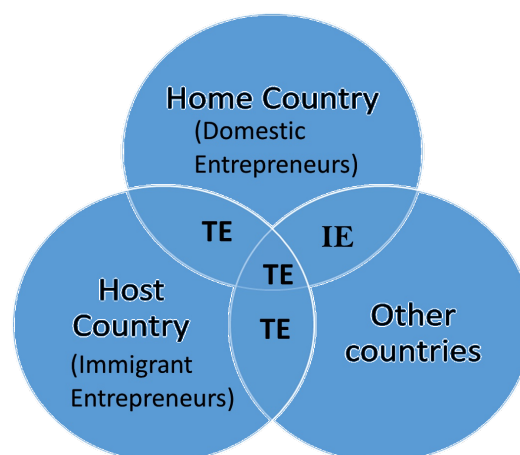

Figure 1. Framework of Transnational Entrepreneurship

Demystifiying the Meaning of Transnational Entrepreneurship: Indian transnational entrepreneurs in comparative perspective

Supriya Singh, Punit Saurabh, Nityesh Bhatt

migration. Due to this, India led the world in international migrants for 2019 (Sen, 2019). Guajaratis in the US, Punjabis and Sikhs in Canada, south Indians in GCC nations, and Biharis in Mauritius, are few prominent examples.

The above representation classifies entrepreneurs. Our framework includes the country that an entrepreneur hails from (Home Country), country of residence (Home/Host Country), and the entrepreneurial activities. We discuss our framework below with the help of two scenarios involving various types of migration in an individual's entrepreneurial journey.

Scenario 1: The entrepreneur initiates the business from home country (HoC)

1. Intra-Mobility (HoC ≠ TE)
- When an individual initiates a business in their home country (HoC), initially they might commence a small business venture that gradually grows and becomes a medium or large scale enterprise within their home country.

- If the entrepreneur encounters a situation when they must migrate to gain better business opportunities, or for any other reason, they might choose another city in their home country that offers a better ecosystem for them to prosper. In this situation, the entrepreneur migrates within the national boundaries of their homeland.

- (HoC ≠ TE): Migration and business within the home country alone cannot qualify an entrepreneur as a TE. Here, business dealings are carried out intra-nationally, hence this has been referred as 'intra-national mobility'.

- In this scenario, the entrepreneur is denoted as a "domestic entrepreneur" or "national level entrepreneur".

2. Inter-Mobility (HoC + OC ≠ TE)
- When a domestic entrepreneur expands their business from the national to international level, business activities then go beyond national borders and connect two or more economies.
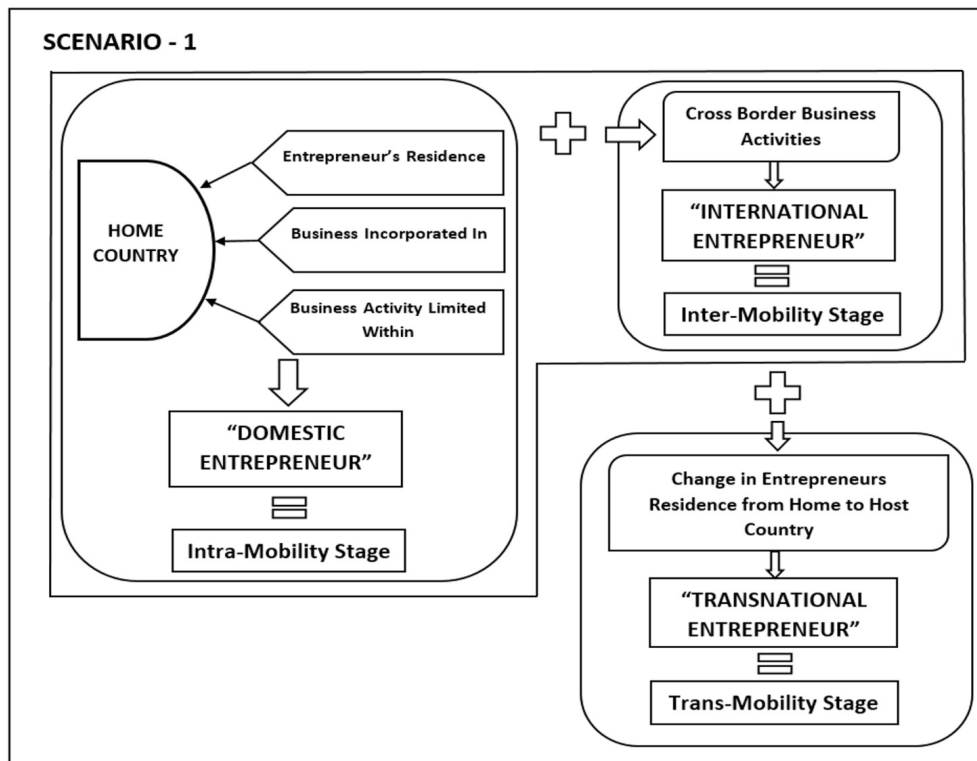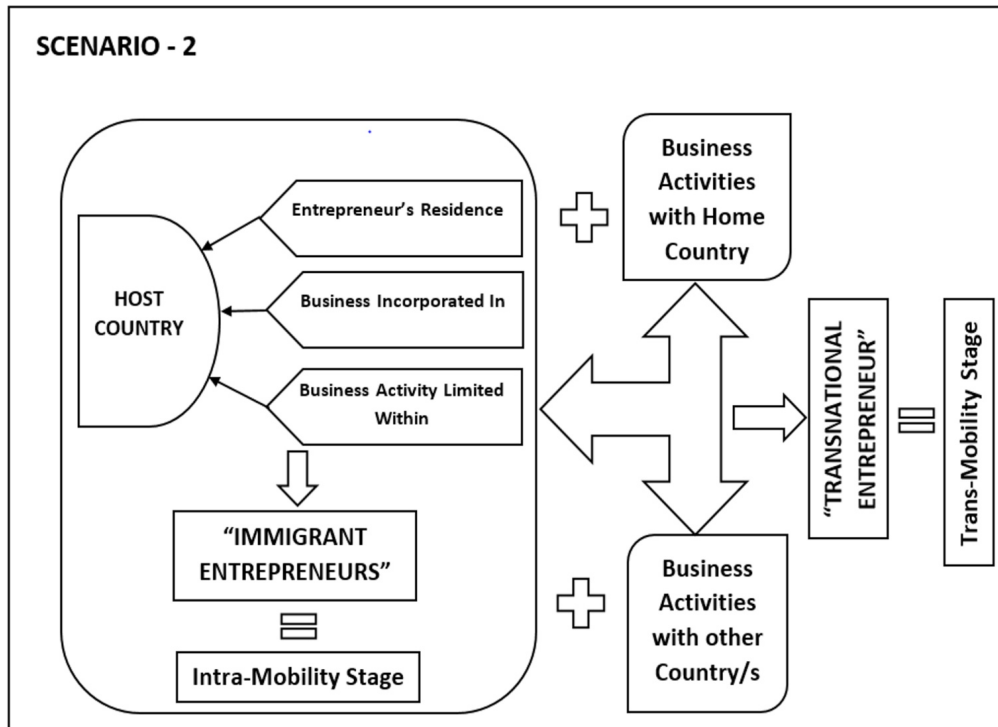

Figure 2. Scenario 1- An entrepreneur initiates a business from their home country

Demystifiying the Meaning of Transnational Entrepreneurship: Indian transnational entrepreneurs in comparative perspective
Supriya Singh, Punit Saurabh, Nityesh Bhatt

Figure 3. Scenario 2 - An entrepreneur initiates a business from the host country

- In this scenario, business activities go beyond national borders, hence this is referred as 'international mobility'.

- (HoC + OC ≠ TE): Business is controlled and directed from the country of residence, meaning, the home country of the entrepreneur. Hence, they do not qualify as a 'transnational entrepreneur' and are instead labelled as an 'international entrepreneur'.

3. Trans-Mobility- (HtC + HoC = TE) or (HoC + HtC + OC = TE)
- An entrepreneur might start from a small enterprise and gradually grow their business within and then outside of the national boundaries.

- (HtC + HoC = TE): In a situation when an entrepreneur opts to settle down in another country (host country) and also runs a venture (s) in the home country, they take the label of 'transnational entrepreneur' (TE).

- (HoC + HtC + OC = TE): Being a resident in a host nation, if an entrepreneur tries to expand their business to other countries and succeeds, a socio-economic connection between home and host

nation and other countries is developed. This also qualifies an entrepreneur as a TE.

- This type of mobility includes a shift of residence from home to host country, along with maini business connect with home and host-land or home, host and other countries. This fulfills all the eligibility criteria of transnational entrepreneurship, and hence is termed as trans-mobility'.

We portray these three types of mobility graphically in Figure 2.

Scenario 2: The entrepreneur initiates the business from the Host Country (HtC)

1. Intra-Mobility (HtC ≠ TE)
- In this scenario, an immigrant starts a small business venture in a host nation that gradually grows inside the host nation.

- If an entrepreneur decides to migrate for better business opportunities or any other reason, they might choose a city in the host country with a better environment. In this situation, the

Demystifiying the Meaning of Transnational Entrepreneurship: Indian transnational entrepreneurs in comparative perspective

Supriya Singh, Punit Saurabh, Nityesh Bhatt

entrepreneur migrates within the national boundaries of their host country.

- Siunce an entrepreneur migrates and their business activities become concentrated within the national boundaries of the host country (HtC), this is labeled as 'intra-mobility'.

- (HtC ≠ TE): In this type of mobility, an entrepreneur is based in a host country with business activities confined within that country's national boundaries. They can therefore be termed as an 'immigrant entrepreneur' rather than as 'transnational entrepreneur'.

2. "Trans-Mobility": (HtC + HoC = TE), (HtC + OC = TE) and (HtC + HoC + OC = TE)

- (HtC + HoC/ HtC + OC/ HtC + HoC + OC = TE): When the business of an immigrant entrepreneur crosses national borders (of the host country) and connects two different nations (home country or any other country), it eventually overlaps two or more distinct economies. This mean the entrepreneur qualifies as a 'transnational entrepreneur'.

- All three conditions, whether an immigrant's business moving beyond the host country, expanding to the home country, or to another country, or in both, qualify a person as a 'transnational entrepreneur'. Hence, we call this "trans-mobility".

- In this case, an entrepreneur develops a transactional relationship between two or more different countries while staying on a host country's territory.

We graphically summarize the two types of mobility in Figure 3.

Both of these scenarios and their classification are based on the definitions and perspectives of various authors given in Table 1. To provide further clarity, we offer the

Table 2. Checklist of being a Transnational Entrepreneur

Scenario	Type of Mobility	Residence of Entrepreneur	Scope of Business Activities	Abbreviation	Qualify as TE	Qualify as
1. When an entrepreneur starts the business from the home country	1. Intra-mobility	Home country	Within home country	(HoC ≠ TE)	No	Domestic Entrepreneur
	2. Inter-mobility	Home country	Home and other countries	(HoC+OC≠ TE)	No	International Entrepreneur
	3. Trans-mobility	Host Country	Home and host countries	(HoC + HtC = TE)	Yes	Transnational Entrepreneur
			Home, host, and other countries	(HoC + HtC + OC = TE)	Yes	Transnational Entrepreneur
2. When an Entrepreneur starts the business from the host country	1. Intra-mobility	Host Country	Only in host country	(HtC ≠ TE)	No	Immigrant Entrepreneur
	2. Trans-mobility	Host Country	Host and home countries	(HtC + HoC = TE)	Yes	Transnational Entrepreneur
			Host and other countries	(HtC+ OC = TE)	Yes	Transnational Entrepreneur
			Host, home, and other countries	(HtC+HoC+OC= TE)	Yes	Transnational Entrepreneur

Demystifiying the Meaning of Transnational Entrepreneurship: Indian transnational entrepreneurs in comparative perspective
Supriya Singh, Punit Saurabh, Nityesh Bhatt

following checklist.

The two major factors for TE as discussed above, are:
1. The country of residence of an entrepreneur
2. The country of origin of a business.

Based on the above framework, we propose the following definition of transnational entrepneurship:

> *When immigrants get involved in entrepreneurial activities by initiating and operating their venture(s) on a foreign land, simultaneously engaging in similar (or different) business(s) in other countries and/or their homeland, in a way that eventually contributes to two or more economies.*

Significance of Transnational Entrepreneurs for India

With approximately 17 million international migrants, India has the largest diaspora (World Migration Report, 2018). Socio-cultural and economic interactions between diaspora communities and their origin nations through trade or remittances sent to families provide ample evidence of a diaspora's impact (Cohen, 2005). In several cases, Indian immigrants have served their host nation in public office. The current Prime Minister of Ireland, Leo Varadkar, hails from Malvan, Sindudurg District of Maharashtra, India (Mahamulkar, 2020).

Transnational entrepreneurs can contribute immensely both to their home country as well as their host country.

Table 3. Distinction between Transnational Entrepreneurs (TE) and International Entrepreneurs (IE)

Name of the Entrepreneur	Company	Current Residence of Entrepreneur	Business presence in Home Country	Business presence in Host Country	Business presence in other countries	Category
Mukesh Ambani	Reliance Industries Limited	Mumbai-India	Yes	No	Yes	IE
Azim Premji	Wipro Group	Bangalore-India	Yes	No	Yes	IE
Lakshmi Mittal	Arcelor-Mittal	London-UK	Yes	Yes	Yes	**TE**
Hinduja Brothers	Hinduja Group	London-UK	Yes	Yes	Yes	**TE**
Pallonji Mistry	Shapoorji Pallonji Group.	Mumbai-India	Yes	No	Yes	IE
Sunny Varkey	GEMS Education	Dubai-UAE	Yes	Yes	Yes	**TE**
Kumar Mangalam Birla	Aditya Birla Group	Mumbai-India	Yes	No	Yes	IE
Sunil Vaswani	Stallion Group	Dubai-UAE	Yes	Yes	Yes	**TE**
Savitri Jindal	Jindal Group	Hisar-India	Yes	No	Yes	IE
Sridhar Vembu	Zoho	Pleasanton-USA	Yes	Yes	Yes	**TE**
Sunil Mittal	Bharti Airtel	Delhi-India	Yes	No	Yes	IE
M.A. Yusuff Ali	Lulu Group	Abu Dhabi-UAE	Yes	Yes	Yes	**TE**

Source: India Rich List 2018 - Forbes India Magazine

Demystifiying the Meaning of Transnational Entrepreneurship: Indian transnational entrepreneurs in comparative perspective

Supriya Singh, Punit Saurabh, Nityesh Bhatt

Many nations including India continue to benefit from remittances sent by the diaspora community to their homelands (Nayyar, 1994). According to a World Bank press release of April 8, 2019, out of $689 billion (USD) remitted around the world, India received the most remittances in 2018 with $79 billion, followed by China with $67.4 billion. Bob Dhillon (Canada), Bicky Chakraborty (Sweden), A.K Nathan (Malaysia), Kirit and Nishita Shah (Thailand), Ananda Krishnan (Thailand), Ryuko Hira 'Kamlesh Punjabi' (Japan) are some of the richest non-resident Indians (Shikhar, 2017).

In the US, Indian-Americans are among the highest earning immigrant communities with a median annual household income of $107,000 (Zong & Batalova, 2017). Of all the companies formed by immigrants in the USA, one third are by Indian diaspora. In Australia, the Asian origin population is a mere 8%, yet about 4% of the top 200 publicly listed companies of Australia have Asian heritage directors on their boards (Rizvi et al., 2016). Indians constitute the "second highest tax paying diaspora" in Australia and contribute significantly to the society and economy (Department of Foreign Affairs and Trade, India. 2020). From these observations, the relevance and importance of transnationals cannot be ignored.

Indian communities have a strong connection with entrepreneurship. Table 3 differentiates between Indian TEs and IEs based on the framework presented above.

Table 3 comprises a list of wealthy Indian entrepreneurs mentioned in Forbes India. Out of a total list of 100 Indian entrepreneurs, 88 were found to be IEs and only 12 qualified as TEs. 12 entrepreneurs are shown in the table above. For instance, Mukesh Ambani is placed under the heading "International Entrepreneur" because the spread of his business is in different countries, while his residence is in the country of origin itself. Contrast this with Lakshmi Mittal, who is referred to as a "transnational entrepreneur" because he resides in the host country from where he manages his host and home country businesses.

Discussion and Conclusion

Transnational entrepreneurship is a typology that has emerged from entrepreneurial activities conducted by entrepreneurs away from their home country. The novel traits of immigrants and their abilities to create and maintain business activities in two or more domains generate numerous monetary and non-monetary perks for the countries engaged. We found multiple perspectives in the literature about transnational entrepreneurship, and tried in this paper to bring out distinctions between the various types of entrepreneurs . The significance of Indian TEs was also discussed in brief to highlight the value of transnational activities. Hence, we believe that creating a favorable ecosystem in both home and host countries to motivate transnational entrepreneurial intentions should be encouraged worldwide.

References

Acs, Z. J., & Terjesen, S. 2013. Born local: toward a theory of new venture's choice of internationalization. *Small Business Economics*, 41(3): 521-535. https://doi.org/10.1007/s11187-012-9446-8

Adiguna, R. & Shah, S.F.H. 2012. Exploring Transnational Entrepreneurship: On the Interface between International Entrepreneurship and Ethnic Entrepreneurship. *Doctoral dissertation*, Jönköping International Business School, Jönköping, Sweden. http://hdl.handle.net/10993/20767

Aldrich, H.E., & Waldinger, R. 1990. Ethnicity and entrepreneurship. *Annual Review of Sociology*, 16(1): 111-135. https://doi.org/10.1146/annurev.so.16.080190.000551

Alexandre, L., Salloum, C., & Alalam, A. 2019. An investigation of migrant entrepreneurs: The case of Syrian refugees in Lebanon. *International Journal of Entrepreneurial Behavior & Research*, 25(5): 1147-1164. https://doi.org/10.1108/IJEBR-03-2018-0171

Bagwell, S. 2015. Transnational entrepreneurship amongst Vietnamese businesses in London. *Journal of Ethnic and Migration Studies*, 41(2): 329-349. https://doi.org/10.1080/1369183X.2014.907739

Bailetti, E. 2018. Transnational entrepreneurship: Distinctive features and a new definition. *Technology Innovation Management Review*, 8(9): 28-38. http://doi.org/10.22215/timreview/1184

Bischoff, P.H. 2017. African transnationalism in China: At the interface of local, transnational, bilateral and multilateral responses. *Journal of Asian and African Studies*, 52(7): 897-914. https://doi.org/10.1177/0021909615623809

Bourdieu, P. 1977. *Outline of a Theory of Practice* (Vol. 16). Cambridge University Press.

Brzozowski, J., Cucculelli, M., & Surdej, A. 2014. Transnational ties and performance of immigrant entrepreneurs: the role of home-country conditions. *Entrepreneurship & Regional Development*, 26(7-8): 546-573.

Demystifiying the Meaning of Transnational Entrepreneurship: Indian transnational entrepreneurs in comparative perspective

Supriya Singh, Punit Saurabh, Nityesh Bhatt

10.1080/08985626.2014.959068

Chen, W., & Tan, J. 2008. Roots and wings: Glocalized networks and transnational entrepreneurship. *Academy of Management Annual Meeting Proceedings*, (1): 1-6.
https://doi.org/10.5465/ambpp.2008.33662544

Chen, W., & Tan, J. 2009. Understanding transnational entrepreneurship through a network lens: Theoretical and methodological considerations. *Entrepreneurship Theory and Practice*, 33(5): 1079-1091.
https://dx.doi.org/10.1111/j.1540-6520.2009.00335.x

Chen, Y. 2018. Exploring immigrant and transnational entrepreneurship in the Australia and China context. *Doctoral dissertation*. The University of Adelaide.

Cohen, J.H. 2005. Remittance outcomes and migration: Theoretical contests, real opportunities. *Studies in comparative international development*, 40(1): 88-112.
https://doi.org/10.1007/BF02686290

Department of Foreign Affairs and Trade, India. 2020. *The Role of the Diaspora - An India Economic Strategy to 2035.*

Drori, I., Honig, B., & Ginsberg, A. 2006. Transnational entrepreneurship: toward a unifying theoretical framework. *Academy of Management Proceedings*, No. 1: Q1-Q6.

Drori, I., Honig, B., & Wright, M. 2009. Transnational Entrepreneurship: An Emergent Field of Study. *Entrepreneurship Theory And Practice*, 33(5): 1001-1022.
doi: 10.1111/j.1540-6520.2009.00332.

Dunning, J.H. 2004. *Making Globalization Good: The moral challenges of global capitalism.* Oxford University Press.
DOI: 10.1093/0199257019.001.0001

Eisenhardt, K.M. 1989. Building Theories from Case Study Research. *The Academy of Management Review*, 14, 4.
https://doi.org/10.5465/amr.1989.4308385

Forbes India. 2019. India Rich List 2018 - Forbes India Magazine. Retrieved 11 November 2019, from http://www.forbesindia.com/lists/india-rich-list-2018/1731/1

Forbes Middle East. 2019. Top 100 Indian Leaders Making an Impact in the Middle East 2019. Retrieved 11 November 2019, from: https://www.forbesmiddleeast.com/profile/top-100-indian-leaders-making-an-impact-in-the-middle-east-2019/firoz-allana

Fornaro, P. 2018. Immigrant Entrepreneurship in Finland (No. 83). *ETLA Report*. ISSN - 2323-2447, 2323-2455

Gabrielli, L., & Franco-Guillén, N. 2018. Transnational diaspora entrepreneurship: the case of Moroccans in Catalonia. *GRITIM-UPF Policy Series*, 7.
http://hdl.handle.net/10230/34012

Gammage, S. 2006. Exporting people and recruiting remittances: a development strategy for El Salvador? *Latin American Perspectives*, 33(6): 75-100.
https://doi.org/10.1177/0094582X06294112

Honig, B. 2019. Exploring the intersection of transnational, ethnic, and migration entrepreneurship. *Journal of Ethnic and Migration Studies*, 46(10): 1974-1990.
https://doi.org/10.1080/1369183X.2018.1559993

Honig, B., Drori, I., & Carmichael, B.A. 2010. *Transnational and immigrant entrepreneurship in a globalized world.* University of Toronto Press.

International Organization for Migration (IOM). 2018. World Migration Report. *The UN Migration Agency.* Retrieved 11 November 2019, from https://www.iom.int/sites/default/files/country/docs/china/r5_world_migration_report_2018_en.pdf

Kuznetsov, Y. (Ed.). 2006. Diaspora networks and the international migration of skills: How countries can draw on their talent abroad. *The World Bank.*
http://hdl.handle.net/10986/7008

Landolt, P., Autler, L., & Baires, S. 1999. From hermano lejano to hermano mayor: The dialectics of Salvadoran transnationalism. *Ethnic and racial studies*, 22(2): 290-315.
https://doi.org/10.1080/014198799329495

Lin, X. 2010. Contemporary diasporic entrepreneurship: a conceptual and comparative framework. In B. Honig, I. Drori, & B. A. Carmichael (Eds.), *Transnational and immigrant entrepreneurship in a globalized world*, Toronto, Canada: University of Toronto Press: 31-60.

Lin, X., & Tao, S. 2012. Transnational entrepreneurs: Characteristics, drivers, and success factors. *Journal of International Entrepreneurship*, 10(1): 50-69.
https://doi.org/10.1007/s10843-011-0082-1

Ma, Z., Zhao, S., Wang, T., & Lee, Y. 2013. An overview of contemporary ethnic entrepreneurship studies: themes and relationships. *International Journal of Entrepreneurial Behavior & Research*, 19(1): 32-52.
doi: 10.1108/13552551311299242

Mahamulkar, S. 2020. When Irish PM Leo Varadkar visited his ancestral village in Maharashtra | Kolhapur News - Times of India. Retrieved 7 March 2020, from https://timesofindia.indiatimes.com/city/kolhapur/for-a-remote-maharashtra-village-year-ends-at-tea-with-aamchi-irish-pm/articleshow/73025597.cms

Manimala, M.J., Wasdani, K.P., & Vijaygopal, A. 2019. Transnational, Ethnic and Returnee Entrepreneurship: Perspectives on SME Internationalization. In *Transnational Entrepreneurship*, Springer, Singapore: 3-33.
Doi:10.1007/978-981-10-6298-8

McDougall, P.P., & Oviatt, B.M. 2000. International entrepreneurship literature in the 1990s and directions for future research. *Entrepreneurship*, Upstart Publishing, Chicago: 291-320.

Demystifiying the Meaning of Transnational Entrepreneurship: Indian transnational entrepreneurs in comparative perspective

Supriya Singh, Punit Saurabh, Nityesh Bhatt

Mountz, A., & Wright, R.A. 1996. Daily life in the transnational migrant community of San Agustin, Oaxaca, and Poughkeepsie, New York. *Diaspora: a journal of transnational studies*, 5(3): 403-428. 10.1353/dsp.1996.0017

Mustafa, M., & Chen, S. 2010. The strength of family networks in transnational immigrant entrepreneurship. *Thunderbird International Business Review*, 52(2): 97-106. https://doi.org/10.1002/tie.20317

Nayyar, D. 1994. *Migration, Remittances and Capital Flows: The Indian Experience*. New Delhi: Oxford University Press.

Nkongolo-Bakenda, J.M., & Chrysostome, E.V. 2019. Dual environments of home and host countries of diasporic transnational entrepreneurs: an empirical study in the Canadian context. *International Journal of Entrepreneurship and Small Business*, 39(4): 455-500. https://doi.org/10.1504/IJESB.2020.106468

Ogbuagu, B.C. 2013. "Diasporic Transnationalism": Towards a Framework for Conceptualizing and Understanding the Ambivalence of the Social Construction of "Home" and the Myth of Diasporic Nigerian Homeland Return. *Journal of Educational and Social Research*, 3(2): 189. DOI: 10.5901/jesr.2013.v3n2p189

Patel, P.C., & Conklin, B. 2009. The balancing act: the role of transnational habitus and social networks in balancing transnational entrepreneurial activities. Entrepreneurship Theory and Practice, 33(5): 1045-1078. https://doi.org/10.1111/j.1540-6520.2009.00334.x

Portes, A., Guarnizo, L.E., & Landolt, P. 1999. The study of transnationalism: pitfalls and promise of an emergent research field. *Ethnic and racial studies*, 22(2): 217-237. https://doi.org/10.1080/014198799329468

Portes, A., Haller, W.J., & Guarnizo, L.E. 2002. Transnational entrepreneurs: An alternative form of immigrant economic adaptation. *American Sociological Review*: 278-298. https://doi.org/10.2307/3088896

Rangel-Ortiz, L.X. 2008. *Sociocultural identity and self-conceptualizations of Mexican transnational entrepreneurs (MTNE) in San Antonio, Texas*. The University of Texas at San Antonio. 10.13140/RG.2.1.2588.8240

Riddle, L., Hrivnak, G.A., & Nielsen, T.M. 2010. Transnational diaspora entrepreneurship in emerging markets: Bridging institutional divides. *Journal of International Management*, 16(4): 398-411. https://doi.org/10.1016/j.intman.2010.09.009

Rizvi, F., Louie, K., & Evans, J. 2016. Australia's Diaspora Advantage: Realising the potential for building transnational business networks with Asia. *Report for the Australian Council of Learned Academies*.

Sari, B.R. 2017. Transnational Migration and Ethnic Entrepreneurship among the Cham Diaspora in Malaysia. *Jurnal Kajian Wilayah*, 8(1): 1-16. https://doi.org/10.14203/jkw.v8i1.763

Schiller, N.G., Basch, L., & Blanc-Szanton, C. 1992. Transnationalism: A new analytic framework for understanding migration. *Annals of the New York academy of sciences*, 645(1): 1-24. https://doi.org/10.1111/j.1749-6632.1992.tb33484.x

Sen, S. 2019. Data: Indian-origin people form the largest share of international migrants as of 2019. Retrieved October 22, 2020, from https://www.thehindu.com/data/indian-origin-people-form-the-largest-share-of-international-migrants/article29489640.ece

Shikhar. 2017. The Top 10 Richest NRI's of The Year. Retrieved November 11, 2019, from https://medium.com/@shikhar_writer/the-top-10-richest-nris-of-the-year-a162e0fd8eb8

O'Leary, S. 2019. 'Migrant entrepreneurs' views on the potential impacts of Brexit on their UK businesses. Retrieved from https://www.regents.ac.uk/sites/default/files/2019-05/RWP1903%20O%27Leary%20S.pdf

Srivastava, R., & Sasikumar, S.K. 2003. An overview of migration in India, its impacts and key issues. In *Regional Conference on Migration, Development and Pro-Poor Policy Choices in Asia* (22-24). Available at http://www.shram.org/uploadFiles/20131014063711.pdf

Sternberg, R., & Müller, C. 2010. 'New argonauts' in China-return migrants, transnational entrepreneurship and economic growth in a regional innovation system: New geographies of migration. *Erde*, 141(1-2): 103-125.

Terjesen, S., & Elam, A. 2009. Transnational Entrepreneurs Venture Internationalization Strategies: A Practice Theory Approach. *Entrepreneurship Theory and Practice*, 33(5): 1093-1120. https://doi.org/10.1111/j.1540-6520.2009.00336.x

The Economic Times. 2019. Five Indian expats in UAE enter Forbes' billionaires list for 2019. Retrieved 11 November 2019, from https://economictimes.indiatimes.com/nri/nris-in-news/five-indian-expats-in-uae-enter-forbes-billionaires-list-for-2019/articleshow/68602213.cms

Urbano, D., Toledano, N., & Ribeiro-Soriano, D. 2011. Socio-cultural factors and transnational entrepreneurship: A multiple case study in Spain. *International Small Business Journal*, 29(2): 119-134. https://doi.org/10.1177/0266242610391934

Wahlbeck, Ö. 2018. The Transferability and Mobilisability of Transnational Resources: The case of Turkish entrepreneurs in Finland. *Nordic Journal of Migration Research*, 8(4): 237-244. DOI: http://doi.org/10.2478/njmr-2018-0027

Demystifiying the Meaning of Transnational Entrepreneurship: Indian transnational entrepreneurs in comparative perspective

Supriya Singh, Punit Saurabh, Nityesh Bhatt

Wang, Q., & Liu, C.Y. 2015. Transnational activities of immigrant-owned firms and their performances in the USA. *Small Business Economics*, 44(2): 345-359.
DOI: 10.1007/s11187-014-9595-z

Whatley, T. 2019. 45 Canadians Make Forbes' 2018 Billionaires List. Retrieved 11 November 2019, from https://notablelife.com/45-canadians-make-forbes-2018-billionaires-list/

World Bank Press Release. 2018. Record High Remittances Sent Globally in 2018. Accessed on August 13, 2020:
https://www.worldbank.org/en/news/press-release/2019/04/08/record-high-remittances-sent-globally-in-2018

Yeung, H.W.C. 2002. Entrepreneurship in international business: An institutional perspective. *Asia Pacific Journal of Management*, 19(1): 29-61.
https://doi.org/10.1023/A:1014887523110

Yokoyama, K., & Birchley, S.L. 2020. Perspectives on Transnational Entrepreneurship. In *Transnational Entrepreneurship in South East Asia*, Springer, Singapore: 1-16.
DOI 10.1007/978-981-32-9252-9

Zong, J., & Batalova, J. 2017. Indian Immigrants in the United States. *Migration Policy*. Retrieved 9 May 2020, from
https://www.migrationpolicy.org/article/indian-immigrants-united-states

About the Authors

Supriya Singh is a Doctoral Scholar from the Institute of Management, Nirma University, Ahmedabad, India. The broad research topic she currently works on is entrepreneurship, innovation and the role of transnational migrants.

Dr. Punit Saurabh is presently serving Nirma University with the Institute of Management and specializes in entrepreneurship, innovation, family business, venture ecosystems, International relations, and geostrategic studies. He holds a doctorate in Management from the Indian Institute of Technology-Kharagpur, and frequently contributes articles to key journals and newspapers.

Dr. Nityesh Bhatt is a Professor and Chair of Information Management Area at the Institute of Management, Nirma University, India. He has more than 20 years of experience in academia. His research areas include e-Governance, E-Commerce, ERP, and IT strategy.

Author Guidelines

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

Topic

Start by asking yourself:

• Does my research or experience provide any new insights or perspectives?

• Do I often find myself having to explain this topic when I meet people as they are unaware of its relevance?

• Do I believe that I could have saved myself time, money, and frustration if someone had explained to me the issues surrounding this topic?

•Am I constantly correcting misconceptions regarding this topic?

• Am I considered to be an expert in this field? For example, do I present my research or experience at conferences?

If your answer is "yes" to any of these questions, your topic is likely of interest to readers of the TIM Review.

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

• Emphasize the practical application of your insights or research.

• Thoroughly examine the topic; don't leave the reader wishing for more.

• Know your central theme and stick to it.

• Demonstrate your depth of understanding for the topic, and that you have considered its benefits, possible outcomes, and applicability.

• Write in a formal, analytical style. Third-person voice is recommended; first-person voice may also be acceptable depending on the perspective of your article.

Format

1. Use an article template: .doc .odt

2. Indicate if your submission has been previously published elsewhere. This is to ensure that we don't infringe upon another publisher's copyright policy.

3. Do not send articles shorter than 2000 words or longer than 5000 words.

4. Begin with a thought-provoking quotation that matches the spirit of the article. Research the source of your quotation in order to provide proper attribution.

5. Include an abstract that provides the key messages you will be presenting in the article.

6. Provide a 2-3 paragraph conclusion that summarizes the article's main points and leaves the reader with the most important messages.

7. Include a 75-150 word biography.

8. List the references at the end of the article.

9. If there are any texts that would be of particular interest to readers, include their full title and URL in a "Recommended Reading" section.

10. Include 5 keywords for the article's metadata to assist search engines in finding your article.

11. Include any figures at the appropriate locations in the article, but also send separate graphic files at maximum resolution available for each figure.

Issue Sponsor

61

Technology Innovation Management Review
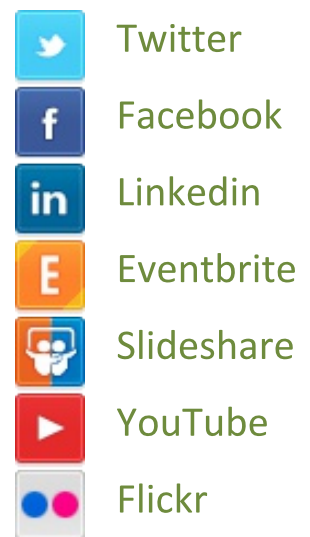
Academic Affiliations and Funding Acknowledgements

SCALE EARLY RAPIDLY AND SECURELY (SERS)

The TIM Review team is a key partner and contributor to the Scale Early, Rapidly and Securely (SERS) Project: https://globalgers.org/. Scale Early, Rapidly and Securely (SERS) is a global community actively collaborating to advance and disseminate high-quality educational resources to scale companies.

The SERS community contributes to, and leverages the resources of, the TIM Review (timreview.ca). The authors, readers and reviewers of the TIM Review worldwide contribute to the SERS project. Carleton University's Technology Innovation Management (TIM) launched the SERS Project in 2019.

We are currently engaged in a project focusing on identifying research and knowledge gaps related to how to scale companies. We are inviting international scholars to join the team and work on shaping Calls for Papers in the TIM Review addressing research and knowledge gaps that highly relevant to both academics and practitioners. Please contact the Editor-in-Chief, Dr. Stoyan Tanev (stoyan.tanev@carleton.ca) if you want to become part of this international open source knowledge development project.