# The Innovation Cascade

## A Five-Level Framework for Building Enterprise Innovation Systems

By

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## Abstract

This Major Research Paper (MRP) describes a framework for creating more innovative, lower-cost enterprise innovation systems (EISs).

Through a literature review, I have identified and described ten driving forces behind the performance of EISs: innovation ecosystems, innovation strategy, enterprise architecture, innovation inputs, the innovation process, portfolio management, innovation working practices, innovation accounting, innovation culture, and innovation tools.

Drawing from the literature, I have gathered and analyzed 250 innovation approaches, such as horizon scanning or value proposition design, to describe the five overarching areas involved in creating EISs: ecosystem, strategy, architecture, people, and infrastructure. Through eleven practitioner interviews and system mapping, I have shaped the five areas into a prototype framework, which I call the Innovation Cascade. The Innovation Cascade provides EIS builders with a process for creating or improving an EIS by framing missing areas or highlighting tensions between the five areas of an EIS.

To test the Innovation Cascade, I conducted a case study with the Ontario Municipal Employees Retirement System (OMERS). In the case study, I mapped OMERS's EIS to the Innovation Cascade, designed an EIS research function for OMERS, and offered ten recommendations for improving OMERS's EIS. Through the case study, I determined the Innovation Cascade is effective for building or enhancing EISs and propose next steps for further refining it.

Finally, I have suggested three other models to augment the Innovation Cascade. First, five modes that EISs can exhibit: informal, linear, distributed, embedded and emergent. Second, patterns or predictable configurations each area can exhibit. Third, five steps that match each area of the Innovation Cascade with appropriate tools and actions. Together, the three models and the Innovation Cascade offer a framework for EIS builders to design, improve, maintain and understand EISs, as well as communicate EISs to stakeholders.

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# Preface

This paper has its roots in a moment years ago in an *Identifying Opportunities* Entrepreneurship and Strategy class. My professor was discussing Steve Blank and his "get out of the building" approach. I remember one concept in particular that fascinated me—the idea of testing and validating ideas to uncover opportunities. The revelation that I could apply the scientific method to solving practical problems set me on a course I am still following today. It has taken me to Utah, where I represented Canada at the International Business Model Competition on behalf of my startup PlantBox. It took me to Brisbane, where with the support of a fundraising campaign all across Ryerson University, I received a certificate from Bill Aulet and MIT in *New Venture Leadership*. Finally, it took me to OCAD U's *Strategic Foresight and Innovation* program and OMERS—where I am thrilled to be testing my ideas in the service of others.

Every step of the way, my vision was about how to use the tools of innovation to try and make the world a more equitable, enriching place for us all. This paper represents the culmination of all that work—the sense of humour I have developed over years of sharing my thoughts, the frameworks built from years of testing and refining my ideas in startup and corporate environments, and the love and respect I feel for those who push beyond creating value for themselves.

It is profoundly shaped by the circle of friends, mentors, and colleagues I have had the pleasure of collaborating with, including my advisors and mentors Michele Mastroeni and Kevin Morris. It is informed by my work as an Innovation Specialist at OMERS, where I have had the honour of working with Jordan Ostapchuk, Catherine Cunningham, and a truly incredible team to help enhance our members' experience to be a healthy, rich life of continuous learning, growth, and community.

This paper is also a product of my limits. At every step, it is my synthesis of readings, conversations, and thinking that is constrained by my limited perspective, experiences, understanding, biases, and beliefs. As such, this paper does not seek to present the truth, so much as my truth and my understanding of how to design value-creating systems by harnessing the resources of enterprises.

I hope you enjoy the thinking on managing innovation this paper presents, despite its limitations. Further, I hope it provokes you to think deeply, not just on how you create and manage value, but on the kind of value you seek to create.

# 1.0 Introduction

Large, for-profit companies—here referred to as enterprises—are experiencing an astounding amount of change. Many industries that were once dominated by enterprises such as media, manufacturing, and retail are being disrupted. Forces such as startups, globalization, and emerging technologies are creating more competition and shifting customer expectations. There are many forces of change not listed here that are widespread or unique to each industry, but overall, most enterprises are worried about their role in the future and their odds of surviving in it.

Many enterprises feel they must respond to the forces of change to avoid declining profits, bankruptcy, or being acquired (Perry, 2017). One common response is to focus on innovation, which in enterprises is the process of capturing value from solving customer problems. Generally, this means creating better products or services than the other options available to customers. For Walmart, this might mean becoming the lowest cost retailer. For Apple, this might mean offering the most luxurious and enjoyable smartphone experience possible. However, in some situations, enterprises choose to focus on entirely new industries or areas. Amazon, for example, launched Amazon Web Services (AWS) and began offering both online retail and cloud computing services. In all cases, enterprises like Walmart, Apple, or Amazon are attempting to create value for customers. To innovate, enterprises must also capture value from the customers they create value for, which usually means customers purchasing the enterprise's offering, but can also take other forms, such as customers referring other customers to the enterprise.

Similar to Accounting or Human Resources, many enterprises treat innovation—regardless of whether it is improving on existing offerings or creating new ones—as another business system. This might mean having a Chief Innovation Officer (CIO) in charge or having a dedicated business unit or innovation lab. Some enterprises will bring customers into the innovation process through platforms like Lego Ideas, which allows Lego customers to design and vote for new Lego products. Regardless of how the enterprise characterizes it, these innovation business areas are generally tasked with conducting research to identify how current offerings are missing the mark or identify potential new offerings. Using techniques like prototyping or concept development, they turn these opportunities into an enhancement or a new product or service. They then deliver that enhancement or new product or service either by integrating it into the existing business or creating a new business to deliver on it.

Regardless of their structure, I have called these innovation areas Enterprise Innovation Systems (EISs). EISs are groups of people, resources, information, and more that are intended to output innovations for the broader enterprise. Many enterprises are starting up an EIS. In Toronto, some examples include Scotiabank's Digital Factory, LoblawsDigital, or the Canada Goose Innovation LAB. While not specific to any EIS, the research suggests that EISs, in general, consistently fail to deliver innovations. For instance, Van Wulfen (2016) found innovation projects fail 96% of the time.

If true, the failure of EISs to consistently create and capture value, either through enhancements or new offerings, could be attributed to many factors. For instance, our education systems may be failing to create employees ready to innovate. Government regulation or policy may also be stifling innovation. It could be that business or economic conditions are causing limited access to capital, which could starve potential innovations of the funding needed to advance. Or, since the risk of failure is inherent to innovation and the creation of the new, there may be no way to improve the success rate of EISs.

However, I hypothesize that enterprises are failing to innovate effectively because of how they approach innovation. I believe that enterprise innovators adopt a very narrow view of innovation, which misses many of the factors that contribute to an EIS's failure or success. For instance, some EISs may believe innovation is solely about putting smart people into a room and giving them the freedom to work at their leisure. Others may believe that innovation is a mostly linear process, similar to the empathize, define, ideate, prototype, test model of design thinking (Brown, 2009). Regardless of which part of the system they are missing, I theorize that if EIS builders were to adopt a system thinking lens for building or running EISs, they would create and capture far more value. Specifically, that means understanding the various levers or components of their EIS and influencing them to enhance how much value their system creates and captures.

Further, I believe there is an opportunity to develop a framework that maps out what these levers or components of an EIS are. For instance, is an EIS merely a process with an intake of ideas and an output of enhancements or new offerings? Or, as I believe, are there far more variables at play that influence the EIS's success?

This paper intends to map out those components to understand what factors matter most to an EIS's capture or creation of value. Then, to convert those factors into a framework, which an EIS builder could use to create or enhance their own EIS. Finally, to test that framework within an existing EIS. Ultimately, to answer the research question, "What actions should innovators take to enhance or create more innovative or lower-cost Enterprise Innovation Systems?"

To explore my theory that a framework could help create better EISs, I have designed a research approach, which I have covered in the following section.

## 2.0 Research Approach

As mentioned in section 1.0, my research objectives for this paper are to:

1. map out the components of an Enterprise Innovation System (EIS);
2. construct a framework from the components that an EIS builder could use to create or enhance their own EIS; and
3. test the framework within an existing EIS.

My hope is this framework can be used for the analysis or design of an EIS, which I believe, could lead to higher innovation outputs in the form of value creation and capture, and more engagement from the internal and external stakeholders of an enterprise.

The primary research question underlying my three research objectives is:

> What actions should innovators take to enhance or create more innovative or lower-cost Enterprise Innovation Systems?

There are several other secondary research questions underlying my primary research question:

> What driving forces of an Enterprise Innovation System are most impactful on the system's innovation outcomes?
>
> How can the proposed actions for innovators be tested in an existing Enterprise Innovation System to assess their value?
>
> What other models might expand on these actions value for enhancing or creating more innovative or lower-cost Enterprise Innovation Systems?

To answer my primary and secondary research questions, I used five research methods. In the following section, I have briefly summarized each method.

1. I began with a literature review, where I uncovered what areas of EISs are most impactful on innovation outputs, then deeply explored each area.
2. I gathered 250 of the innovation approaches I identified in the literature review and conducted a themes analysis on them to identify the handful of overarching areas that each approach fits into. For instance, the innovation ecosystem may be one overarching area that innovation approaches such as scenario building fit into.
3. I conducted interviews with eleven innovation practitioners. The interviews helped to shape the previously identified overarching areas into a preliminary framework.
4. I used a system mapping technique, known as the Rich Picture technique (Checkland, 1972), to make sense of the relationships between the five overarching areas. This allowed me to combine all work thus far into a final framework that I call the Innovation Cascade.
5. I conducted a case study with an existing EIS to assess whether the Innovation Cascade permits an enterprise innovator to build or enhance an EIS. The system in question was within The Ontario Municipal Employees Retirement System (OMERS), a pension fund that serves municipal employees in Ontario. As part of the case study, I have proposed recommendations for how OMERS might improve their EIS.

In the following section, I have explained each research method in more detail, followed by an explanation of the limitations I have identified in this research study.

## 2.1 Literature Review

My literature review contains three areas of inquiry:

1. I began by exploring what innovation is, including its history, the different types of innovations, and the many definitions of innovation. This permits me to define exactly what enterprises are managing in their innovation systems.
2. Next, I explored the management of innovation, including why enterprises choose to pursue innovation and why enterprises seem to be failing to innovate effectively.
3. Finally, I identified the factors that are most impactful on an EIS's innovativeness and then explored each factor in detail. Examples of these factors include innovation ecosystems, innovation strategy, and enterprise architecture.

I have chosen these three areas of inquiry as I believe understanding what innovation is, and the why and how of its management in enterprises, is necessary to hone on in on what factors are most impactful on an EIS's innovativeness and provide a base of secondary research for the framework.

## 2.2 Themes Analysis and Synthesis

Throughout the literature review, I identified hundreds of different innovation approaches, such as the Business Model Canvas (Osterwalder & Pigneur, 2010). Not all those approaches are mentioned in the literature review. However, I have captured them in an Excel database. I identified the origins of each approach, along with a description of how the approach works. I conducted a code framing exercise on all 250 approaches, which involved tagging each with an appropriate label. For instance, I might have tagged the British Design Council's (2005) Double Diamond design process with the tag "Process." Once I tagged each approach once, I grouped the lowest frequency codes into the higher frequency codes. This involved my synthesis about which codes appear to represent the contents of that approach best. I repeated this tagging and grouping process until I had five codes remaining, which I believe are representative of the 250 approaches. The process of identifying categories within a domain is known as native categories, which Buckley and Chapman (1997) describe as "the groupings of knowledge within a field or area of study."

Once I had my five codes, I created an Innovation Approaches Map that I used to demonstrate the five overarching ways in which innovation is approached. I created this map by identifying two axes that demonstrate a relationship between the five codes. For instance, inside vs outside the enterprise or divergent vs convergent thinking.

## 2.3 Practitioner Interviews

Drawing on the literature review and the analysis and synthesis of the themes, I constructed a set of components that I believe represent the contents of each of the five previously identified codes. These components can be considered the levers of an EIS, which EIS builders influence to change their EIS's innovativeness or resource cost. For example, within the strategy code, one component might be focus areas, which Talke, Salomo, and Rost (2010) define as "a specific industry or area of focus for innovation," such as urban mobility or remote healthcare.

I turned each component into a question, which I took to eleven innovation practitioners sourced from within my network or with assistance from my advisors. The practitioners come from areas such as startups, venture capital, government, enterprise innovation, innovation service consultancies, or

innovation education. I have chosen not to limit my interviews solely to enterprise innovators as I believe the other types of innovators will offer a broader lens from which to analyze EISs, which I would otherwise miss.

I recorded these interviews, but due to time constraints, did not transcribe and analyze them. Instead, I re-listened to each interview and incorporated my interpretation of their observations into the five codes and previously identified components. This permitted me to construct a preliminary version of the framework I call the Innovation Cascade.

## 2.4 Systems Mapping

The preliminary version of the Innovation Cascade contains the five codes and their components. However, what is missing is a systems lens on how the codes and components fit together. Without that lens, I believe the framework falls prey to the same narrow lens that I hypothesize other EIS builders struggle with. Therefore, I performed a system mapping exercise to map the relationships between the various codes and components.

After reviewing several systems mapping techniques such as Synthesis Mapping (Jones & Bowes, 2017) or the ERAF system technique (Kumar, 2012), I settled on using Peter Checkland's (1972) Rich Picture technique. Rich Picture involves creating a visual model of a system through identifying, labelling, and drawing connections between different components. While similar to many system mapping techniques, I chose Rich Picture because of its emphasis on visualizing the system, which I believe aids in communicating the Innovation Cascade to other EIS builders. After the Rich Picture technique, I finalized the Innovation Cascade, which includes the five codes, the components of each code, and a hypothesis for how to use the Innovation Cascade within existing EISs.

## 2.5 Case Study

With the finalized Innovation Cascade, I conducted a case study with the Ontario Municipal Employees Retirement System (OMERS) to test two applications for the Innovation Cascade. I identified these two applications through an analysis of applications for other innovation approaches, such as the Business Model Canvas (Osterwalder & Pigneur, 2010).

The two applications are:

1. The Innovation Cascade as a mapping tool. In this application, I captured existing components of the OMERS innovation system and mapped them to the Innovation Cascade to frame missing or misaligned components to suggest tensions or other opportunities for improvement.
2. The Innovation Cascade as a generative tool. In this application, I used the Innovation Cascade to propose how a portion of the OMERS innovation system could function. This involves proposing what form each code and component of the Innovation Cascade could take. This portion focuses specifically on the innovation research team, which is a team within the broader OMERS innovation system.

In both cases, I drew on internal documents and my research to either fill in or suggest what could fill in a component of the OMERS innovation system. The research includes a foresight report I wrote for OMERS called *The Future of the Pension Experience*. The supporting material for this report is included in Appendix A.

Next, I proposed a set of recommendations for OMERS regarding how they could improve their innovation system. The strategies, cultural elements, and other suggestions I made throughout the mapping and generative portions of the case study and within the closing recommendations are not intended to be representative of the purpose of the case study. While I do believe they are helpful for OMERS, the point within this paper is to assess whether the Innovation Cascade is helpful for mapping or generating elements of an EIS. Therefore, the focus is not on whether, for instance, the focus areas are appropriate, but whether the Innovation Cascade effectively captures and contextualizes them. To that end, I finished the case studying by reviewing how the Innovation Cascade performed, which includes specific strengths and weaknesses that I have identified and suggestions for how I might improve the Innovation Cascade in future iterations.

## 2.6 Limitations of this Study

Beyond my five chosen research methods, I also speculated three other applications for the broader Innovation Cascade model, including a set of modes EISs can move between, a set of dimensions that all EISs may vary by, and a set of steps for how an enterprise innovator can apply the Innovation Cascade. The speculative applications are supported by secondary research but are meant to be exploratory, rather than explanatory or predictive. Finally, I reflected on possible directions the Innovation Cascade could go, my process, and the journey of constructing this paper.

While I believe the Innovation Cascade and any speculative applications are very valuable for EIS builders, the five research methods I used to construct the Innovation Cascade do not permit me to move beyond speculation on them, which is one of the limitations of this study.

There are three other limitations I have identified:

1. Many of the findings have come from my synthesis, which introduces biases from my limited perspective, experiences, upbringing, and identity. Therefore, this paper's aggregate findings can only ever be representative of my viewpoint.
2. As an employee of OMERS, there is the potential for my case study to be influenced by that relationship. I have made every effort to remain objective, but it is impossible to avoid influence from the extremely far-reaching impact of the employer/employee relationship.
3. Given this paper's accelerated timeline, my analysis and synthesis may be lacking, opening the opportunity for missing important areas of inquiry or untested assumptions.

In spite of these limitations, I believe the Innovation Cascade will be extremely helpful for EIS builders who are overwhelmed or frustrated by the volume of information they need to deal with, by the sky-high expectations leaders often place on enterprise innovation units, or by the potentially underwhelming performance of their innovation systems, which they know can be improved upon.

In the next section, I begin with the literature review mentioned in section 2.1, which permits me to narrow down which factors are most impactful on EISs and then deeply explore those factors.

# 3.0 Literature Review

I began this paper by conducting a literature review on what innovation is, how innovation is managed in enterprises today, and which factors are most impactful on the innovativeness of Enterprise Innovation Systems (EISs).

In section 3.1, I have provided a brief history of innovation, constructed a definition of innovation for this paper, and explained what the different types of innovation are.

In section 3.2, I have explored the failures of EISs today, including an analysis of whether or not the management of an EIS could be the cause of any underwhelming performance.

Finally, in section 3.3, I have evaluated several literature reviews on what the most impactful factors are on an EIS's innovativeness. I have also identified what I believe are the ten most critical factors in an EIS's creation and capture of value. The factors are innovation ecosystems, innovation strategy, enterprise architecture, innovation inputs, the innovation process, portfolio management, innovation working practices, innovation accounting, innovation culture, and innovation tools. I have chosen this order as it goes from what I hypothesize are the most to the least impactful factors.

## 3.1 The Nature of Innovation

Benoît Godin traced the history of innovation and found its roots in Ancient Greece, where it was known as *kainotomia*, or "to introduce change into the established order" (Godin, 2015). He found that up until the 17th century, innovation was a negative term associated with revolutions or disturbing the social order. During this time, innovators like Protestant reformer Henry Burton deviated from accepted thinking and were punished for it, while revolutionary new creations such as the printing press or the scientific method were thought of as entirely separate from innovation.

Godin found that it was after World War II that innovation evolved into its modern form, where it is seen as a tool of governments, enterprises, or society to induce change through technologies, faster processes, or other positive changes (Godin, 2015).

One of the leading thinkers on innovation at this time was Schumpeter (1942), whose view of innovation reinforced the idea of innovation as a tool of positive change, rather than the historical view of it as a negative one. He found that innovation has three components: the invention of a new idea or process, the arrangement of economic factors necessary to realize that invention, and the diffusion of the invention. Schumpeter seemed to focus mostly on innovation at the societal level, while Drucker (1985) instead looked into what made individual innovations successful. He found that enterprises which adopted a customer-centric lens created more innovations. Specifically, enterprises which focused on addressing market needs rather than trying to find use cases for internal technologies. The creation of value through solving customer solutions is generally how innovation is viewed today.

To narrow down a specific definition for this paper, I have gathered existing definitions. Together, Ali and Edison (2010), Dwyer (2018), and Skillicorn (2016) identified 56 unique definitions of innovation. I have analyzed these definitions and synthesized a definition that will be used for this paper, in which innovation is:

Creating value through novel solutions to meaningful problems.

In other words, innovation involves solving problems in new ways to make things easier, faster, cheaper, or in some way better for someone. In enterprises, innovation also involves capturing value from the diffusion of that value (Drucker, 1985). Karlsson (2016) estimates that enterprises create 84% of the world's innovations, while Ettlie (2006) estimates that 6-10% of innovations are disruptive, which suggests enterprises have a disproportionate role in driving innovation and change compared to other innovators such as activists, scientists, governments, startups, and not-for-profits.

Innovations can take many forms. Satell (2017) defines four levels of change created by an innovation, which are basic research, sustaining, disruptive, breakthrough. In order, these levels of change indicate how much value or change is created through the innovation from least to most. Keeley, Walters, Pikkel, and Quinn (2013) built a model, known as the Ten Types of Innovation, which explains the ten ways—such as process or brand—that can be involved in better addressing a market need. The Ten Types of Innovation are seen in Figure 7.

Innovations can also vary by what industry they focus on. For instance, the automated teller machine (ATM) could be described as a sustaining process innovation within the financial sector. The ATM is sustaining because it helped banks improve the convenience and speed of withdrawing and depositing money and was a process innovation as it helped banks reduce their costs by removing human employees from simple withdrawing and depositing transactions.

It is important to understand that innovations come in many shapes and sizes. Satell (2017) and Keeley, Walters, Pikkel, and Quinn (2013) offer just two examples of how innovations can vary. I have gone into more detail into the types of innovations in section 3.3 but put simply, enterprises must manage innovations of all levels of change, types, and industries to remain competitive.

## 3.2 The Management of Innovation

Most enterprises pursue innovation to create new profits or avoid losing existing ones (Drucker, 1985). Jaruzelski, Chwalik and Goehle (2018) found the most effective innovators had gross profit growth of 6.6 times their industry groups. When enterprises do not innovate, they may suffer the fate of acquired or bankrupt enterprise such as Nokia, Blockbuster, Xerox, or Yahoo, who all experienced creative destruction (Schumpeter, 1942) and fell behind their competitor's offerings or customer's needs. Creative destruction is becoming more common as "corporations in the S&P 500 Index in 1965 stayed in the index for an average of 33 years. By 1990, average tenure in the S&P 500 had narrowed to 20 years and is now forecast to shrink to 14 years by 2026" (Perry, 2017).

While there are many reasons enterprises pursue innovation, the majority of enterprises are pursuing innovation in some capacity. Foo (2014) found that 72 percent of senior executives claim innovation-led growth is one of their top strategic priorities. However, while enterprises are consistently pursuing innovation, the execution of their innovation agendas appears to be lacking. Van Wulfen (2016) found modern innovation efforts fail 96% of the time, while Cierpicki, Wright and Sharp (2000) found "seven out of 10 products fail in their first 18 months to two years on the market." Alon, Elron and Jackson (2015) found that 82% of organizations attempt to innovate the same way they run their typical operations, leading to 72% missing crucial growth opportunities and 60% failing to learn from mistakes. This suggests that the ineffective innovation activities of enterprises are not a result of whether or not those enterprises choose to innovate, they are instead a result of how those enterprises manage innovation.

Management is a process of systematic control. The role of a manager is to force out variability to create predictable results. Many components of enterprises, such as human resources, operations, or strategy are routinely managed. There is even evidence that this management results in creating value for the enterprise, indicated by Birshan, Dye, and Hall (2011) who found a clear relationship between "value creation and corporate strategy." This means that management, as opposed to not managing enterprise activities, creates value.

Although Kiechel (2010) speculates the relationship between management and the creation of value is overstated, many researchers such as Christensen and Raynor (2013), Osterwalder and Pigneur (2010), and Martin (2010) believe enterprise innovation can be managed. For instance, Verganti (2009) found that Italian design firm Artemide's extremely successful Metamorfosi lighting system—which reimagines the home lighting experience to reflect the experience of natural light—was developed through a systematic innovation process. Therefore, it seems that, similar to human resources, operations, or strategy, it is possible to manage innovation so as to create value. In fact, in Brick by Brick Robertson and Breen (2014) deeply detail how Lego's effective innovation management lead to Lego to surpassing Mattel as the largest toy company in the world to become worth an estimated $15 billion.

This, in light of the high failure rate of enterprise innovation mentioned previously, suggests that many enterprises are attempting to manage innovation, but few do it well. Further, there are existing examples of how to manage innovation effectively, which if followed, could lead to consistent enterprise innovation outputs. Therefore, if I can identify the critical factors that influence an EIS's effectiveness, I can design a framework around them. In section 3.3, I have identified and analyzed each of these critical factors.

## 3.3 Factors in Enterprise Innovation

Enterprises manage innovation in many ways, such as by acquiring innovative companies to gain their patents or employees (Karim & Mitchell, 2004). Further, enterprises will often engage service firms to help build innovations or to help build innovation capabilities (Srinivasan, 2014).

Both acquisition and outsourcing have roles in enterprise innovation management. However, this paper focuses solely on the internal development of innovations, which includes innovations developed through collaboration with partners, customers, or competitors but that are facilitated through internal systems rather than through acquisition or outsourcing. The internal management of innovation, which will hereafter be referred to as an EIS, can involve innovations of any type, level of impact, or industry. For instance, PepsiCo has two innovation units within their system (Stringer, 2000). One is housed within PepsiCo's operational division and focuses on incremental improvements to existing products and processes. The other is an innovation lab housed outside the rest of PepsiCo, which focuses on disrupting PepsiCo's established product lines.

To identify what factors are most impactful on these EISs, I have conducted a review of several other reviews of these innovation indicators.

Jaruzelski, Chwalik, & Goehle (2018) identified the five most important factors for effective EISs, which are:

1. alignment of innovation strategy and organizational strategy;
2. innovations are based on direct insights from users;
3. rigorous project selection;
4. leadership is highly involved with the innovation program; and

5. widespread cultural support for innovation.

In essence, these factors can be distilled down to strategy, customer-centrism, portfolio management, leadership, and culture.

Van der Panne, Van Beers, and Kleinknecht (2003) reviewed 43 papers surrounding what factors led to the success or failure of enterprise innovation. They found numerous relevant factors, such as research and development intensity and a culture of innovation. However, what is most interesting is that while they suggest there is not a strong consensus on what the most impactful factors are, there is on management's role in acting on the factors. Essentially, the issue with enterprise innovation management is in how leaders understand and integrate all the various components of an EIS. It follows, that by identifying those factors and constructing a framework for managing them, that EIS builders will be able to better influence the various components of their EIS, which supports my hypothesis about the Innovation Cascade being helpful.

I also analyzed Dziallas and Blind's (2019) review of 800 innovation articles. They identified eleven indicators of innovation effectiveness within EISs. The percentages in Figure 1 indicate the percent of the 800 innovation articles that they believe fit within that indicator. For example, 80 of the 800 innovation articles were focused on innovation culture.

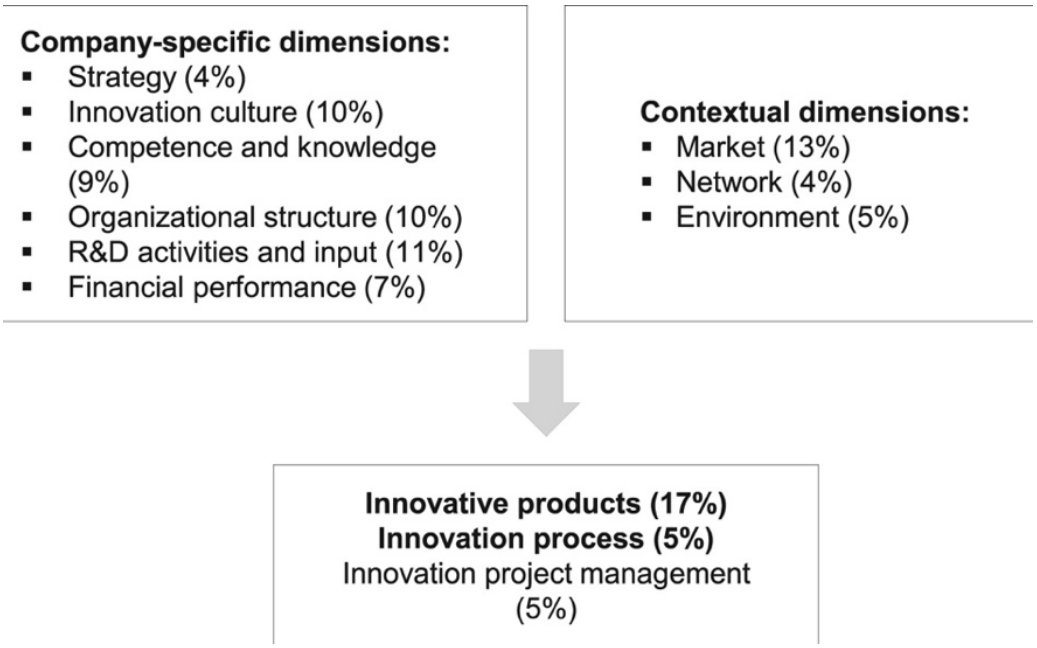


*Figure 1: Distribution of 800 Innovation Articles*

I found that when I combined Dziallas and Blind's (2019) review with the findings of Jaruzelski, Chwalik, & Goehle (2018) and Van der Panne, Van Beers, and Kleinknecht (2003) that there were ten groupings of innovation indicators, which I refer to as the components, that are most impactful on EISs.

These components are:

1. innovation ecosystems;
2. innovation strategy;
3. enterprise architecture;
4. innovation inputs;

5. the innovation process;
6. portfolio management;
7. innovation working practices;
8. innovation accounting;
9. innovation culture; and
10. innovation tools.

I believe that if I explore these components and integrate them into a single framework, EIS builders could use this framework to build more innovative EISs. Thus, in sections 3.3.1 to 3.3.10, I have reviewed literature on each component in order. I chose these ten as they seemed to capture the majority of the concepts I have explored, such as types of innovations, selecting which innovations to pursue, and the structure of innovation systems. I excluded some components, such as innovation outputs, to keep the list to a reasonable length. The ten components are not meant to be an exhaustive list of every component of an innovation system. Instead, they are a useful way of grouping the literature review to enable my exploration of what factors enhance or diminish an EISs innovativeness.

Some of the discussion on these ten components will be incorporated directly into the enterprise innovation framework, which I call the Innovation Cascade.

### 3.3.1 Innovation Ecosystems

The term ecosystem was first described by English botanist Arthur Tansley in 1935, but the concept was not applied to business until James Moore (1993) made the connection in 1993. A business ecosystem is the web of interconnected actors, drivers of change, ecosystem signals, stakeholders, competitors, relationships, legislation, regulations, available capital, education systems, the employable talent base, and every other aspect of an EIS that exists outside the enterprise. Kohn, Brayman, and Ritcey (2000) describe the barrier between the enterprise and its ecosystem as an enterprise membrane, which suggests that the membrane is one facet of an EIS that must be managed within innovation ecosystems. If the membrane is the inner lining of the ecosystem, the boundary is the outer limit. Ecosystems always have boundaries, which is the membrane between what is and is not within an ecosystem.

In *Open Innovation* (Chesbrough, Vanhaverbeke, & West, 2006), the ecosystem is where innovation inputs that do not originate within the enterprise come from including new ideas, feedback, or insights. Chesbrough, Vanhaverbeke, and West (2006) suggest that firms with more open membranes create product/market fit faster and more reliably, which could indicate that enterprises should manage which innovation inputs pass through the membrane into the enterprise's innovation system.

Buchanan (2001) was one of the first thinkers to suggest that ecosystems could be designed. For instance, by influencing what actors in the ecosystem are able to offer innovation inputs to the EIS, as Lego did with their Lego Ideas platform, which enables Lego enthusiasts to offer ideas that Lego can use as the inputs for their innovation process. With Lego Ideas, Lego is able to capture innovation inputs from many of their customers, which they can shape into higher viability products and services. One role of the ecosystem designer is to decide what boundaries are relevant to the innovation being explored. For instance, the boundaries of OCAD University's ecosystem could include other Canadian universities, other forms of education such as Massive Open Online Courses (MOOCs), regulation around education, student loan services such as the Ontario Student Assistance Program (OSAP), or competing workplaces students might go to instead of university within their boundaries. Relevant boundaries for innovation ecosystems can

vary by industry grouping, competitors, by customer need, or any other way designers see fit to limit their scope of inquiry into an ecosystem.

Ecosystems are notoriously hard to visualize, given the sheer volume of actors and relationships in them. However, since part of managing an EIS is understanding its ecosystem, it is helpful to explore some models. One model is the business context diagram (Kossiakoff, Sweet, Seymour, & Biemer, 2011), which groups actors and their relationships into governance, customers, partners, or suppliers. Another is the Entrepreneurship Ecosystem Canvas (Segers, 2015), seen in Figure 2, which characterizes startup ecosystems by eleven different areas.


*Figure 2: The Entrepreneurship Ecosystem Canvas*

Thinkers such as Taylor (1911), Beer (1972), Jaques (1997), and Spewak and Hill (1992) have all worked on enterprise design models that attempt to match an enterprise's operating system with the ecosystem it is embedded in, which is covered further in section 3.3.3. These thinkers believe that if the enterprise achieves a good fit with its ecosystem, it is more likely to thrive—similar to an animal that has evolved to suit its environment. Normann and Ramirez (1993) explore how value can spread throughout actors in an ecosystem, which they call a value constellation. Similar to Taylor, Beers, and Spewak and Hill, Normann and Ramirez suggest that certain actors are more impactful on the flow of value in an ecosystem.

Structural couplings were first identified by Varela, Maturana, and Uribe (1974). Couplings are when an organism's interactions with its environment cause both to change. For instance, how hummingbird's beaks and flower's blooms co-evolve so both better fit their environments. In innovation ecosystems, couplings are other enterprises or individuals whose actions shape and are shaped by another's. For instance, this might be a competitor releasing a new product, which sparks research and development investment in other enterprises. Both members of the coupling are shaped through their interactions with

each other. When applied to value constellations, couplings are the forces that shape which actor creates and captures what value in the ecosystem.

These ecosystems are also impacted by drivers of change. Lustig (2015) explores how drivers of change and ecosystem signals change ecosystems over time. These drivers of change could be things like globalization, artificial intelligence, or climate change. He found that scenarios are an effective way of exploring what forms that change might take, as scenarios use stories to communicate and contextualize the complex forces within an ecosystem.

Overall, ecosystems are what is outside the enterprise membrane but within the chosen boundaries. Within the ecosystem, there are different actors and other forces that shape the context an enterprise operates within. If an enterprise fits its ecosystem, such as Amazon's Web Services getting ahead of the trend of cloud computing, then the enterprise is more likely to succeed. An enterprise's success, is in part, shaped by the competitors, partners, and other couplings that shape the duration, impact, and type of innovations an enterprise can create to be most successful.

### 3.3.2 Innovation Strategy

Mintzberg (1987) defined strategy as a deliberate plan made in advance of action to achieve a desired objective. In ecosystems language, an innovation strategy can be described as:

1. an enterprise's current ecosystem position including existing or potential couplings and the drivers that are shaping it;
2. the enterprise's intended destination, which could be to grow larger through increasing revenue, to shift to a different location in the ecosystem by serving a different customer need, or to resist the pervasive background forces and maintain a constant position by innovating to stay ahead of industry trends; and
3. the enterprise's intended route, which might be to enhance existing products, develop new product lines, or enhance their brand or reputation.

In other words, an innovation strategy is figuring out how to navigate the enterprise's ecosystem to achieve its goals.

Strategies can take many forms. Some enterprises choose to define a distinct innovation strategy such as Lantmännen, a Nordic agricultural cooperative, which planned for "6 percent growth in the core business and 2 percent growth in new organic ventures" (de Jong, Roth, & Marston, 2015). Other enterprises choose to have innovation fit into their enterprise-wide strategy, such as Bristol-Myers Squibb (BMS), who "decided to shift its repertoire of technological capabilities from its traditional organic-chemistry base toward biotechnology" (Pisano, 2015). Rather than grow larger like Lantmännen, BMS chose to shift to a new position in the ecosystem by drawing from a new technology base to meet similar customer needs. Pisano (2015) explains that innovation was not the strategy itself but was part of BMS's enterprise-wide strategy.

In *Patterns of Strategy*, Loh and Hoverstadt (2017) explore how strategy and ecological theory intersect. They found through analyzing power differentials, relative resource concentrations, agility, and fit that structural couplings could be mapped and acted on to navigate the ecosystem. In essence, that it was possible to use strategy to move to a desired ecosystem position, such as getting larger relative to competitors or shifting to address a new customer need.

If a strategy is about navigating to an ecosystem position, then it must include some form of vision or goal, a plan for achieving that goal, and some discussion of barriers or risks that might prevent achieving the goal.

Amidon (2009) explores the role of vision within innovation strategy. She found that while visions do not address obstacles, they do help align enterprises behind shared goals, especially when it comes to innovations with high levels of change, such as disruptive or transformational ones. Talke, Salomo, and Rost (2010) found that by breaking down a vision into innovation fields—here referred to as focus areas—that enterprises become more innovative. In other words, breaking the vision down into smaller pieces makes it easier to execute on those pieces. For instance, IKEA's SPACE10 innovation lab has a vision of creating better and more sustainable ways of living. To make that more manageable, they broke their vision down into four focus areas: natural interfaces, shared living, local food, and digital fabrication.

Strategies may also contain an implementation plan. Often known as roadmaps, these are timelines and specific activities that, if executed, will theoretically lead to the strategy's successful execution. Phaal, Farrukh, and Probert (2015) discuss how roadmaps can be useful as they "can be more widely disseminated, acting as a reference point for ongoing dialogue and action." Roadmaps help create a shared understanding of the strategy and its timeline.

Lafley and Martin (2013) explore how to match supporting capabilities to a vision and focus areas. They use a model known as the Choice Cascade, seen in Figure 3, to describe how to match the right capabilities and management systems to support an enterprise strategy. For example, how a customer relationship management (CRM) system can support sales and communications work and, further, whether sales or communication capabilities are right for the enterprise's strategy. Lafley and Martin (2013) believe that when the answers to the five boxes of the Choice Cascade reinforce each other, there are fewer unnecessary costs, and an enterprise strategy is more likely to succeed.

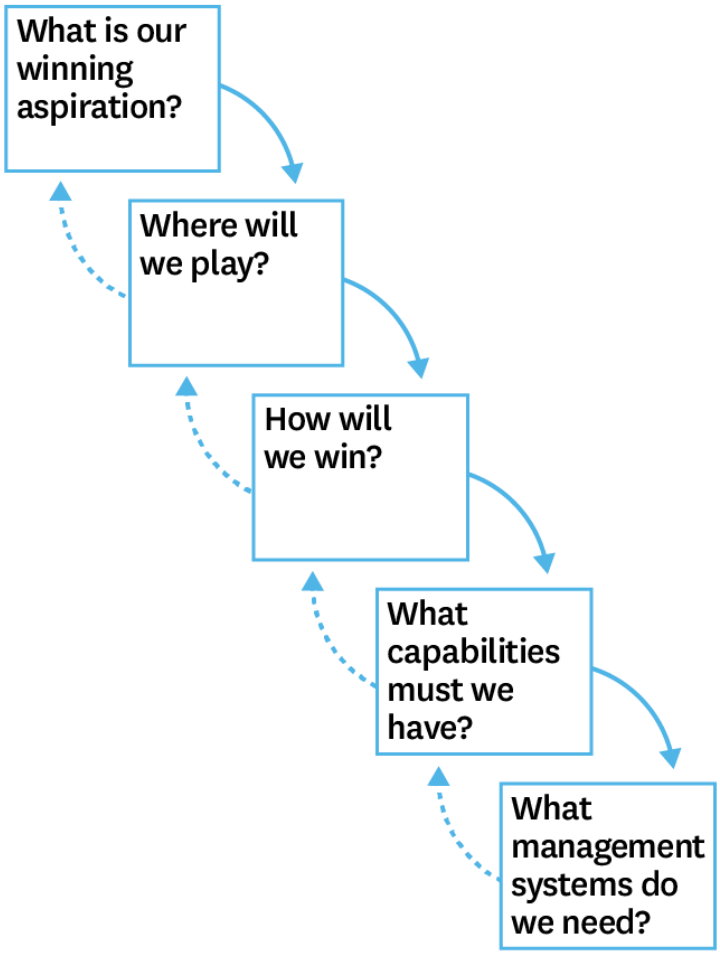


*Figure 3: The Choice Cascade*

Innovation faces many of the same barriers and risks as other business areas, such as demotivating management, financial losses, being out of compliance, inefficient operations, or loss of reputation. Innovation presents many additional risks, as well. For instance, Christensen (1997) explains the innovators dilemma, which is that enterprises are incentivized to not pursue innovation as it produces lower immediate profits than existing lines of business and risks cannibalizing those lines of business. Or Blank (2005), who explains innovation fatigue, which is when enterprises become cynical and frustrated with innovation overall as a result of experiencing the low rates of successful execution mentioned in section 3.2.

Together, a vision, focus areas, capabilities, a roadmap, and barriers or risks present a base for what constitutes an innovation strategy. Overall, a strategy is about navigating to a certain ecosystem position, which is determined by the priorities of the leaders within the enterprise or by what strategy best fits within the ecosystem.

### 3.3.3 Enterprise Architecture

The modelling of enterprise architecture began in 1855 when Daniel McCallum drew the world's first enterprise diagram for the New York and Erie Railroad (Vose, 1857). Since then, thinkers such as Taylor (1911), Beer (1972), Jaques (1997) Spewak and Hill (1992) have worked to develop models for the design

of enterprises that seamlessly execute strategies within their operating environments. Enterprise architecture is the conceptual blueprint for how enterprises execute on their strategies, which otherwise are just plans.

Much of the research on enterprise architecture specific to innovation, here referred to as innovation architecture, focuses on the role of physical spaces in innovation (Allen & Henn, 2007), rather than on the conceptual model of how ideas or insights are transformed into new sources of stakeholder value. When innovation architecture refers to the structures of value creation, it is often at the government or societal level rather than within enterprises (Lessig, 2002). The literature that exists on innovation architecture breaks it down into where innovations originate from—here referred to as innovation inputs—how innovations are processed, how innovations of different types are managed, what happens to innovations after they are finished—for instance, are they moved to the operational part of the enterprise or is a new team stood up to operate the new product or service—working practices, and how innovations are tracked and accounted for. Each of these areas is covered in sections 3.3.4 to 3.3.8.

### 3.3.4 Innovation Inputs

It is hard to determine exactly where an innovation begins. For instance, the Blackberry is a famous Canadian innovation, well regarded for its ability to make the moments in between activities productive, such as checking emails while commuting or during meetings. It would be impossible to determine the specific insight or idea that led to a complex technological and social innovation like the Blackberry. It could be other previous innovations such as the Palm Pilot, which led to its creation or a unique insight into the psychology of business professionals. However, innovations do begin somewhere, and a convenient way of characterizing their origin is either as an insight or as an idea.

Verloop and Wissema (2004) define an insight as a novel view on a problem or a market need and suggest it is the starting point of innovation. For instance, an insight Christensen & Raynor (2003) describe is how business professionals often read the newspaper, scribbled in notebooks, or thought about problems during those brief moments before the Blackberry. Sanders and Stappers (2013) describe an idea as a new method or process for doing something, otherwise known as a technology. They suggest an idea is where innovation begins.

The notion of insights and ideas as the inputs of an EIS mirrors the concept of technology-push and demand-pull. Chidamber and Kon (1993) describe this as innovations originating from either market needs pulling enterprises to address them through the lure of profit, or enterprises pushing technology or other ideas to create or discover market needs. Xerox's PARC innovation lab is famous for developing novel technologies then attempting to find market needs they can address. Chesbrough, Vanhaverbeke, and West (2006) suggest that many successful enterprises harness both technology-push and demand-pull to create product-market fits faster and more reliably.

Other thinkers such as Carlson and Wilmot (2006) describe the origin of an innovation as a value proposition, which is an insight into a market need alongside an idea for how to address that need. Osterwalder, Pigneur, Bernarda, Smith, and Papadakos (2014) define a value proposition as "the benefits customers can expect from your products or services." Carlson and Wilmot's (2006) Need, Approach, Benefits per costs, and Competition (NABC) value proposition model offers one way of characterizing an insight and idea and then framing the business opportunity that value proposition represents. Another is Christensen and Raynor's (2003) Jobs-to-be-Done framework, commonly known as outcome-driven innovation, which holds that customers hire a solution to accomplish a specific job they want done. In

other words, it asserts that an innovation begins with an idea for how to better accomplish a customer's job.

Sanders (2012) and Martin (2010) both offer different knowledge-based models of innovation, where an innovation begins either with a deep level of knowledge about a market need or subject area or with a mystery, which is a problem that a customer will pay someone to solve. In both cases, these are different takes on innovations originating from knowledge rather than from a way of doing something. Osterwalder et al., (2014) use the Value Proposition Canvas (VPC), seen in Figure 4, to capture the origin of an innovation. In the VPC, an innovator starts on either the customer need or solution side and then identifies an appropriate match to create a value proposition.

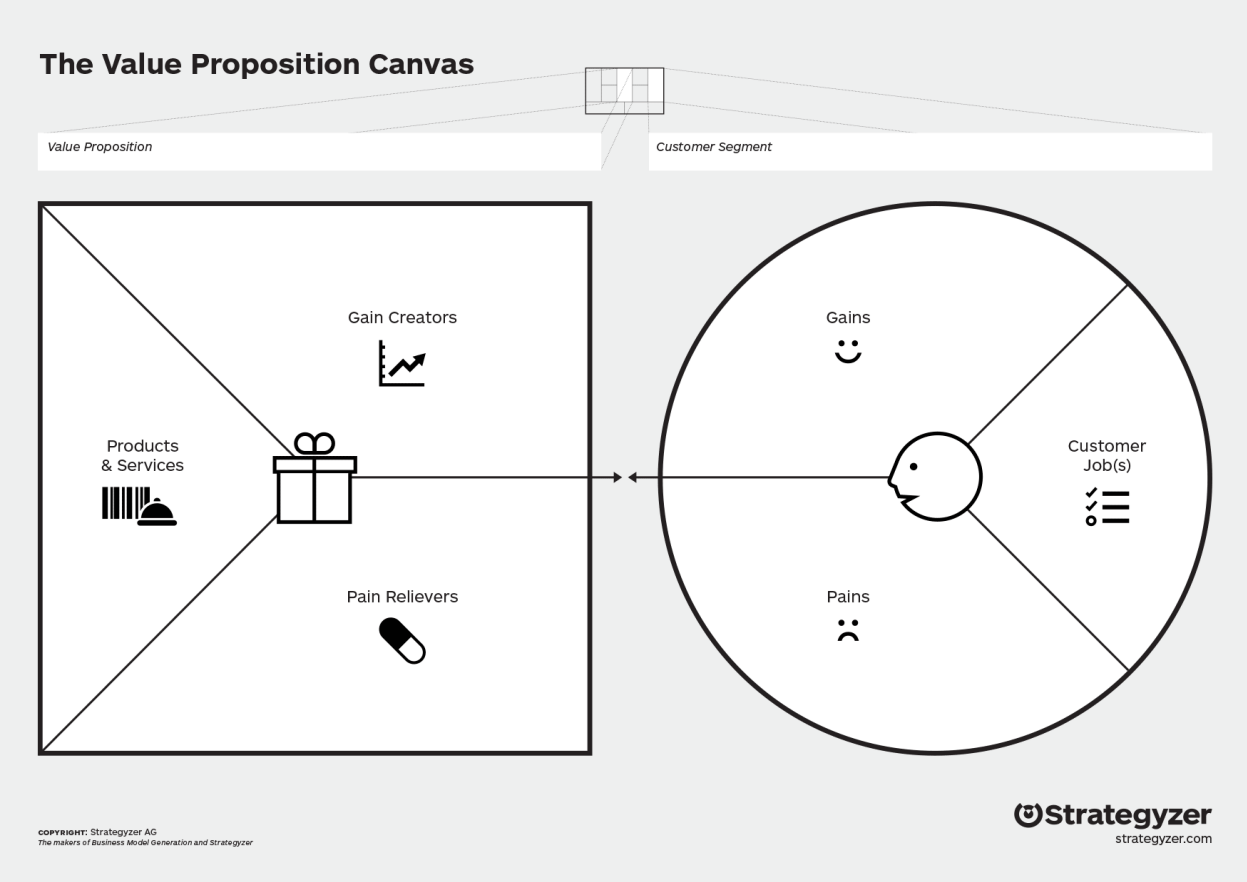


*Figure 4: The Value Proposition Canvas*

### 3.3.5 The Innovation Process

Regardless of whether an input begins with an insight or an idea, the process of innovation involves developing that input into a source of value for a stakeholder. In enterprise innovation, there is an additional layer of value capture to the innovation process where enterprises are looking to develop profitable business models around each innovation.

The dominant model for enterprise innovation processes is known as stage gate (Cooper, 1990). Instead of stage gate, McGrath and MacMillan (1995) use the term discovery-driven planning. Stage gate involves defining certain gates that innovations must pass through to continue receiving funding and other

resources. To pass through the gate, innovations usually must meet predefined criteria such as a certain level of positive customer feedback or a market opportunity size. Each implementation of stage gate includes a definition of what an innovation should be at each stage. This definition can be very narrow, for instance, that an innovation must have a $100 million market opportunity, align with one of four focus areas, and have positive customer feedback before advancing. The gate can also be very broad, as in the innovation must have a team willing to work on it.

Often enterprises will have several stage gates. Usually, the innovation must be better developed, such as through having existing customers or a certain level of sales to continue passing through the later gates. Passing through each gate normally triggers a release of resources like funding or a preapproved amount of time to reach and pass through the next gate. Stage gate is popular as it allows enterprises to hedge financial risk by only allocating resources to innovations that are promising while cutting funding to ones that seem like they will be unsuccessful. The people who decide which innovations pass through the gate are known as gatekeepers and are usually senior leaders, such as the board of directors or a committee of managers.

In stage gate, there are also stages. These are sets of steps that innovators follow to move between the gates and continue to receive resources. There are many potential models for what the stages of an EIS could be. For instance, Brown (2009) describes an innovation process known as design thinking, with the stages of empathize, define, ideate, prototype, and test.

The British Design Council (2005) describes what seems to be the most common set of stages in enterprises, which are discover, define, develop, and deliver. In the discover phase, innovators explore the ecosystem to identify a promising insight or idea. In the define phase, innovators narrow that promising insight or idea into a value proposition, using models like the Value Proposition Canvas seen in Figure 4. In the develop phase, innovators develop the value proposition, often using direct feedback from its end-user, until it is proven to satisfy a profitable market need. Finally, in the deliver phase, innovators build the supporting systems and processes necessary to deliver the solution at scale to capture the full market opportunity. In these models, there is often iteration and cycling back to previous stages, which can be a source of conflict in a more linear stage gate system.

Many popular innovation tools were designed to help innovators move from one specific stage to the next. For instance, the Business Model Canvas (Osterwalder & Pigneur, 2010) is designed to help innovators design the underlying structures to profitably realize a value proposition, which would happen in the develop phase of the British Design Council's (2005) model.

Rather than define stages, Ries (2011) defines the Build, Measure, Learn cycle, which is a repeating loop of building something, testing it with users, and identifying how to improve the innovation that innovators can follow within any stage.

Keeley, Walters, Pikkel, and Quinn (2013) also chose not to define stages. Instead, their Balanced Breakthrough model offers three parallel streams of work—customer, technology, and business—that must occur to develop an innovation. In other words, advancing an innovation involves simultaneously finding a profitable market need, developing methods to address that need, and building the enterprise capabilities to deliver on that method.

Not all EISs have gates or defined stages. They may instead choose to have an informal innovation process that leaves it up to the innovator to decide how to advance or how much funding is required. But

as described earlier, enterprises usually prefer to manage innovation that involves hedging financial risk and building controls to allow managers to guide the results of the innovation system. Some enterprises have parallel stage gate implementations with two different sets of gates. One set of gates for enhancements or incremental innovations and one set for transformative innovations. Keeley, Walters, Pikkel, and Quinn (2013) describe this as innovating the known and innovating the new.

Most innovation processes end up forming funnels, where more insights or ideas are explored than enhancements or new offerings are launched, since, at each gate, some innovations will not pass through. Flynn, Dooley, O'Sullivan and Cormican (2003) define this as an idea funnel. The speed at which innovations pass though the funnel and the percent of innovations that make it through can be tracked to manage the overall innovativeness of an EIS, which is covered further in section 3.3.8. Figure 5 (Chesbrough, Vanhaverbeke, & West, 2006), shows a complete enterprise innovation process. Each vertical line is a gate, while the space between each gate is the stage an innovation has reached.

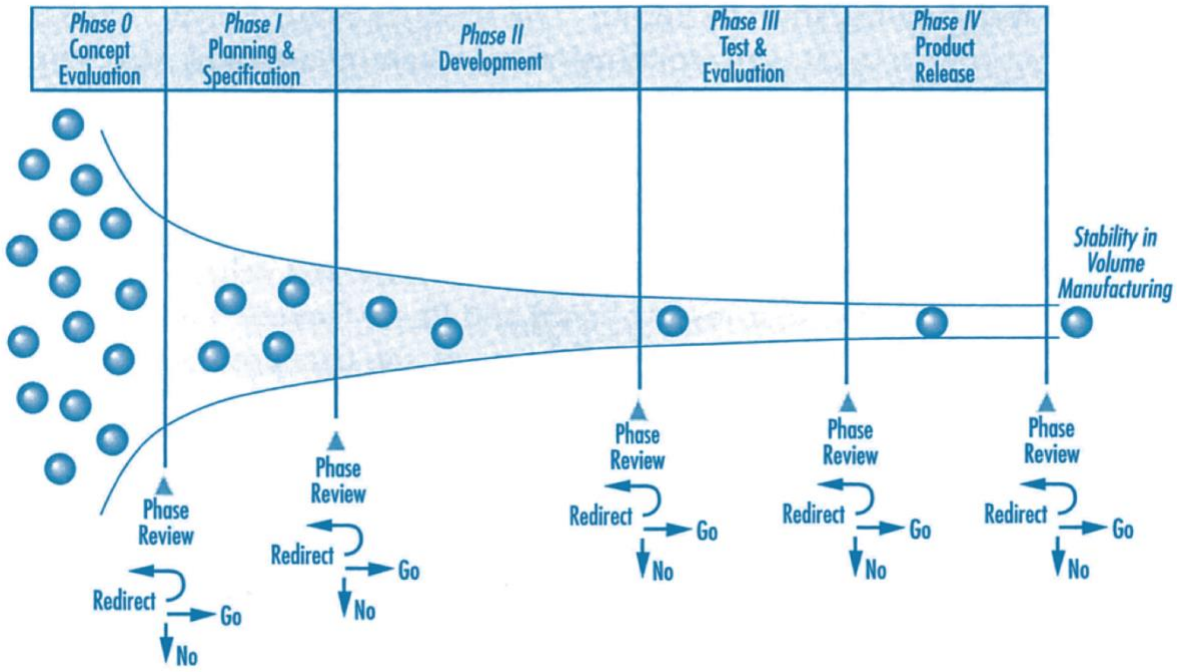


*Figure 5: Innovation Process Diagram*

### 3.3.6 Portfolio Management

As described in section 3.1, there are many different types of innovations. Some EISs have different processes for different types of innovations. For instance, one for new offerings and one for improvements to existing ones. Nagji and Tuff (2014) found that when enterprises balance the different types of innovations by having some new offerings and some enhancements, the overall portfolio is more profitable and less risky. They believe this is because innovations that are new to the company or new to the world are more profitable in the long term but take longer to begin delivering those profits. They define this as an innovation's ambition and define three levels of ambition for enterprise innovations. These levels are used to form the Ambition Matrix, seen in Figure 6, which is a tool enterprise innovators can use to map the innovations in their system. Nagji and Tuff (2014) claim that the most profitable

proportion of innovations with each ambition vary by industry, but that as a general rule of thumb innovation portfolios should be 70% core, 20% adjacent, and 10% transformational. They derived this rule from ex-Google CEO Eric Schmidt who called it the 70-20-10 rule. By mapping innovations to the Ambition Matrix, innovators can diagnose what their proportion per ambition is and adjust as needed to get closer to the 70-20-10 level or their desired level.

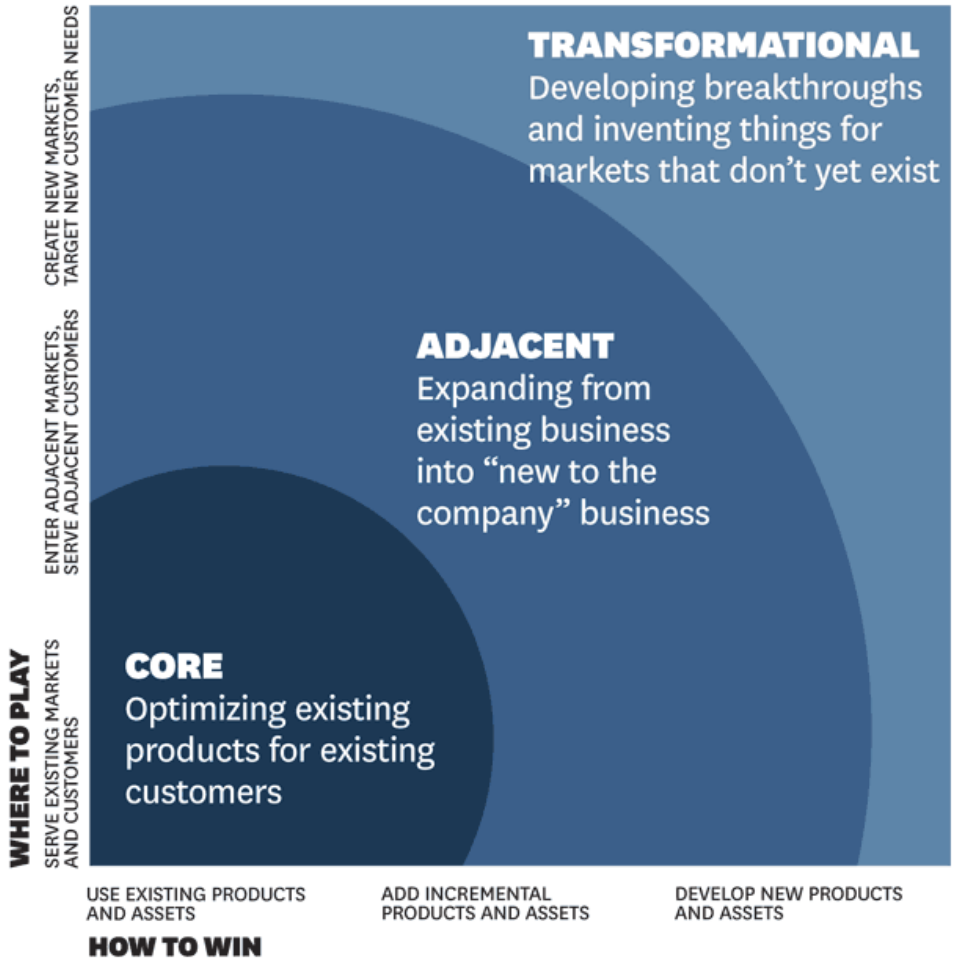


*Figure 6: The Ambition Matrix*

Aside from the ambition matrix, there are other models for how to classify and manage the types of innovations in an EIS. For instance, focus areas are one way of aligning innovations of any ambition with certain industries or areas the enterprise wants to build a presence in. An enterprise could even have an innovation portfolio of 70-20-10 per focus area and treat each focus area as a distinct innovation process.

Baghai, Coley, and White (1999) offer another take on innovation ambition, which they call the 3 Horizons model. In 3 Horizons, innovations fall into one of three horizons: horizon 1 (0-1 year), horizon 2 (1-3 years), and horizon 3 (3+ years). The horizon's timespan indicates how long it would take to bring that innovation to market successfully. Baghai, Coley, and White draw a similar conclusion to Nagji and Tuff (2014), which is that that innovations with shorter time horizons are more profitable in the short term but less so in the long term. Thus, they also suggest EISs have some innovations within each horizon but have more representation of horizon 1.

Overall, EISs are not required to manage their innovations as portfolios. Further, portfolio management only makes sense when there are enough resources in the EIS to fund and develop numerous innovations simultaneously. However, many enterprises choose to manage portfolios, and they often find that by guiding numerous innovations simultaneously, they can find opportunities for those innovations to reinforce each other (Nagji & Tuff, 2014). For instance, an enterprise simultaneously pursuing open banking and a financial wellness service may find that the open banking technology allows the financial wellness service to have a much more convenient user experience, as financial data can be pulled in automatically rather than having to be manually entered by the user.

### 3.3.7 Innovation Working Practices

Working practices within EISs are often very different than in more conventional enterprise systems. For instance, in a typical business process, such as processing transactions, the rate of processing and outputs are very predictable. Managers often have metrics they are accountable for, such as throughput or volume of transactions processed. Conversely, Keegan and Turner (2002) found that conventional management techniques stifle innovation. Innovators may be asked to deliver a certain number of innovations, meet specific revenue projections, or keep costs to a certain level. However, innovation is far more unpredictable than processing transactions. It is impossible to predict with any certainty whether an innovation will be profitable. Promising innovations may flounder, while seemingly doomed innovations may one day become an enterprise's greatest revenue driver. Therefore, attempting to force innovators to conform to typical management processes often leads to frustration, increased employee turnover, lower overall productivity, or falsified results to meet metrics—thereby making those metrics unreliable (Hamel, 2006). On the other hand, most enterprises are not fully self-managing (Laloux, 2014), and many employees struggle to find what to do without having general guidelines or working practices to follow.

That is why agile or agile-like working practices are very common in EISs (Balaji & Murugaiyan, 2012). Typically, in agile, work is broken into short sprints, usually lasting for 1-3 weeks. Each sprint ends with the delivery of a finished output, which may be advancing to the next gate or performing certain activities. Employees have daily stand up meetings, often known as scrums, which keeps everyone connected and in sync. At the end of each sprint, there is an after-action review, where the team goes over what went right and wrong and how to improve in the future. Agile works well in innovation as it allows managers to plan the sprints or work with sprint planners to keep track of who is doing what and what employees are accountable for. The sprints themselves can be designed to align with stages or gates to give senior leadership a sense of what innovations to expect and when. Agile also helps employees know what to expect and gives teams predictable routines and rituals, which Smith and Stewart (2011) found encouraged bonding and team cohesion. It is for these reasons (among others) that agile can more than double innovation velocity (Rigby, Sutherland & Takeuchi, 2016).

Another model for working practices within an EIS is Doerr's (2018) Objectives and Key Results (OKR) model. In OKR, employees and management collaborate to define the employees' deliverables for the next work period, which is usually at least a few weeks and rarely more than a year. One common OKR structure is three month and one-year deliverables to track short- and long-term progress. OKRs are popular because they encourage individual autonomy, as employees are not told how to achieve their OKRs. Feldman (1989) found an inseparability between individual autonomy and innovation outcomes, which suggests OKRs may be better for EISs over agile, which has lower levels of autonomy. However, agile is much more similar to how conventional enterprises operate, which suggests that conventional

enterprises building innovation systems will find agile much easier to work with, especially in the early stages of the EIS.

Overall, either agile, OKRs, or some combination offer effective models for how work can be structured within EISs.

### 3.3.8 Innovation Accounting

Most conventional enterprises rely on metrics or Key Performance Indicators (KPIs), as they are commonly known, to measure and judge how effectively a process or team is operating. In a sales team, metrics might include volume of sales, number of phone calls made, or customer satisfaction ratings (Kofman, 2018). These metrics are usually effective measures for managers to judge if a team is performing well, and if not, how to create a higher-performing team. For instance, if a lot of calls are being made but sales are low, the problem is likely what is happening on the call.

However, enterprise innovation does not lend itself to metrics the same way. There is no volume of interviews conducted or number of ideas generated that will lead to a successful innovation. Instead, innovation systems use what Kleinknecht, Van Montfort, and Brouwer (2002) call an innovation indicator. Innovation indicators are different metrics that indicate the expected innovativeness of an EIS. Manuele (2009) breaks innovation indicators down into two types: leading and lagging. Leading metrics are forward-looking and assess the inputs of innovation, such as innovation velocity, which is the average speed innovations move through the funnel or between gates. Lagging metrics are retrospective and assess the outputs of innovation, such as an innovation's hurdle rate, which is whether an innovation exceeded its expected rate of return.

Having a system of metrics, hereafter referred to as innovation accounting, can allow the leaders of an EIS to assess how the system is performing at a high level and find ways of increasing the innovation systems outputs. A possible assessment might involve determining whether innovations are consistently slowing down between two gates or whether one gate is rejecting more innovations than average. Metrics are also useful as they provide objective measures of the innovation processes performance rather than an individual interpreting its performance who could potentially introduce bias.

However, metrics can also have drawbacks. For instance, a common innovation indicator to measure a team's performance is how many successful innovations they have launched. But Knight, Randall, Muller, Välikangas, and Merlyn (2005) suggest that this can create "not-invented-here attitudes, resulting in innovation empires whereby individuals or groups become overly invested in the success of their project at the expense of innovation projects elsewhere in the company."

Alternatively, Keeley, Walters, Pikkel, and Quinn (2013) suggest aligning metrics with the three risks of innovation they identified: desirability, viability, and feasibility. They suggest innovators should determine whether the proposed innovation addresses a compelling market or customer need, is economically sustainable for the enterprise to produce, and is technically possible for the enterprise to execute. They suggest that enterprises whose innovations are measured along these three risks will have superior innovation outcomes.

### 3.3.9 Innovation Culture

Every EIS has a culture, which Needle (2010) defines as "the organization's vision, values, norms, systems, symbols, language, assumptions, beliefs, and habits." Culture is all the human factors of the EIS, including

whether employees get along with each other, enjoy or find meaning in their work, how they communicate with each other, and how their individual lived experiences guide their work. Szczepańska-Woszczyna (2014) found three of the four drivers of innovation effectiveness were around culture and its associated factors.

Leadership is an important component of culture, as it is leaders who drive culture through examples, incentives, and working practices. Leaders also hire and fire employees and overall have the most influence on the formal and informal hierarchies that exist within enterprises around experience, position, and personality. Kesting, Ulhøi, Song, and Niu (2015) found leadership was a significant determinant of innovation outcomes.

Milne (2007) suggests that while culture is intangible, it is expressed through concrete action such as pay rates, hiring practices, cultural norms, and cultural practices. One way of understanding culture is through motivations, which are what people want to do and why. Ryan and Deci (2000) believe that motivations can either be:

1. extrinsic, which are tied to promotions, raises, and other status indicators; or
2. intrinsic, which Pink (2011) believes either fall into mastery, autonomy, or purpose.

Whether work encourages employees to grow, whether it provides employees with freedom or choice, and whether it provides employees with a sense that they are contributing to something worthwhile and bigger than themselves can all be considered motivations. Scotchmer (2004) suggests every culture has elements of both intrinsic and extrinsic motivations, but that intrinsic motivations are far more motivating. This is especially true in innovation, which relies far more on engagement and creativity rather than more conventional processes like working on an assembly line.

Despite this, Kohn (1999) found that most conventional enterprises try to motivate employees and build culture through extrinsic motivation. He found that these enterprises encouraged employees to focus more on earning rewards for themselves rather than on creating value for the enterprise's customers. Conversely, Alm, Johan, and Jönsson (2014) found that cultures that promote effective innovation share five traits: innovation readiness, creativity and learning, leadership and entrepreneurship, market orientation, and motivations and relations. None of those cultural traits involve extrinsic motivation, which further suggests that if enterprises want to create cultures that produce high levels of innovation, they should encourage intrinsic motivation and incentives.

Many of the organizations that do try to focus on intrinsic motivations often approach this in a shallow manner. They do this by creating visually appealing offices, offering free beers and lunch, or providing flexible and remote working options. However, Hogan and Coote (2014) suggest that to create an intrinsic culture, you have to go beyond surface-level artifacts and look at the deeper layers of enterprise culture such as behaviours and norms.

Many models exist for creating intrinsic motivation in employees by guiding behaviours and norms. Kegan, Lahey, Miller, Fleming, and Helsing's (2016) Deliberately Development Organizations (DDOs) model encourages mastery through each individual being responsible for growing and developing themselves and those around them through their work. Other models for creating employee autonomy through working practices include Laloux's (2014) Teal Organization, Robertson's (2015) Holacracy, and Ressler and Thompson's (2008) Results-Only Work Environments (ROWE).

### 3.3.10 Innovation Tools

In innovation, tools are the space, digital or physical tools, concepts, frameworks, and artifacts that employees use to do their work. When thinking about tools innovators often think of frameworks such as the Business Model Canvas (Osterwalder & Pigneur, 2010), while overlooking the array of email clients, software subscriptions, meeting rooms, cell phone subscriptions, printers, and computers that underly the work of any enterprise employee, including innovators (Moultrie, Nilsson, Dissel, Haner, Janssen, & Van der Lugt, 2007). The right tools can help guide collisions, manage information, and empower innovators.

Humble, O'Reilly, and Molesky (2015) believe that most enterprises select tools to satisfy procurement or finance needs rather than because they are useful to the tools end user. This results in most enterprises using the same handful of approved tools. Instead, tools can be a competitive advantage that boost productivity, avoid time-consuming workarounds, and give employees more agency in their work, which in turn can boost workplace satisfaction. Thomke (2006) uses a case study with Booking.com to demonstrate the impact tools can have on innovation. He found that having the right tools was critical for ensuring that innovation work progressed smoothly. Alternatively, Moultrie et al., (2007) found that tools are less a determinant of innovation than other factors such as strategy or architecture. Overall, it appears that procuring tools that match people's preference for communicating, managing work, silence or privacy, and collaboration and individual work can accelerate work and encourage people to feel comfortable, all of which can contribute to superior innovation outcomes.

# 4.0 The Innovation Map

In the literature review in section 3.0, I defined innovation as "creating value through novel solutions to meaningful problems." Then, I explored how enterprises manage this process to avoid disruption. However, I found that most enterprises were not managing innovation effectively as they had adopted a very narrow view of enterprise innovation. Following that, I broke down enterprise innovations into ten critical factors that greatly impact the innovativeness of Enterprise Innovation Systems (EISs), which are innovation ecosystems, innovation strategy, enterprise architecture, innovation inputs, the innovation process, portfolio management, innovation working practices, innovation accounting, innovation culture, and innovation tools.

From reviewing the literature on these factors, I identified hundreds of different innovation approaches, such as the Business Model Canvas (Osterwalder & Pigneur, 2010). Many were not featured in the literature review. However, I have captured the majority of them and added them to an Excel database, which can be seen in Appendix B.

In sections 4.0 to 4.2, I have covered how I analyzed and grouped these approaches and then mapped them to what I call the Innovation Approaches Map. I believe the Innovation Approaches Map demonstrates the five overarching ways in which innovation is approached. Further, the Innovation Approaches Map forms the foundation for the Innovation Cascade framework.

## 4.1 Mapping the Approaches to Innovation

As the literature review in section 3.0 has demonstrated, there are many ways to approach enterprise innovation. Some enterprise innovators focus on tools such as the Business Model Canvas (Osterwalder & Pigneur, 2010), while others focus more broadly on innovation ecosystems such as value constellations (Normann & Ramirez, 1993). From the work of Van der Panne, Van Beers, and Kleinknecht (2003), it appears that most enterprise innovators fail to focus on all of them. Instead, they often selectively focus on certain components such as innovation strategy or innovation working practices. While there are likely reasons for why enterprise innovators will selectively focus on certain aspects of enterprise innovation, what is evident is that the most effective innovators incorporate all ten components into their EIS, which Chwalik and Goehle (2018) suggest can lead to gross profit growth of 6.6 times their industry groups. Additionally, Tidd (2001) found a relationship between "environmental contingencies, organization configurations and performance" in innovation work, meaning that there are interconnected factors within EISs that jointly impact outcomes.

However, what it means to incorporate all ten components is still unclear. The components I explored in the literature review helped me to form a clear idea about what factors impact innovation outcomes, but not how to use those factors to build better EISs. Bridging that gap is the intention of the Innovation Cascade.

Therefore, I need to identify what Buckley and Chapman (1997) define as native categories, which are "groupings of knowledge within a field or area of study." For instance, Mintzberg, Ahlstrand, and Lampel (1998) identified ten native categories in enterprise strategy, which are: design, planning, positioning, entrepreneurial, cognitive, learning, power, cultural, environmental, and configuration. These overarching categories within a domain are often known as schools of thought or what Christensen and Raynor (2003)

describe as categorization. Christensen and Raynor believe classifying phenomena into categories is "key to developing useful theory" or, in the case of this paper, to developing an effective framework.

Before I developed my own set of native categories, I first checked if there were any existing ones within enterprise innovation. I identified two related sets. In *Schools of Innovation Thought* Mele, Russo-Spena, Nuutinen, and Kallio (2017) identified three native categories regarding perspectives on innovation in academia, which are:

1. linear and planned;
2. iterative and interactive; and
3. practice-based.

While these are helpful for approaching the study of innovation, they did not address building EISs.

Keeley, Walters, Pikkel, and Quinn (2013) came much closer in *Ten Types of Innovation*. They analyzed thousands of successful innovations and synthesized them into a "periodic table of innovation." The ten types within that table, shown in Figure 7, are what they believe are the categories any enterprise innovation must fall within. For example, the early 2000's Apple Music store combined profit model, network, process, product system, service, and channel innovations to become the world's number one music retailer.

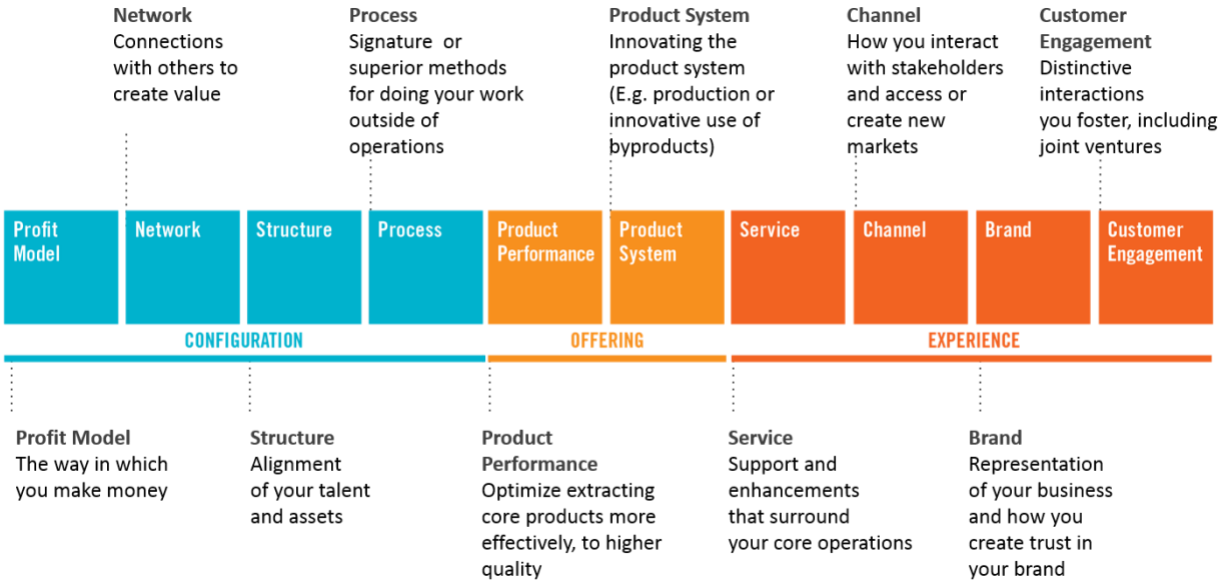


*Figure 7: The Ten Types of Innovation*

While this table was interesting, it also did not address what components of an EIS innovators should focus on. Therefore, using the 250 innovation approaches I collected from the literature review, I began identifying what the native categories within EISs are.

First, I collected all the approaches in Excel. Then I researched the approach's name, a description of the approach, who created it, its year of origin, and reference material. In some instances, the year of origin and creators were uncertain, so I labelled the earliest identified public use of the term as the creator and year of origin.

Next, I tagged each approach with a code pulled from the earlier literature review. The earliest tags included but were not limited to, metrics, governance, funding, structures, focus areas, talent management, incentives, and roles. Each tag had a certain number of occurrences. I grouped the tags with the lowest occurrences or lowest frequency into tags with higher frequency. In some instances, I combined high-frequency codes. Overall, my intention was to reduce the number of codes to a manageable set. For instance, foresight was a fairly common tag that I grouped into the ecosystem tag, as I interpreted foresight in the context of EISs as exploring possible future or trends within the ecosystem. After several rounds of tagging and grouping, I arrived at my five native categories, which are:

1. **Ecosystem**: The broader interconnected system the EIS is embedded within.
2. **Strategy**: The enterprise's current and desired ecosystem position, along with the intended route to reach the desired position.
3. **Architecture**: The design of the EIS that permits it to realize the innovation strategy.
4. **People**: The members of the EIS acting within the innovation architecture.
5. **Infrastructure**: The tools and resources supporting the members of the EIS.

The definitions for each code were written after pulling material from my literature review. For references, please refer to the associated material such as Innovation Ecosystem in 3.3.1 for ecosystem. Table 1 shows three cells from the total 250 cell database, which is included in its entirety in Appendix B.

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Horizon Scanning** | A bird's-eye view of an environment. Acronyms include PESTLE and STEEPV. | Francis Aguilar | 1967 | Ecosystem | Aguilar, F. J. (1967). Scanning the business environment. Macmillan. |
| **Ten Types of Innovation** | The periodic table of innovation. Ten categories all innovations fall within. | Larry Keeley, Helen Walters, Ryan Pikkel, Brian Quinn | 2013 | Infrastructure | Keeley, L., Walters, H., Pikkel, R., & Quinn, B. (2013). Ten types of innovation: The discipline of building breakthroughs. John Wiley & Sons. |
| **Teal Organization** | An organizational model characterized by self-management, wholeness and evolutionary purpose. | Frédéric Laloux | 2014 | Architecture | Laloux, F. (2014). Reinventing organizations: A guide to creating organizations inspired by the next stage in human consciousness. Nelson Parker. |

*Table 1: Examples of the 250 Innovation Approaches*

Table 2 indicates the proportion of the 250 approaches that fell within each code. As a brief test to assess how my native categories aligned with the broader thinking in enterprise innovation, I mapped my five codes to the eleven indicators Dziallas and Blind (2019) identified through their review of 800 innovation articles. The results are also in Table 2 and suggest the enterprise innovation native categories I identified generally align with the results of their literature review. However, this is by no means a rigorous test and should not be interpreted as definitive proof that these are accurate native categories for enterprise innovation.

| Name | Volume | Percentage of 250 Approaches | Indicators Within Code | Percentage of Indicators | Variance |
|---|---|---|---|---|---|
| **Ecosystem** | 44 | 17.6% | Market (13%), Network (4%), Environment (5%) | 22% | 4.4% |
| **Strategy** | 45 | 18% | Strategy (4%), R&D activities and input (11%), Financial performance (7%) | 22% | 4% |
| **Architecture** | 49 | 19.6% | Organizational structure (10%) Innovation process (5%), Innovation project management (5%) | 20% | 0.4% |
| **People** | 66 | 26.4% | Innovation culture (10%), Competence and knowledge (9%) | 19% | 7.4% |
| **Infrastructure** | 46 | 18.4% | Innovation products (17%) | 17% | 1.4% |

*Table 2: Innovation Approaches Breakdown*

## 4.2 Making Sense of How We Innovate

With my five native categories for enterprise innovation finalized, I then identified how the native categories fit together to eventually construct the Innovation Cascade. I call the map that I produced from seeing how the native categories fit together the Innovation Approaches Map.

To make the Innovation Approaches Map, I looked for similar maps designed by other researchers. The only one I identified was Sanders's (2008) Design Practices Map. This map, seen in Figure 8, visualizes the native categories for approaches to design.

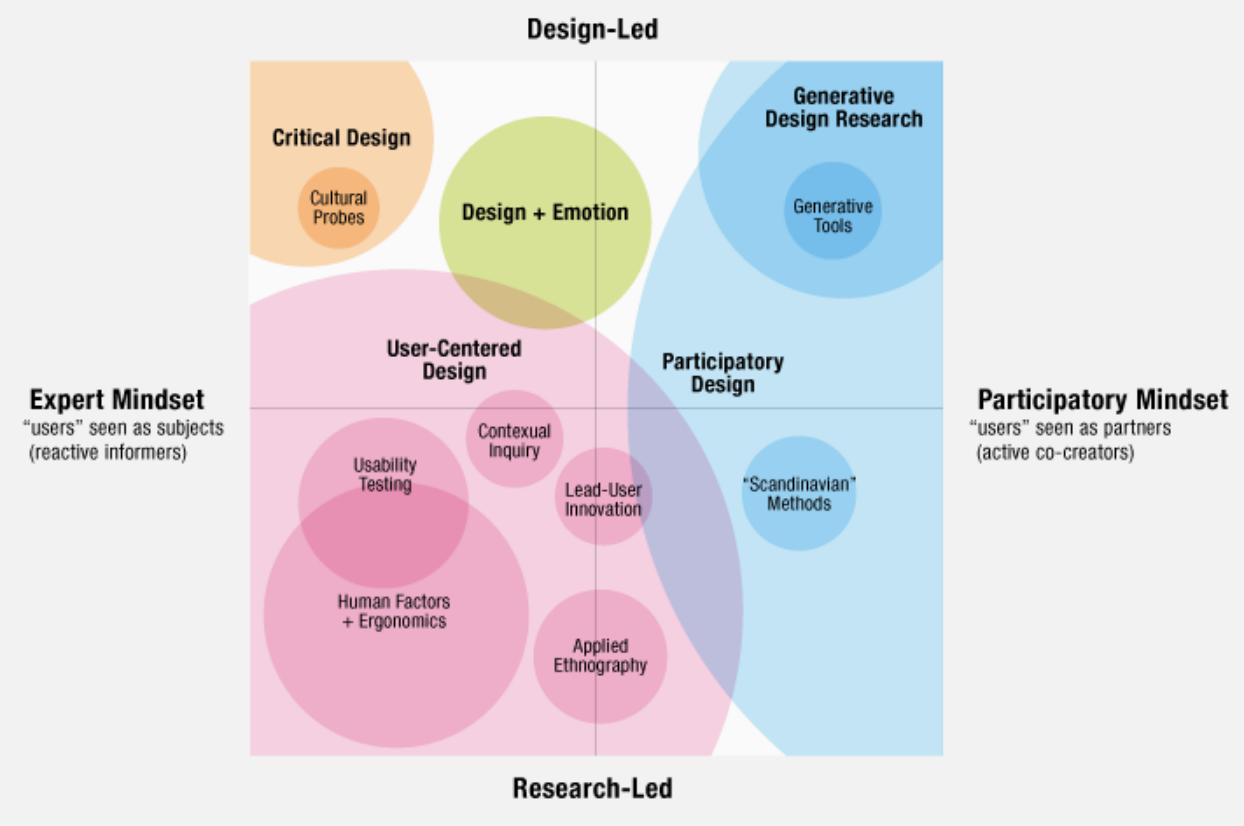


*Figure 8: The Design Practices Map*

While Sanders does not explicitly confirm this, I believe the Design Practices Map is a constellation map. A constellation map involves mapping individual points to a grid and then finding patterns within the points, similar to finding constellations from stars.

To make a constellation map for my five native categories, I defined two axes that showed a pattern for how the ecosystem, strategy, architecture, people, and infrastructure of an EIS were connected. While there are an infinite number of possible patterns, I was specifically looking for one that suggested an order in which an EIS builder should focus on the five codes. For instance, is it more effective to focus on ecosystem or architecture first? The reason I was searching for that pattern was that EIS builders using the Innovation Cascade likely would not consider each native category simultaneously. Rather, they will focus on each sequentially and potentially return to previously considered ones to iterate.

I experimented with a variety of different axes, including process vs human-centered, enterprise vs individual, doing vs knowing, and top-down vs bottom-up. These axes created various observations, including that ecosystems and people are predominantly human-centered, while strategy, architecture, and infrastructure are more process or structure-centered. However, I found the most insight from the Focus and Thinking axes, which are explained along with their endpoints below.

### 4.2.1 Axis 1: Focus

The Focus axis indicates whether the innovation approach is concentrated within or outside the enterprise. For instance, ecosystem is concentrated the furthest outside the enterprise, while infrastructure is concentrated the deepest inside the enterprise. The first endpoint is "External Focus." An example

approach is Stakeholder Mapping (Rhieman, 1968), which involves identifying the interests and influence of the primary and secondary stakeholders who have an interest in an issue. The second endpoint is "Internal Focus." An example is the Logical Framework (Couillard, Garon, & Riznic, 2009), commonly known as the Log Frame, which is a project management tool useful for managing projects goal, activities, and expected results.

### 4.2.2 Axis 2: Thinking

The Thinking axis indicates the approach's relationship to decision-making. Strategy is the second-most exploratory of the five codes, as it primarily involves acting on ecosystem context to achieve objectives. People is the second-most decision-oriented of the five codes, as it involves choosing and implementing working practices and cultural elements. The first endpoint is "Divergent Thinking," which involves making novel connections to expand the range of possible decisions. An example is futures scanning, which involves identifying weak signals, trends, and drivers of change to understand possible shapes the future could take. The second endpoint is "Convergent Thinking," which involves synthesizing information to make informed decisions. An example is the Strategy Palette (Reeves & Haanaes, 2015), which identifies the optimal strategy for an enterprise's position within its competitive environment.

### 4.2.3 The Innovation Approaches Map

Using the five codes, two axes, and the proportions identified in Table 2, I constructed the Innovation Approaches Map seen in Figure 9. The size of the bubble indicates the proportion of the approaches that fell within that code. For the proportion's percentages refer to Table 2.

The Innovation Approaches Map shows a very obvious pattern where the approaches trickle down from exploring the possibilities that exist within the ecosystem outside the enterprise, to identifying and acquiring infrastructure that supports the enterprise's members within the enterprise. I believe that this pattern shows a clear order that EIS builders should follow when building or enhancing EISs.

This follows from the literature review, which supported that the most logical order for building an EIS is first to understand the ecosystem, then fit a strategy to it, then define the structures of executing on that strategy while identifying people to work within those structures, and then finally source supporting tools and resources for those people. This order is further supported by thinkers such as Loh and Hoverstadt (2017), who explored the intersection of ecosystems, strategy, and other factors and their impact on enterprise success. While the Innovation Approaches Map suggests linearity of process, my findings are that it simply gives a general sense of the highest to lowest impact decisions around building an EIS. There will likely have to be many iterations or cycles between the different areas of the Innovation Approaches Map to gradually build a picture of what form the EIS will take.

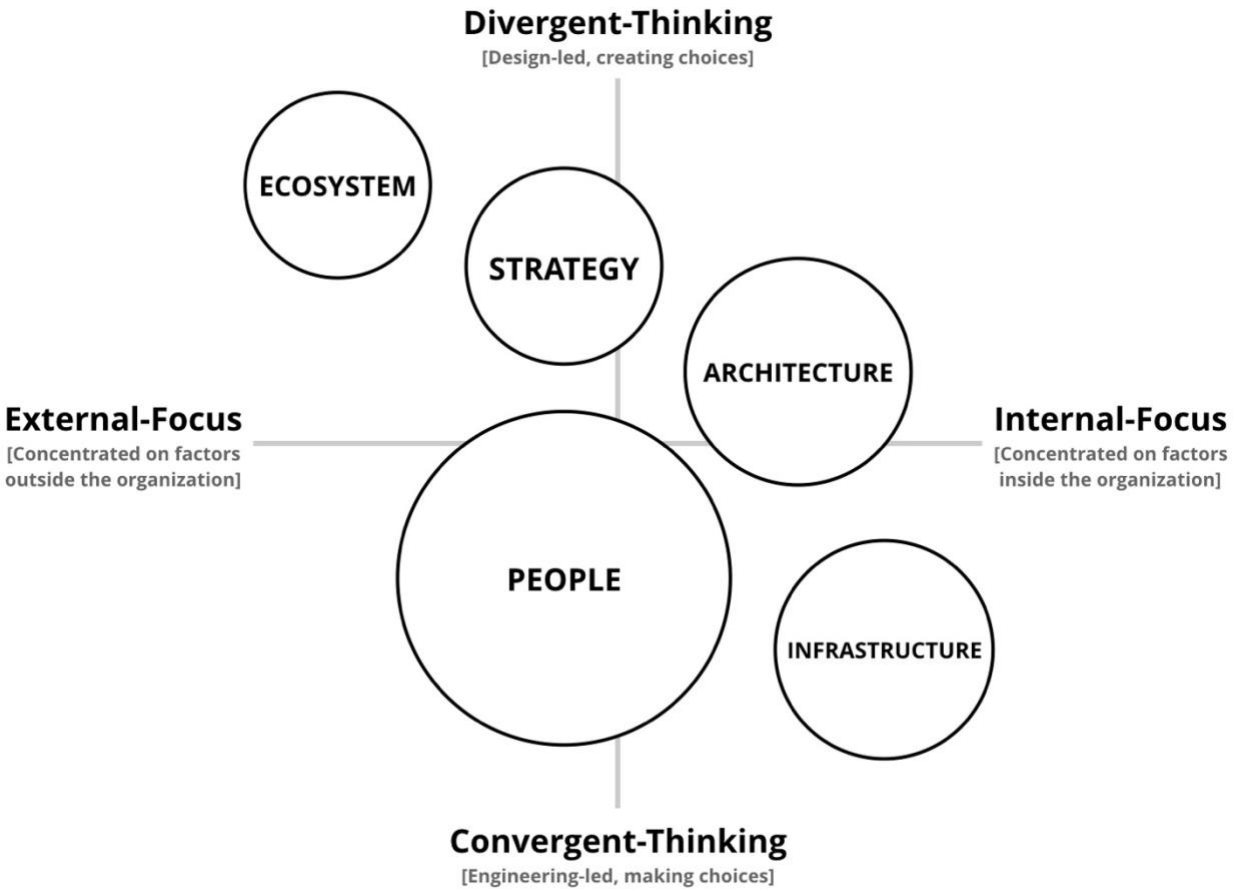


*Figure 9: The Innovation Approaches Map*

However, even with the broad categories and sequence of the Innovation Cascade determined. I was still murky on the specific contents of each of the five codes. My literature review gave me a head start, but I believe it was necessary to go speak with existing innovation practitioners to get their perspective on my work to help inform the contents of each of the five codes.

In the following section, the Innovation Cascade is fully built out through practitioner interviews in section 5.1 and a system mapping activity in section 5.2. All of my findings are then brought together into the final pre-case study version of the Innovation Cascade in sections 5.3 and 5.4.

# 5.0 The Innovation Management Framework

From sections 3.0 to 4.2, I explored literature surrounding innovation and deeply explored the ten components of an Enterprise Innovation System (EIS): innovation ecosystems, innovation strategy, enterprise architecture, innovation inputs, the innovation process, portfolio management, innovation working practices, innovation accounting, innovation culture, and innovation tools.

From there, I captured 250 innovation approaches and conducted an analysis to determine the five native categories for EISs, which are: ecosystem, strategy, architecture, people, and infrastructure. Using a methodology known as constellation mapping, I mapped the five native categories to the Focus and Thinking axes to create the Innovation Approaches Map, which demonstrated that EIS builders should follow the ecosystem, strategy, architecture, people, and infrastructure order when building EISs.

My next objective, which I cover in sections 5.0 to 5.4, is to continue building on my previous work to finish constructing the Innovation Cascade. In section 5.1, I have covered how I used interviews to apply an innovation practitioner lens to the Innovation Cascade thus far. In section 5.2, I have used a system mapping technique known as Rich Picture (Checkland, 1972) to explore the contents of each of the five codes. In section 5.3, I have compiled all the work done thus far, to create a final version of the Innovation Cascade. Finally, in section 5.4, I have speculated use cases for the Innovation Cascade, in preparation for the case study with OMERS in section 6.0.

## 5.1 Innovation Practitioner Interviews

The Innovation Approaches Map, seen in Figure 9, demonstrates that it makes the most sense to consider the five codes in the order of ecosystem, strategy, architecture, people, and infrastructure. I believe this is the case because ecosystem is the most exploratory of the five codes and involves trying to understand what is happening outside the enterprise. Strategy is about navigating the ecosystem to create a more profitable enterprise, happier customers, or to achieve other objectives of the enterprise. Architecture is about the structures and systems built to execute on that strategy. People are those who work within the architecture. Finally, infrastructure is the farthest inside, the most concrete, and involves the tools and supporting resources they use while working.

To better understand what other innovation practitioners thought of my hypotheses, and to generally understand their experiences and worldview, I conducted a set of eleven interviews that were loosely structured around the five codes. Each interview was very conversational and driven by what the interviewee had to say. While not a script, the general questions or areas I explored are detailed in section 5.1.1.

### 5.1.1 Interview Questions

The questions are organized around the five codes, with each covering a component that the literature review and approaches analysis suggested might be in each of the five codes. The questions do not refer to EISs specifically, but innovation systems more broadly. That is intentional as many of my participants were not enterprise innovators, which I explain more in section 5.1.2.

**Ecosystem**

- **Environment:** What external factors could influence your innovation system?

- **Couplings:** What stakeholder relationships exist that impact or are impacted by your innovation system?
- **Drivers:** What pressures shape the environment your innovation system operates within?
- **Scenarios:** What futures could your innovation system or its drivers potentially create?
- **Fit:** How will your innovation system fit with the scenarios, strategies, and systems it is embedded within?

**Strategy**

- **Vision:** What shared statement or image captures and aligns people behind the objective of your innovation system?
- **Focus Areas:** What broad categories indicate how you will navigate towards realizing that vision?
- **Roadmap:** What are the set of steps your innovation system could follow to realize the focus areas?
- **Milestones:** What progress markers exist to track progress along your roadmap?
- **Barriers:** What likely obstacles exist that may challenge you in realizing your vision?

**Architecture**

- **Process:** What is the flow of value that drives innovations from actionable insights to launched businesses within your innovation system?
- **System:** How does your innovation process fit with other enterprise functions such as finance or administration?
- **Metrics:** How is the flow of innovation work accounted for and understood?
- **Organization:** What roles and reporting lines do the innovators of your system work within?
- **Governance:** How are major decisions or systems changes made?
- **Funding:** How is your innovation system funded and what commitments are tied to that funding?

**People**

- **Membership:** How is the right talent found and welcomed into your innovation system?
- **Leadership:** Which members are empowered to guide innovation or business impact?
- **Culture:** What shared norms or customs unite your innovation group?
- **Values:** What shared expectations of conduct does your innovation group hold?
- **Incentives:** What intrinsic or extrinsic factors motivate innovators within your system to drive change or business impact?

**Infrastructure**

- **Tools:** What objects, programs, or concepts support your innovation systems work?
- **Space:** In what physical or digital spaces is your innovation work performed?
- **Platforms:** How do your tools and physical space work together to accelerate innovation work?

### 5.1.2 Interview Candidates

I drew on my advisors and on my network to source the eleven innovation practitioners I interviewed. My interview candidates were not all from enterprise innovation. They came from backgrounds, including startups, venture capital, government, enterprise innovation, innovation service consultancies, and innovation education. I chose not to limit my interviews solely to enterprise innovators as I believed the other types of innovators would offer helpful context and perspectives on non-EISs, which I would otherwise miss.

Table 3 below details who I interviewed, while still maintaining their anonymity as per the consent agreement I signed with them. The order in Table 3 indicates the order I conducted the interviews in.

| Interview Number | Role | Industry | Interview Type |
|---|---|---|---|
| 1 | Innovation Policy Expert | Government | In-Person |
| 2 | Partner, Innovation Coach | Applied Research, Academia | In-Person |
| 3 | Partner | Innovation Services | Phone |
| 4 | CEO | Innovation Education | In-Person |
| 5 | Co-Founder | Innovation Services | Phone |
| 6 | Founder | Startup | In-Person |
| 7 | Executive Director | Incubator | In-Person |
| 8 | Chief Innovation Officer | Primary Industry | Phone |
| 9 | Innovation Advisor | Primary Industry | Phone |
| 10 | Product Management | Healthcare | In-Person |
| 11 | Vice President, Innovation | Manufacturing | Phone |

*Table 3: Interview Candidates*

### 5.1.3 Interview Analysis

I recorded my interviews with each candidate. However, due to time constraints, I chose not to transcribe each one. I limited myself to re-listening to each interview and incorporating my interpretation of their observations into the preliminary version of the Innovation Cascade.

There were some noteworthy findings from the interviews. I discovered that one interview candidate was working with an industry group to lead innovation efforts across a portfolio of companies, rather than just within one enterprise. This suggests that perhaps the Innovation Cascade has another level above ecosystem or that the Innovation Cascade can be applicable for EISs as well as industry innovation systems.

Another candidate, who founded an organizational behaviour services startup, suggested that EIS building is performed at a certain level of complexity and that certain practitioners might be better equipped to handle that complexity than others. This could indicate there are certain practitioners who might find the Innovation Cascade more useful than others. Or that certain practitioners are more effective at building or enhancing EISs than others.

A candidate working for a European applied-research firm suggested that in their experience, the value of innovation was not in the outputs of innovation but in the external benefits it created for the rest of the enterprise, such as creative problem solving, confidence, or ambition. This suggests the value of the Innovation Cascade could be in educating or engaging stakeholders in EISs.

Regardless, my next step was to advance the Innovation Cascade through understanding its interconnected nature, which I achieved through a system mapping activity.

## 5.2 System Mapping the Five Codes

After the interviews, I was still unclear about what the contents of each of the five codes of the Innovation Cascade were. Even if the innovation ecosystem is where any EISs builder should start, what aspects of the ecosystem should be considered by that innovator?

To address this, I performed a system mapping exercise to map out the contents of each code and see how the codes fit together. I chose system mapping because I wanted to understand more than just what the components of the five codes could be. I believe that this exercise, rather than just a literature review, allowed me to understand how the codes are interconnected more deeply. Since the Innovation Cascade is designed to build EISs, seeing the interconnectedness is essential.

I explored several different systems mapping techniques, including Synthesis Mapping (Jones & Bowes, 2017) and the ERAF system technique (Kumar, 2012), before settling on using Peter Checkland's (1972) Rich Picture technique. Rich Picture involves creating a visual model of a system through identifying, labelling, and drawing connections between different components. While similar to many systems mapping techniques, I chose Rich Picture because of its emphasis on visualizing the system, which I believe aids in communicating the Innovation Cascade to other EISs builders.

To begin using Rich Picture, I first mapped the five codes onto blank sheets of paper and sorted and grouped components from the literature review, innovation approaches analysis, and interview questions.

I found numerous interconnections in areas such as metrics, which I explored in section 3.3.8. I found metrics fit within architecture as a feedback mechanism for how leaders can assess the EIS's performance as well as how metrics could also inform strategy as a way of assessing possible new designs for the architecture based on the existing performance of the EIS.

Another interconnection is self-management, which is explored in section 3.3.9. I found it could be at the architecture level if the architecture was designed to promote self-management, such as in Laloux's (2014) teal organization model. But self-management could also exist at the people level if the members of the EIS had a preference for autonomy. However, if self-management was in the culture but not in the architecture, it could create a tension that could potentially lead to disengaged employees or chaotic working practices.

Overall, the findings were promising as they suggested the Innovation Cascade was capable of surfacing these tensions in EISs so that enterprise innovators could identify and address them.

Figure 10 below is a simplified visual summary of my findings. I had two main findings from the Rich Picture exercise, as it relates to the Innovation Cascade:

1. Each code is embedded in the layer above it. In enterprise systems literature, embeddedness is seen in Beer's (1995) Viable Systems Model (VSM). In the VSM, each level of an enterprise is

embedded within the level above it. For instance, the operations business unit of a factory is embedded within the general management of the factory. In Figure 10, this is shown through each layer of the EIS existing within the level above it and surrounding the layer below it.

2. A preliminary hypothesis about what specific components of the EIS are most impactful on EIS building. Definitively determining what specific components—shown by the labels within each code of Figure 10—are most impactful would require more rigorous research. However, for the purposes of this paper, the components shown in Figure 10 represent what they could be, which will carry over to the Innovation Cascade.

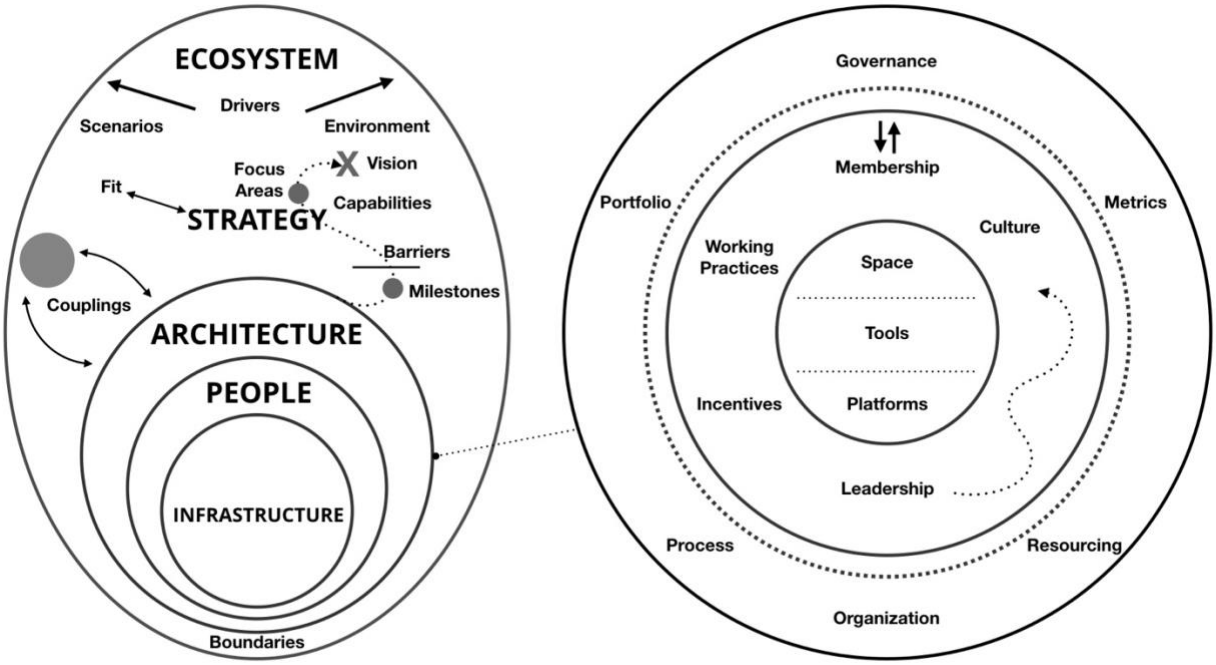


*Figure 10: The Enterprise Innovation Systems Map*

While not perfect, Figure 10 gives a preliminary sense of what is inside each code. It shows that each code impacts and is impacted by the codes above and below it. For instance, an enterprise's innovation strategy is shaped by the ecosystem the strategy is being executed within. It also shows the most effective infrastructure for an innovation system is shaped by the people using it and the architecture it is embedded within.

In section 5.3, I have provided a definition for each component. Further, I have created a prototype Innovation Cascade that will be the subject of the case study in section 6.0.

## 5.3 The Innovation Cascade

With my literature review, innovation approaches analysis, practitioner interviews, and systems map analyzed and broken down. I was ready to construct a prototype version of the Innovation Cascade.

The reason I have called this framework the Innovation Cascade is in reference to Lafley and Martin's (2013) Choice Cascade, which is a similar set of five integrated, sequential areas to explore within an enterprise. However, the Choice Cascade focuses on enterprise strategy, whereas the Innovation Cascade focuses on EISs.

The Innovation Cascade, seen in Figure 11, shows five horizontally laid out columns. Each column represents one of the five native categories I identified in the innovation approaches analysis, in the order of ecosystem, strategy, architecture, people, and infrastructure. They are organized in the order they are analyzed in, from left to right. Each column contains the components I identified through the literature review, approaches analysis, interviews, and systems mapping.

To use the Innovation Cascade, an EIS builder would start by making sense of their EISs ecosystem. Based on my research thus far into the components of each code, I would recommend starting with mapping the couplings and drivers, along with the current environment of the EIS. While not necessary, scenarios can be a useful way of summarizing the various components of an ecosystem and their impact on the enterprise over time. Then they would continue through strategy, architecture, people, and infrastructure. There will likely be insights generated at architecture and below that would require circling back and iterating on ecosystem and strategy until the entire EIS is aligned.

The Innovation Cascade diagram suggests a fairly linear process. However, that should be considered a limitation of the current graphic, rather than the reality of building or enhancing an EIS. Given the many interconnected, impactful variables within each of the five areas, it is highly likely using the Cascade will involve cycling back and forth between the areas, implementing different components, and iterating on them as needed. Further, given that innovation is a non-linear process, it is logical to assume systems of innovation are equally non-linear.

In section 7.3, I have suggested a speculative set of steps an EIS builder could follow to use the Innovation Cascade. However, the steps are beyond the scope of this paper's research methods and thus are not explored in this section. In section 5.4, I have explained the two use cases I have identified for the Innovation Cascade and given an overview of how I tested them in the case study with OMERS in section 6.0.

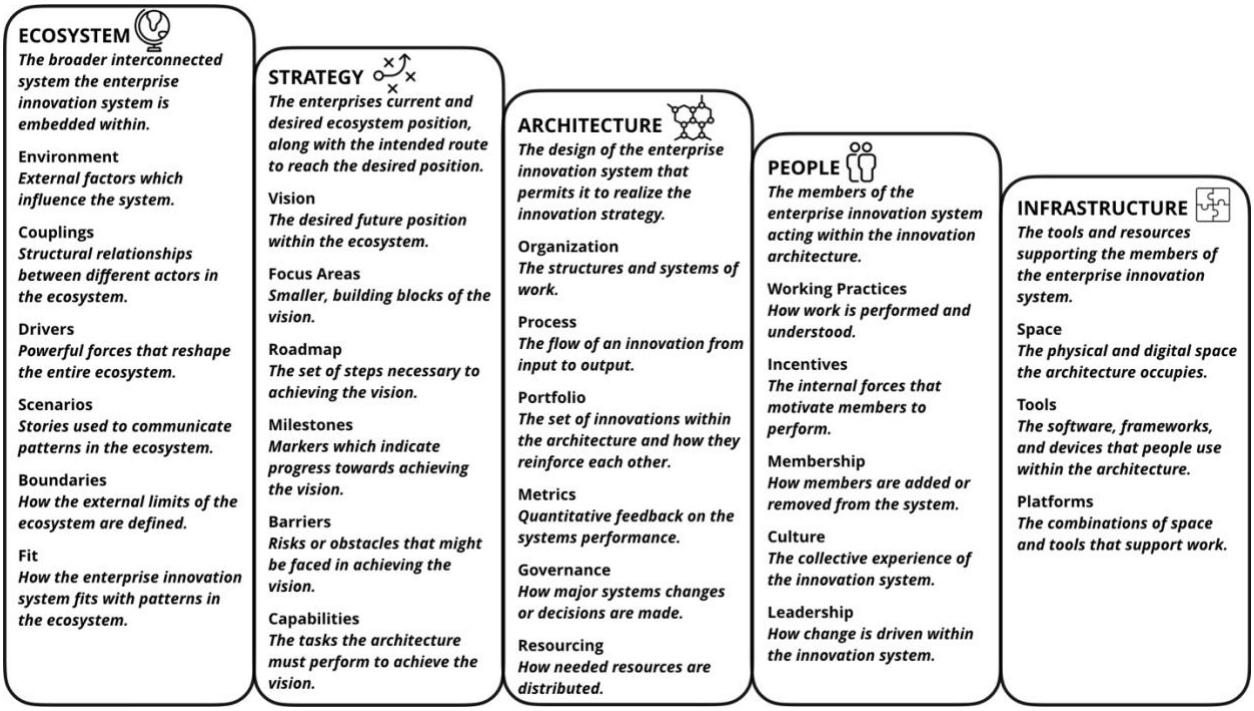


*Figure 11: The Innovation Cascade*

## 5.4 Using the Innovation Cascade

Based on the literature review and 250 approaches analysis, I have identified a handful of tools that appear to function similarly to the Innovation Cascade. Those tools include the Choice Cascade (Lafley & Martin, 2013), the Business Model Canvas (Osterwalder & Pigneur, 2010), the Operating System Canvas (Dignan, 2019), the Empathy Map (Gray, Brown & Macanufo, 2010), and Mental Models Diagrams (Young, 2008).

Each of these tools can be used in groups or individually and provide both a visual template to map thinking, as well as a framework to structure and guide thinking. I have designed the Innovation Cascade to function in the same way. Specifically, I believe the value of the Innovation Cascade lies in providing EIS builders with a set of categories to structure their thinking and prompt them to identify gaps, such as builders not having a strategy that fits with their ecosystem or infrastructure that does not support the specific members of the innovation architecture. The visual seen in Figure 11 could also, theoretically, be useful to map information physically. However, I suspect the visual will require a redesign after this paper if that is the case.

Assuming I am correct about the value of the Innovation Cascade as a set of categories to map information to—I hypothesize that there are two use cases EIS builders will have. In the first, they have an existing system that either has some identified issues or they suspect might be able to operate better and they are looking for a tool that can help them make sense of their system. In the second, they are building an entirely new EIS and are looking for a tool to either help them get started or to help broaden the scope of their inquiry as they attempt to build the many interconnected components of their system.

I call the first use case "mapping," which means mapping existing information to the Innovation Cascade. I call the second use case "generating," which means creating new information and fitting it to the Innovation Cascade to see how different options fit together. In this instance, information refers to any of the components of the Innovation Cascade, including couplings, fit, or process.

### 5.4.1 The Innovation Cascade as a Mapping Tool

The Innovation Cascade suggests all the components of an EIS fit within either ecosystem, strategy, architecture, people, or infrastructure. For example, the EIS's culture fits within people, or its innovation process fits within architecture. Similar to the Business Model Canvas's nine business model components (Osterwalder & Pigneur, 2010), the Innovation Cascade provides EIS builders with a set of consistent categories to map information. The Cascade also provides a sense of how different decisions fit together. For instance, building a strategy without understanding the ecosystem could increase the chance of the strategy not being executed, since the strategy may face unexpected barriers or not fit with ecosystem patterns like emerging technologies.

The Innovation Cascade allows an EIS builder to take the many different pieces of information about their system and group it together. For instance, if an EIS builder in the financial sector has an agreed-upon strategy with their leadership, a few employees, and a rough idea of their innovation process, they can map that information to strategy, architecture, and people to help identify gaps. This can enable the EIS builder to identify steps they can take to improve the innovativeness of their innovation system or frame recommendations for others to action, which could be the case in a consulting service contract. Future iterations of the Innovation Cascade will include more work on the contents of each code. I suspect there is more to infrastructure than just tools, space, and platforms.

### 5.4.2 The Innovation Cascade as a Generative Tool

Some EIS builders may be starting from nothing. This could be the case if they want to tear down an existing system and start from scratch, or if innovation is a new initiative within their enterprise that they are involved with delivering. In either case, the five codes can be used to frame what aspects of an EIS should be considered to guide them in their systems building work. When using the Innovation Cascade as a generative tool, I have hypothesized that it makes sense to begin with the ecosystem components, then drill down to infrastructure. Specifically, the steps could be:

1. Make sense of the innovation ecosystem, potentially through identifying trends and drivers, contacting stakeholders like customers or competitors, or writing scenarios about the future of their industry.
2. Craft a vision, focus areas, and the other components of an innovation strategy.
3. Design an architecture including where innovations come from, how they are processed, and where they go afterwards.
4. Hire the right people and define what culture, working practices, and leadership are appropriate for those people and the architecture.
5. Procure tools and space for those people to work with.

I have speculated further about a set of steps for using the Innovation Cascade in section 7.3. In the next section, I have applied both the mapping and generative use cases of the Innovation Cascade to the Ontario Municipal Employees Retirement System (OMERS).

# 6.0 OMERS Case Study

I began working with OMERS in May 2019 as an Innovation Specialist. In my role, I am working with several innovation leaders and team members to build out OMERS innovation capabilities. Since OMERS has much of their Enterprise Innovation System (EIS) already built out, but with some components still being developed, it seemed like a perfect opportunity to test both the mapping and generative use cases for the Innovation Cascade.

I conducted this case study by scouring through internal documents, collecting and recording notes, and conducting many informal interviews over a six-month span. I mapped existing information about the broader innovation system to the five codes of the Innovation Cascade. Further, I worked with the leadership of the newly stood up research team, which is a component of the broader innovation system, to help generate strategy, architecture, and the other components of a new business function. In doing so, I used the five codes of the Innovation Cascade to suggest certain areas of inquiry and map decisions to see how they fit together. Together, this permitted me to test both the mapping and generative use cases of the Innovation Cascade.

Despite my best efforts, this case study has some flaws. For instance, the mapping use case has many instances where I have generated potential options for OMERS. Conversely, the generative use case has instances where I have mapped existing information. I expect this reflects most EIS builders' experience, where some things are concrete and some things are not, and I have taken steps to ensure I specify the source of the information I have mapped or generated.

Moving forward, in section 6.1, I have provided an introduction to OMERS, including a brief history of retirement, why OMERS was created, and an overview of OMERS today, to provide context for why OMERS is looking to build innovation capabilities. In section 6.2, I have summarized my findings from the mapping use case of the Innovation Cascade. In section 6.3, I have summarized my findings from the generative use case of the Innovation Cascade. In section 6.4, I have provided recommendations for OMERS, based on my use of the Innovation Cascade, which will demonstrate what an output of the mapping or generative use cases of the Innovation Cascade could lead to. Finally, in section 6.5, I have reviewed how the Innovation Cascade performed and suggested how it might be improved upon.

In both use cases and in the recommendations, I have made suggestions for what I believe OMERS should do based on my use of the Innovation Cascade. While I stand by my suggestions, they are not grounded in the research approach of this paper. Rather, the case study is intended to test how the Innovation Cascade handles the various information in both the broader innovation system and in the research team. Thus, while I have explained why I have made each suggestion, they are more an output of my thinking, rather than inherent to the function of the Innovation Cascade, which is what this case study is testing. Therefore, the case study should be read to assess how the information connects and whether inconsistencies or gaps appear, rather than if the specific suggestions are appropriate.

Further, not every subheader within the case study reflects a component of the Innovation Cascade seen in Figure 11. I adapted the components to fit the existing information or information being generated within the research team and highlight potentially missing components in the recommendations in section 6.4. Further, all opinions, recommendations, or facts are products of my synthesis unless otherwise cited. In many cases, I drew on information from private internal documents and public documents, which are both cited as such.

## 6.1 Introduction to OMERS

In this section I have provided a brief overview of OMERS to contextualize the mapping and generative use cases of the Innovation Cascade in sections 6.2 and 6.3.

### 6.1.1 A Brief History of Retirement

The first known mention of retirement is the Roman *aerarium militare*, but many believe it was German Chancellor Otto von Bismarck who truly pioneered the state-led retirement in 1889 (Edelman, 2014). Through his work, "those who are disabled from work by age and invalidity have a well-grounded claim to care from the state" (Pasricha, 2016). Bismarck belied that after a certain age, the state should take care of all its citizens through financial instruments known as pensions.

Since then, retirement has evolved to give many around the world security and choice as they age (Laskow, 2015). However, pensions are not cheap. A retiree's pension is paid for through the contributions and earnings of the next generation of workers (Rabbior, 2014). It is both a social contract and an actual one. One that works best in a booming economy with stable birth rates. With the rise of private plans to complement public ones, workers now enjoy many retirement savings vehicles as they move through their careers. However, research shows defined benefit (DB) pension plans are usually the best, as they provide the most money per contributed dollar for workers and give retirees the most predictability and security in retirement (HOOPP, 2018).

### 6.1.2 Canada's Overlooked Industry

Canada is well known for being a global leader in agriculture, energy, and resource extraction. However, what is often overlooked is Canada's sophisticated financial system. Canada has the world's ninth-largest financial center (Edenhoffer, 2018), and its youth are tied first globally for financial literacy (Schleicher & Messy, 2015). Nowhere does Canada's financial sophistication shine more than in the pension industry. Canada has eight pension plans—The Big Eight—amongst the top 100 worldwide (Bédard-Pagé, Demers, Tuer, & Tremblay, 2016), including the Canada Pension Plan Investment Board, the Ontario Teachers' Pension Plan, and the Ontario Municipal Employees Retirement System (OMERS).

### 6.1.3 Summary of OMERS

In 1962 the OMERS Act was passed, bringing OMERS to life for an initial 160 employers. Since then, OMERS has grown to serve over 500,000 members across more than 1,000 employers. With net assets over $97 billion, OMERS is one of Canada's largest institutional investors. With offices across the world, OMERS maintains a sophisticated mix of investments through its Ventures, Capital Markets, Infrastructure, and Oxford Properties investment divisions.

A few key factors define OMERS (Baldwin, 2015):

- **Patient Capital.** OMERS pursues investments with multi-decade time horizons. As a steward for half a million pension holders, OMERS balances risk across several investment divisions.
- **Committed Membership.** For OMERS members, contributions are mandatory, at a max of 13.5% of income. Thus, member attrition and competition are not significant considerations.
- **Pension Services.** OMERS maintains traditional service operations such as a call centre, transactional processing, and member and employer-facing digital service portals.
- **Two Board System.** The OMERS Sponsors Corporation (SC) and Administration Corporation (AC) jointly oversee strategy approval, Plan design changes, and Plan administration.

- **Defined Benefit.** Actuaries analyze net assets, funded status, market volatility, and expected payouts to design the pension formula, indexing, and beneficiary payouts of the OMERS Plan, which provides members with a monthly pension payment until they pass.

OMERS is a global financial powerhouse. However, it is also a service enterprise with 500,000 members to serve. It is in service to these members that OMERS is looking to build innovation capabilities, which I have covered further in the mapping case study of the Innovation Cascade in the next section.

## 6.2 The Innovation Cascade as a Mapping Tool

This section goes through each of the five codes of the Innovation Cascade in the order of ecosystem, strategy, architecture, people, and infrastructure. In each of the five codes, I began with an introduction explaining what specific components of the Innovation Cascade, seen in Figure 11, that section covers. Many of the components I have not covered, which I have explained in each subsection's introduction.

### 6.2.1 Ecosystem

In this section, I have covered the OMERS ecosystem, which includes their innovation environment, the stakeholders in their ecosystem—which I usually refer to as couplings—the drivers of change in the ecosystem, and four scenarios that I prepared through my work with OMERS. These scenarios summarize many of the patterns of change in the ecosystem. I chose not to discuss boundaries or fit in this mapping case study as I was unable to find any existing material on it.

#### The Innovation Environment

OMERS' innovation environment involves any external factors that influence the OMERS innovation system. As the OMERS innovation system is embedded within OMERS more broadly, this section primarily covers the context in which the OMERS innovation system is being stood up.

By 2030, OMERS aspires to be a $200 billion pension plan to further realize their vision of a world-class, sustainable, and secure defined benefit (DB) pension for over 500,000 Ontarians. Based on Arthurs (2008), I believe OMERS aspires to grow as larger plans experience lower investment fees, easier expert talent acquisition, a wider range of investment vehicles to spread risk, lower administration unit costs, and more stability and resilience overall.

To navigate to OMERS aspiration, they must navigate a complex and challenging environment including driving factors (OMERS, 2019), such as:

1. Federal and Provincial governmental changes;
2. the expansion of the Canada Pension Plan;
3. geopolitical instability;
4. the disruption of many industries;
5. competitive investment markets; and
6. rising interest rates.

Baldwin (2009) identified several other drivers, including the changing nature of work, longer life expectancies, and the maturity of the Plan.

Much of the environment that the OMERS innovation system will exist within is summarized in the OMERS strategy (OMERS, 2020), seen in Figure 12.


*Figure 12: OMERS Strategy*

Among the various components of the OMERS strategy is Engagement and Operations, of which Pension Services—which provides most member-facing aspects of the Plan—will be primarily responsible for delivering on. One approach Pension Services is taking is to invest in digital and innovation capabilities, specifically to enhance the member experience, expand the Plan value for members, and to make the Plan more resilient and sustainable through generating revenue, reducing costs, or raising OMERS public profile.

Foundational work on building digital and innovation capabilities has been underway since 2017, and much of it happened well before this case study began.

Some of the work thus far includes:

- The design an OMERS innovation playbook.
- A workshop series to bring Pension Services employees into the process of change.
- The development of a vision for the future member experience.
- Agile working practices implemented in parts of Pension Services.
- A partnership with a local academic institution to share knowledge and expertise.
- A redesigned innovation space, which will be opened in 2020.
- A 2025 and 2030 strategy framework for OMERS to align behind.
- The development of an internal foresight report on the 2040 pension experience, named *The Future of the Pension Experience* (Disclaimer: I was the lead author of this foresight report, with substantial guidance and help from the innovation group).

### Ecosystem Stakeholders

Within OMERS' innovation ecosystem, there are various groups that shape or are shaped by OMERS. Many of these stakeholders are gathered in Table 2, which shows the groupings I have devised for them, what specific stakeholders fall within that group, and what relationship OMERS has with each stakeholder group.

| Group | Members | Relationship |
|---|---|---|
| **Governors** | SC and AC Board of Directors, Management Committees, Pension Services Leadership | Reporting, Alignment with broader strategy, Direction and guidance, Design of Plan environment |
| **Business Areas** | Legal, Pension Services, Investment Units, Pension Digital | Knowledge sharing, Co-alignment with broader strategy, Consultation, Program-level collaboration |
| **Consumers** | Members, Employers, Other plan administrators, Customers of new offerings | Enhanced Plan experience, Involved in participatory design, Retirement income, Additional products or services |
| **Stakeholders** | Pensioner Organizations, Labour Organizations | Shared member bases, Provides services and communications to their members |
| **Partners** | Investees, Academic institutions, Policymakers | Exchange of reputation, Knowledge sharing, Financial interactions, Guiding policy |
| **Competitors** | Pension funds, Alternatives to New Offerings | Competition for revenue and customers, Potential joint-ventures, Knowledge sharing |

*Table 4: OMERS Ecosystem Relationships*

These ecosystem stakeholders are relevant as any strategy or architecture decisions OMERS makes for the innovation system will shape them. It is important when making other decisions to circle back to stakeholders and assess how they might be impacted.

### Ecosystem Drivers

Within OMERS' innovation ecosystem, there is the current environment, which the strategy shown in Figure 12 summarizes. However, there are also longer-term drivers of change that shape the conditions of the innovation environment over long periods of time. These drivers shape OMERS ecosystem stakeholders as well. Table 5 below summarizes many of these drivers. The table is organized along the STEEPV foresight acronym and along three-time horizons. The time horizons are not specific to any timeframe. Rather, my intuition and analysis suggest the trend will be most impactful either in the present, fairly soon, or in a long while. Many of these trends I sourced from my foresight report *The Future of the Pension Experience* or are otherwise cited when from external sources.

| Category | Present | Near Future | Distant Future |
|---|---|---|---|
| **Society** | **Unaffordable Retirement:** 73% of Canadians struggle to save for retirement, while 41% worry they will never be able to retire (Yih, 2010). Canadians are finding it harder to fund their retirements, encouraging an expanded CPP or another response that may threaten OMERS membership. | **Population Bulge:** By 2036, 10.4 million Canadians will be over 65 (CEIRC, 2018), which will strain healthcare, senior housing, and retiree financial support systems. This could pressure OMERS through a lower active-to-retired funding ratio and lower domestic economic growth. | **100 Plus:** Canadians currently live to 82 on average and are healthy for most of that span. The average lifespan is expected to be over 100 by the end of the century (Office of the Chief Actuary, 2014). DB plans will struggle as the percent of life spent retired doubles on average, potentially doubling per pensioner obligations. |
| **Technology** | **Digital First:** With 92% of organization leaders developing digital transformation strategies (SAP, 2017), the use of digital tools and processes to understand and manage the member experience will become the norm for OMERS members. | **Data-Driven Decisions:** 90% of the information ever created was in the last two years (Gore, 2013). Business intelligence will be crucial for OMERS to scale and use to reinforce all investment or member-oriented decision-making. | **Artificial Intelligence:** AI has the potential to increase business efficiency by 40% by 2025 (Accenture, 2016). AI will pressure OMERS to transform from how members are served to the analysis of investment opportunities. |
| **Economy** | **The Gig Economy: "**Made up of gig workers, job jumpers and postponed professionals" (TD, 2019), workers without benefits or pensions are becoming more common, impacting OMERS' potential membership and encouraging government response. | **The Wealth Landscape:** Wealth is not stagnant, and opportunities will continue shifting globally (Desjardins, 2018). OMERS is already responding with global offices in Europe, Southeast Asia, and Australia. This will likely continue. | **Automation:** Up to 35% of OMERS members' jobs will be eliminated through automation (Oschinski & Wyonch, 2017), which will impact membership. OMERS will have the opportunity to use automation to reduce internal service costs drastically. |
| **Environment** | **Sustainable Investors:** 86% of millennial investors prioritize investments in socially responsible companies (Morgan Stanley, 2017). Both OMERS' portfolio and staff will shift in this direction indicated by the hiring of a Vice President of Sustainable Investing. | **Climate Adaption Investing:** Many funds and investment opportunities are shifting to post-climate change opportunities such as agricultural yield, green energy, or energy efficiency (Gray, 2019), which may impact the opportunities and returns available to OMERS. | **A Post Climate-Change World:** Climate change-induced drought, natural disasters and other impacts will displace hundreds of millions of people by 2050 (The World Bank, 2018). These and other impacts will transform the investing landscape, immigration system, lifestyles, and more. |

| Category | Present | Near Future | Distant Future |
|---|---|---|---|
| **Politics** | **Barriers to Innovation:** Since 2008, pension reform related to creating more innovation in the pension industry has been an ongoing discussion. If advanced, it could give OMERS and its potential competitors far more room to serve members' needs and pilot new offerings (Arthurs, 2008). | **The Open Market:** Australia, the United Kingdom, and New Zealand all have mostly mandatory employer-sponsored pension plans. While the ORPP initiative failed in Ontario, there is an understanding that many Ontarians are not set up for retirement. An open market for pension funds is one possible response (Gros, 2013). | **Geopolitical Instability:** Shifts in the political landscape, including a fragile European Union and a declining United States' role on the world stage, are creating market volatility and unpredictable trade laws that make for a very uncertain investing environment for OMERS (Antolín & Stewart, 2009). |
| **Values** | **Experience Management:** Members increasingly expect personalized, memorable experiences when interacting with OMERS, prompting OMERS to need to start understanding and managing those experiences (Berry, Carbone, & Haeckel, 2002). | **Intergenerational Conflict:** In our four-generation society, wealth creation disparities and age-related workplace conflicts are impacting the perception of pension funds and experiences in the workplace (Urick, Hollensbe, Masterson, & Lyons, 2016). This could influence member satisfaction and OMERS culture. | **The Next Third:** A new generation of elders with time, energy, and experience expect more from their retirements, including continuous learning, flexible work, different travel and financing techniques (Endicott & Sviokla, 2019). OMERS has an opportunity to meet these emerging needs or risk falling behind others who do. |

*Table 5: STEEPV Analysis of Pension Drivers*

Many of these drivers are interconnected and deeply shape each other and the innovation environment. For instance, Ontarians living for over 100 years would radically reshape the viability of a pension model that offers lifetime benefits generally after 60 or 65. Additionally, the gig economy could dramatically reduce the number of active workers contributing to the pension plan, which could affect the proportion of income to outcome and cause the Plan to shrink.

Given the interconnected nature of these drivers, Ambachtsheer (2010) has chosen to call them the Pension Crisis. The name indicates that many of these drivers pose a threat to the viability of the pension model, including OMERS. Given that these drivers are interconnected, I attempted to design a system map that captures how some of these drivers influence or are influenced by each other.

I began by analyzing what I thought were the four critical drivers of a DB pension plan, which I found to be investment returns, member experience, the ratio of active to retired members, and the volume of assets under management by OMERS. I then mapped several of the drivers in Table 5, along with other possible components of the pension system that could be impacted.

Figure 13 shows a visual of this system map, which I call the Pension Crisis Map. The Pension Crisis Map is a speculative map that shows possible connections between different drivers within the pension industry.

The arrows indicate potential points of influence between the drivers.

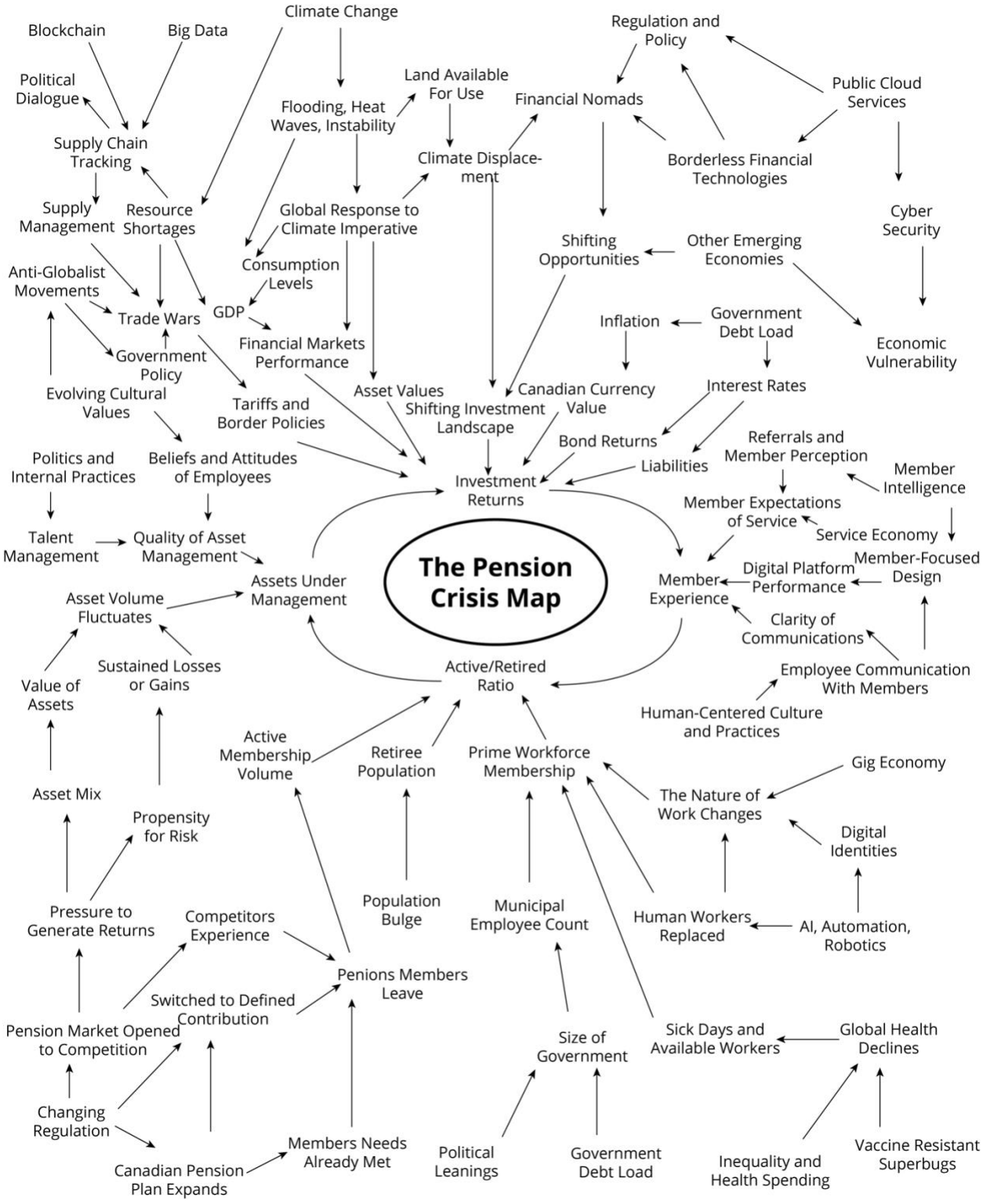


*Figure 13: The Pension Crisis Map*

### Scenarios

To help further define how the innovation environment, ecosystem stakeholders, and ecosystem drivers interconnect, I prepared four scenarios as part of *The Future of* the *Pension Experience* report. This report was intended to be a speculative exercise to prove the value of foresight within OMERS and to spark conversations about the future of pensions.

The process for generating the scenarios began with constructing personas, which I distilled from the work of psychologist Nancy Schlossberg (2017) and her theory of retirement personalities. The personas are summarized in Figure 14.


*Figure 14: The Future of the Pension Experience Personas*

Next, I mapped out many of the drivers that are summarized in Table 5, along with constructing the Pension Crisis Map seen in Figure 13. Through that work, and with the help of the broader innovation team, I identified what I thought were the two most critical drivers of the pension ecosystem.

#### Member Expectations

- **Self-Serve:** OMERS members expect to be given comprehensive choice regarding how their finances are controlled and the sorts of experiences their pension creates for them.
- **Full-Serve:** OMERS members expect to receive experiences curated to their specific needs, without lifting a finger.

#### Competitive Landscape

- **Monopoly**: OMERS has a government-granted or competitive monopoly, and members have limited or no choice in their pension fund.
- **Meritocracy**: OMERS is one of many pension funds competing for member contributions and engagement.

Together these formed a 2x2 matrix, with a scenario in each corner of the quadrant. The 2x2 matrix is shown below in Figure 15, which is separate from the 2x2 matrix seen in the Innovation Approaches Map in Figure 9.

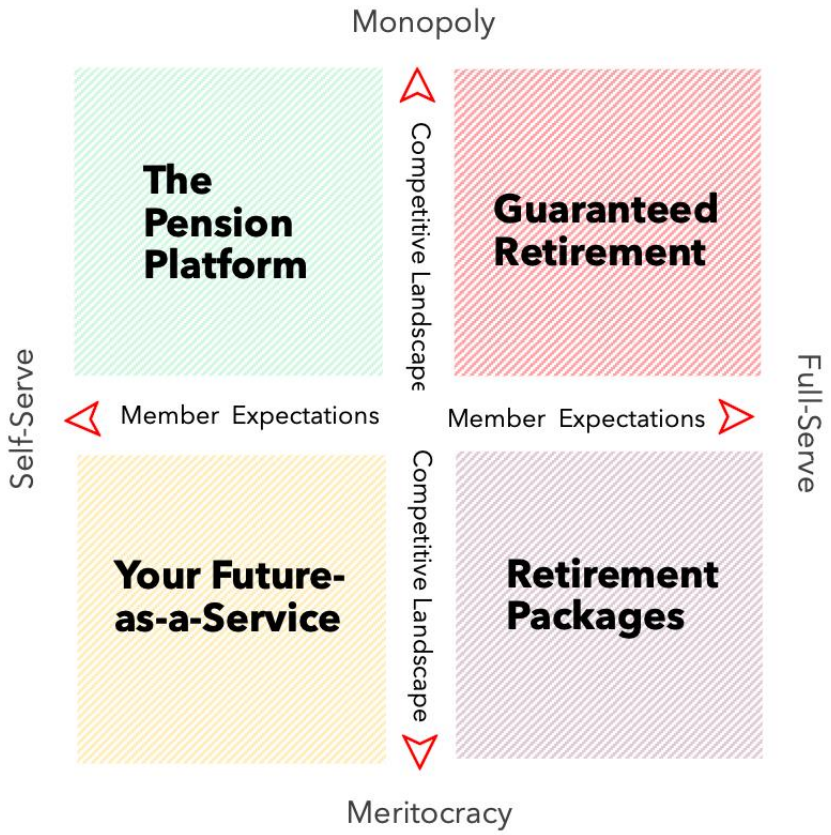


*Figure 15: The Future of the Pension Experience Scenarios*

Next, I used a technique known as worldbuilding to identify and define the differences that make each of the four worlds within the scenarios distinct and worth exploring. I mapped each world along the dimensions of member experience, the funding model, the member base, competitors, and operations. A summary of the worldbuilding is included in Appendix A.

Finally, I expanded on the worldbuilding to write each of the four scenarios, including a story of how OMERS came to become that version of it in that specific world in 2040, along with how the persona I thought would most benefit from that version of OMERS found it.

The four scenarios are briefly summarized below:

- In the **Pension Platform**, OMERS offers free pension services to global pension funds and uses the collected data to inform targeted investments in retirement services.
- In **Guaranteed Retirement**, OMERS becomes a world-leading facilities and services manager on behalf of Ontario's *Guaranteed Retirement Program*.
- In **Your Future-as-a-Service**, OMERS grows into a global powerhouse by developing a sophisticated supply management system and retirement services platform.
- In **Retirement Packages**, OMERS sells extravagant guaranteed experiences that become one of the largest purchases a person can make, alongside their home and car.

The full scenarios are included along with the worldbuilding material in Appendix A.

The innovation environment, ecosystem stakeholders, ecosystem drivers, and scenarios are purely meant to contextualize the actions of OMERS, to inform why building innovation capabilities are being pursued, and what potential barriers, considerations, or other information must be taken into consideration when acting on that.

In the next section, I have covered how OMERS innovation strategy fits within the context of their innovation ecosystem.

### 6.2.2 Strategy

This section covers OMERS innovation strategy, which includes their vision and focus areas. I have not gone over OMERS roadmap, milestones, barriers, or capabilities.

#### Vision

A vision is the position OMERS wants to adopt in the ecosystem. Since OMERS' broader mission is to continue offering a world-class, sustainable, and secure defined benefit (DB) pension to over 500,000 Ontarians, their innovation vision is to support this mandate through creating and implementing new or enhanced sources of value.

The scenarios and the Pension Crisis Map in Figure 13 show the extreme uncertainty OMERS is dealing with. The Boston Consulting Group (2015) found in environments of "ongoing, substantial changes in technologies, customer needs, competitive offerings, or industry structure" that enterprises should focus on building resilience through continuous adaptation to their environment. Organizational resilience is defined as the "the ability of an organization to anticipate, prepare for, respond and adapt to incremental change and sudden disruptions" (Denyer, 2017).

Therefore, I believe OMERS innovation strategy should focus on building resilience. Based on *The Future of the Pension Experience*, I defined a vision for OMERS that I believe would succeed in each of the four scenarios. This is known as wind tunnelling (Van der Heijden, 1996), and it suggests the strategy is resilient as it permits OMERS to prosper when challenged by many potential futures. This vision is my own work, but I believe it is an innovation vision that fits within the ecosystem and with OMERS' broader mandate of offering a world-class, sustainable, and secure defined benefit pension to over 500,000 Ontarians. The vision is as follows:

> In our early years as Ontarians, we are guided through life by our parents and a succession of educational institutions. Once we join the workplace, it provides us with community, guidance, and support. Yet upon retiring, we lose that institutional partner. Aside from a monthly cheque in the mail, OMERS members are left alone during this intense transition and beyond. OMERS has an opportunity to be a steward for members to and through retirement, such that the post-retirement period becomes the next chapter of a life well-lived, rather than a decline in opportunity and ability, for our members.

Within this vision, I have grouped the value I believe OMERS would offer to members:

1. **Build identity** through volunteering, starting a business, working, or contributing.
2. **Grow community** through social platforms, forums, or member networking.
3. **Navigate retirement** through counselling, financial planning, and pension payments.
4. **Support members** through health services, insurance, benefits, and referrals.

#### Focus Areas

Focus areas are the smaller building blocks of a vision. The four value offerings listed in the previous section are different than focus areas as they reframe what the vision is, whereas the following six focus areas break down the vision into achievable streams of activity. For instance, digital transformation involves converting many of OMERS analog or older systems into effective digital ones, then building on what services OMERS offers through its digital capabilities. The following six focus areas were derived from *The Future of the Pension Experience*. Specifically, they came from breaking down many of the findings from the worldbuilding seen in Appendix A into actions that could be taken today that would execute on the vision in the above section.

The six focus areas are:

1. **Member Experience:** Offer a world-class pension experience that is simple and engaging for members or customers of any language, location, or ability.
2. **Brand Value:** Attract elite talent and build a global brand through publishing research, advocating for positive change, and creating a renowned employee development program.
3. **Digital Transformation:** Use technology and thoughtful enterprise design to organize and align internal operations with the needs of members and other stakeholders.
4. **OMERS CoCreate:** Invite stakeholders to co-design the pension experience with OMERS through online community platforms, ethnographic studies, and feedback systems.
5. **Pension Entrepreneurship:** Become an entrepreneurial pension fund through deeply understanding members, employers, and pension funds to offer and capture more value.
6. **Rethinking Retirement:** Anticipate and address the evolving needs of a generation of Ontario pensioners, employees, and unsupported workers such as gig workers, job jumpers, and postponed professionals all throughout their work and post-work lives.

The vision and focus areas frame the areas I believe OMERS should innovate towards. These areas include enhancing employee development, improving on the member experience, and finding new offerings for members or other stakeholders.

### 6.2.3 Architecture

OMERS' innovation architecture includes its organization, governance, innovation process, and metrics. Within the process section of this paper, I have touched briefly on the portfolio management of OMERS. For privacy purposes, I have also not explored resourcing. However, I will note that it follows conventional budgeting cycle and cost centre structures.

The purpose of architecture is to translate strategy into the structures and systems of innovation work. There will be some dissonance between the two as much of the ecosystem and strategy in sections 6.2.1 and 6.2.2 I derived from my work on *The Future of the Pension Experience*, while much of the architecture came from internal documents. However, the test is whether the Innovation Cascade is a helpful framework for mapping this information to, and I believe any dissonance has not compromised that test.

All the components of architecture in this section have been sourced from internal documentation, specifically the innovation playbook and other documents mentioned in section 6.2.1.

### Organization

To build out its innovation capabilities, OMERS is building an internal innovation and digital systems business unit, which is currently referred to as OMERS Gateway (OG). OG will focus on core improvements to the member experience, including upgrading and maintaining member and employer facing digital platforms, process improvements, and enhancing member communications.

OG creates value for OMERS in many ways:

- understanding members, employers, and Plan administrators to offer them more value;
- enhancing the member experience;
- raising the profile of OMERS as an innovative, exciting employer; and
- integrating and exploring new ways of working and product offerings that can be shared back to Pension Services and OMERS more broadly.

The overall vision for OG is to pilot new working practices and sources of value to create a better member experience and help execute on the Pensions Services portion of the OMERS strategy, seen in Figure 12.

The architecture of OG has been modelled off successful corporate innovation groups such as LoblawsDigital, Scotiabank's Digital Factory, and GroeiFabriek from the Netherlands APG pension fund. Figure 16 below shows what the brand artwork for OG might look like. The brand artwork demonstrates that OG is attempting a new way of working for OMERS.

*Figure 16: OMERS Gateway Brand Artwork*

### Governance

Overseeing major decisions within OG is three layers of governance. The first layer is the Board of Directors, who will approve and monitor strategy, risk, and financials. The second layer is Pension Services leadership, who will coordinate service and technology roadmaps with OG Management. The third layer is OG Management, who will run the day to day operations of OG.

OG will be split into five areas:

1. **Innovation,** which includes research, ideation, concept development, digital content, communications, and design.
2. **Product,** which includes product owners, scrum masters, and product squads.

3. **Growth,** which includes business development, strategy, portfolio management, and external partnerships.
4. **Technology,** which includes development, quality assurance, and solution architecture.
5. **Operations**, which includes human resources, legal, finance, and general administration.

Each of these five areas will be responsible for a different aspect of the OG mandate. Innovation, product, and growth will primarily be responsible for the innovation aspects of OG, while technology and operations will be responsible for the digital aspects of OG and the day-to-day maintenance of the business entity.

### Process

An innovation process is the flow of an insight or idea from when it is created until it is launched or implemented. OG has broken that process down into three stages, which are outlined below.

1. **Discover.** In the Discover phase, member or market insights are identified through research and added to an idea inventory. Ideas can also be added to the inventory through a digital form that lets Pension Services employees offer their ideas for new products or member experience enhancements. Ideas in the inventory are ranked according to how they meet customer, business, and technology benchmarks. Ideas that exceed a minimum threshold are discussed and approved for further development by OG Management.
2. **Define.** In the Define phase, product squads, which include a design researcher, business analyst, developer, and project manager, plan and execute sprints to develop approved ideas into concepts. This is done through designing prototypes, capturing customer feedback, and refining the product, business model, and value proposition. Once ready, concepts are presented to the Board of Directors for approval for further development.
3. **Deliver.** In the Deliver phase, product squads align on a minimum viable product (MVP) roadmap using journey maps, user stories, and requirement maps. Alongside the MVP, a growth plan and go-to-market strategy are developed. Once ready, the MVP is launched, then scaled and integrated into Pension Services operations. If it is a new product, a team will be organized to manage it.

The innovation process is both linear and iterative. Ideas can circle back if they are not approved for further refining based on feedback from either OG Management or the Board, but they also progress through three pre-defined stage gates. The process forms a funnel between idea, concept, MVP, and product. Two stage gates are established and manage alignment with strategy, risk, and finance. Figure 17 shows the three-stage process and the two stage gates.

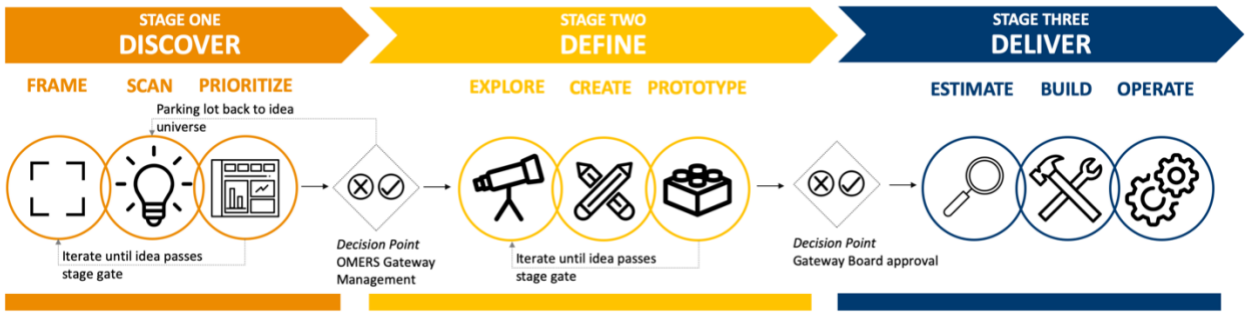


*Figure 17: The OMERS Gateway Innovation Process*

#### Metrics

Key Performance Indicators (KPIs) and stage gates are how the three layers of governance will manage the innovation system. The managers of different parts of the process will have their performance assessed against their respective KPIs.

KPIs are either leading or lagging. Leading metrics are forward-looking and assess the inputs of innovation. Lagging metrics are retrospective and assess the outputs of innovation. Examples of metrics OG could use from other innovation groups are:

- **Shape of Funnel:** Volume and financials of innovation projects by stage (Leading).
- **Innovation Velocity:** The rate projects move through each phase (Leading).
- **Hit Rate:** percentage of projects that exceed the minimum expected return (Lagging).
- **Return on Investment:** Return on invested $ by initiative (Lagging).

The organization, governance, process, and metrics demonstrate at a high-level how OMERS will structure innovation capabilities within the broader enterprise, how OMERS will manage and oversee the EIS, and how the innovation system itself will function to deliver on the vision of a world-class, sustainable, and secure defined benefit (DB) pension to over 500,000 Ontarians by potentially aligning with the six focus areas I defined in section 6.2.2.

Next, I cover how the people of OG fit within this architecture.

### 6.2.4 People

Discussion of the people of OG includes their working practices and culture. Given the time constraints of this case study, I have not covered incentives, membership, or leadership. However, it is not to say they are not important or would not be covered in a full-scale trial of the Innovation Cascade. As covered in section 3.3.9, the human factors of an EIS are extremely impactful on an EIS's innovativeness.

#### Working Practices

Employees of OG will work within an agile system. Agile working practices involve work with short cycle times, flexibility regarding adapting to changing business needs, and reviewing and improving on working practices after each work cycle (Balaji & Murugaiyan, 2012).

Within OG, this means work will take the following shape:

- Innovators will work within teams advancing an idea, concept, or MVP from one stage of the innovation process to the next.
- These teams will likely work in one- or two-week sprints that are managed through product owners, team leads, or some other form of team leadership.
- Within their sprints, each team member will have some specific tasks they are accountable for, such as delivering a prototype design or conducting a certain number of interviews.
- At the end of each sprint, teams will conduct a review of how the sprint went to improve upon future sprints.

OG has chosen agile as it promises to provide the speed, flexibility, and autonomy that the research on innovation working practices in section 3.3.8 suggests leads to the best innovation outcomes.

#### Culture

Alm, Johan, and Jönsson (2014) conducted a review of innovation cultures and defined five broad pillars EISs should have. They are innovation readiness, creativity and entrepreneurship, organizational learning, market orientation, and motivation and relations. Further, Pink (2011) defined the best intrinsic cultures as supporting autonomy, mastery, and purpose. By combining this research, conversations with OG leadership, and the six focus areas mentioned in 6.2.2, I have synthesized the following eight elements, I believe OG's culture should contain.

1. **Member Literacy.** Everyone within OG should be fluent in the underlying needs of the members, employers, and pension administrators that OG serves and how their work directly addresses those needs.
2. **Inclusivity.** As OMERS already does, OG should continue respecting different personalities, backgrounds, beliefs in hiring, promoting, and conduct. Both because it is the right thing to do and because diversity encourages improved innovation outcomes.
3. **Self-Direction.** Each employee should be an active participant in the decisions that most affect them, especially their own accountabilities. Using a model such as Objectives and Key Results (OKRs), the employee can collaborate on their deliverables with leadership, then have free rein to use their ingenuity and talent to execute on their OKRs.
4. **Intrapreneurship.** Beyond just creating innovations for external parties, the systems and processes that underly work should be a constant focus for innovation as well.
5. **Growth-Orientation.** Rather than purely focusing on results, resources and leadership should be applied to help accelerate employee growth. This includes rewarding thoughtful risk-taking, encouraging stretch goals, and making 360-degree feedback an expectation.
6. **Acceptance.** Actively striving for inclusivity and diversity of socio-economic backgrounds, ethnicity, gender, skillsets, and lived experiences will help avoid groupthink and encourage empathy for the customer and understanding of each other.
7. **Balance.** Rather than shooting for the moon in a day, acceptance of delays and encouraging the pursuit of life outside work will support employees to bring their whole selves to work, which will promote more creative thinking and effective collaboration (Fried & Hansson, 2018). Balance can include remote work, free days for hobbies or team activities, or being flexible about ways of working, tools and methods, or expectations.
8. **Transparency.** Each employee should be able to understand the work and methods of teams around them easily. While not always possible, resources should be actively invested in knowledge sharing and in communicating insights and methods from various teams.

OG's working practices and culture are just a piece of the human factors within any EIS. However, for this case study, they are sufficient to get a sense of how the Innovation Cascade gathers and presents information to help aid EIS builders with understanding EISs.

In the next section, I cover some of the infrastructure that OG will have to support the people working within OG's innovation architecture.

### 6.2.5 Infrastructure

Considering that many of the tools and space are still speculative or being developed, this section focuses on OG's innovation space, some existing tools, and some tools I suggest OG procure or develop.

### The Innovation Space

OG intends to call its innovation space the Member Experience Factory (MEF). The MEF is a redesign of an existing space within OMERS main offices in downtown Toronto, in partnership with an acclaimed architecture firm. The MEF will feature a space near the front for participatory design with members, including workshops, interviews, or other group sessions. While still in the planning stages, the space will likely feature project rooms and other amenities to support the innovation work of OG.

### Existing Tools

Like any enterprise, OMERS and OG have a network of existing vendors for the many tools needed to run an enterprise, including productivity software from Microsoft, design software from Adobe, and CRM software from Salesforce.

However, specific to OG are some existing tools that have been developed to support the innovation work. These are:

- **The Decision-Making Algorithm (DMA):** An Excel spreadsheet that ideas are imported into and scored through approximately 15 questions around the people, business, and technology considerations of an idea. The scored ideas can be sorted and analyzed for representation of different focus areas and enable the three governing groups to manage the innovation portfolio strategically.
- **The Idea Canvas:** A digital or printed worksheet that employees throughout Pension Services or OG can fill out and submit to the DMA lead for consideration. It is currently hosted for all Pension Services employees on the OMERS intranet. The canvas can be seen below in Figure 18, and it asks a few simple questions to help articulate new ideas.

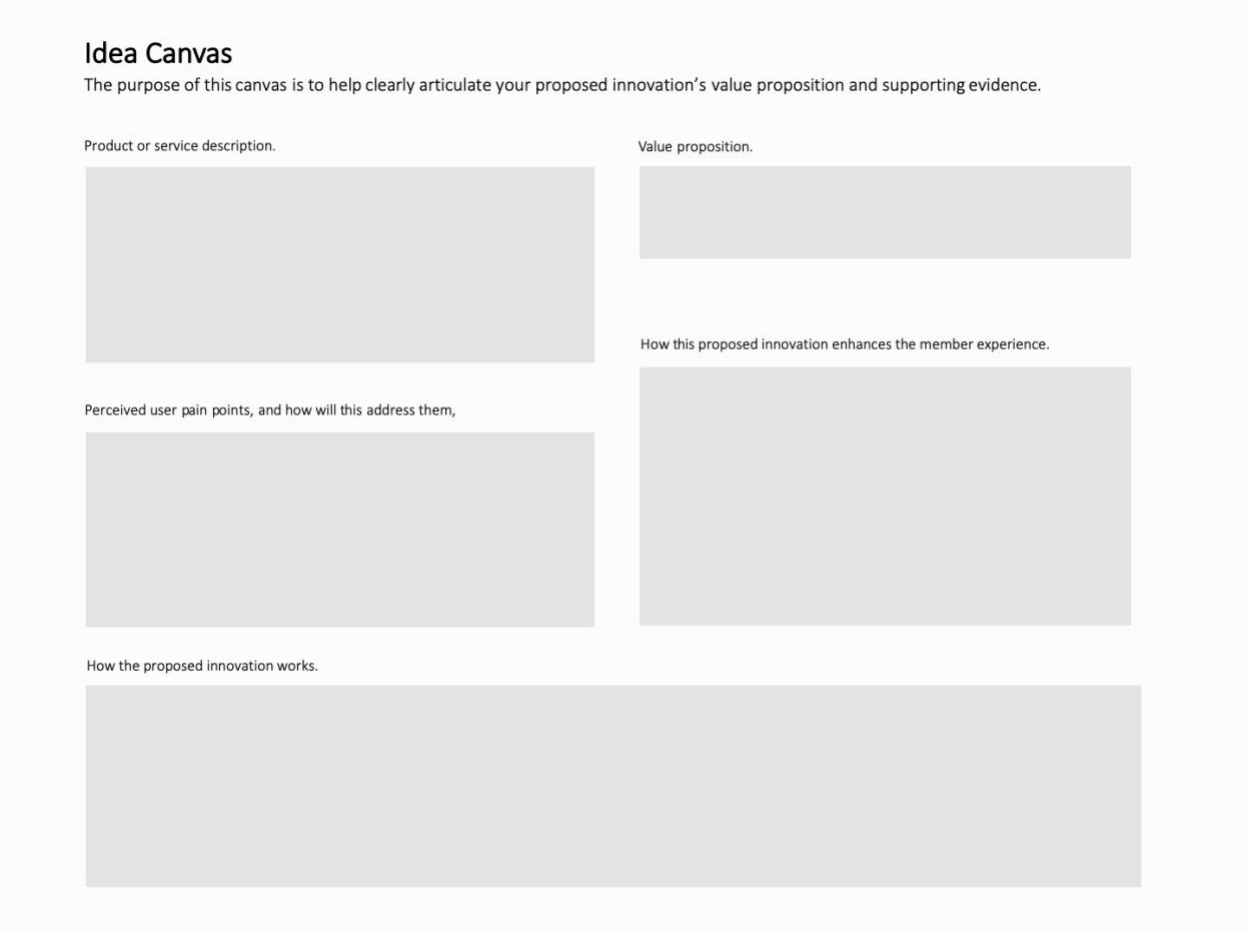


*Figure 18: The Idea Canvas*

### Suggested Tools

Beyond the DMA and Idea Canvas, there are several tools I expect OG will need in the coming months and years. Many of these tools come from synthesizing different components of the literature review. For instance, metrics help governors to make informed decisions. Thus, having a dashboard to communicate those metrics on an ongoing basis would be helpful.

My suggested tools are as follows:

- **Metrics Dashboards:** A tool that tracks critical metrics for OG within the innovation process. It can be used by the three governance groups to monitor OG's vitals.
- **A DMA for the Second Stage Gate:** The stage gate between Develop and Deliver may also require a tool for deciding whether to advance an innovation or not. This function could be built into the existing DMA, be an entirely new spreadsheet, or another type of tool.
- **Sprint Management:** A tool for planning, running, and reviewing sprint periods would be helpful for sprint planners. Microsoft's Planner or Trello are current solutions that both lack the necessary functionality to track and manage sprints and their associated tasks over time.
- **Customer Relationship Manager (CRM):** A CRM that can automatically manage, onboard, and contact potential participants for research studies and communicate with members and other customers. There are currently aspects of this system in place but building automated backend

and data management will vastly reduce the amount of employee hours being spent on managing participants for innovation research.
- **Project Rooms:** The space should take into consideration the workflows of innovation, which often involve multi-month projects requiring space to hang materials, and house supplies and portable computer workstations.
- **Knowledge Management:** To ensure each project is not starting from scratch knowledge-wise, a system to import, store, and pull knowledge should be developed.

While there is far more to infrastructure than just space, tools, and platforms, this section should have provided a sense of the kind of tools OMERS will need within the innovation system.

In the next section, I have summarized my findings from the mapping case study using the Innovation Cascade graphic seen previously in Figure 11.

### 6.2.6 Innovation System Summary

Thus far, I have covered the mapping use case of the Innovation Cascade. While I believe this work is of value to OMERS, the intention was to test how the Innovation Cascade performs for gathering and mapping the existing information of an EIS. I found that OMERS had primarily focused on EIS building at the architecture level. I could not identify a cohesive vision that was specific to the innovation system. Further, I found that aside from *The Future of the Pension* Experience, there was not much documented consideration of the broader ecosystem. There also was not much work I could find at the people level. However, the infrastructure level had some formalized work, including the Member Experience Factory, the DMA, and the Idea Canvas.

I suspect this is typical for EIS building. Further, I suspect the more abstract aspects such as human factors, ecosystem, or aligning strategy with other components is often overlooked in EIS building, which the literature review suggests can have unintended negative consequences. However, I acknowledge I had a limited perspective within OMERS, both given the information I had access to and my limited tenure with OMERS. Thus, I may have missed formal documentation or an informal understanding of these aspects that nonetheless is within the system. Regardless, I believe I gathered enough feedback on the use of the Innovation Cascade for mapping existing information, which I have collected in section 6.5.

I have also summarized my findings in Figure 19, using the Innovation Cascade graphic shown in Figure 11. Much of the detail has been omitted given the dimensions of the visual. Still, it gives a sense of how the Innovation Cascade will currently visualize components of an EIS for OMERS.

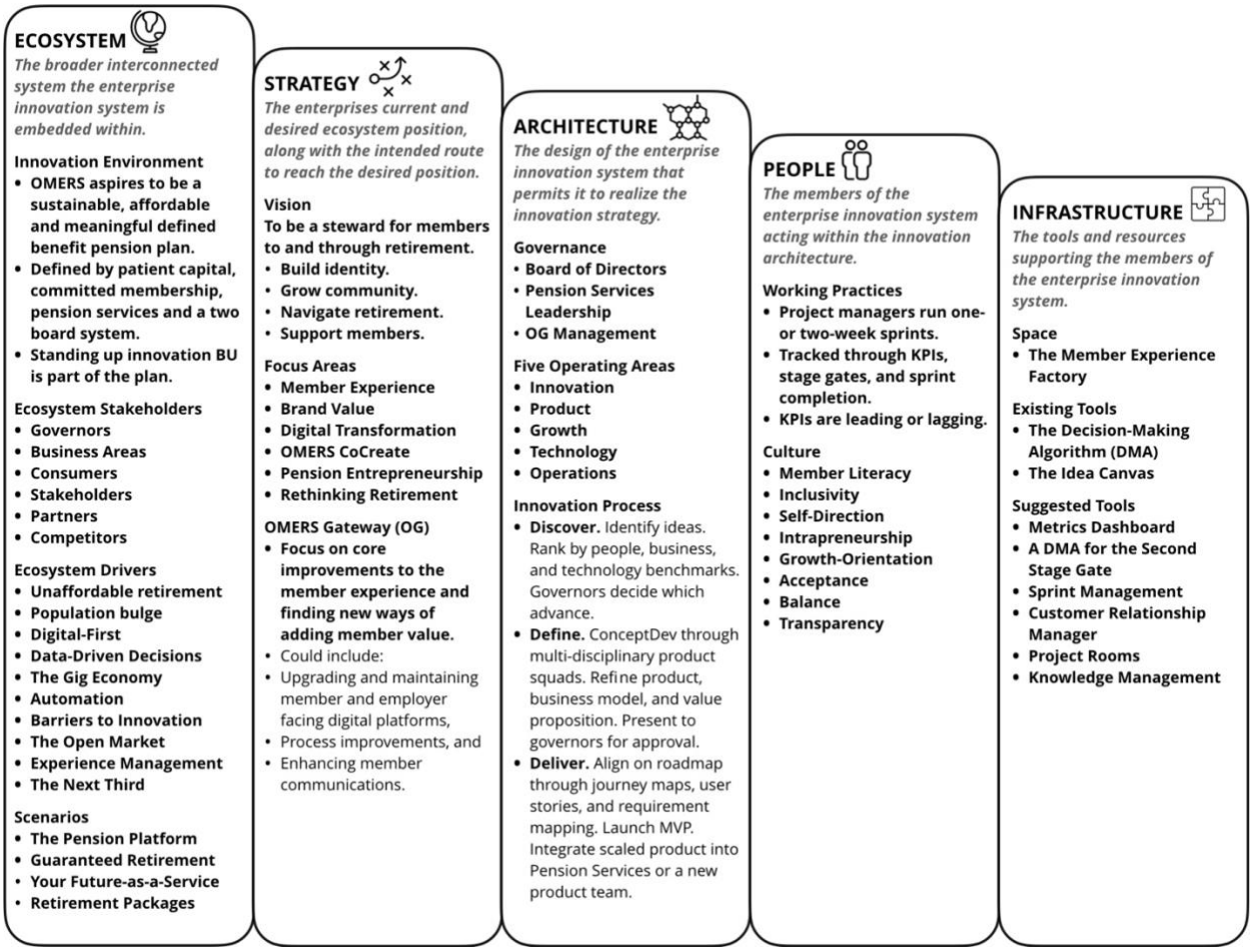


*Figure 19: Summary of the OMERS Innovation System*

## 6.3 The Innovation Cascade as a Generative Tool

As in section 6.2, this section tests one of the two use cases I defined for the Innovation Cascade. In this case, it tests how the Innovation Cascade can be used to create, rather than analyze, an EIS—or in this instance—a team within an EIS. This is done by going through the five codes of the Innovation Cascade again. Compared to section 6.2, this run-through of the five codes is much briefer, as it is being used on an ongoing basis to generate components of a research team that functions within the broader OMERS innovation system. Therefore, many of the components will eventually be developed, but have not as of this case study.

As with the entire case study, I have conducted the research in this section over the past six months through a combination of scouring internal documents, collecting and recording notes, and conducting many informal interviews, as well as ideating and analyzing opportunities such as whether agile makes sense in the context of enterprise research within an EIS.

The work in section 6.3 was conducted in coordination with research team leadership. Thus, much of the synthesis is not my own, nor should it be considered as such. Given the dynamic of working in a team, it is impossible to determine which idea or concept came from which person. Thus, rather than citing each individual point, the entirety of section 6.3 should instead be considered a product of teamwork that I

have obtained consent to share and use as part of the generative case study of the Innovation Cascade. However, for the entirety of that teamwork, I have used the Innovation Cascade to frame which aspects of EIS building should be considered and to gather and map the components we created. Much of this work is exploratory and should not be considered a commitment to what the research team will do.

### 6.3.1 Ecosystem

Given that the research team is embedded within the broader OMERS innovation system, it has roughly the same ecosystem.

However, the one major change is that since it is embedded within the OMERS innovation system, the OMERS innovation system also forms part of the research team's ecosystem. Thus, a change to the Discover, Define, and Deliver innovation process covered in section 6.2.3 would likely change how the research team would need to function to deliver on that revised process. Apart from this difference, the environment, ecosystem stakeholders, ecosystem drivers, and scenarios are the same.

Figure 20 highlights some of the research teams fit with other groups in Pension Services.

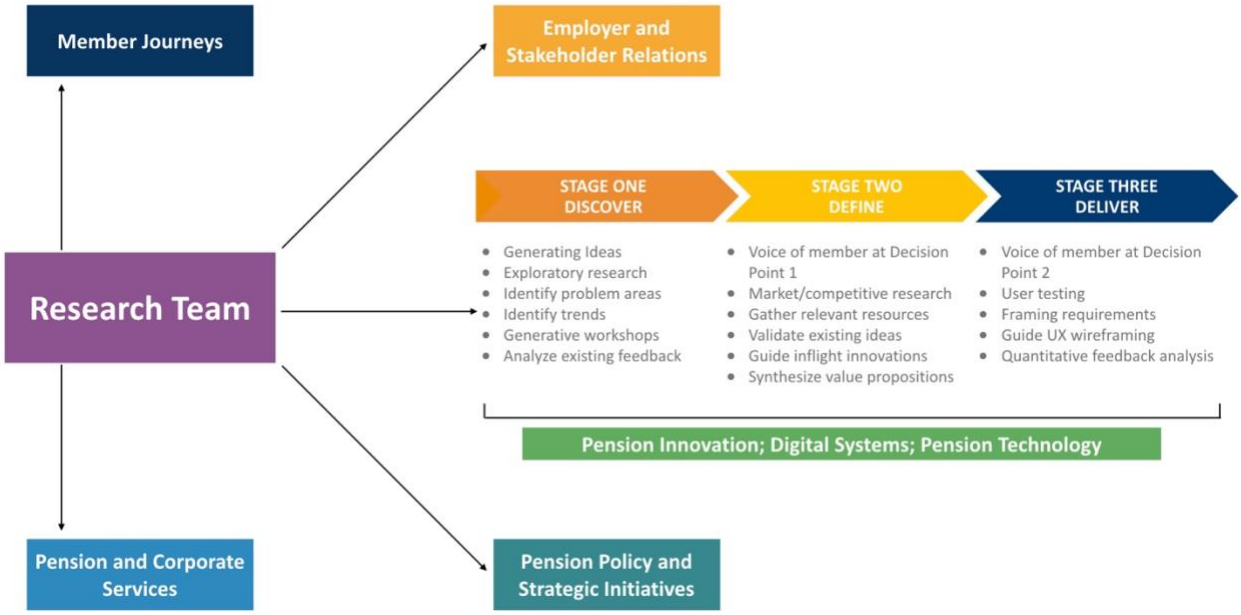


*Figure 20: The Research Ecosystem*

### 6.3.2 Strategy

In this section, I have covered the research team's vision, focus areas, roadmap, and milestones. As the research team is still very new, there has not been a chance to generate a more detailed long-term roadmap or to analyze barriers. However, given that the research team is a component of the broader OMERS innovation system, much of its strategy will trickle down from the innovation strategy.

#### Vision

The following vision came from an analysis of how the research team could best fit within the broader OMERS innovation system. Our hypothesis is that the main focus for research should be on collaborating

with other business units to offer actionable intelligence on member and other stakeholder needs, along with creating member value through research. The vision is as follows:

We exist to deliver meaningful member experiences that are in line with or surpass the expectations of our members, employers, and sponsors groups. We empower OMERS employees to make faster, more informed decisions in service of our 500,000 members reducing costs, creating value, mitigating risk, and building resilience.

### Focus Areas

With our vision established, we were able to break it down into a handful of focus areas.


*Figure 21: Research Team Focus Areas*

### Roadmap and Milestones

We placed the focus areas into a roadmap with two sets of milestones to get us to mid-2020. We found that when we tried to predict any further, we became very speculative about the needs of the OMERS innovation system. Thus, it could be self-defeating to define a roadmap that would very likely change.

The roadmap covers the remainder of 2019 and early 2020. Its streams follow our three main priorities within the focus areas, which are CoCreate, Rethinking Retirement, and building the research system. CoCreate is a member research program that involves building an automated system to source and engage research participants from OMERS 500,000 members and other stakeholder groups. Rethinking Retirement is a research study on the experience of OMERS retirees and members nearing retirement. Finally, the research system is about hiring, procuring tools, and otherwise defining how the research team will function. These priorities helped to shape the milestones that appeared on our roadmap:

#### End of 2019

- Automate the onboarding and segmenting process for the 3,300+ consenting CoCreate research participants.
- Share findings from Rethinking Retirement, a study of 15+ in-depth interviews with Southern Ontario retirees to bust retirement myths and misconceptions.
- Propose a research system that supports the OMERS Innovation System.

### Early 2020

- Expand CoCreate, including tracking and measuring engagement, automation, and fielding participant requests from other teams.
- Implement the Agile Research Playbook, which is a set of guidelines for how the OMERS research team works. Its structure may be roughly based around the Innovation Cascade, in that it will cover the research team's ecosystem, strategy, architecture, people, and infrastructure.
- Publish research focusing on new members and retirees.
- Support other components of the OMERS innovation system, including the innovation unit, digital solutions team, and member journeys team.

### 6.3.3 Architecture

This section covers the research team's organization, research process, and metrics, which were designed to execute on the vision, focus areas, roadmap, and milestones of the research team.

As mentioned in section 6.3.2, we are working on devising a system for how enterprise research within an innovation system could function. We found that agile methodologies, which are somewhat novel in enterprise research, could both align the research team with the broader working practices of OG and permit research to be done quickly, to a high degree of quality. As a result, the system would promote autonomy amongst researchers.

#### Organization

Figure 22 shows a preliminary model for how an agile research system could work. As a general overview, research projects start with a research question, which is stored in an intake process until the team is ready to research it. Each team will have a project or research manager who will plan sprints around answering that research question. That manager will work with their research teams quantitative and qualitative leads to answer the research question. Then, the results will be communicated to the original requester in whatever format they requested, for instance, in a presentation or a report.

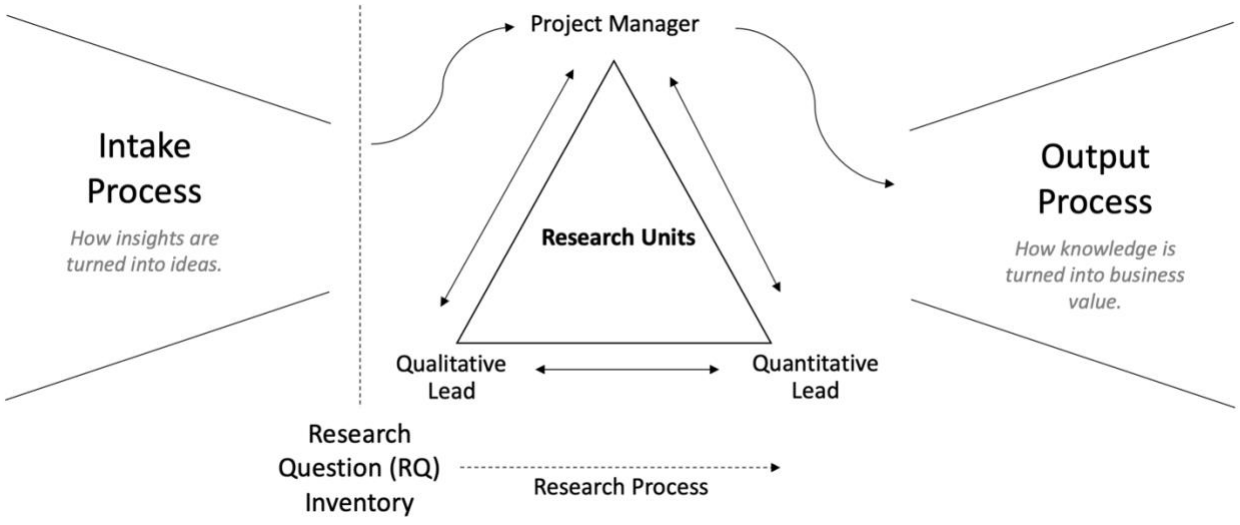


*Figure 22: The Research Architecture*

Each component is explored in more detail below:

- **Intake Process:** Where new research projects come from, such as other team's requests or ideas drawn from previous findings.
- **Research Question Inventory:** Where upcoming projects are stored, organized by priority, and assigned to research units to conduct.
- **Research Units:** Teams composed of three roles: project manager, qualitative lead, and quantitative lead. Each role has specific responsibilities, which they coordinate together to move through the research process.
- **Research Sprints:** Research units conduct studies in multi-week sprints run through weeklong sprint plans.
- **Output Process:** How findings are disseminated to other teams. This could include writing reports, preparing presentations, or planning meetings.
- **Research Process:** The steps research teams follow to conduct studies, seen in Figure 23.

The research system in Figure 22 is designed to fit within the innovation system. Thus, if a product squad needs user testing or a ConceptDev team needs market research for a financial tool, the research team is intended to be able to rapidly onboard that request, assign talent, oversee progress and disseminate participants or findings. In theory, this could lead to a turnaround time on research questions of only a week or two, depending on the scope of the research project, which could lead to rapid, informed decision-making across the OMERS innovation system. There are other models aside from Figure 22, such as having each researcher work independently and pull in collaborators as needed, but the preliminary model in Figure 22 seems to be the best way to conduct research.

### Process

As part of an agile research system, there needs to be a process that researchers follow. This process would follow the steps of Coordinate, Conduct, Compile, and Communicate, seen in Figure 23. These steps came from analyzing other design-led or agile processes such as design thinking (Brown, 2009) and adapting them to the specific needs of research, which include sourcing participants and compiling findings for communication.


*Figure 23: The Agile Research Process*

#### Metrics

The research system also has three general outputs: how participants are managed, how knowledge is created and disseminated, and how the skills of research are shared. Thus, the research team devised three groups of metrics that align with those three outputs and enable research leadership or any of the Innovation System governors mentioned in section 6.2.3 to monitor how the research team is performing.

The three metric groupings are:

1. **Participant Funnel:** Tracks how readily participants for research studies can be drawn from OMERS membership. Metrics are based around a funnel, where participants move through discovery, sign-up, onboarding, participating, and engaging.
2. **Knowledge Funnel:** Tracks the rate and quality of the research team's generation and dissemination of knowledge. Metrics are based around a knowledge funnel containing observation, insight, and theme.
3. **Skills Sharing:** Tracks how much value the research team brings to OG, including knowledge sharing, researchers' work with other teams, and offering workshops and other education.

### 6.3.4 People

Thus far in the research team, the only aspect we have specifically considered is what cultural values are best for the team. There are many other questions around incentives, specific individual working practices based on the architecture in 6.3.3, how members are added to the research team, and how leadership will manage the team. However, for the sake of this case study, sharing what has been generated so far is an effective test for the Innovation Cascade.

#### Culture

The work on culture for the research team has been distilled from the culture of OG explored in 6.2.4, along with an additional focus on encouraging researcher growth, engagement with work, and delivering business impact in alignment with the five focus areas covered in 6.3.2.

The research team's culture has six pillars, three of which can be attributed to Pink (2011), whose work on intrinsic incentives is especially relevant in knowledge work such as innovation research.

The six pillars are:

1. **Curiosity:** Researchers should always be inquiring into behaviour, reasoning, or intentions to help uncover new and relevant knowledge.
2. **Leadership:** Taking initiative to guide, coach, and mentor others.
3. **Mastery:** Growth through developing the many hidden or underlying skills of research.
4. **Autonomy:** Using intelligence to reason through problems and making decisions to solve them without specific guidance.
5. **Shared Purpose:** Finding common threads between OG, the research team, and its members that inspire, motivate, and align researchers.
6. **Communication:** Staying in sync with the team through honest communication and feedback about work, yourself, and each other.

### 6.3.5 Infrastructure

Finally, given how new the research team is, very little infrastructure has been developed. Similar to the broader OMERS innovation system, there are many enterprise-wide tools the research team uses and will

use, such as productivity software from Microsoft, design software from Adobe, and Customer Relationship Management (CRM) software from Salesforce. However, based on conversations with research leadership, the following are some of the tools the research team will likely develop in the coming months:

- **Templates:** One-page summaries of different research methods.
- **Dashboards:** Quick summaries of research activities at weekly and monthly intervals.
- **CRM:** A system for automatically onboarding, managing, and contacting participants.
- **Knowledge Repository:** A system for importing, storing, and analyzing gathered knowledge.
- **Sprint Planner:** A tool for planning, running, and reporting on sprint periods.
- **Agile Research Playbook:** A document that outlines the research system, including the ecosystem, strategy, architecture, people, and supporting infrastructure.
- **Ticketing:** A system for submitting and tracking work on research questions.
- **Research Inventory:** A tool for managing research questions before being assigned to sprints.

While there is more to infrastructure than just tools, this is sufficient given what has been generated so far for this case study. In the next section, I have summarized my findings from the generative case study.

### 6.3.6 Research System Summary

In section 6.2.6, I demonstrated how the Innovation Cascade visual, seen in Figure 11, could be used to display the findings of the mapping use case. For the generative use case, I have chosen to mirror the format of the OMERS strategy graphic seen in Figure 12. I chose to do this to demonstrate how the Innovation Cascade is more than a visual. Instead, it is a way of grouping and understanding information about EIS building.

Figure 24 shows a summary of the research system. It shows that the research team is a part of the broader innovation system, what the strategy is, and how research is performed. It only shows the more concrete aspects. Thus, the agile research organization, shown in Figure 22, is not included.

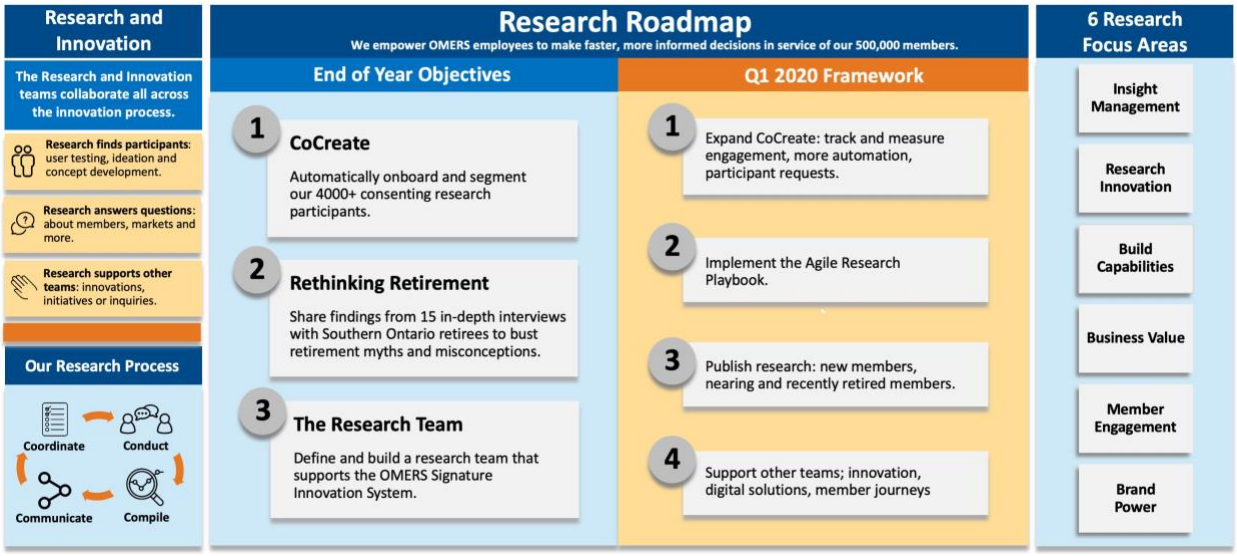


*Figure 24: Summary of the Research System*

The next section covers recommendations I have identified for the OMERS innovation system based on my analysis of the mapping and generative case studies.

## 6.4 Recommendations for OMERS

The following recommendations are included to both demonstrate what sort of analysis and problem-finding the Innovation Cascade enables. These recommendations go beyond the research approach of this paper, which included a literature review, themes analysis, practitioner interviews, systems mapping, and case study. The recommendations are products of my own analysis, synthesis, and ideas that have been informed by the research approach but are not a part of this paper's research questions. Therefore, for the purposes of this paper, the recommendations should by analyzed along the lines of what they say about the Innovation Cascade, rather than the inherent quality of each recommendation. As the OMERS innovation system is constantly evolving these recommendations may become dated after publishing.

For OMERS, the intention for the recommendations is to encourage critical thinking about the surface or hidden decisions that create any EIS. The recommendations do not indicate that OMERS or OMERS Gateway (OG) have not considered or are missing what is contained in the recommendation. Rather, it is my opinion that OMERS and OG should ensure each recommendation is eventually met as the OMERS innovation system continues growing and improving. Further, the recommendations are primarily focused on the broader OMERS innovation system, rather than any recommendations specifically focusing on the research team. However, any changes to the OMERS innovation system will impact the research team, as it is embedded in the OMERS innovation system. These recommendations are the work and synthesis of myself and are not necessarily reflective of the aspirations of OMERS or OG.

### 6.4.1 Define a Clear Vision

Van der Heijden, Bradfield, Burt, Cairns, and Wright (2002) found compelling visions can significantly enhance enterprise innovativeness. In my opinion, OG lacks a compelling vision that could guide or unite employees. Transforming OMERS into a third age institutional partner for retirees is a compelling vision I believe in, but another might be to become the underlying platform that shapes the member experience for 50% of pension funds in North America. Pension Services and OG leadership should define and commit to a specific vision. Van der Heijden et al. (2002) suggest the vision should be time-bound, inspiring, and create a shared purpose among leadership and employees.

### 6.4.2 Stress Test Different Strategies

Once the vision is defined, OG should explore different strategies and wind tunnel them to test how they perform based on different combinations of drivers, couplings, and other ecosystem patterns. One method is to test each strategy's resilience by seeing how it performs in each of the four scenarios explored in section 6.2.1 or in Appendix A. As an example, exclusively serving pension stakeholders in North America would succeed if Ontario adopted a mandatory pension program but would struggle if all pensions were made optional due to the decreased market size.

### 6.4.3 Further Define the Innovation Process

With a proven strategy in place, the Innovation Playbook should go beyond just defining the high-level innovation process and several roles within it. It should be expanded into an innovation system that incorporates fit with broader stakeholders and their strategies. This should be a clear, widely understood strategy, a process tailored to realize that strategy, homegrown or sourced talent, and the right tools, space and metrics for that talent to execute on the process. Generally, this means adopting the Innovation Cascade as a guide and using it to identify any gaps or missing pieces and address them.

### 6.4.4 Dig Deeper into Roles and Working Practices

Luo, Van de Ven, Jing, and Jiang (2018) found that role confusion was a key challenge in enterprise changes. Therefore, defining the roles within the innovation system should be an ongoing focus including activities, tools or resources needed, accountabilities, reporting lines, and fit with other systems. If roles are left murky, it is likely an unseen role will emerge for each individual that may or may not align with the strategy, which Kegan et al. (2016) call an invisible role. However, if the role is too rigidly defined then the limited autonomy may demotivate the employee. Objectives and Key Results (OKRs) (Doerr, 2018) are an effective tool for bridging that tension through aligning individual objectives with enterprise strategy while empowering employees to be creative and autonomous in achieving their OKRs.

### 6.4.5 Be Intentional About Culture

Culture is how roles and the people within them fit together. Once a culture is established it is difficult to change it (Needle, 2010). That is why the values and incentives within OG should be defined. Each decision should, in part, be analyzed for its fit within the culture. Otherwise, similar to roles, an unseen culture may emerge that is contrary to OG's stated values. For example, if constant learning is a value but there are not mechanisms to offer feedback to team members and leadership, then it is likely that concerns or improvements will not be discussed or implemented, potentially hindering learning outcomes and frustrating employees.

### 6.4.6 Grow Talent In-House

Growing talent in-house is a cheaper, culture-building way of matching talent to roles. Kegan et al. (2016) found developing internal talent can increase retention by 40%, which lowers training and integration costs. One method General Electric uses for encouraging growth is creating promotion checklists which guide employee's growth outcomes as they move through their careers (Hamel, 2006). Another method involves giving employees free time to experiment, such as 3M's 15% time, which is given to employees to use as they see fit (Govindarajan & Srinivas, 2013). The key to encouraging growth is to align OG's strategy and roles with the growth outcomes desired by employees, either through hiring for growth direction or by encouraging more autonomy.

### 6.4.7 Measure Innovation Outcomes

To monitor workflows, OG needs a system of actionable metrics that OG governance can use to guide the innovation system (Manuele, 2009). Metrics that speak only to outcomes such as "Volume of Innovations Launched" can be useful for demonstrating created value. However, they do not help guide governors to create better innovation outcomes. A more actionable metric might be "Innovation Velocity", which indicates the rate at which innovations travel through the stages. That being said, no one metric is perfect, so a system of metrics that accounts for a variety of innovation determinants should be developed.

### 6.4.8 Build a Mission Control to Support Innovators

Miles, Snow, Meyer, and Coleman (1978) found bureaucratic, command-and-control enterprises with "formalized job descriptions, low tolerance for deviancy from prescribed behaviour, and centralized vertical decision-making" were too inflexible and slow to keep pace with a fast-changing world. Instead, similar to GroeiFabriek from the Netherlands APG pension fund, OG should develop a central support group that coaches, guides, and supports autonomous innovation teams. This group, known as Mission Control, still controls governance and holds employees accountable, but it removes the formal reporting

lines that prioritize control over creativity. Instead, it pushes for a model of innovation leadership that emphasizes participatory decision-making and a focus on value creation (Johansson & Jönsson, 2014).

### 6.4.9 Further Open the Innovation System

A common theme thus far is innovation systems being valuable for reasons beyond added revenue or cost reductions. The innovation system can spark cultural change to bust bureaucracy and encourage aligning employee work with stakeholder value. Scaling participatory design through platforms such as LEGO Ideas or OMERS CoCreate, using social or financial incentives, implementing gamification, or offering workshops and other co-creative events can create member and enterprise value beyond revenue or reduced costs. If this value can be proven, it can demonstrate OG's non-financial value and thus increase the funding runway as OG ramps up to being cost-positive.

### 6.4.10 Procure Appropriate Innovation Tools

In many enterprises, tools are selected to satisfy procurement or finance needs, rather than the tool's user (Humble, O'Reilly, & Molesky, 2015). This results in most enterprises using the same handful of approved tools. Instead, tools should be considered a competitive advantage that boost productivity, avoid time consuming workarounds, and give employees more agency in their work, resulting in a boost of overall workplace satisfaction. OG should consider allowing teams to select their own systems of tools. There may be fewer enterprise discounts and more considerations to ensure security and privacy needs are met, but the benefits are worth it.

### 6.4.11 Summary of the Recommendations

The ten recommendations were an example of what analysis the Innovation Cascade can permit. There is still a level of familiarity with enterprises and secondary research required, but the Innovation Cascade seems to function as an effective guide for what to pay attention to and what to do with components of an EIS once they are produced.

In the next section, I have reviewed how the Innovation Cascade performed. However, it is in section 8.0 where I have compiled my findings from using the Innovation Cascade into a set of next steps for iterating on its design and expanding its use.

## 6.5 Reviewing the Innovation Cascade

In the cases studies contained in section 6.0, I used the Innovation Cascade to either map information I gathered through a combination of scouring internal documents, collecting and recording notes, and conducting many informal interviews or generate possibilities from working with research leadership to build out the research component of the OMERS innovation system.

The case studies were intended to test whether the Innovation Cascade effectively achieved the two use cases I identified in section 5.4, which were the Innovation Cascade as a mapping tool and the Innovation Cascade as a generative tool.

I have grouped my review of the Innovation Cascade from both use cases into strengths and weaknesses, then summarized my findings. I have further outlined next steps for the Innovation Cascade in section 8.0.

### 6.5.1 Innovation Cascade Strengths

Based on my use of the Innovation Cascade, as well as from some preliminary feedback I received from colleagues I have shared it with, I have identified three mains strengths:

1. **Structured Dialogues:** The Innovation Cascade is useful for surfacing the many hidden decisions embedded in building an EIS. This has helped frame and make decisions surrounding culture, flows of resources, and other components of an EIS. It has helped with identifying gaps that resulted from not defining these components.
2. **Laying It All Out:** The Innovation Cascade helps compile existing information in one place, rather than having information lost in various presentations, in people's minds, or elsewhere. This is especially true of the graphic, which captures the essence in one visual. I have also found it is encouraging to others to see the unmade decisions within their EIS, as it seems to provide a desire to make those decisions.
3. **Common Language:** The Innovation Cascade gives many of the concepts within building an EIS a universal language. In my experience, having a shared way of communicating something makes effective dialogue about it much more likely, especially with people who do not come from a background in enterprise innovation.

### 6.5.2 Innovation Cascade Weaknesses

Based on my use of the Innovation Cascade, as well as from some preliminary feedback I received from colleagues I have shared it with, I have also identified four mains weaknesses:

1. **Confusing Labels:** The ecosystem, strategy, architecture, people, and infrastructure labels are unclear to others. The terms originate from very different lexicons. Infrastructure especially seems to confuse people, as many do not associate it with tools and other supporting factors within an EIS. The strength of the labels is heavily diluted if nobody understands the terms being used and why they are applicable.
2. **Hard to Use:** There is a lot of specific knowledge required to understand how to use the Innovation Cascade. This includes systems building, enterprise architecture, and even seemingly unrelated areas like ecology. Several people have been confused by the Innovation Cascade, suggesting it needs to be simplified, both language-wise and in how it is used.
3. **Too Broad:** The five categories are very broad and require more digging to shape what is inside each one. I have begun to do that with the work on the components, but it seems more work is needed to refine the components.

4. **Weak Visualization:** The five-box Innovation Cascade diagram, seen in Figure 11, is hard to fit any detail into and is still very text-heavy and visually overwhelming. I could improve it by exploring other methods for visualizing enterprise systems such as Beer's (1995) Viable Systems Model, which has boxes and labelling conventions tied to a systems map.

### 6.5.3 Innovation Cascade Review Summary

Overall, the Innovation Cascade has been very helpful as a sensemaking tool for an already skilled practitioner to identify, make, and present decisions about EISs. I have found with my guidance it has been useful for facilitating discussions on EISs. However, even with my explanations and guidance, the tool is confusing and challenging for others to use.

Work on simplifying the language, planning for non-facilitated conversations, redesigning the visual, and further defining the contents of each code within the Innovation Cascade seems necessary to enhance its utility for EIS builders. Further, the Innovation Cascade has only been used in a single, large enterprise—OMERS. While I believe it can be useful for not-for-profits, startups, and other entities, it has not been tested or proven yet and will require further work.

This concludes the case study. Given the time constraints of this process, I have not actioned the following review on the Innovation Cascade. Rather, I have compiled my findings into a set of next steps, which I have discussed further in section 8.0.

However, as a result of my research, three other opportunities to apply the Innovation Cascade have come up:

1. a model for the five modes of EISs;
2. the dimensions of an EIS along which each component can vary; or
3. a five-stage process for moving between the five modes or otherwise enhancing/building an EIS.

These three opportunities are explored in detail in the next section.

# 7.0 Other Applications for the Innovation Cascade

Throughout my research, three other very interesting applications for the underlying thinking of the Innovation Cascade emerged.

First, there seemed to be some dominant archetypes for how an Enterprise Innovation System (EIS) worked. For instance, stages gates often seemed to be paired with idea or insight intake processes. I believe that by mapping out these archetypes, I could quickly diagnose or understand an EIS without going through the entire Innovation Cascade. In section 7.1, I have defined and explored the five modes of EISs I identified.

Second, within each code, such as ecosystem or strategy, there seemed to be different forms they consistently took. Similar to the five EIS modes, if these forms could be mapped out, I could quickly understand an EIS. Further, the forms each code could take could help give language to what makes the five EIS modes work. Together, these forms and codes could provide a vocabulary for EIS builders to discuss and compare EISs. I have covered these forms, or what I call Enterprise Innovation System Dimensions in section 7.2.

Third, I found that while there was an informal process to using the Innovation Cascade that I described and applied in the case study in section 6.0, there is also an opportunity to define a set of formal, predictable steps that a novice EIS builder could use to get a handle on the Innovation Cascade or that a more experienced EIS builder could use to understand and apply the Innovation Cascade to their system rapidly. I have described these steps in section 7.3.

Finally, in section 7.4, I brought the three speculative models together with the Innovation Cascade to explore how they fit together.

## 7.1 The Five Modes of Enterprise Innovation Systems

While conducting the five research methods I used in this paper, I found patterns among the EISs I studied. I believe these patterns indicate certain predictable forms that an EIS may take. Generally speaking, these patterns in an area of study are known as a dominant design. A dominant design is "the norm for how a device or activity works" (Tushman, & Murmann, 1998). Dominant designs are often known as industry standards, such as the QWERTY keyboard. All other designs in a space are usually designed in reference to the dominant design.

Dominant designs exist in social systems and enterprises as well, such as hierarchies being the dominant design for structuring an enterprise (Leavitt, 2003). Dreiling, Rosemann, van der Aalst, Sadiq, and Khan (2005) described what they called "generic patterns of configuration alternatives," which were several dominant designs for enterprise business processes. Therefore, there may be dominant designs within EISs as well. Before speculating about my own set of dominant designs for EISs, I first conducted a review to see if there were any existing ones. I found one set in a Steelcase (2017) whitepaper. The authors found eight alternative dominant designs for innovation systems:

1. In-house marketplace model.
2. In-house share model.
3. In-house center model.
4. Off-site model.
5. Partnership model.

6. Consultancy model.
7. Network model.
8. Community model.

Steelcase's dominant designs are interesting, but they mostly focus on how centralized or decentralized an innovation system is. However, I suspect that EISs vary across many dimensions, such as those covered in the Innovation Cascade. Throughout the five research methods of this paper, I identified a different set of dominant designs for EISs.

These five modes are informal, linear, distributed, embedded, and emergent. These modes are not linear stages that enterprises move through. Neither are they restrictive, such that enterprises can only exhibit one mode at any given time. Rather, they are a way of quickly capturing the nature of an EIS at the component or overall level. For instance, Lego has a distributed intake process through their Lego Ideas platform, but a linear innovation process that involves processing innovations sequentially through new or enhanced product streams (Robertson & Breen, 2014). Figure 25 summarizes the five modes.

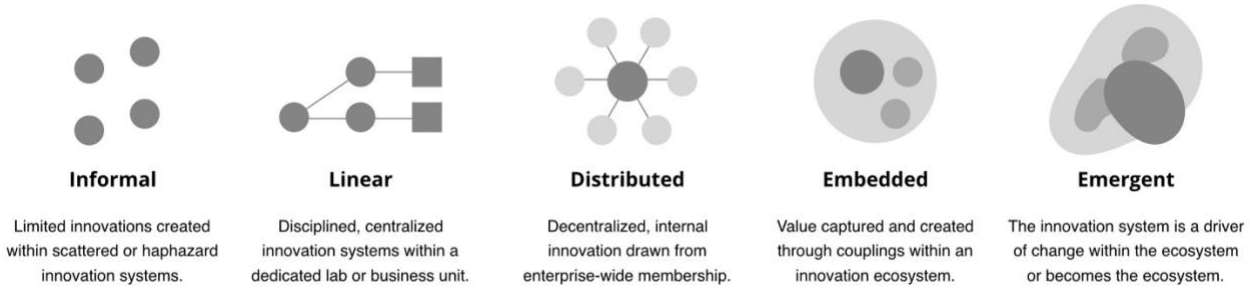


*Figure 25: The Five Modes of Enterprise Innovation Systems*

My hypothesis is that enterprises that do not intentionally innovate generally exhibit the informal mode. Then, as enterprises begin improving their innovation systems, they begin to exhibit higher modes in different components as they gradually raise the innovativeness of the entire system.

As an example, an enterprise system may have no formal intake process for ideas, but a team dedicated to turning ideas into new sources of value. They may decide to create a formal intake system or even a distributed platform that other innovators can offer ideas through. They may partner with academic institutions to help move ideas forward through avenues like hackathons or joint ventures. Each time, they raise the mode of some component of their innovation system and likely increase the quality and volume of their innovation outputs.

I formed this hypothesis by observing the different states the innovation systems that my interview candidates took, along with researching and exploring other systems such as that of Whirlpool, Citi Bank, and the Bill and Melinda Gates Foundation. If accurate, these modes could be helpful for rapidly assessing an existing innovation system and making recommendations to enhance its innovativeness. Below I have explained each mode in more detail.

### 7.1.1 Informal Modes

Enterprises that are not actively innovating still create or capture new value. However, they do it at a much slower and less predictable rate than enterprises with more formalized innovation systems. It appears that enterprises with informal modes are shaped by their ecosystem and thus often follow mature or declining

trends. They are often caught off guard and are prone to being disrupted (Lefebvre, 2013). The limited innovation these enterprises do produce is usually haphazard and the result of creative individuals rather than a systematic approach to innovating (Damanpour, 1991). Overall, informal modes still create innovation. However, they likely do not keep pace with the ecosystem and thus fall behind over time.

### 7.1.2 Linear Modes

From my research, it appears that enterprises almost always begin with a linear mode as they begin to formalize their innovation system (Godin, 2014). A linear mode is characterized by centralized control and a strategy carried over from the broader enterprises.

The sustained strategy often leads to a focus solely on core innovations, as linear modes are usually designed to sustain and manage existing offerings rather than launch new ones. In a sense, they are an initial, low-risk foray into innovation. However, disciplined, linear modes can be extremely effective and even preferable for many enterprises.

With skilled management, they can intake, process, and output innovations repeatedly and consistently. They are often low risk, require limited resources, and mesh well with hierarchical enterprises that desire predictability, clear metrics, and defined accountability (Keum & See, 2017). However, these strengths can also be limitations.

Linear modes can find themselves limited by the enterprise they are closely tied to. Examples of this include leadership not believing the value of innovation or innovations with high potential being blocked because of a low appetite for risk (Kotter, 1985). Linear modes often feature rigid stage gates that allow leaders to manage the flow of innovations (Kock & Gemünden, 2016) and also allow decision-makers to advocate for their favourite innovation, rather than the most promising one.

### 7.1.3 Distributed Modes

Distributed modes seem to emerge from linear ones when decision-makers decide to widen the intake process to allow more of the enterprise, or even external stakeholders, to join the innovation process. Often this can take the form of an internal incubator (Etzkowitz, 2002) or an internal rotation program, which often leads to interest and more innovativeness from non-innovation areas of the enterprise. Planned innovation education can accelerate the shift to a distributed mode and often leads to enterprises using the innovation system to both train staff or high-potential leadership and to create or launch new offerings (Barsh, Capozzi, & Davidson, 2008).

Distributed modes often feature external partnerships such as customer co-creation or jointly funded projects. Generally, the broader range of insights entering the system allows for more complex, effective innovation creation (Sherman & Schultz, 1998). However, controlling leadership or cultures that punish failure can stifle these efforts (Whitford, 2006). If distributed modes can avoid these pitfalls, they can be extremely effective for producing innovations with longer time horizons than linear modes (Rollwagen, Hofmann, & Schneider, 2008), including new products and services or transformative innovations.

### 7.1.4 Embedded Modes

To guide innovations, focus areas may be used to narrow the range of potential innovations (Christensen & Donovan, 2000). This could lead distributed modes to abandoning the stage gate system, which previously could have been funnelling innovations into predictable, acceptable formats (Sethi & Iqbal,

2008). This can enable more agility and responsiveness to the ecosystem and can even encourage the enterprise to begin shaping their ecosystem (Kock & Gemünden, 2016).

Once enterprises begin actively shaping their ecosystem, rather than passively launching innovations into whatever context exists in the ecosystem, they exhibit an embedded mode. Chesbrough, Vanhaverbeke, and West (2006) define embedded innovation as open innovation, which indicates the extent to which the enterprise allows external stakeholders such as competitors, academic institutions, and customers to participate in their innovation. These partnerships encourage both parties to evolve. However, oftentimes, one partner will achieve a greater level of change than the other. Hoverstadt & Loh (2017) found these dominant partners can end up shaping the ecosystem.

Usually, enterprises with embedded modes have foresight capabilities that they use to anticipate and benefit from trends and drivers in their ecosystem. This awareness can help them steward the ecosystem to a desirable strategic position through gaining size, diminishing competitor power, or occupying a specific niche. These enterprises can use their position to exploit the maximum amount of gain out of a position as Apple did through the iPod, iPhone, and iTunes ecosystem or to achieve some alternative purpose as Wikipedia did through cataloguing the world's knowledge.

Embedded modes have a tremendous influence on their ecosystems, which allows their innovations to get taken up faster and find integrated offerings, like Google's Pixel product line, that add low-cost value. As a result, it can take tremendous effort to displace them (Huizingh, 2011).

### 7.1.5 Emergent Modes

Some innovation systems become so deeply embedded in their ecosystems that they become a driver of change. One interview candidate described these as "horizon 4" innovations, referring to innovations that go beyond McKinsey's 3 Horizons model (Baghai, Coley, & White, 1999). These enterprises have innovation systems that may be the ecosystem itself, which I call an emergent mode.

An example is Automattic's WordPress. Since practically every blog is built off this platform, it is often indistinguishable from the blogging ecosystem. Automattic has reshaped blogging, yet they have less than a thousand employees (Vecchi, 2019). That is because much of their innovation is done through the ecosystem they are woven into. Legions of bloggers, developers, and entrepreneurs build their own creations through WordPress with Automattic acting as a supporter and facilitator.

Automattic goes beyond open-source, which involves transparency and user control, and moves toward empowering and becoming the entire ecosystem. This often allows enterprises to eclipse their ecosystem and navigate to other ones (Nambisan & Baron, 2013), such as by launching successful innovations in a new industry or to a new customer base. Emergent modes are usually created through emergent strategies where the enterprise uses ecosystem signals to find their way, rather than attempting to navigate to a deliberately set position based off internal priorities (Chia & Holt, 2009).

### 7.1.6 Summary of the Five Modes

The five modes of EISs do not capture the endless variety that innovation systems can take. EISs are messy, complex, and hard to understand, given the many organizational, human, strategic, and environmental factors at play. Thus, to say that Lego is linear or Automattic is emergent could be an oversimplification that misses many factors that influence innovation outcomes. However, I believe that the modes can provide a model for understanding different patterns within EISs and for quickly

diagnosing how EISs might be enhanced. Alternatively, the modes may provide a model for designing an entirely new system.

No one mode is objectively better. Each offers trade-offs and strengths. For instance, embedded and emergent EISs seem to offer a greater capacity to influence the ecosystem, but often involve hundreds of innovators (Salter, Criscuolo, & Ter Wal, 2014), while informal or linear modes can operate with only a handful of people.

Different enterprises may also prefer various levels of control, influence, openness, or strategy alignment, which suggests certain modes may better meet the needs of different enterprises (Dougherty & Hardy, 1996). For instance, the Software-as-a-Service (SaaS) industry lends itself better to the connectivity and widespread membership necessary for embedded or emergent systems (Dahlander & Gann, 2010). Further, other factors such as reputation, ecosystem drivers and trajectory, and chance can influence which mode is best for a given enterprise.

Huizingh (2011) found a preliminary relationship between the openness of an innovation system and innovation effectiveness. Therefore, in light of the increased rate of organizational disruption (Viguerie, Anothony, & Waldeck, 2016), it is possible that many enterprises would prefer to have a distributed or above innovation system to ensure their rate of innovation at least keeps pace with change in their ecosystem. This may help the enterprise to avoid being disrupted. Thus, I believe that the higher modes, such as emergent or embedded, are preferable in many circumstances. However, the modes are speculative and require further research to solidify what form they take in different enterprises and industries, and what their relationship to innovation outputs are.

## 7.2 Configuring an Enterprise Innovation System

Within the five modes of EISs defined in section 7.1, there were certain patterns that each of the five codes of the Innovation Cascade displayed. For example, the enterprise moving from predominantly being shaped by the ecosystem to predominantly shaping the ecosystem. It is possible that these different patterns can be intentionally controlled in a process known as configuration to intentionally create a certain kind of EIS. Van der Aalst, Dumas, Gottschalk, Hofstede, Rosa, and Mendling (2010) describe a configuration as "a set of possible forms a component of a process can take." To them, configuring involves fitting an appropriate form to the specific context the process exists in. They believe configurations reduce complexity by creating a manageable range of potential options, which can lead to better decisions or decisions being made at all. As an example, Choi and Välikangas (2001) described ten forms that an innovation strategy could take, including consolidation, convergence, or experience. While their configurations are specific to strategy, I suspect there are configurations for the ecosystem, strategy, architecture, people, and infrastructure of an EIS. I have attempted to define configurations for each of the five codes of the Innovation Cascade. These configurations can be viewed in Figure 26.

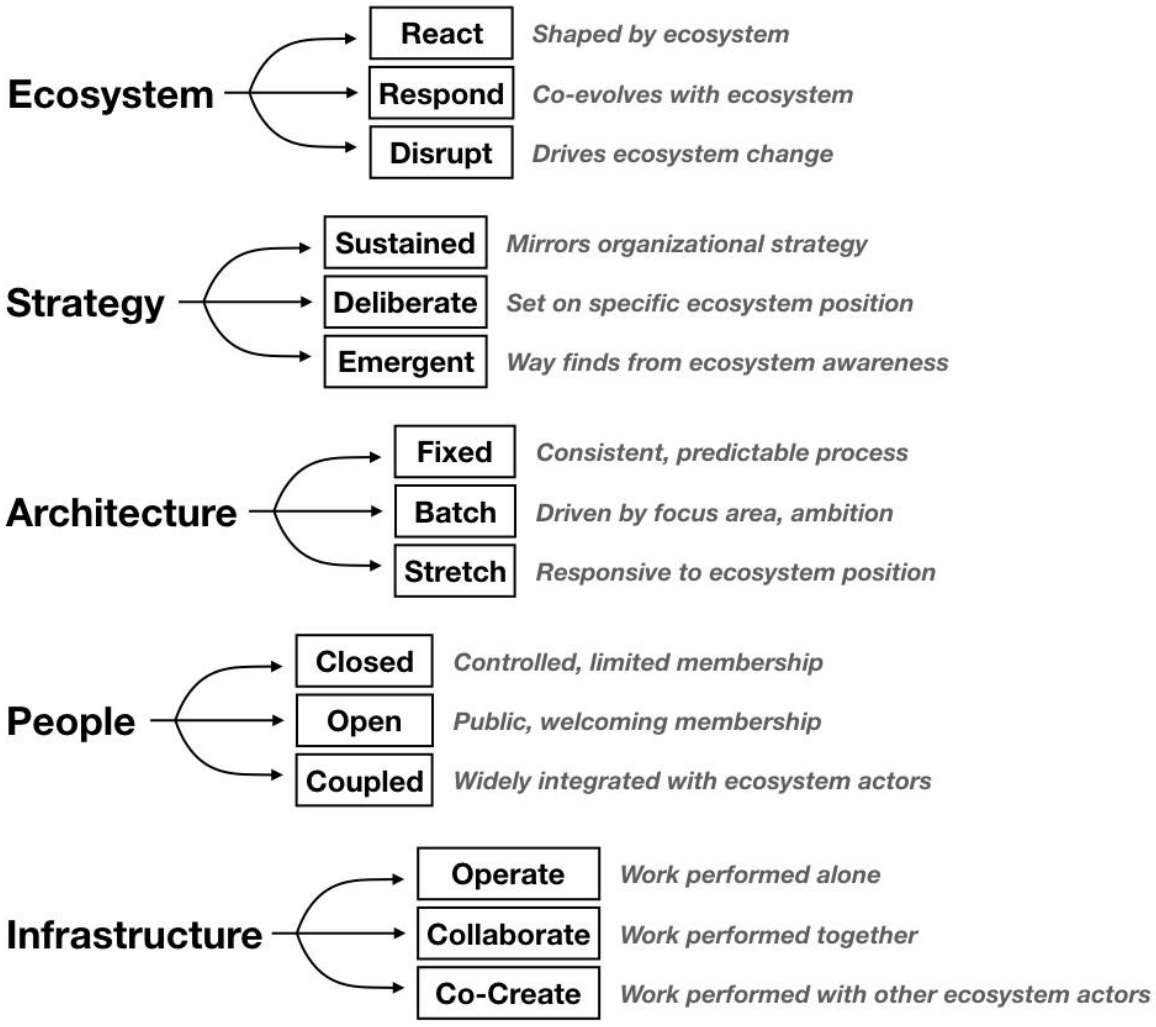


*Figure 26: Enterprise Innovation System Dimensions*

Figure 26 is modelled on the strategy configuration diagram Hoverstadt and Loh (2017) presented in *Patterns of Strategy*. Theoretically, if I can define the potential configurations for each of the five codes of the Innovation Cascade, it could allow an EIS builder to mix and match different forms to configure their ideal innovation system.

For instance, different builders might prefer a sustained strategy from the broader enterprise, a deliberate strategy specific to the EIS, or to intentionally leave the strategy undefined and instead navigate the ecosystem through wayfinding. While there may be an endless number of possible configurations and forms the five codes could take, this approach could bring specific language to EISs, which could help individuals with limited innovation experience to offer their input. Alternatively, it could allow experienced EIS builders to rapidly frame and implement opportunities to enhance or design better EISs.

However, the configurations in Figure 26 are speculative. It is an oversimplification to say that infrastructure can exclusively support solo, collaborative, or co-creative working practices. Different tools or spaces may offer different levels of participation. Thus, the configurations for infrastructure could be a spectrum from individual to team working practices. However, other aspects of infrastructure, such as

rates of collisions between information, may not be captured in that spectrum. Thus, the configurations still need improvement. However, they offer a quick shorthand for understanding the different options available within each area of the Innovation Cascade and they may allow innovators to mix and match components to rapidly match an EIS to their enterprise's context and needs.

## 7.3 The Five Steps of Using the Innovation Cascade

Using the Innovation Cascade appears to be challenging for innovation practitioners of all skill levels. There are many questions at play that do not have obvious answers. How would an innovator make sense of the ecosystem? What possible process or set of steps would they follow to align a strategy with that ecosystem?

The value of the Innovation Cascade lies in surfacing these unrecognized areas of inquiry and providing a skeleton for making sense of them. However, using the Innovation Cascade in its current form requires having a process or set of tools for that sensemaking. Therefore, there is an opportunity to define a set of steps for using the Innovation Cascade and for aligning those steps with the modes and configurations of EISs.

I designed my process leveraging the five research methods of this paper and several existing models, mostly centered on innovation design or change management. These existing models are:

- the 8-Step Change Model (Kotter, 1995);
- logical incrementalism (Lindblom, 1959);
- the iterative process of inquiry (Gharajedaghi, 2011);
- the innovation wheel (Basadur, 1995); and
- the design innovation process (Kumar, 2012).

The five steps I created are search, map, shape, make, and drive (see Figure 27). They roughly match the five dimensions of ecosystem, strategy, architecture, people, and infrastructure. Each step is matched with appropriate approaches from the 250 approaches described in Appendix B.

Further, two loops appear within the five steps. First, it appears that innovators will iterate between searching and mapping until a strategy emerges that gets the innovator to their desired objective. Second, it appears that innovators will iterate between architecture, people, and infrastructure to build the internal conditions in which the strategy will be executed.

These two loops can be thought of like a figure eight (8), where innovators loop back and forth between the external and internal work. This loop mirrors the one Mazzucato (2002) found in the development of strategy. If correct, these two loops could help innovators to apply the Innovation Cascade within their enterprise or to communicate what activities or steps they are taking as they build their EIS.

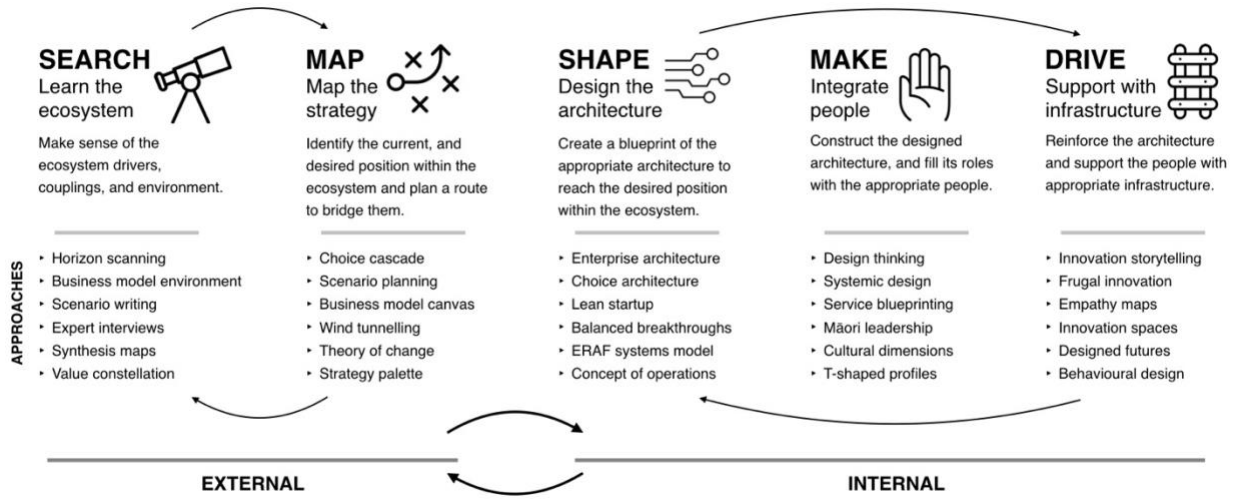


*Figure 27: The Five Steps of Using the Innovation Cascade*

The following sections are an overview of each of the five steps.

### 7.3.1 Search

The search step involves making sense of the ecosystem the innovation system is embedded within. This can include organizational factors such as other teams or business units, decision-making structures, and reporting lines. It also includes understanding the broader ecosystem, including competitors, customers, and other actors.

Searching can involve learning tours, interviews and discussion, and attempts to visualize the ecosystem through drawings such as the Business Model Environment (Osterwalder & Pigneur, 2010), which includes key trends, market forces, macro-economic forces, and industry forces. It can include scenario writing or other foresight analysis (Ringland & Schwartz, 1998).

The searching phase naturally bleeds into the mapping phase as understanding the ecosystem and understanding where to navigate to within the ecosystem are often intertwined.

### 7.3.2 Map

The mapping step involves identifying the innovation system's current position within the ecosystem if it has one, the desired position, and the intended route, which constitutes the innovation system's strategy. The most common strategy is simply growth, which is to occupy a larger area in the same position of the ecosystem. More recently, digital transformation is a common strategy that involves anticipating a specific set of drivers of change and adapting to maintain the same position in response to them.

Mapping also involves setting a vision or a description of the desired ecosystem position, wind tunnelling by asking, "if we were to achieve this vision, how would the ecosystem evolve in response?" and finding some way of visualising or communicating what the innovation system intends to create. A Business Model Canvas or a choice cascade (Lafley & Martin, 2013), can be used to indicate the set of decisions that a startup or new venture has made.

### 7.3.3 Shape

The shaping step involves designing the architecture that will realize the innovation strategy. The structure used in this framework includes the system or process, structures, and governance. Common innovation systems involve an intake process for insights and ideas, a number of stages that convert the idea into a viable business, and gates between those stages (Cooper, 1990). Shaping the architecture should involve sketching and testing the architecture to stress test it under different circumstances.

Innovation architecture can be iterated on and often involves some measure of learning by doing. Some examples of architecture include Cowan's (2012) venture design and Fabun's (1968) idea stages.

### 7.3.4 Make

The making step involves bringing people into the architecture. Often this is done through hiring and talent management, through internal transfers, or through reorganization. Since the architecture is just a design until people work within it, there will often be some dissonance between how those people work and the architecture's design. The making phase involves making the architecture work for those people, either through governance structures that empower members to reshape the architecture or through leadership listening to the architecture's members and adjusting the architecture as necessary (Foss, 2007).

### 7.3.5 Drive

The driving step is where supporting infrastructure is brought in to help accelerate the innovation work. This could be connections to other departments, external suppliers, purchasing subscriptions to tools or platforms, space redesigns, or purchasing equipment. One model for the drive phase is the toolchain, which is a sequence of tools that map to a business process (Polgár, Ráth, Szatmári, Horvath, & Majzik, 2009).

## 7.4 Expanding the Innovation Cascade Framework

The value of the Innovation Cascade lies in how it surfaces and frames tensions or missing components of an EIS. However, in its current form, it does not help innovators to identify other possibilities for their system or help them implement those possibilities. The modes, configurations, and steps were designed to address that gap and help augment the Innovation Cascade into a robust framework for EIS builders to design, improve, or understand EISs and communicate EISs to stakeholders. Further, the Innovation Cascade could help to describe and influence the patterns of enterprise innovation through benchmarks or comparative analysis to frame best practices for EIS building and for innovating with enterprises more generally.

In this section, I have brought the four models together to describe how this broader, more robust framework might work. However, only the Innovation Cascade is supported by this paper's research, and as a result, this framework is speculative and intended to hint at the broader possibilities and next steps for the Innovation Cascade.

### 7.4.1 Bringing the Four Models Together

The four models fit together to help frame the process and areas of designing or enhancing EISs. The Innovation Cascade highlights the five areas of exploration during the EIS building process. The five steps show the process for applying the Innovation Cascade. The configurations show somewhat predictable

outputs from using the five steps. Finally, the five modes show what mode each configuration maps to and suggests the overall innovation potential of the EIS. If the modes can be mapped to benchmarks and resourcing, it could be possible to create speculative models for how different EISs might perform and thus to quantify the value creation potential for an EIS before and during the process of implementing it.

This could lead to far more informed decision-making for leaders with innovation agendas and could help to demystify the broader process of enterprise innovation, which currently seems to struggle with bringing other stakeholders into the process beyond simple ideating activities or highlighting created innovations. Figure 28 shows how the four models could fit together.

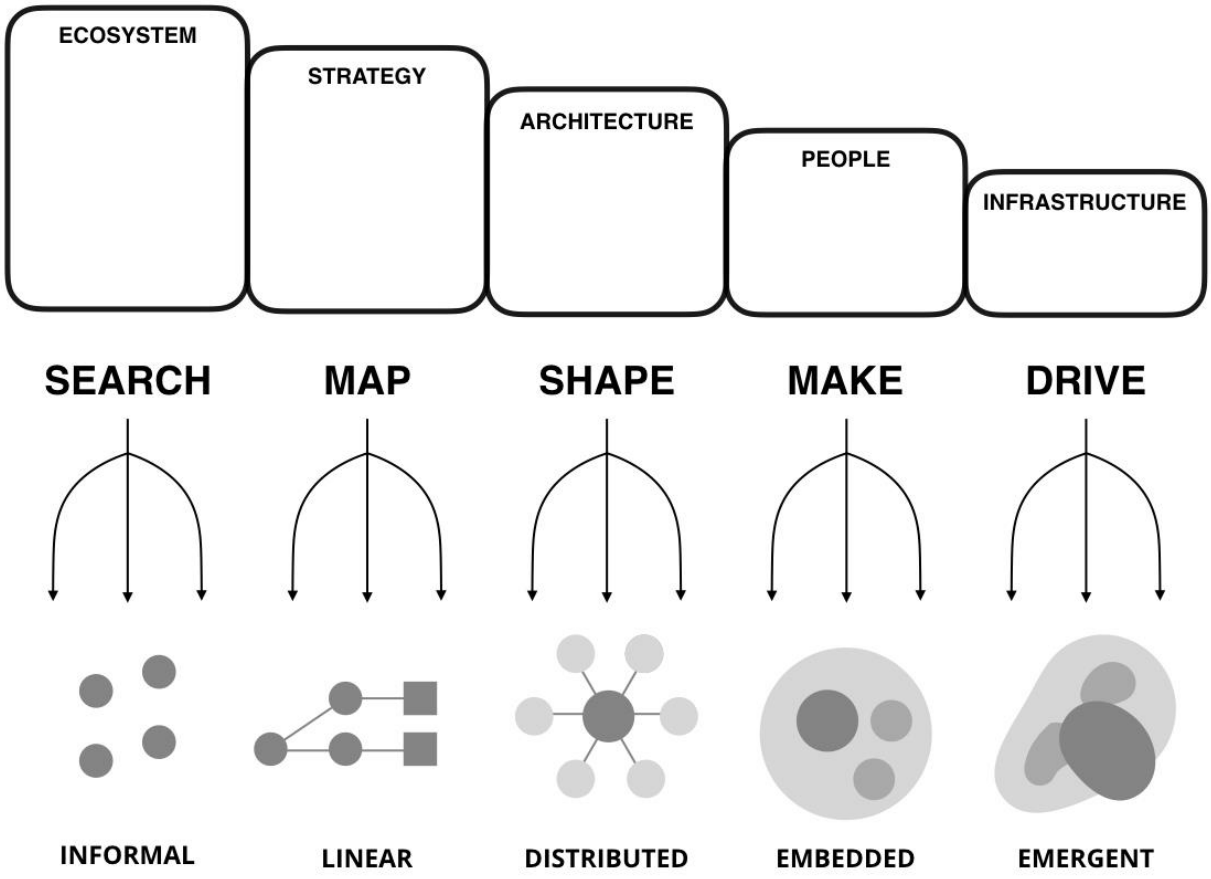


*Figure 28: How the Four Models Fit Together*

**7.4.2 The Enterprise Innovation Loop**

The four models each highlight a different part of building an EIS. However, together they also form a loop. The loop, shown in Figure 29, begins with the Innovation Cascade, where innovators can make sense of their EIS. Next, innovators can see how their EIS compares to other EIS benchmarks or other systems using the modes and assess what opportunities exist to alter their system. From there, they can use the configurations to redesign or enhance their EIS. Finally, they can implement their desired configuration using the five steps. Then, they can return to the Innovation Cascade to measure the EIS's performance. If the performance is up to expectation, they can leave the EIS alone, and if not, they can repeat the cycle to gradually iterate on the EIS. Further, they can also run this loop as an ongoing maintenance activity to

ensure the EIS does not have unrecognized gaps or tensions that have evolved over time. I call this loop the Innovation Cascade Cycle, and it offers another opportunity to apply the broader Innovation Cascade framework to help build innovative, efficient EISs.

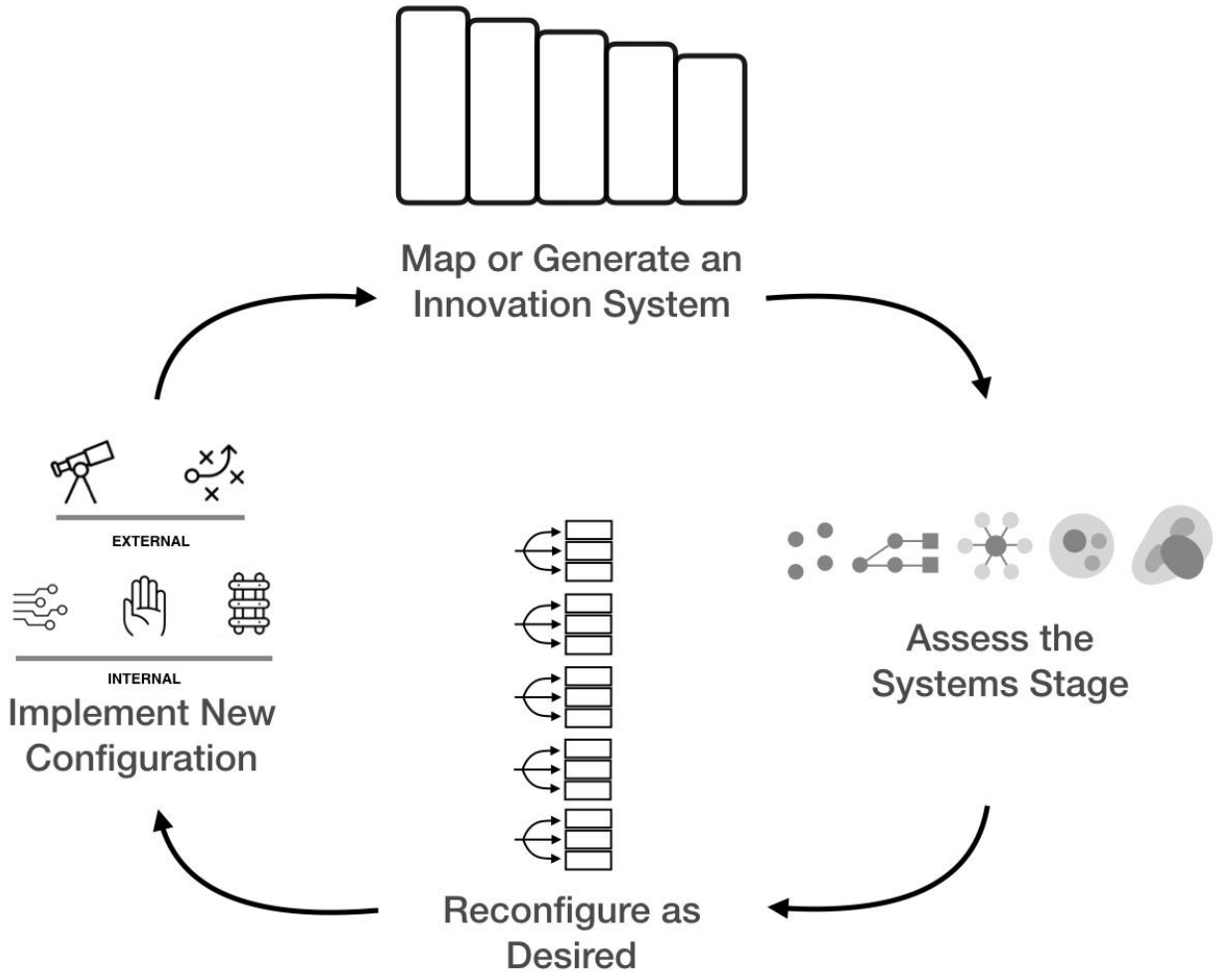


*Figure 29: The Innovation Cascade Cycle*

# 8.0 Next Steps

This paper was written to understand what actions enterprise innovators should take to enhance or create more innovative or lower-cost Enterprise Innovation Systems (EISs). Many are familiar with processes for innovating, such as design thinking or the double diamond, but systemizing the outputs of those processes within an enterprise is an entirely different conversation. Further, while there are methodologies for innovation processes, managing innovation portfolios, and crafting innovation strategies, the Innovation Cascade is the first methodology I have found for the practice of EIS building. Through the Innovation Cascade, the five modes, configurations, and the five steps—I believe I have defined a framework that will help facilitate that conversation and fill a gap in enterprise innovation management.

However, the Innovation Cascade, the five modes, configurations, and the five steps are the synthesis of one researcher and are prone to my biases and misconceptions. Further, they have only been used on one enterprise in a limited trial and to a limited degree. As section 6.5 discussed, the Innovation Cascade also has several issues, such as confusing labels, being hard to use, the broad content of the five codes, and the five-column visual being difficult to read.

Therefore, to continue iterating on the Innovation Cascade, there are some necessary next steps:

1. Source practitioner feedback from innovators of all skill and experience levels.
2. Run trials in enterprises other than OMERS.
3. Conduct further research to refine each of the five codes.
4. Improve the visual modelling of the Innovation Cascade.
5. Experiment further with the modes, configurations, and the five steps.
6. Explore other organizational structures for the framework, such as with not-for-profits or startups.

In many respects, the Innovation Cascade was designed to help democratize innovation—to pull back the curtain on the practice of creating positive change in the world. As we collectively face global challenges such as climate change, overconsumption, and health threats, innovation is more necessary than ever—not just product or service innovation, but innovating our institutions, political ideologies, and economic systems. Thus, professional innovation cannot remain housed in for-profit enterprises. It must be freed of the dogma, mystification, and esoteric theories that limit it to a select few. Instead, we need to illuminate the underlying principles of complex problem solving and systematic value creation. I imagine a world where not-for-profits, social enterprises, startups, public service agencies, and any other organization are equally able to offer their stakeholders value. I hope that the Innovation Cascade may help with this challenge, and that together, we can innovate to create a shared future worth inhabiting.

# 9.0 Reflections on the Process

This paper has built on the incredible work of incredible thinkers such as Larry Keeley, Clayton Christensen, Stafford Beer, Roger Martin, Alexander Osterwalder, Steve Blank, Richard Buchanan, Frederic Laloux, Eric Von Hippel, and Fred Kofman. I also owe a great deal to the patience, empathy, and insight of my mentors and friends Michele Mastroeni, Kevin Morris, Jordan Ostapchuk, and Catherine Cunningham. Each worked tirelessly to pull my best work out of me, and I am proud of what we have accomplished together. I am eternally grateful to them.

I began this paper with a clear idea—I wanted to help organizations innovate better. I chose enterprises because I believe they are the primary driver of innovations in the world. Now, several months later, I can safely say how amazed and proud I am of the work contained in this document and of the community of innovators, researchers, communicators, and friends I am proud to be connected with.

I sometimes reflect on the Strategic Foresight and Innovation (SFI) journey. I have been challenged to work closely with new friends who I believe I once would have struggled with. I am a better person for this journey, more compassionate, more willing to embrace being wrong, and more comfortable with my place in the world. I am more comfortable with my flaws, which has freed me to embrace my strengths more confidently. This paper, and SFI more generally, have surprised me in two major ways, which also form my primary learnings from this process.

## 9.1 Change is a Team Sport

Innovation is extremely difficult. I have found that more than anything, unless I love what I am doing, and perhaps more importantly, love the people I am doing it with, nothing gets done. Without motivated, dedicated innovators who push and engage each other in the process of innovation, nothing will change. I have to thank all my colleagues, friends, family, classmates, mentors, and peers for sharing this lesson with me as they collectively encouraged me to never settle for less than my best.

## 9.2 Nothing Exists in a Vacuum

No project or action, including innovation, exists in a vacuum. Instead, they are embedded and deeply influenced by the surrounding people, structures, and processes they sit within. Thus, effective innovation is as much about building the systems of innovation as it is about getting the sticky notes and sharpies out. For my life, this may mean meditation, but for innovation, this can mean mapping idea flows, studying incentives, understanding the impact of leaders, or even speaking with competitors—activities many likely would not describe as "innovation."

I have been humbled by this process, but also inspired. I see a world where my work helps others to serve their communities, but I also see a long road ahead to get there. All I can say is how excited I am to continue this journey. Onward.

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# 11.0 Appendix

## Appendix A: The Future of the Pension Experience Supporting Material

| Top Drivers | The Pension Platform | Guaranteed Retirement | Your Future-as-a-Service | Retirement Packages |
|---|---|---|---|---|
| **Summary** | OMERS freely offers services to pension funds around the world and collects data to develop leading-edge products. | The government guarantees all Ontarians the basics of retirement including a place to live, enough to eat and universal healthcare. | Members subscribe and manage service streams, such as housing, at-home care and financial management. | Customers can invest in a planned retirement throughout their career. Upon retirement, they have a guaranteed retirement experience. |
| **Member Experience** | Other pension funds source OMERS technology and services to serve their members. | Ontarians sign up for services through a loosely integrated network of providers. | Members manage their retirements through the OMERS digital platform and marketplace. | Customers research and select their desired package, then fund it over their careers. |
| **Funding Model** | OMERS enters data-sharing agreements with customers and uses global retiree and employment datasets to inform their investment portfolio. | Guaranteed retirement is funded through Ontario-wide paycheck deductions. | Ontarians contribute to their OMERS fund over their careers and draw on these funds to pay for chosen service streams. | Customers choose to purchase their package via paycheck deductions, scheduled payments or a lump sum. |
| **Member Base** | Any pension fund or institution worldwide. | All Ontarians are guaranteed access. Many opt for private alternatives. | All Ontarians are required to contribute to a pension provider. Some choose the OMERS platform. | Packages vary in price. Anyone may purchase. |
| **Competitors** | Rival pension fund service providers. | Private sector alternatives without the waitlists or mandated scope. | Similar products and service retailers. | Alternative retirement service providers. |

| Top Drivers | The Pension Platform | Guaranteed Retirement | Your Future-as-a-Service | Retirement Packages |
|---|---|---|---|---|
| **Operations** | Primarily new product development, portfolio management and data science. | Manages the provision of local services, facilities and infrastructure for retirees. | Supply chain management, digital infrastructure, member research and marketing. | Long-term forecasting, strategic purchasing, experience management and marketing. |

*Table 6: The Future of the Pension Experience Worldbuilding*

## Scenario #1: The Pension Platform

OMERS offers free pension services to global pension funds and uses the collected data to inform targeted investments in retirement services.

In 2025, OMERS launches their *Pension Management Platform*, which helps other funds understand their members and manage their overall experience. This new service is a hit and OMERS transforms into a pension fund service provider. Pension funds around the world become dependent on OMERS various services.

In 2029, OMERS makes their customers a compelling offer, "Would you like to keep using our systems, but for free?" OMERS offers a data sharing agreement that gives OMERS a window into retirement around the world. At first, this offer is met with skepticism, but OMERS treats member data with respect and ultimately the offer is too good for other funds to refuse. Around this time, OMERS investment portfolio shifts heavily towards retirement-focused companies and returns go up significantly.

In 2033, it's revealed that OMERS has been using the troves of data they've collected to make strategic investments. This revelation is initially met with shock, "How could OMERS betray our trust?" However, as things settle, it's realized that OMERS offering free services while also investing in the companies these funds rely on to serve their members make pension funds around the world more financially viable. This win-win model reshapes expectations for what's possible within the pension model, and by 2040, OMERS has become one of the largest and most sustainable financial institutions in the world.

**The Member Journey**

I've worked at a UK pension fund for over a decade now, and this OMERS *Pension Management Platform* has changed everything. I can see every detail of each members' interaction with my fund and personalize the experience to their needs. OMERS manages and supports our easy-to-use member and employer facing platforms, which we can customize to our brand. It's just so easy! Initially, OMERS charged us for this service, but now they're offering it for free. It never made sense to me that every pension fund has to build similar software and processes themselves. Why not have those who do it best, do it for the rest?

*–Pension Manager, 2035*

## Scenario #2: Guaranteed Retirement

OMERS becomes a world-leading facilities and service manager on behalf of Ontario's Guaranteed Retirement Program.

In response to the health and financial challenges facing seniors and based on the success of global Universal Basic Income (UBI) pilots, the Government of Ontario pilots the 2026 *Guaranteed Retirement Program*. This pilot program promises each Ontarian aged 65 and older a place to live, health and pharma care, and a stipend for living expenses. Initially limited to Hamilton, the pilot led to fewer financial shortfalls, better health outcomes and fewer unhoused seniors.

In 2029, the program rolls out to all of Ontario. Based on existing pensions funds' relative strengths, each was legislated to fulfill some aspect of the *Guaranteed Retirement* promise. OMERS role shifts to managing the provision of services, facilities and infrastructure for retirees, while other funds take on financial management, member services and governance. Initially, the merger leads to inefficiencies, repeated work and service gaps but by 2034 the dust settles, and every Ontarian consistently receives the essentials of a secure retirement.

With the necessities covered, the rate of working seniors and senior entrepreneurship goes up, while senior financial and health struggles become antiquated realities of the past. OMERS thrives in its new role, and by drawing on Oxford Properties' decades of experience, becomes a world-leading facilities and service manager.

By 2040, Ontario's model for pension management has been copied and instituted around the world, and Ontario is known as the place to retire on account of the vibrant and lively senior lifestyles created, and the affordable nature of the program.

**The Member Journey**

I moved to Ontario from Washington to retire and I love it here! I may not get all the same perks as the Ontarians, but the lifestyle is incredible. I moved into this dynamic retiree community where everyone's healthy and active. There are dances and socials every night. I've never had this much fun in my life! I've told all my friends abroad about what a treasure it is living here and they want to come too. Back home, many of my friends who didn't have pensions still struggle to make ends meet and I worry for them. I think governments have a responsibility to support their people and I respect the commitment Ontario has made to do that.

*–American Retiree, 2039*

## Scenario #3: Your Future-As-A-Service

OMERS develops a sophisticated supply management system and digital retirement service platform to grow into a secure, global powerhouse.

In 2021, OMERS launches a financial planning service *Omentum*, which integrates financial management, lifestyle planning and guidance into one straightforward dashboard. Members love it and OMERS moves to offer more services more widely.

In 2026, the Government of Ontario shifts to compulsory contributions for all Ontario employers on behalf of their employees. Pension funds are opened to the market, and employees are given the choice of which fund to contribute to. Turmoil ensues, and many funds lose their membership and collapse. However, OMERS had anticipated this change and chose to invest in value-added services to become more than a pension fund.

By 2030, OMERS has grown to nine million Ontarian members who direct their funds to OMERS investment management. These funds grow over their careers and upon retirement retirees are able to draw from these funds to subscribe to the services of their choice. The mix of a choice-filled marketplace, unbeatable prices and security allows OMERS to expand year after year. By 2034, OMERS has developed a sophisticated supply management system, allowing them to expand and offer the OMERS experience to anyone around the world. By 2040, many have chosen to take OMERS up on this offer, and OMERS grows into one of the world's largest publicly-owned corporations. Retirees around the world are able to access a wide variety of housing, care and support services, and OMERS's stable member base turns OMERS into a secure, global powerhouse.

**The Member Journey**

I've been a firefighter in Orangeville my whole career. I've seen the town grow and change—it's been a blessing. I've also been an OMERS member since the old days, and it's changed a great deal too. I used to contribute a little bit off each cheque and I knew I had a good retirement waiting for me. Then the government opened the market, and suddenly every pension fund wanted me. I trusted OMERS though and stuck with them. They offered more than the other funds and I felt like I had a personal relationship with everyone there. Now that I'm retired, the OMERS platform makes it easy to manage everything and make sure my funds last until I retire.

*–Retired Firefighter, 2036*

## Scenario #4: Retirement Packages

OMERS sells extravagant guaranteed experiences that become one of three largest purchases a person can make, alongside their home and car.

In 2023, the Government of Ontario nervously anticipates the coming 2030 senior population bulge. They choose to deregulate pensions, as it's believed the open market can better see to retirees' needs. Existing pensioners are given the choice to convert their pension into an annuity or a lump sum.

By 2026, most pension funds have collapsed or been transformed. OMERS had for years been offering value-added services beyond the pension experience and chose to fully commit to that revenue model in order to avoid the fate of other funds. As a private company, OMERS initially offers retirement services including running care centers, managing real estate and arranging travel packages. However, by 2031, OMERS has pivoted to a new business model that they call *Retirement Packages*. Customers are offered guaranteed experiences that, in the most expensive models, include fabulous housing, exclusive travel destinations and unparalleled comfort—all guaranteed regardless of price fluctuations. OMERS offers to let customers pay these packages down over their careers and by 2036 retirement packages have replaced homes as the largest purchases in many consumers' lives.

OMERS uses the span of customers' careers to gradually purchase the components of their packages, resulting in OMERS acquiring vast swathes of land and service providers in times of economic downturn, and acting as an unintentional self-regulating mechanism for economies. By 2040, retirement packages have become a fixture in day-to-day life. A network of competitors has evolved, but OMERS remains the obvious and most profitable global choice.

**The Member Journey**

My Globe-Trotter Retirement Package was probably the best purchase I've ever made. I'm seeing new countries, meeting new people and I never have to worry about a thing. OMERS arranges my meals, books my hotels and flights, and takes care of me if anything unexpected pops up. This is the retirement I dreamed of and I can't imagine doing this without OMERS. My friends tell me, "Toni, that sounds to good to be true. It must get boring!" But they're wrong. All I want is to take it easy, and OMERS makes that possible. My partner and I paid it down together over my career in finance and affording it was never an issue.

*-Retired Finance Professional, 2038*

## Appendix B: The 250 Innovation Approaches

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Agile** | A management system designed to make organizations nimble and responsive to complex operating environments. | The Agile Manifesto | 2001 | Architecture | Beck, K., Beedle, M., Van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., ... & Kern, J. (2001). *Manifesto for agile software development.* |
| **Business Model Canvas** | A strategic management and lean startup template for developing or documenting existing business models. | Alexander Osterwalder, Yves Pigneur | 2010 | Infrastructure | Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers.* John Wiley & Sons. |
| **Value Proposition Canvas** | A strategic management and lean startup template for developing or documenting user problems and potential solutions. | Alexander Osterwalder, Yves Pigneur, Gregory Bernarda, Alan Smith | 2014 | Infrastructure | Osterwalder, A., Pigneur, Y., Bernarda, G., & Smith, A. (2014). *Value proposition design: How to create products and services customers want.* John Wiley & Sons. |
| **Design Thinking** | A step-by-step business process which replicates the creative outcomes of the design process. | Peter Rowe | 1987 | Architecture | Rowe, P. G. (1987). *Design Thinking.* MIT press. |
| **3 Gears of Business Design** | Applying a human-centered approach to innovation in the business environment. | Roger Martin | 2009 | Architecture | Martin, R. (2009). *The design of business: Why design thinking is the next competitive advantage.* Harvard Business Press. |
| **Five Forces** | Assess the threats to the profitability of your strategy by identifying who holds the balance of power in your market or situation. | Michael Porter | 1980 | Ecosystem | Porter, M. E. (1980). *Competitive strategy: Techniques for analyzing industries and competitors.* Simon and Schuster. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Horizon Scanning** | Bird's-eye view of the whole environment from many different angles. Acronyms include PESTLE and STEEPV. | Francis Aguilar | 1967 | Ecosystem | Aguilar, F. J. (1967). *Scanning the business environment*. Macmillan. |
| **Core Competencies** | Key abilities or strengths that a company has developed that give it a competitive advantage over its peers and contribute to its long-term success. | Coimbatore Krishnarao Prahalad, Gary Hamel | 1990 | Strategy | Hamel, G. (1990). The core competence of the corporation. *Harvard Business Review, 68*(3), 79-91. |
| **Value Chain** | How an organization differentiates their products by analyzing the chain of events which occur within and around their company. | Michael Porter | 1985 | Ecosystem | Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance.* New York: Free Press. |
| **Strategy Cascade** | A set of interrelated and powerful choices that positions an organization to win. | Roger Martin, Alan Lafley | 2013 | Strategy | Lafley, A. G., & Martin, R. L. (2013). Playing to win: How strategy really works. Harvard Business Press. |
| **10 Types of Innovation** | Ten distinct types of innovation that need to be orchestrated with care to make game-changing innovations. | Larry Keeley, Helen Walters, Ryan Pikkel, Brian Quinn | 2013 | Infrastructure | Keeley, L., Walters, H., Pikkel, R., & Quinn, B. (2013). *Ten types of innovation: The discipline of building breakthroughs.* John Wiley & Sons. |
| **5 P's of Strategy** | Plan, Pattern, Position, Perspective and Ploy. These five components allow an organisation to implement strategy. | Henry Mintzberg | 1987 | Strategy | Mintzberg, H. (1987). *Crafting strategy*. Boston: Harvard Business Review. |
| **Scenario Planning** | Help predict uncertainties within an industry or organization and make plans accordingly. | Herman Kahn | 1950s | Strategy | Fahey, L., & Randall, R. (1998). *Learning from the future: Competitive foresight scenarios.* New York: John Wiley. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Wind Tunnelling** | A model for building and testing things such as strategies, where conditions can be varied readily, and the results measured. | Kees van der Heijden | 1996 | Strategy | Van der Heijden, K. (1996). *Scenarios: the art of strategic conversation.* John Wiley & Sons. |
| **8 Steps of Change** | Step by step model which provides a clear description and guidance on the entire process of change. | John Kotter | 1996 | Architecture | Kotter, J. P. (1996). *Leading change.* Harvard business press. |
| **Growth Share Matrix** | Matrix to build a portfolio of products with different growth rates and different market shares. | Bruce Henderson | 1970 | Architecture | Henderson, B. (1970). *The Product Portfolio.* BCG Perspectives. |
| **Futures Scanning** | Looking at weak signals, trends, and drivers of change to understand possible shapes the future could take. | Peter Schwartz | 1991 | Ecosystem | Schwartz, P. (1991). *The art of the long view: planning for the future in an uncertain world.* Crown Business. |
| **Causal Layered Analysis** | "Causal layered analysis consists of four levels: the litany, social causes, discourse/worldview and myth/metaphor." A model for structuring in-depth analysis. | Sohail Inayatullah | 1998 | Strategy | Inayatullah, Sohail (1998). Causal layered analysis: Poststructuralism as method. *Futures, 30*(8). |
| **Manoa Method** | "A process that triangulates on initial difference to maximize resulting difference." Used in foresight. | Wendy Schultz | 1991 | Strategy | Schultz, W. (1991). Manoa: The future is not binary. *APF Compass,* 22-26. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **3 Horizons** | "3H maps overlapping waves of change visible in the present as mindsets: managerial, visionary, and entrepreneurial." A way of assigning time horizons to projects, such as innovations. | Mehrdad Baghai, Stephen Coley, David White | 1999 | Strategy | Baghai, M., Coley, S., & White, D. (1999). *The alchemy of growth.* Basic Books. |
| **Four Futures** | "All our narratives (stories, scenarios) on social change issues can be classified into four recurring groups." | Jim Dator | 1979 | Strategy | Dator, Jim. (1979). The Futures of Culture/Cultures of the Futures. *Perspectives in Cross-Cultural Psychology,* 369–88. |
| **VERGE** | "Verge is a way to frame and explore changes in the world." A framework for structuring foresight analysis. | Richard Lum, Michele Bowman | 2004 | Ecosystem | Lum, R. (2014, September 15). *Verge: a General Practice Framework for Futures Work*. Retrieved September 15, 2019, from https://visionforesightstrategy.wordpress.com/2014/09/15/verge-a-general-practice-framework-for-futures-work/ |
| **Foresight Diamond** | A methodological framework exploring various foresight methods to help map them to a project's requirements. | Rafael Poppers | 2008 | Infrastructure | Popper, R. (2008) *The Handbook of Technology Foresight.* Edward Elgar: Cheltenham. |
| **Design Fiction** | "Design fiction is the construction of a narrative artifact to immerse an audience in an experience." | Julian Bleeker | 2009 | Architecture | Bleecker, J. (2009). Design Fiction: A short essay on design, science, fact and fiction. *Near Future Laboratory,* 29. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **SWOT Analysis** | A planning tool used to understand the Strengths, Weaknesses, Opportunities, and Threats of a business. | Albert Humphrey | 1966 | Strategy | Humphrey, A. (2005). *SWOT analysis for management consulting.* SRI Alumni Newsletter (SRI International), 1. |
| **Ambition Matrix** | A tool to help companies manage their innovation portfolio. | Bansi Nagji, Geoff Tuff | 2012 | Architecture | Nagji, B., & Tuff, G. (2012). *A Simple Tool You Need to Manage Innovation.* Harvard Business Review. |
| **Personas** | "Personas are fictional characters, which you create based upon your research to represent the user types that use your offering." | Alan Cooper | 1983 | Infrastructure | Cooper, A. (1983). *The inmates are running the asylum: [Why high-tech products drive us crazy and how to restore the sanity]*. Indianapolis, IN: Sams. |
| **Ethno-graphic Research Methods** | Includes interviews, observation and other forms of primary human-centered research. | Bronislaw Malinowski | 1767 | Infrastructure | Vermeulen, Han F. (2008), Early History of Ethnography and Ethnology in the German Enlightenment. *Leiden,* 199. |
| **Stakeholder Mapping** | Identify all primary and secondary stakeholders who have an interest in an issue. | Eric Reiman | 1968 | Ecosystem | Rhieman, E. (1968). *Industrial Democracy and Industrial Man.* London: Tavistock Institute. |
| **Ishikawa Diagram** | A diagram that shows the possible causes of an event or problem. | Kaoru Ishikawa | 1968 | Strategy | Ishikawa, Kaoru (1968). *Guide to Quality Control.* Tokyo: JUSE. |
| **22 Rules of Storytelling** | The rules to telling a captivating story as told by a Pixar employee. | Emma Coats | 2012 | Infrastructure | Coats, E. (2011, May 11). *Pixar's 22 Rules of Storytelling.* Retrieved September 15, 2019, from http://www.pixartouchbook.com/blog/2011/5/15/pixar-story-rules-one-version.html |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **10 Magic Slides** | "A pitch should have ten slides, last no more than twenty minutes, and contain no font smaller than thirty points." | Guy Kawasaki | 2004 | Infrastructure | Kawasaki, G. (2004). *The art of the start: The time-tested, battle-hardened guide for anyone starting anything.* Penguin. |
| **Technology Adoption Lifecycle** | Making the transition from an early market dominated by Innovators to the Early Majority. Relates to strategies for navigating the diffusion of innovation. | Geoffrey Moore | 1991 | Architecture | Moore, G. A., (1991). *Crossing the Chasm.* HarperCollins |
| **Discovery-Driven Planning** | "In discovery-driven planning, funds are released based on the accomplishment of key milestones or checkpoints." | Rita Gunther McGrath, Ian MacMillan | 1995 | Architecture | McGrath, R. G., & MacMillan, I. C. (1995). *Discovery driven planning.* Philadelphia: Wharton School, Snider Entrepreneurial Center. |
| **The Policy Cycle** | The general order in which policy development occurs. | Harold Lasswell | 1956 | Architecture | Lasswell, H. D. (1956). *The decision process: Seven categories of functional analysis.* Bureau of Governmental Research, College of Business and Public Administration, University of Maryland. |
| **Disciplined Entrepre-neurship** | A framework used to translate an idea into innovative new offerings. | Bill Aulet | 2013 | Infrastructure | Aulet, B. (2013). *Disciplined entrepreneurship: 24 steps to a successful startup.* John Wiley & Sons. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Lean Canvas** | 1-page business plan template that helps deconstruct an idea into its key assumptions. | Ash Maurya | 2010 | Infrastructure | Maurya, A. (2010, September 11). *How to Document Your Business Model on 1 Page.* Retrieved September 15, 2019, from https://blog.leanstack.com/how-to-document-your-business-model-on-1-page-a6c91ab73efd |
| **Traction Roadmap** | Ballpark financial potential of an idea through minimum success criteria, pricing model, and customer lifetime assumption. | Ash Maurya | 2016 | Infrastructure | Maurya, A. (2016). *Scaling lean: Mastering the Key Metrics for Startup Growth.* Penguin. |
| **SECI Model of Knowledge Dimensions** | The creation of knowledge is the result of a continuous cycle of four integrated processes: externalization, internalization, combination, and socialization. | Ikujiro Nonaka, Hirotaka Takeuchi | 1995 | People | Nonaka, I., & Takeuchi, H. (1995). *The Knowledge Creating Company*. New York, 304. |
| **Absorptive Capacity** | Ability of a firm to recognize the value of information, assimilate it, and apply it to commercial ends. | Wesley Cohen, Daniel Levinthal | 1990 | Architecture | Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative science quarterly, 35*(1), 128-152. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Innovation Formula** | "Innovation = f (passion * velocity * creativity * variables) ^ risk." | David Macy | 2015 | Infrastructure | Macy, D. (2015, March 19). *Innovating Innovation: A Formula for Success.* Retrieved September 15, 2019, from https://blogs.adobe.com/creativecloud/innovating-innovation-a-formula-for-success/ |
| **Six Thinking Hats** | "A simple, effective parallel thinking process that helps people be more productive, focused, and mindfully involved." | Edward de Bono | 1985 | People | De Bono, E. (1985). *Six thinking hats.* Penguin UK. |
| **Five-Factor Model** | Five broad dimensions used to describe the human personality and psyche. | Robert McCrae, Paul Costa | 1989 | People | McCrae, R. R., & Costa, P. T., Jr. (1989). The structure of interpersonal traits: Wiggins's circumplex and the five-factor model. *Journal of Personality and Social Psychology,* 56, 586-595. |
| **Effective Intelligence** | "A system for learning how to choose the best thing to do (intelligence) and to make sure it gets done (effectiveness)." | Jerry Rhodes | 1977 | People | Rhodes, J., & Thame, S. (1988). The colours of your mind. HarperCollins. |
| **Myers-Briggs Type Indicator** | Sixteen personality types determined through the interactions of four preferences. | Carl Jung | 1921 | People | Jung, C. G. (1921). *Psychological Types, Vol. 6, The collected works of C. G. Jung.* |
| **Enneagram of Person-ality** | A model of the human psyche in nine interconnected personality types. | Óscar Ichazo | 1972 | People | Ichazo, O. (1976). *The human process for enlightenment and freedom.* Arica Institute. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Four Steps to the Epiphany** | A checklist on what to do when starting a new venture. | Steve Blank | 2005 | Infrastructure | Blank, S. (2005). *The four steps to the epiphany.* K & S Ranch. |
| **From Good to Great** | A collection of concepts exploring how companies become great. | Jim Collins | 2001 | Infrastructure | Collins, J. (2001). *Good to Great: Why Some Companies Make the Leap and Others Don't.* HarperCollins. |
| **Built to Last** | Six principles for building organizations that last. | Jim Collins, Jerry Porras | 1994 | Infrastructure | Collins, J., & Porras, J. I. (1994). *Built to last: Successful habits of visionary companies.* Random House. |
| **Lean Startup** | A framework of build, measure, learn used for establishing the effectiveness of new ideas quickly and cost-effectively. | Eric Ries | 2011 | Architecture | Ries, E. (2011). *The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses*. Crown Books. |
| **Teal Organ-ization** | "Characterized by three breakthroughs in human collaboration; self-management, wholeness and evolutionary purpose." An organizational model based on spiral dynamics. | Frédéric Laloux | 2014 | Architecture | Laloux, F. (2014). *Reinventing organizations: A guide to creating organizations inspired by the next stage in human consciousness.* Nelson Parker. |
| **Five Disciplines** | The principles of learning organizations are building shared visions, systems thinking, mental models, team learning and personal mastery. | Peter Senge | 1990 | Architecture | Peter, S. (1990). *The fifth discipline. The Art & Practice of Learning Organization.* New York: Doupleday Currence. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Innovator's Canvas** | A series of steps to take in order to validate a business model hypothesis. | Jake Nielson | 2015 | Infrastructure | Nielson, J. (2018, August 10). *Innovator's Canvas 3: How to Quickly and Effectively Document and Validate Your Innovation Idea - Ignition Framework*. Retrieved November 30, 2019, from https://www.ignitionframework.com/innovators-canvas-3-quickly-effectively-document-validate-innovation-idea/ |
| **Historiog-raphy** | Historians studying the methods of history as an academic discipline. The origin of the critical analysis of methods. | Herodotus | 400 BC | Strategy | Herodotus, M. J. (1998). *The histories (Vol. 1, p. 132)*. Oxford: Oxford University Press. |
| **Empathy Map** | Helps teams develop a shared understanding and empathy for others. | Dave Gray | 2010 | Infrastructure | Gray, D., Brown, S., & Macanufo, J. (2010). *Gamestorming: A playbook for innovators, rulebreakers, and changemakers*. O'Reilly Media, Inc. |
| **Forecasting** | Making predictions of the future based on past and present data and most commonly by analysis of trends. Otherwise known as predictive modelling. | Alan Turing | 1940 | Strategy | Turing, A. M. (1940). *Mathematical theory of enigma machine*. Public Record Office, London, 3, 150. |
| **Sprint** | Five-day process for solving problems and testing new ideas. | Jake Knapp | 2016 | Infrastructure | Knapp, J., Zeratsky, J., & Kowitz, B. (2016). *Sprint: How to solve big problems and test new ideas in just five days.* Simon and Schuster. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Mental Model Diagrams** | A process to collect and curate person-focused research. | Indi Young | 2008 | Infrastructure | Young, I. (2008). *Mental models: aligning design strategy with human behavior. Rosenfeld Media.* |
| **Root Cause Analysis** | Ask "Why?" five times to uncover the root cause of a problem. | Taiichi Ohno | 1950 | Strategy | Ohno, T. (1988). *Toyota production system: beyond large-scale production.* CRC Press. |
| **Gigamaps** | Mapping across multiple layers and scales with the goal of investigating relations between seemingly separate categories. | Birger Sevaldson | 2006 | Ecosystem | Sevaldson, B. (2006). *Design Computing in the Post Digital Age.* Syracuse University School of Architecture. |
| **Synthesis Maps** | Distinctive visualization method for understanding complex social systems and proposing design options. | Peter Jones, Jeremy Bowes | 2017 | Ecosystem | Jones, P., & Bowes, J. (2017). Rendering systems visible for design: Synthesis maps as constructivist design narratives. *She Ji: The Journal of Design, Economics, and Innovation, 3*(3), 229-248. |
| **Process Mapping** | Map of the individual steps of a process and its participants. Otherwise known as flow analysis. | Frank Gilbreth | 1921 | Architecture | Gilbreth, F. B., & Gilbreth, L. M. (1921). *Process charts.* The American Society of Mechanical Engineers. |
| **User Journey Mapping** | Tell the story of a customer's experience from original engagement into a long-term relationship. | Lewis Carbone, Stephan Haeckel | 1994 | Infrastructure | Carbone, L. & Haeckel, S. (1994). Engineering Customer Experiences. *Marketing Management,* 3. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Rich Picture** | "A drawing of a situation that illustrates the main elements to be considered in trying to intervene in order to create some improvement." | Peter Checkland | 1972 | Strategy | Checkland, P. (1972). Towards a Systems Based Methodology for Real-World Problem Solving. *Journal of Systems Engineering, 3*(2): 87-116. |
| **Social Network Analysis** | Determine the nature of social interactions within groups. | Georg Simmel | 1908 | Strategy | Simmel, Georg (1908). *Soziologie*. Leipzig: Duncker & Humblot. |
| **Affinity Diagrams** | Gathers large amounts of ideas, opinions, and issues and organizes them into groupings based on their natural relationships. | Kawakita Jiro | 1960 s | Infrastructure | Kawakita, J. (1975). *The KJ method–a scientific approach to problem solving*. Kawakita Research Institute, 2. |
| **Brain-storming** | A method for generating ideas to solve a design problem. | Alex Osborn | 1953 | Infrastructure | Osborn, A. (1953). *Applied Imagination-Principles and Procedures of Creative Writing*. New York: Charles Scribner's Sons. |
| **Behavioural Design** | Designing for how participants use a space or object by tracking activity and movement and designing in accordance. | Herbert Simon | 1969 | People | Simon, H.A. (1969). *The science of the artificial,* Cambridge: MIT Press. |
| **Bodystorm-ing** | Derive new and unexpected ideas by physically experiencing a situation. | Colin Burns | 1994 | People | Burns, C., Dishman, E., Verplank, W. & Lassiter, B. (1994). Actors, hairdos & videotape - informance design. *CHI Conference Companion*, 119-120 |
| **Cognitive Map** | An individual's knowledge about the spatial and environmental relations of geographic space. | Edward Tolman | 1930 | People | Tolman, E. C., & Honzik, C. H. (1930). "Insight" in rats. *University of California Publications in Psychology*, 4, 215-232. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Innovation Ecosystem** | Innovation outcomes based on multiple and interconnected actors such as governments, the private sector, universities and entrepreneurs. | Ron Adner | 2006 | Ecosystem | Adner, R. (2006). Match your innovation strategy to your innovation ecosystem. *Harvard business review, 84*(4), 98. |
| **Innovation Spaces** | The experience or design of space, which creates communities, facilitates collaboration and makes chance encounters happen. | Erving Gauffman | 1959 | People | Goffman, E. (1959). *The Presentation of Self in Everyday Life*. New York: Doubleday. |
| **Global Innovation Index** | Ranking the world's countries and economies through innovational measures, environments, and outputs. A measure of innovation economics. | Soumitra Dutta | 2007 | Ecosystem | Dutta, S., & Caulkin, S. (2007). The world's top innovators. *World Business,* 17. |
| **Emergent Design** | "To innovate, we must skew the day in ways that will spur innovation to allow the new design to emerge." | David Cavallo | 2000 | Ecosystem | Cavallo, D. (2000). Emergent design and learning environments: Building on indigenous knowledge. *IBM Systems Journal, 39*(3.4), 768-781. |
| **Dialogic Design** | "A dialogic approach, in which the various stakeholders interact as they bring their own ideas and define and accept their own responsibilities." | Peter Jones, Alexander Christakis, Thomas Flanagan | 2007 | People | Jones, P. H., Christakis, A. N., & Flanagan, T. R. (2007, June). Dialogic design for the intelligent enterprise: Collaborative strategy, process, and action. *In INCOSE International Symposium, 17*(1), 717-732. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Service Blueprint-ing** | Operational planning tool on how a service will be provided. | Lynn Shostack | 1984 | Infrastructure | Lynn Shostack, G. (1984). Designing Services That Deliver. *Harvard Business Review, 62*(1), 133-139. |
| **Opportunity Mapping** | "Illuminate the ways in which structures and institutions promote or restrict access to opportunity based on their 'situatedness.' Origins in identifying land values by layering different data sets." | Ian McHarg | 1960 s | People | McHarg, I. L., & Mumford, L. (1969). *Design with nature*. New York: American Museum of Natural History. |
| **Balanced Break-throughs** | Desirable, viable, feasible and the innovation sweet spot. A way of identifying the core factors that influence the success of an innovation initiative. Used to address business risk, viability=execution risk, desirability=market risk, feasibility=technology risk. | Larry Keeley | 2013 | Architecture | Keeley, L., Walters, H., Pikkel, R., & Quinn, B. (2013). *Ten types of innovation: The discipline of building breakthroughs.* John Wiley & Sons. |
| **Four Questions** | The four questions that guide a design thinking process: What is? What if? What wows? What works? | Jeanne Liedtka, Tim Ogilvie | 2011 | Architecture | Liedtka, J., & Ogilvie, T. (2011). *Designing for growth: A design thinking tool kit for managers.* Columbia University Press. |
| **Game-storming** | Game based co-creation tools used for designing new offerings. | Dave Gray | 2010 | People | Gray, D., Brown, S., & Macanufo, J. (2010). *Gamestorming: A playbook for innovators, rulebreakers, and changemakers*. O'Reilly Media, Inc. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Seven Modes** | There are seven distinct modes of the design innovation process: Sense Intent, Know Context, Know People, Frame Insights, Explore Concepts, Frame Solutions, and Realize Offerings. | Vijay Kumar | 2012 | Architecture | Kumar, V. (2012). *101 design methods: A structured approach for driving innovation in your organization.* John Wiley & Sons. |
| **Open Govern-ment** | Open government involves transparent policy-making and stakeholder involvement to help civil servants create and deliver policy that meets the demands of a fast-paced and increasingly digital world. | Wallace Parks | 1957 | Ecosystem | Parks, W. (1957). *Open Government Principle: Applying the right to know under the Constitution.* Geo. Wash. L. Rev., 26, 1. |
| **Policy Design** | Frameworks for applying design thinking to help policy-makers explore different ideas before deciding which options to follow. | Lester Salamon | 1981 | Architecture | Salamon, L. (1981) Rethinking Public Management: Third Party Governmentand the Changing Forms of Government Action. *Public Policy, 29*(3), 255-275. |
| **Issue Mapping** | "This tool helps you to set out the different levels of issues associated with your complex challenge and identify the drivers behind them." Also known as controversy or discourse analysis. | Bruno Latour | 1970 s | Strategy | Marres N. (2015). Why Map Issues? On Controversy Analysis as a Digital Method. *Science, technology & human values, 40*(5), 655–686. |
| **Reverse En-gineering** | "Take apart an existing solution, understand its elements and how they can potentially be applied to your challenge." | Michael Rekoff | 1985 | Infrastructure | Rekoff Jr., M. G. (1985). On Reverse Engineering. IEEE Trans. *Systems, Man, and Cybernetics,* 244-252 |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **The Culture Map** | A model for decoding how cultural differences impact cross-cultural relations. | Erin Meyer | 2014 | People | Meyer, E. (2014). *The culture map: Breaking through the invisible boundaries of global business*. Public Affairs. |
| **Impact Gap Canvas** | Understand the landscape of a problem to identify paths to a solution. | Daniela Papi-Thornton | 2016 | Infrastructure | Papi-Thornton, D. (2016, February 23). *Tackling Heropreneurship (SSIR)*. Retrieved November 30, 2019, from https://ssir.org/articles/entry/tackling_heropreneurship |
| **Theory of Change** | How a desired change is expected to happen in a particular context. | Carol Weiss | 1995 | Strategy | Connell, J. P. (1995). *New Approaches to Evaluating Community Initiatives. Concepts, Methods, and Contexts*. Roundtable on Comperhensive Community Initiatives for Children and Families. Aspen Institute, Publications Office. |
| **Cynefin Framework** | A framework for establishing the type of problem being faced. | David Snowden | 1999 | Infrastructure | Snowden, D. J., & Boone, M. E. (2007). A leader's framework for decision making. *Harvard business review, 85*(11), 68. |
| **Fermi Estimates** | Quick evaluation of a problem to get a sense of the scope faced. Works with the assumption it is better to be approximately right, fast, rather than precisely wrong. | Enrico Fermi | 1945 | Infrastructure | Fermi, E. (1945). *My observations during the explosion at Trinity on July 16, 1945.* Records of the Los Alamos National Laboratory, courtesy of Gregg Herken. |
| **First Principles** | Understanding the first basis from which a thing is known. | Aristotle | 330 BC | Strategy | Irwin, Terence (1988). *Aristotle's First Principles*. Oxford: Oxford University Press. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Problem-Solving Method** | Process for breaking down a problem and building up a solution. | James McKinsey | 1926 | Infrastructure | Rasiel, E. M. (1999). *McKinsey way.* New York: McGraw-Hill. |
| **Linguistic Relativity** | How the structure of a language influences the way its speakers conceptualize the world. Evolved from the Sapir-Whorf hypothesis—indicates the deep coupling of our thoughts and the world. | Edward Sapir, Benjamin Whorf | 1929 | People | Sapir, E. (1929). The status of linguistics as a science. *Language,* 207-214. |
| **Switching Costs** | The costs associated with switching away from something. | George Stigler | 1964 | Ecosystem | Stigler, G. J. (1964). A theory of oligopoly. *Journal of political economy, 72*(1), 44-61. |
| **Logical Fallacies** | Heuristics that map archetypes for flaws in reason such as misattribution or misdirection. | Aristotle | 330 BC | People | Aristotle, E. (1866). *Aristotle on Fallacies, or the Sophistici Elenchi.* London: Macmillian and Co. |
| **Cultural Dimensions** | Six basic factors that define how a society organizes itself. | Geert Hofstede | 1980 | People | Hofstede, G. (1980). *Culture's consequences: International differences in work-related values.* Sage. |
| **Perceptual Positions** | Understanding your mental map of a place or belief to reorient and change that map. | Richard Wayne Bandler, John Grinder | 1975 | People | Grinder, J. (1975). *The structure of magic: a book about language and therapy.* Science and Behavior Books. |
| **Gestalt Therapy** | The exploration of reactionary responses to uncover deeper reoccurring patterns of behaviour. | Frederick Perls | 1951 | People | Perls, F., Hefferline, G., & Goodman, P. (1951). *Gestalt therapy.* New York. |
| **Human-Tech Pyramid** | A pyramid indicating the relative complexity of culture at the physical, psychological, team, organizational and political levels. | Kim Vicente | 2003 | People | Vicente, K. J. (2003). *The human factor: Revolutionizing the way people live with technology.* Routledge. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **5 Dysfunctions of a Team** | The root causes of politics and dysfunction on the teams where you work, and the keys to overcoming them. | Patrick Lencioni | 2002 | People | Lencioni, P. (2006). *The five dysfunctions of a team*. John Wiley & Sons. |
| **Stages of Group Development** | Teams go through 5 stages of development: forming, storming, norming, performing and adjourning. | Bruce Tuckman | 1965 | People | Tuckman, B. W. (1965). Developmental sequence in small groups. *Psychological bulletin, 63*(6), 384. |
| **Behaviour Theory** | Classical and operant conditioning and forms of reinforcement. | Ivan Pavlov | 1902 | People | Pavlov, I. P. (1897/1902). *The work of the digestive glands*. London: Griffin. |
| **Overton Window** | The range (or window) of policies that the public will accept. | Joseph Overton | 1990s | Ecosystem | Szałek, B. Z. (2013). Some Praxiological Reflections On The So Called 'Overton Window Of Political Possibilities', 'Framing'and Related Problems. *Reality of Politics: Estimates-Comments-Forecasts*, (4), 237-257. |
| **8 Stages of Psychosocial Development** | "During each development stage, two conflicting ideas must be resolved successfully in order for a person to become a confident, contributing member of society." | Erik Erikson | 1950 | People | Erikson, E. H. (1950). *Childhood and society*. WW Norton & Company. |
| **Theory of the Evolution of Consciousness** | Growth involves movement through five progressively more complex ways of knowing. | Robert Kegan | 1982 | People | Kegan, R. (1982). *The evolving self*. Harvard University Press. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Choice Architecture** | How seemingly small changes in how choices are presented can have large effects on people's decisions. Nudges. | Cass Sunstein, Richard Thaler | 2008 | People | Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness.* Penguin. |
| **Strategy Pallette** | Five distinct approaches to strategy, helping leaders match their approach to their particular business environment. | Martin Reeves, Knut Haanaes | 2015 | Strategy | Reeves, M., & Haanaes, K. (2015). *Your strategy needs a strategy: How to choose and execute the right approach.* Harvard Business Review Press. |
| **Paradigm Shifts** | How changes in the social sciences happen in huge leaps, based on small aggregate changes. | Thomas Kuhn | 1962 | Ecosystem | Kuhn, T. S. (1962). *The structure of scientific revolutions.* Chicago and London. |
| **Change Theory Model** | A three-step model for how to create changes in people or organizations: unfreeze, change, refreeze. | Kurt Lewin | 1947 | Architecture | Lewin, K. (1947). Frontiers in group dynamics: Concept, method, and reality in social science. *Human Relations, 1*(1), 5-42. |
| **Aggregate Project Planning** | Plan and manage various projects together in an integrated way, rather than managing projects individually. | Steven Wheelwright, Kim Clark | 2003 | Architecture | Wheelwright, S. C., & Clark, K. B. (1992). *Creating project plans to focus product development.* Harvard Business Press. |
| **The Theory of Constraints** | The idea that projects often fail due to bottlenecks or other issues and that identifying and addressing constraints leads to more successful projects. Often known as the Project Triangle with the three corners of budget, scope and time. | Eliyahu Goldratt | 1984 | Architecture | Cox, J., & Goldratt, E. M. (1984). *The goal: a process of ongoing improvement.* Gower. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Task Assignment** | A model developed through the requisite organization model to assign tasks by outlining the tasks context, purpose, quality, quantity, resources, time (CPQQRT). | Elliot Jaques | 1989 | Architecture | Jaques, E. (1989). *Requisite organization: The CEO's guide to creative structure and leadership*. Arlington, VA: Cason Hall. |
| **Open Space Technology** | A participant-driven process for events whose agenda is created by people attending. Based on five rules and the principles of self-organization. | Harrison Owen | 1980s | People | Owen, H. (1995). *Tales from open space*. Potomac, MD: Abbott Publishing. |
| **PACE Layered Application Strategy** | Build some systems for rapid change and others for stability, depending on the business need. | Yvonne Genovese | 2012 | Architecture | Genovese, Y. (2012). *Accelerating innovation by adopting a pace-layered application strategy*. Gartner Inc. |
| **Logical Framework** | "Logframe is a planning tool consisting of a matrix which provides an overview of a project's goal, activities and anticipated results in four rows and four columns." | US Agency of International Development | 1960s | People | Couillard, J., Garon, S., & Riznic, J. (2009). The logical framework approach-millennium. *Project Management Journal, 40*(4), 31-44. |
| **Hype Cycles** | The maturity, adoption and disillusionment of technologies and applications. | Jackie Fenn, Marcus Blosch | 1971 | Architecture | Linden, A., & Fenn, J. (2003). Understanding Gartner's hype cycles. *Strategic Analysis Report Nº R-20-1971*. Gartner, Inc. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **The Zettelkasten Method** | A number and branching logic system for categorizing and connecting information developed before computers, but similar to the technology used in linked wikis. | Niklas Luhmann | 1981 | Infrastructure | Luhmann, N. (1981). *Kommunikation mit Zettelkästen. In Öffentliche Meinung und sozialer Wandel/Public Opinion and Social Change.* VS Verlag für Sozialwissenschaften. |
| **ERAF Systems Model** | A systems dynamics model that maps the entities, relations, attributes and flows of a system. | Vijay Kumar | 2012 | Ecosystem | Kumar, V. (2012). *101 design methods: A structured approach for driving innovation in your organization.* John Wiley & Sons. |
| **System Dynamics** | A computer-aided approach to policy analysis and design in problems arising in complex social, managerial, economic, or ecological systems. | Jay Forrester | 1969 | Ecosystem | Forrester, J. (1969). *Urban Dynamics.* Pegasus Communications. |
| **12 Systems Archetypes** | "A number of reoccurring archetypes pioneered by Donella Meadows, Jay Foster and Peter Senge that show typical systems behaviour in different circumstances." | Leyla Acaroglu | 2017 | Ecosystem | Acaroglu, L. (2019, October 7). *Tools for Systems Thinkers: The 12 Recurring Systems Archetypes.* Retrieved November 30, 2019, from https://medium.com/disruptive-design/tools-for-systems-thinkers-the-12-recurring-systems-archetypes-2e2c8ae8fc99 |
| **The Tragedy of the Commons** | The principal that shared resources are inevitably exploited by individual actors maximizing their personal gain at the cost of the larger system. | Garrett Hardin | 1968 | Ecosystem | Hardin, G. (1968). The tragedy of the commons. *Science, 162*(3859), 1243-1248. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **The Futures Cone** | Cone of possibilities. Seven types of futures: potential, preposterous, possible, plausible, probable, preferable, projected, predicted. | Joseph Voros | 2000 | Ecosystem | Voros, J. (2017). *'Big History and anticipation: Using Big History as a framework for global foresight', in R Poli (ed.) Handbook of anticipation: Theoretical and applied aspects of the use of future in decision making.* Springer International. |
| **Servant Leadership** | "The servant-leader is servant first. It begins with the natural feeling that one wants to serve, to serve first. Then conscious choice brings one to aspire to lead." | Robert Greenleaf | 1970 | People | Greenleaf, R. K. (1970). *The servant as leader.* |
| **Māori Leadership** | Traits of leadership in New Zealand's indigenous communities: humility, altruism, others, guardianship, long term thinking and cultural authenticity. | Jarrod Haar, Maree Roche, David Brougham | 2018 | People | Haar, J., Roche, M., & Brougham, D. (2018). Indigenous insights into ethical leadership: A study of Māori leaders. *Journal of Business Ethics,* 1-20. |
| **Core Culture** | The core of an organization's culture from inside to our are purpose, philosophy, priorities, practices, and projections. | Sheila Margolis | 2008 | People | Margolis, S. L. (2008). *Building a Culture of Distinction: Facilitator Guide for Defining Organizational Culture and Managing Change.* Atlanta: Workplace Culture Institute. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Future Fit Business Benchmark** | 23 social and environmental goals, which together identify the extra-financial break-even point every business must eventually reach to ensure it protects people and the planet. | Bob Willard | 2016 | Strategy | Willard, B. (2019). *Future-Fit Business Benchmark Methodology Guide*. Retrieved from https://futurefitbusiness.org/wp-content/uploads/2019/08/FFBB-Methodology-Guide-R2.1.4.pdf |
| **B Corporation** | A new kind of business that balances purpose and profit. They are legally required to consider workers, customers, suppliers, community, and the environment. | Jay Gilbert, Bart Houlahan, Andrew Kassoy | 2006 | Strategy | Honeyman, R. (2014). *The B Corp Handbook: How to Use Business as a Force for Good*. Masters Thesis. |
| **Assumptions Exercise** | A list of questions to answer the broad assumptions about a new idea or venture to map what needs to be answered in future tests. | Frank Rimalovski, Giff Constable | 2014 | Infrastructure | Constable, G., & Rimalovski, F. (2014). *Talking to humans*. Giff Constable. |
| **People Skills** | The skills necessary to connect and collaborate with those around us: empathy, non-possessive love and genuineness. | Robert Bolton | 1979 | People | Bolton, R. (1979). *People skills*. Simon and Schuster. |
| **Double Diamond** | Draws on the convergence-divergence thinking model and maps four design phases to it: discover, define, develop, deliver. | Bela Banathy | 1996 | Architecture | Banathy, B. H. (1996). *Designing social systems in a changing world*. Springer Science & Business Media. |
| **Experience Curve** | The fall of the production costs of a business unit as it accumulates production experience. | Bruce Henderson | 1968 | Strategy | Henderson, B. (1968). *The Experience Curve*. BCG Perspectives. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Open Innovation** | "Combining internal and external ideas as well as internal and external paths to market to advance the development of new technologies." | Henry Chesbrough | 2003 | Ecosystem | Chesbrough, H. W. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Harvard Business Press. |
| **14 Grand Challenges** | The biggest global challenges for engineers to tackle in the 21st century, grouped into sustainability, health, security and life enrichment. | National Academy of Engineering | 2008 | Ecosystem | National Academy of Engineering. (2017). *NAE Grand Challenges of Engineering*. Retrieved from http://www.engineeringchallenges.org/challenges/11574.aspx |
| **Three Kinds of Fit** | The three kinds of fit an innovation can have as it's gradually developed and socialized: problem-solution, product-market and business model. | Alexander Osterwalder, Yves Pigneur | 2014 | Ecosystem | Osterwalder, A., Pigneur, Y., Bernarda, G., & Smith, A. (2014). *Value proposition design: How to create products and services customers want*. John Wiley & Sons. |
| **Ten Schools of Strategy** | The ten schools of thought around strategy: design, planning, positioning, entrepreneurial, cognitive, learning, power, cultural, environmental and cultural. | Henry Mintzberg | 1998 | Strategy | Mintzberg, H., Ahlstrand, B., & Lampel, J. (1998). *Strategy Safari: a guided tour through the wilds of strategic mangament*. Simon and Schuster. |
| **AEIOU Observation Framework** | For contextual inquiry and coding observational findings. Activities, Environments, Interactions, Objects, Users. | Rick Robinson, Ilya Prokopoff, John Cain, Julie Pokorny | 1991 | Infrastructure | Robinson, R. E. (2015, February 23). *Building a Useful Research Tool: An Origin Story of AEIOU - EPIC*. Retrieved December 1, 2019, from https://www.epicpeople.org/building-a-useful-research-tool/ |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Social Business Model Canvas** | "A tool for creating a solid business model around your social enterprise and for creating a shared language with stakeholders." | Tandemic | 2016 | Infrastructure | Tandemic. (2019, July 23). *Social Business Model Canvas.* Retrieved December 1, 2019, from http://www.socialbusinessmodelcanvas.com/ |
| **Code of Ethics** | Code of ethics guiding the ethical conduct of anthropological research for the AAA. 1) Do No Harm; 2) Be Open and Honest Regarding Your Work; 3) Obtain Informed Consent; 4) Weigh Competing Ethical Obligations; 5) Make Your Results Accessible; 6) Protest Your Records; and 7) Maintain Respectful and Ethical Relationships. | American Anthropological Association | 2012 | People | AAA Web Admin. (2012, October 1). *Principles of Professional Responsibility.* Retrieved December 1, 2019, from http://ethics.americanthro.org/category/statement/ |
| **Concept of Operations** | "CONOPS is a user-oriented document that 'describes systems characteristics for a proposed system from a user's perspective.'" Used to describe a system from a users perspective. | Institute of Electrical and Electronics Engineers | 1998 | Architecture | Software Engineering Standards Committee. (1998). IEEE Guide for Information Technology–System Definition–Concept of Operations (ConOps) Document. *IEEE Std,* 1362-1998. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Open, Explore, Close** | "The idea is, if we open the world, we need to close the world so that we can move on even if it means putting something aside for later on." A technique for creating spaces to have ideas or other forms of creative output. | Dave Gray | 2010 | People | Gray, D., Brown, S., & Macanufo, J. (2010). *Gamestorming: A playbook for innovators, rulebreakers, and changemakers.* O'Reilly Media, Inc. |
| **Graphic Gameplan** | "Create a dynamic action plan to help a group clarify its goals and how it will reach them by defining the key steps, success factors and major challenges all in one place." | David Sibbet, Gisela Wendling | 2018 | People | Sibbet, D., & Wendling, G. (2018). *Visual Consulting: Designing and Leading Change.* John Wiley & Sons. |
| **Forced Analogy** | "Break hard-wired categories and see things from a different angle, opening new possibilities in problem solving and idea generation." | Dave Gray | 2010 | Infrastructure | Gray, D., Brown, S., & Macanufo, J. (2010). *Gamestorming: A playbook for innovators, rulebreakers, and changemakers.* O'Reilly Media, Inc. |
| **Team Role Inventories** | Nine behaviour clusters, each of us can fill multiple roles, and teams need all of them. | Meredith Belbin | 1993 | People | Belbin, R. M. (1993). *Team roles at work.* Routledge. |
| **Four Point Pitch Formula** | Problems, Pains, Trends, Solutions, Demo, Benefits, Market, Business Plan. | Chris Lipp | 2014 | Infrastructure | Lipp, C. (2014). *The Startup Pitch: A Proven Formula to Win Funding.* |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **The History Map** | "Collecting and visualizing the components of history, we necessarily discover, recognize, and appreciate what got us where we are today. We can see the past as a guiding light or a course correction for our future." | David Sibbet | 2011 | Infrastructure | Sibbet, D. (2011). *Visual Teams: Graphic Tools for Commitment, Innovation, and High Performance.* John Wiley & Sons. |
| **Heuristic Ideation Technique** | Use a matrix to generate new ideas or approaches to a solution. | Edward Tauber | 1972 | Infrastructure | Tauber, E. (1972). HIT: Heuristic Ideation Technique. A Systematic Procedure for New Product Search. *Journal of Marketing, 36*(1), 58-61. |
| **The Ras-mussen Framework** | Decisions and actions at all levels of the system interact with one another to shape system performance. | Jens Rasmussen | 1997 | Strategy | Rasmussen, J. (1997). Risk management in a dynamic society: a modelling problem. *Safety science, 27*(2-3), 183-213. |
| **Levels of Knowledge** | The kinds of knowledge we hold and accessing it. Originally defined as tacit and explicit, now includes latent and observable. | Michael Polanyi | 1966 | People | Polanyi, M. (1966). *The Tacit Dimension.* London: Routledge & Kegan Paul. |
| **Simplified Whole Product Model** | The sum of the generic, expected, augmented and potential products. | Geoffrey Moore | 1991 | Architecture | Moore, G. A. (1991). *Crossing the chasm.* HarperCollins. |
| **Stress Scale** | A scale used to measure the stress someone has in their lives, including life's five greatest stressors: the death of a loved one, divorce, marriage, moving (or injury) and job loss. | Thomas Holmes, Richard Rahe | 1967 | People | Holmes, T. H., & Rahe, R. H. (1967). The social readjustment rating scale. *Journal of psychosomatic research.* |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Picturing Excess** | Using everyday material like plastic cups to visualize the impact consumerism has on society. An example of using creative visualisation and artifacts to communicate deep truths. | Chris Jordan | 2003 | Ecosystem | Jordan, C. (2012). *Running the numbers. In Alternative forms of knowing (in) mathematics.* Rotterdam: SensePublishers. |
| **Integrative Thinking** | "Your stance (who am I) guides your tools (how do I organize my understanding) which guides your experiences (how can I build my skills). Integrative thinking involves embracing this personal knowledge system to understand complex, or challenging truths." | Roger Martin | 2007 | People | Martin, R. L. (2009). *The opposable mind: How successful leaders win through integrative thinking.* Harvard Business Press. |
| **Transcend-ent Leader-ship** | A framework for strategic leaders in dynamic contexts including leadership of organization, self and others. | Mary Crossana, Dusya Verab, Len Nanjadc | 2008 | People | Crossan, M., Vera, D., & Nanjad, L. (2008). Transcendent leadership: Strategic leadership in dynamic environments. *The leadership quarterly, 19*(5), 569-581. |
| **Intrinsic Motivation** | Three pillars: autonomy, mastery, purpose. The trifecta of internal motivation. | Daniel Pink | 2009 | People | Pink, D. H. (2011). *Drive: The surprising truth about what motivates us.* Penguin. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Iterative Process of Inquiry** | "Holistic Thinking (iteration of structure, function and process), Operational Thinking (dynamics of multi-loop feedback systems; chaos and complexity), Self-organization (movement toward a predefined order; socio-cultural model) and Interactive Design (redesigning the future and inventing ways to bring it about)." | Jamshid Gharajedaghi | 1999 | Strategy | Gharajedaghi, J. (1999). *Systems thinking: Managing chaos and complexity: A platform for designing business architecture.* Elsevier. |
| **Five Dimensions of an Organization** | Conflict management, membership, decision-making, knowledge and throughput. | Jamshid Gharajedaghi | 1999 | Architecture | Gharajedaghi, J. (1999). *Systems thinking: Managing chaos and complexity: A platform for designing business architecture.* Elsevier. |
| **Territory Maps** | A systems map showing the flows between stakeholders and where conflicts or partnerships can arise. | Richard Pew, Anne Mayor | 2007 | Ecosystem | Pew, R. & Mavor, A. (2007). *Human-System Integration In The System Development Process: A New Look*. Committee On Human-System Design Support For Changing Technology. Washington: National Academies Press. |
| **Value Constellation** | "Roles and relationships among a constellation of actors—suppliers, partners, customers—to mobilize the creation of value by new combinations of players." | Richard Normann, Rafael Ramirez | 1993 | Ecosystem | Normann, R., & Ramirez, R. (1993). From value chain to value constellation: Designing interactive strategy. *Harvard business review, 71*(4), 65-77. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Logical Incrementalism** | "Business strategy is not developed at one particular point of time, but through a series of small decisions evaluated periodically." Evolved from the concept of muddling through or making small, low-risk steps when navigating wicked problem territory. | Charles Lindblom | 1959 | Strategy | Lindblom, C. E. (1959). The science of muddling through. *Public Administration Review, 19*(2), 79-88. |
| **Stakeholder Matrix** | Mapping stakeholders onto a 2x2 of power vs influence to identify how to act with each stakeholder group. | Aubrey Mendelow | 1981 | Strategy | Mendelow, A. L. (1981). *Environmental Scanning--The Impact of the Stakeholder Concept.* ICIS 1981 Proceedings. 20. |
| **Advantage Matrix** | 2x2 matrix of the number of different approaches to competitive advantage available vs the potential size of the competitive advantage. | Richard Lochridge | 1981 | Strategy | Lochridge, R. (1981). *Strategy in the 1980s.* BCG Perspectives. |
| **Simple Rules** | A handful of guidelines tailored to the user and the task at hand, which balance concrete guidance with the freedom to exercise judgment. | Kathleen Eisenhardt, Donald Sull | 2001 | Infrastructure | Eisenhardt, K. M., & Sull, D. N. (2001). Strategy as simple rules. *Harvard business review, 79*(1), 106-119. |
| **Adaptive Advantage** | A model for addressing the turbulence of competitive environments in the modern world based on readiness, responsiveness, resilience and recursiveness. | Martin Reeves, Michael Deimler | 2009 | Ecosystem | Martin, R., & Michael, D. (2009). *New Bases of Competitive Advantage.* BCG Perspectives. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **VUCA Environments** | A way of understanding environments that are messy: volatile, uncertain, complex and ambiguous. | U.S. Army War College | 1990s | Ecosystem | Bennett, N., & Lemoine, J. (2014). What VUCA really means for you. *Harvard Business Review, 92*(1/2). |
| **The Animal Kingdom** | Mice (small, everywhere), gazelles (medium, engine of the economy), elephants (big, lumbering, slow), unicorns (rapid growth, rare). Some reside in Silicon Valley's rainforest. The idea is using analogies to make sense of organizational environments. | David Birch | 1970s | Ecosystem | Acs, Z. J., & Mueller, P. (2008). Employment effects of business dynamics: Mice, gazelles and elephants. *Small Business Economics, 30*(1), 85-100. |
| **Blue Ocean Strategy** | The simaltaneous pursuit of differentiation and low-cost to create new, uncharted business opportunities. | W. Chan Kim, Renée Mauborgne | 2004 | Strategy | Mauborgne, R., & Kim, W. C. (2005). *Blue Ocean Strategy*. Harvard Business Press. |
| **Maverick Scan** | Identifying and understanding the value propositions offered by the mavericks or extreme edges of an organization's competitive environment. | Martin Reeves, George Stalk, Jussi Lehtinen | 2013 | Strategy | Martin, R., George, S., & Jussi, L. (1981). Lessons from Mavericks: Staying Big by Acting Small. BCG Perspectives. |
| **Disruptive Innovation** | Innovations that create new markets or otherwise shift the value proposition of an offering to a new paradigm. | Clayton Christensen, Joseph Bower | 1995 | Ecosystem | Bower, J. L., & Christensen, C. M. (1995). *Disruptive technologies: catching the wave*. Harvard Business Review. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **User Innovation** | Innovation led by the consumer or end-user of some offering done to address an unmet need they've identified through their use of the offering. | Eric von Hippel | 1986 | Ecosystem | Von Hippel, E. (1986). Lead users: a source of novel product concepts. *Management science, 32*(7), 791-805. |
| **Opportunity Spotting** | A taxonomy for the factors involved in identifying opportunities in the world: richness (stuff in your head), association (connect things), priming (top of mind), see clearly (pay attention). | Dave Valliere | 2011 | People | Valliere, D. (2013). Towards a schematic theory of entrepreneurial alertness. *Journal of Business Venturing, 28*(3), 430-442. |
| **Decision Tree Approach** | Based in decision analysis, a decision tree helps to evaluate options by mapping the possibilities, probability and magnitude of different outcomes. | Ross Quinlan | 1986 | Strategy | Quinlan, J. R. (1986). Induction of Decision Trees. *Machine Learning,* (1), 81-106 |
| **Peak-End Rule** | A psychological phenomena in which people judge an experience based on it's best point and how it ended. | Daniel Kahneman, Barabra Fredrickson, Charles Schrieber, Donald Redelmeier | 1993 | People | Kahneman, D., Fredrickson, B. L., Schreiber, C. A., & Redelmeier, D. A. (1993). When more pain is preferred to less: Adding a better end. *Psychological Science, 4*(6), 401-405. |
| **Prospect Theory** | Individuals are risk-averse when winning but risk-seeking when losing to regain their losses. | Daniel Kahneman, Amos Tversky | 1979 | People | Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica, 47*(2), 263-292. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **VRIO** | A resource-based view of gaining a competitive advantage that suggests entrepreneurs get to choose their resources, while managers make do and advantage is gained through valuable, rare, inimitable or organized resources. | Jay Barney | 1991 | Strategy | Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of management, 17*(1), 99-120. |
| **Environ-mental Mu-nificence** | A way of understanding the competition for scarce resources within one "pond" that firms operate within. Firms may decide which pond, which may have lots of flies, few frogs or other characteristics. | Gary Castrogiovan ni | 1991 | Strategy | Castrogiovanni, G. J. (1991). Environmental munificence; a theoretical assessment. *Academy of management review, 16*(3), 542-565. |
| **Throughline** | The emotional points a character moves through in their journey, similar to journey mapping. Gains power through seeing the connections and alignment between points. | Konstantin Stanislavski | 1936 | People | Stanislavski, C. (1989). *An actor prepares.* Routledge. |
| **Service Design Principles** | The principles that underly the practice of designing human-centered experiences: user-centered, co-creative, sequencing, evidencing and holistic. | Marc Stickdorn, Jakob Schneider | 2010 | Infrastructure | Stickdorn, M., Schneider, J., Andrews, K., & Lawrence, A. (2010). *This is service design thinking: Basics, tools, cases.* Hoboken, NJ: Wiley. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Future Proofing** | A model for how to use foresight, innovation strategy and scenarios to create an organization that's resilient to rapidly unfolding changes. | Alexander Manu | 2006 | Strategy | Manu, A. (2006). *The imagination challenge: Strategic foresight and innovation in the global economy*. New Riders. |
| **Fundamen-tal Human Needs** | The universal needs and satisfiers people require to grow and develop: subsistence, protection, affection, understanding, participation, idleness, creation, identity and freedom. | Manfred Max-Neef | 1986 | People | Max-Neef, M. A. (1986). *Human scale development: conception, application and further reflections*. New York: The Apex Press. |
| **Hierarchy of Needs** | The five needs each individual has and the order in which they take precedence: physiological, safety, love and belonging, esteem and self-actualization. | Abraham Maslow | 1943 | People | Maslow, A. H. (1943). A theory of human motivation. *Psychological review, 50*(4), 370. |
| **Signalling Theory** | How one agent will use indicators to signal to another agent the traits they have. For instance education on a resume to signal being hard-working. | Michael Spence | 1973 | People | Spence, M. (1973). Job Market Signaling. *Quarterly Journal of Economics 87*(3), 355–374. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Organizational Charts** | A diagram of the structure of an organization that shows roles, responsibilities and reporting lines. | Daniel McCallum | 1855 | Architecture | Vose, G. L. (1857). *Handbook of Railroad Construction: For the Use of American Engineers. Containing the Necessary Rules, Tables, and Formulæ for the Location, Construction, Equipment, and Management of Railroads, as Built in the United States,* 415-416 |
| **IKEA Effect** | People place a disproportionately high value on things they partially create and value experiences they've suffered to receive. | Michael Norton, Daniel Mochon, Dan Ariely | 2011 | People | Norton, M. I., Mochon, D., & Ariely, D. (2012). The IKEA effect: When labor leads to love. *Journal of consumer psychology, 22*(3), 453-460. |
| **Agency Costs** | The costs accrued by an actor in having someone else represent their interests, including monitoring, bonding (profit sharing), screening (adverse selection or rigorous screening which could repel the best agents). | Michael Jensen, William Meckling | 1976 | Architecture | Jensen., Meckling, W. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics 3*(4), 305–360. |
| **Moral Hazard** | When actors make decisions that maximize their personal profit in inefficient ways because they're protected from the consequences of their actions. | Mark Pauly | 1968 | People | Pauly, M. V. (1968). The economics of moral hazard: comment. *American economic review, 58*(3), 531-537. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Requisite Organiza-tion** | A management philosophy that looks at role complexity and structure to fulfill three main steps: getting the right structure; getting the right people in the right roles; and holding all managers accountable for using the right managerial practices. | Elliot Jaques | 1989 | Architecture | Jaques, E. (1989). *Requisite organization: The CEO's guide to creative structure and leadership*. Arlington, VA: Cason Hall. |
| **Peter Principle** | People in a hierarchy tend to rise up until they can no longer excel and thus stop rising, often known as their level of incompetence. | Laurence Peter, Raymond Hull | 1969 | People | Peter, L. J., & Hull, R. (1969). *The peter principle*. London: Souvenir Press. |
| **General In-telligence** | People's capacity to make sense of the world, broken down into fluid and crystallized intelligence. Fluid intelligence involves reasoning and figuring things out, while crystallized involves building secondary connections from existing ones. | Raymond Cattell | 1971 | People | Cattell, R. B. (1971). *Abilities: Their structure, growth, and action*. New York: Houghton Mifflin. |
| **Intelligence Quotient** | A measure of someone's ability to reason and solve problems usually assessed through standardized tests. | William Stern | 1914 | People | Stern, W. (1914). *The psychological methods of testing intelligence*. Warwick & York. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Waterfall** | Projects flow downward through the stages of conception, initiation, analysis, design, construction, testing, deployment and maintenance. | Herbert Benington | 1956 | Architecture | United States, Navy Mathematical Computing Advisory Panel. (1956). *Symposium on advanced programming methods for digital computers.* Washington, D.C. |
| **Minimum Viable Product** | "The MVP is the optimal point between the cost of implementing a solution and the value the solution brings." Often seen as being the leanest way to advance new offerings and has the highest return-on-risk. | Frank Robinson | 2001 | Architecture | Blank, S. (2005). *The four steps to the epiphany.* K & S Ranch. |
| **Jobs to be Done** | Customers 'hire' solutions to address their jobs that need to be done, such as a refrigerator keeping food from spoiling. Has evolved into the Outcome-Drive-Innovation (ODI) process. | Tony Ulwick | 2005 | Architecture | Ulwick, T. (2005). *What Customers Want: Using Outcome-Driven Innovation To Create Breakthrough Products And Services.* McGraw-Hill. |
| **Customer Lifecycle Metrics** | Commonly known as the pirate metrics, which is acronym AARRR that suggests five metrics that together provide a deep understanding of the customer. They are acquisition, activation, retention, revenue and referral. | Dave McClure | 2007 | Infrastructure | Cohn, A. Z. (2010, December 3). *Dave McClure – Ignite Seattle.* Retrieved December 1, 2019, from https://igniteseattle.com/tag/dave-mcclure/ |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Dominant Economic Features Analysis** | An analysis of the characteristics of the economic environment an organization operates in, including market size, scope of rivalry, growth rate and the state of the life cycle. | Joseph Schumpeter | 1954 | Ecosystem | Schumpeter, J. A. (1954). *History of economic analysis*. Routledge. |
| **Success Factors** | The factors to focus on which are critical to the success of an organization. | Ron Daniel | 1961 | Strategy | Ronald, D. (1961). Management Information Crisis. *Harvard Business Review*. |
| **Strategic Groups** | Clusters of groups within an industry where organizations follow a similar strategy or value proposition. | Michael Porter | 1979 | Ecosystem | Porter, M. (1979). The Structure within Industries and Companies' Performance. *The Review of Economics and Statistics 61*(2), 214-227 |
| **Industry Life Cycle** | The stages an industry following startup, growth, shakeout, maturity and decline. | Mileidis Gort, Steven Klepper | 1982 | Ecosystem | Gort, M. and Klepper, S. (1982) Time Paths in the Diffusion of Product Innovations. *The Economic Journal*, 92, 630- 653. |
| **Competitive Assessment** | A weighted table used to compare the critical success factors and different firm's performance within a strategic group. | Jack Duncan, Peter Ginter, Linda Swayne | 1998 | Strategy | Duncan, W. J., Ginter, P. M., & Swayne, L. E. (1998). Competitive advantage and internal organizational assessment. *Academy of Management Perspectives, 12*(3), 6-16. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Business Statistics** | Using measures of probability to assess different probabilistic outcomes using measures such as reliability, construct validity, statistical validity, internal validity and external validity. | Blaise Pascal, Pierre de Fermat | 1654 | Infrastructure | Devlin, K. (2010). *The unfinished game: Pascal, Fermat, and the seventeenth-century letter that made the world modern.* Basic Books. |
| **Design Guidelines** | Clear instructions to designers and developers on how to adopt specific principles to meet the needs of your users. | Thomas Erl | 1900 | Architecture | Erl, T. (1900). *Service-oriented architecture: concepts, technology, and design.* Pearson Education India. |
| **T-Shaped Profile** | An individual with a broad base of general skills and deep knowledge in one area. | David Guest | 1991 | People | Guest, D. (1991). The hunt is on for the Renaissance Man of computing. *The Independent,* 17. |
| **Flow State** | A mental state in which a person is fully immersed in a feeling of energized focus, full involvement, and enjoyment in the process of an activity. | Mihaly Csikszentmihalyi | 1990 | People | Csikszentmihalyi, M. (1990). *Flow: the psychology of optimal experience*. New York: NY Harper & Row. |
| **Pareto Principle** | A rule of thumb that 80 percent of the outcome is caused by 20 percent of the input, which relates to the law of diminishing returns. | Vilfredo Pareto | 1835 | Infrastructure | Pareto, V. (1835). *Political Economy Course (Vol 1).* Librairie Droz. |
| **Knowledge Corridors** | The prior knowledge entrepreneurs have which influence their assessment of new business opportunities. | Scott Shane | 2000 | People | Shane, S. (2000). Prior knowledge and the discovery of entrepreneurial opportunities. *Organization science, 11*(4), 448-469. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Diffusion of Innovation Theory** | The theory of how different competing innovations spread throughout society. The creator or innovator is biased towards their innovation leading to the belief that their innovation should be adopted by whole society without being altered. | Everett Rogers | 1962 | Ecosystem | Rogers, E. M. (1962). *Diffusion of innovations*. Simon and Schuster. |
| **Business Model Patterns** | Consistent, reusable patterns of business model configurations that can be adopted in different circumstances. | Alexander Osterwalder, Yves Pigneur | 2010 | Strategy | Osterwalder, A., Pigneur, Y. (2010). *Business Model Generation*. New Jersey: Wiley. |
| **The Five Capitals** | A model for understanding sustainability in terms of capitalism, including natural, human, social, manufactured and financial capital. | Jonathon Porritt | 2005 | Strategy | Porritt, J. (2005). *Capitalism as if the World Matters*. Routledge. |
| **MultiCapital Scorecard** | A scorecard used to assess an organization's performance relative to five types of capital. It's designed as a measurement and reporting system to bring accounting to the 21st century. | Mark McElroy, Martin Thomas | 2016 | Architecture | Thomas, M. P., & McElroy, M. W. (2016). *The MultiCapital scorecard: Rethinking organizational performance*. Chelsea Green Publishing. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Layers of Value** | Indicates the value ecosystem an organization operates within, including value captured by the organization, shared value and externalities. | Hugo Hollander, Hester Touwen, Brendan LeBlanc, Matthew Bell | 2014 | Ecosystem | Ernst & Young. (2014). *Integrated Reporting: Elevating value.* Retrieved from https://www.ey.com/Publication/vwLUAssets/EY-Integrated-reporting/$FILE/EY-Integrated-reporting.pdf |
| **Integrated Reporting** | An evolution of conventional corporate reporting that involves a number of different types of value beyond financial. | International Integrated Reporting Committee | 2013 | Architecture | International Integrated Reporting Council. (2013). *Consultation draft of the international Framework: Integrated Reporting.* Retrieved from https://integratedreporting.org/wp-content/uploads/2013/03/Consultation-Draft-of-the-InternationalIRFramework.pdf |
| **Business Models** | Business models identify the way the company operates, how it captures value, and who it exchanges value with to make money. | Richard Bellman, Charles Clark, Donald Malcolm, Clifford Craft, Franc Ricciardi | 1957 | Architecture | Bellman, R., Clark, C. E., Malcolm, D. G., Craft, C. J., & Ricciardi, F. M. (1957). On the construction of a multi-stage, multi-person business game. *Operations Research, 5*(4), 469-503. |
| **Value Net-work Analysis** | Value network analysis is a business modelling methodology that visualizes business activities and relationship sets from a dynamic whole systems perspective. | Verna Allee | 2006 | Ecosystem | Allee, V. (2006). *What is ValueNet works analysis.* ValueNet Works Fieldbook. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Living Systems** | Five conditions a system must meet to mirror biological life. Organizations mirror these conditions. They are pattern (structure of components), structure (physical embodiment of pattern), process (continued embodiment of pattern), autopoietic network (continues to perpetuate itself) and dissipative structures that exchange value with their ecosystem. | Fritjof Capra | 1996 | Ecosystem | Fritjof Capra. (1996). *The Web of Life*. Anchor Books. |
| **Basadur Profile** | An inventory and four styles of creative behavioural patterns known as generation, conceptualization, optimization and implementation. | Min Basadur | 1995 | People | Basadur, M. (1995). *The power of innovation.* London: Pitman Professional Publishing. |
| **Innovation Wheel** | An eight-step creative problem-solving process that goes through problem-finding, fact-finding, problem definition, idea finding, evaluation and selection, action plan, gaining acceptance, and action. | Min Basadur | 1995 | Architecture | Basadur, M. (1995). *The power of innovation.* London: Pitman Professional Publishing. |
| **Enterprise Architecture** | A blueprint of an organization that's evolved into organizational design. Includes different kinds of architecture including business, data and application. | Steven Spewak, Steven Hill | 1992 | Architecture | Spewak S., Hill S,. (1992). *Enterprise Architecture Planning: Developing a Blueprint for Data, Applications, and Technology.* Boston, QED Publishing Group. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Ecological Economics** | A field of study that involves the interdependence and coevolution of natural ecosystems and the human economies embedded within them. | Nicholas Georgescu-Roegen | 1971 | Ecosystem | Georgescu-Roegen, N. (1971). *The Entropy Law and the Economic Process*. Cambridge, Massachusetts: Harvard University Press. |
| **Mile's Law** | A trait of human behaviour that the position people take on issues is dependent on their relationship to the issue, or "where you stand is where you sit." | Rufus Miles | 1940s | People | Miles, R. E. (1978). The origin and meaning of Miles' Law. *Public Administration Review, 38*(5), 399-403. |
| **Tempered Radicalism** | Organizational insiders who both succeed in their jobs and struggle between their desire to act on their "different" agendas and the need to fit into the dominant culture. | Debra Meyerson | 2004 | People | Meyerson, D. (2004). The tempered radicals: How employees push their companies–little by little–to be more socially responsible. *Stanford Social Innovation Review,* 1-23. |
| **Johari Window** | A visual model that helps people to understand their relationship to others. Has the boxes public self, private/hidden self, area of awareness, and undiscovered self. | Joseph Luft, Harrington Ingham | 1955 | People | Luft, J.; Ingham, H. (1955). *The Johari window, a graphic model of interpersonal awareness*. Proceedings of the western training laboratory in group development. Los Angeles: University of California, Los Angeles. |
| **Multi-disci-plinary Agility** | The rate at which an organization can bring employees of different knowledge backgrounds together to collaborate on problem-solving. | Roman Krznaric | 2007 | Architecture | Krznaric, R. (2007). *How change happens: Interdisciplinary perspectives for human development*. Oxfam. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Social Determinants of Health** | The social and economic factors that influence an individual's health and wellbeing. Commonly accepted determinants include stress, social exclusion, work, and social support. | Frederic Wolinsky | 1988 | People | Wolinsky, F. (1988). *The sociology of health: Principles, practitioners, and issues.* Belmont, CA: Wadsworth. |
| **Critical Consciousness** | A mindset involved in critically examining the world around us to uncover hidden contradictions and truths such as the power structures that underly capitalism. | Paulo Freire | 1970 | People | Freire, P. (1970). *Pedagogy of the oppressed*. Bloomsbury publishing USA. |
| **Intersectionality** | A qualitative framework for how social factors such as race and gender intersect to form an individual's social identity. | Kimberlé Crenshaw | 1989 | People | Crenshaw, K. (1989). *Demarginalizing the intersection of race and sex: A black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics.* u. Chi. Legal f., 139. |
| **Ecological Systems Theory** | A framework through which psychologists can study the way an individual intersects with their community: microsystem, mesosystem, ecosystem, macrosystem, and chronosystem. | Urie Bronfenbrenner | 1979 | Ecosystem | Bronfenbrenner, U. (1979). *The Ecology of Human Development: Experiments by Nature and Design.* Cambridge, Massachusetts: Harvard University Press. |
| **Orthodoxies** | Biases or our range of perspectives which we take for granted that underly our view of what's normal or possible. By flipping orthodoxies, new possibilities can be unearthed. | Gary Hamel, Coimbatore Prahalad. | 1996 | Infrastructure | Hamel, G., & Prahalad, C. K. (1996). *Competing for the Future*. Harvard Business Press. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Idea Stages** | The process someone goes through as they generate a new idea: desire, preparation, manipulation, incubation, intimation, illumination, and verification. | Don Fabun | 1968 | Architecture | Fabun, D. (1968). *Communications: The Transfer of Meaning.* Prentice Hall. |
| **Knowledge Velocity** | The speed at which knowledge is spread and utilized. Different groups disseminate knowledge at different rates or in different levels of readability, limiting velocity. Includes concepts like knowledge pollution and loss. | Jeremy Roschelle, Stephanie Teasley | 1995 | Architecture | Roschelle, J., & Teasley, S. D. (1995). The construction of shared knowledge in collaborative problem solving. *Computer supported collaborative learning,* 69-97. |
| **Integral Theory** | A theory that holds all human experience can be placed along a four-quadrant grid, with the axes of "interior-exterior" and "individual-collective and that every entity is both an individual and a part of a hierarchy of collective experience. People can move through stages which incorporate different types of experiences that fall roughly into the categories of pre-personal, personal and transpersonal. | Ken Wilbur | 1977 | People | Wilber, K. (1977). *The spectrum of consciousness.* Quest Books. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Spiral Dynamics** | A list of eight stages or selves we develop through that indicates the levels of consciousness humans can operate at. Each stage transcends the previous one, and our current stage is our "center of gravity" which we're drawn to operate at. | Clare Graves | 1974 | People | Graves, C. W. (1974). Human nature prepares for a momentous leap. *The futurist, 8*(2), 72-85. |
| **Change Formula** | A simple model for calculating the costs of change. "Dissatisfaction x Vision x First Steps > Resistance to Change." | Richard Beckhard, Reuben Harris | 1987 | Strategy | Harris, R. T., & Beckhard, R. (1987). *Organizational transitions: Managing complex change*. Reading: Addison-Wesley Publishing Company. |
| **Post Colo-nialism** | The way in which human identity continues to develop in a world that exists after many colonial nations gained independence. | Edward Said | 1978 | Ecosystem | Said, E. (1978). *Orientalism.* New York: Pantheon. |
| **Reflexive Innovation** | Self-reinforcing feedback loops where cause and effect are linked. In innovation, it involves an examination of the appropriateness of the innovation, such as whether it destroys more value than it creates or creates value that's not needed. | William Thomas, Dorothy Thomas | 1928 | Strategy | Thomas, W. I. (1928). *The Child in America: Behavior Problems and Programs.* New York: Knopf. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Syntegra-tion** | A group problem-solving method involving managing the collisions of large groups to optimize the output per person for addressing complex problems. | David Benjamin, David Komlos | 2019 | Infrastructure | Komlos, D., & Benjamin, D. (2019). *Cracking Complexity: The Breakthrough Formula for Solving Just about Anything Fast.* Nicholas Brealey. |
| **Viable Systems Model** | An organizational model and visual diagram that maps how an organization functions and evolves within a changing environment. | Stafford Beer | 1972 | Architecture | Beer, S. (1972). *Brain of the firm: the managerial cybernetics of organization.* Wiley. |
| **Venture Design** | A six stages process for building and launching a new venture: personas, problem scenarios and alternatives, value propositions and assumptions, customer discovery and experiments, user stories and prototypes, and product and promotion. | Alexander Cowan | 2012 | Strategy | Cowan, A. (2012). *Starting a Tech Business: A Practical Guide for Anyone Creating Or Designing Applications Or Software.* John Wiley & Sons. |
| **Mindshare Matrix** | A theory that an entity's power is determined not by its size but by its connectivity. Mapped by the 5 C's countries, cities, commonwealths, companies, and communities. | Parag Khanna | 2016 | Ecosystem | Khanna, P. (2016). *Connectography: Mapping the future of global civilization.* Random House. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **The Theory of Inventive Problem Solving** | "The TIPS or TRIZ is a problem-solving process derived from a review of how patents from around the world were developed. The theory found problems, solutions and patterns of technical evolution are repeated across domains, and that innovations use learning from outside the domain they were developed in." | Genrich Altshuller | 1940s | Infrastructure | Altshuller, G. S.; Shapiro, R. B. (1956). "О Психологии изобретательского творчества (On the psychology of inventive creation)". *Вопросы Психологии (The Psychological Issues) (in Russian)* (6): 37–39. |
| **Sources of Innovation** | The seven sources that innovation can spring from: unexpected, incongruities, process need, structural change, demographics, changes in perception, mood, meaning, and new knowledge. | Peter Drucker | 1985 | Ecosystem | Drucker, P. F. (1985). The discipline of innovation. *Harvard business review, 63*(3), 67-72. |
| **Results-Only Work Environ-ment** | ROWE is an organization design principle where employees are paid for the outputs they produce (results) rather than their inputs (usually time). | Jody Thompson, Cali Ressler | 2008 | Architecture | Ressler, C., & Thompson, J. (2008). *Why work sucks and how to fix it: The results-only revolution.* Penguin. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Self Organization** | Order arises from the interactions of parts of a system. In organization design, it's that individual employees will create order and structures that meet their needs rather than typical management, which imposes order and structure onto employees. | William Ashby | 1947 | Architecture | Ashby, W. R. (1947). Principles of the Self-Organizing Dynamic System. *The Journal of General Psychology, 37*(2), 125–28. |
| **Frugal Innovation** | Originated with the concept of appropriate technology, which is that solutions should be chosen on the basis of which are the most "small-scale, decentralized, labor-intensive, energy-efficient, environmentally sound, and locally autonomous. In innovation the concept evolves to which innovations should be pursued or invested in. | Ernst Schumacher | 1950s | Strategy | Schumacher, E. F. (1973). *Small is beautiful: A study of economics as if people mattered.* Random House. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Innovation Designer** | A capability map that shows the characteristics of an innovation designer who is able to add value in diverse problems and contexts with the skills of Innovation Leadership, Strategic Foresight and Innovation, Strategy Development, Design Research, Service Design, Product Development, Visual Design, Writing and Storytelling, Process Design and Facilitation, Organizational and Culture Change, Team Development & Coaching, Business Design, and Systemic Design. | The Moment | | People | The Moment. (2017). *Innovation Designer Capability Map*. Retrieved from https://cdn2.hubspot.net/hubfs/3903042/themoment_InnovationDesignersCapabilityMap.pdf |
| **Change of Meanings** | A framework that shows how to change the meanings of an offering to create new value or new markets. | Robert Verganti | 2009 | Infrastructure | Verganti, R. (2009). *Design driven innovation: changing the rules of competition by radically innovating what things mean*. Harvard Business Press. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Patterns of Strategy** | A framework for understanding strategy based on power (concentration, strength), fit (differentiation, stretch, drive), and time (relative speeds, cycle time, foresight and change rates). Includes recipes that are unique combinations of configurations used to gain competitive advantages in different couplings. | Patrick Hoverstadt, Lucy Loh | 2017 | Strategy | Hoverstadt, P., & Loh, L. (2017). *Patterns of strategy*. Routledge. |
| **Value-Based Manage-ment** | A philosophy that looks at maximizing the creation of value in an organization. Often seen as shareholder value. However, recently it's expanding to encompass stakeholder value. | Michael Mankins, James McTaggart, Peter Kontes | 1994 | Architecture | McTaggart, J. M., Kontes, P. W., & Mankins, M. C. (1994). *The value imperative: Managing for superior shareholder returns.* Free Press. |
| **Economic Value Esti-mation** | A model used to determine the amount of value an offering creates for its customer relative to the next closest comparable. | John Hogan, Joseph Zale, and Thomas Nagle | 1986 | Infrastructure | Hogan J., Nagle, T. T., & Zale, J. (1986). *The strategy and tactics of pricing: A guide to growing more profitably*. Routledge. |

| Name | Description | Creator(s) | Year | Type | Reference |
|---|---|---|---|---|---|
| **Wicked Problem** | Problems that are not understood until after the formulation of a solution, have no stopping rule, have no right or wrong solutions, each is essentially novel and unique, every solution is a 'one-shot operation,' and have no given alternative solutions. | Horst Rittel, Melvin Webber | 1973 | Ecosystem | Rittel, H., Webber, M. (1973). Dilemmas in a General Theory of Planning. *Policy Sciences, 4*(2), 155–169. |
| **Value Disci-plines** | A model based on three distinct strategies for offering customer value: customer intimacy, product leadership, and operational excellence. | Michael Treacy, Fred Wiersema | 1995 | Strategy | Treacy, M., & Wiersema, F. (1995). *The Discipline of Market Leaders.* United States: Addison-Wesley. |
| **Innovation Lifecycle** | The four stages an innovation goes through: ideation, project selection, product development, and commercialization. | Barry Jaruzelski, Kevin Dehoff, Rakesh Bordia | 2006 | Architecture | Jaruzelski, B., Dehoff, K., & Bordia, R. (2006). The Booz Allen Hamilton Global Innovation 1000: Smart Spenders. *Strategy+ Business,* 45, 46-61. |

*Table 7: Database of 250 Innovation Approaches*