Foresight-Informed Agile For Resilient Product Strategy

Improving the Strategic Resilience of Agile Software Organizations in Ontario Canada

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Abstract

Agile is today's dominant operational framework in software product development due to its effectiveness at helping teams overcome dynamic and uncertain conditions. As external uncertainties increase, some organizations are also adopting Agile as a strategic approach. However, we hypothesize that while Agile contributes to adaptability, it is insufficient for an organization to be resilient against major disruptions.

This research project studies the relationship between Agile software development and the strategic resilience of small-to-medium-sized organizations in Ontario, Canada. Using a mix of surveys and interviews with product leaders, we found that many teams' strategic capability to be resilient is limited due to Agile's narrow attention and short-term focus, encouraging teams to be reactive rather than proactive.

We designed the Resilient Product Strategy Toolkit, which integrates proven Strategic Foresight practices with existing Agile and product management processes to help teams broaden their attention and increase their capability to manage uncertainty. This research design contributes to the plausibility of combining Agile and Strategic Foresight as an ambidextrous approach to enhance an organization's strategic resilience.

Keywords: *Agile, software, Scrum, product strategy, Strategic Foresight, resilience, SME, product management, disruption, organizational ambidexterity, technology*

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Statement of Contributions

This research project was completed through an equal partnership between Caitlin Pannell-Evans and Eugene Peng. All stages of the process were worked on as a team from concept to completion.

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Introduction

We are entering the "Age of Agile", declared Julian Birkinshaw, professor at London Business School in 2016 (Denning, 2016). Agile principles and frameworks at the time had not only taken over the software development industry, but they had begun influencing general organizational management and strategy. Organizational agility was being hailed as the key to success in a world overwhelmed with information and rapid change.

Yet only four years later, in 2020, Birkinshaw asserted that being Agile is no longer enough. The new business imperative is resilience—the ability to bounce back from external shocks (Birkinshaw, 2020). Against the backdrop of the COVID-19 pandemic and other systemic challenges in an intricately connected world, shocks can come from anywhere. Being only Agile is still fragile. To be resilient requires more.

As graduate students at OCAD University's Strategic Foresight and Innovation program, we are interested in seeing problems through the lens of complexity. We also have work experience in the tech sector, with intimate knowledge of the increasing complexity and uncertainty that Agile teams and product managers face in software product development. We recognize how Agile, with incremental delivery and quick feedback, allows a team to be more effective in dynamic and uncertain environments than teams that follow traditional strategic planning that tends to ignore or deny uncertainties. Yet, we also see organizations letting go of traditional strategic planning in favour of only being Agile, which leaves a gap around the broad and long-term strategic thinking required to create sustainable and resilient futures. A new type of strategic thinking is needed to complement Agile for a team to fully embrace the complexity and uncertainty in today's world. So we started to ask: *does this gap exist in product teams that use Agile, and how might we address this gap to create more resilient strategies in an increasingly complex and uncertain world?*

This project is our effort to answer that question, and we hope this is a step towards product leaders and Agile teams having more ownership over creating resilient futures.

Background Context

Why is this important and meaningful?

Agile and Scrum

Over the past few decades, software development methodologies have evolved to keep up with increasing complexity and change (Krutikov, 2021; Varhol, P, n.d.). One of the most significant shifts was when tech organizations began moving away from the traditional "Waterfall" development method, which conducts project phases in a linear sequence, into what is commonly known as "Agile", where the phases are iterative and overlapping (Rigby et al., 2016a).

This shift emerged from the growing need to improve the speed to market and quality of software being developed in the '90s. Waterfall, the prevailing software development process at the time, has been heavily criticized for its focus on linear progression, often limiting a project's flexibility to adapt and change partway through the development process (McCormick, 2012). This limitation poses a severe threat to a product's viability and success due to the fast pace of change in the tech market. Agile frameworks have risen to mainstream popularity over the past 20 years due to their effectiveness in helping teams iterate and adapt by constantly scanning for data and gathering customer feedback. Agile focuses on developing software in small incremental stages, encouraging teams to be nimble and pivot quickly based on changing priorities as new information is learned. The flexibility in Agile methods has been credited for allowing a software team to deliver more value in less time and for being highly effective in complex projects where requirements are unclear up-front or change during development (Sutherland, 2012).

Scrum is by far the most popular of all the Agile frameworks, with approximately 81% of Agile software development teams surveyed in 2021 stating they follow Scrum or a Scrum hybrid (Digital.ai, 2021). Scrum and Agile are terms often used interchangeably. However, for clarity, Agile is about the overall ideology with set values and principles. In contrast, Scrum is an Agile framework with more specific processes, roles, and ceremonies.

Change and Resilience

More than two decades since the advent of Agile, the pace of change and level of uncertainty have continued to increase in the marketplace and the overall environment—accelerating technological advances, the rising impacts of climate change and resource depletion, the widening cultural and political polarization, recovery from the global COVID-19 pandemic, and more. With its increasing interdependencies around the planet, today's environment is ripe for potential disruptions not only from an organization's immediate environment but also from other sectors and regions. Looking at technology and the software industry specifically, we are witnessing exponential change and growth (Roser & Ritchie, 2013). Technology organizations are at a heightened risk of disruption due to rapidly advancing innovation, changing consumer behaviours, and highly competitive markets. The 2021 Global Risk Reports outlines that in 2020 the

world economy experienced the deepest crisis in peacetime, with output expected to have shrunk by approximately 4.4%. In contrast, the 2008 financial crisis had an impact of 0.1% (World Economic Forum, 2021). The long-term impacts of the pandemic are still unknown. Yet, it is certain there have been major systemic shifts with a variety of emerging and accelerating trends that are having and will continue to have a significant impact on the world around us. This volatility makes it a critical necessity for organizations to look outward and ensure their business and strategies will be able to adapt to the many possibilities the future may hold.

The fact of the matter is: there is an increasing resilience gap—the difference between an organization's capacity to be resilient and the rise of complexity and volatility in the world as seen in Figure 1 (Hamel & Välikangas, 2003; Woods, 2020). Therefore, finding ways to be resilient—to anticipate, to adapt, and to recover from significant shocks or disruptions—is becoming more critical. Resilience not only improves an organization's long-term viability but could by itself be a source of competitive advantage (Martin, 2019; Hamel & Välikangas, 2003).

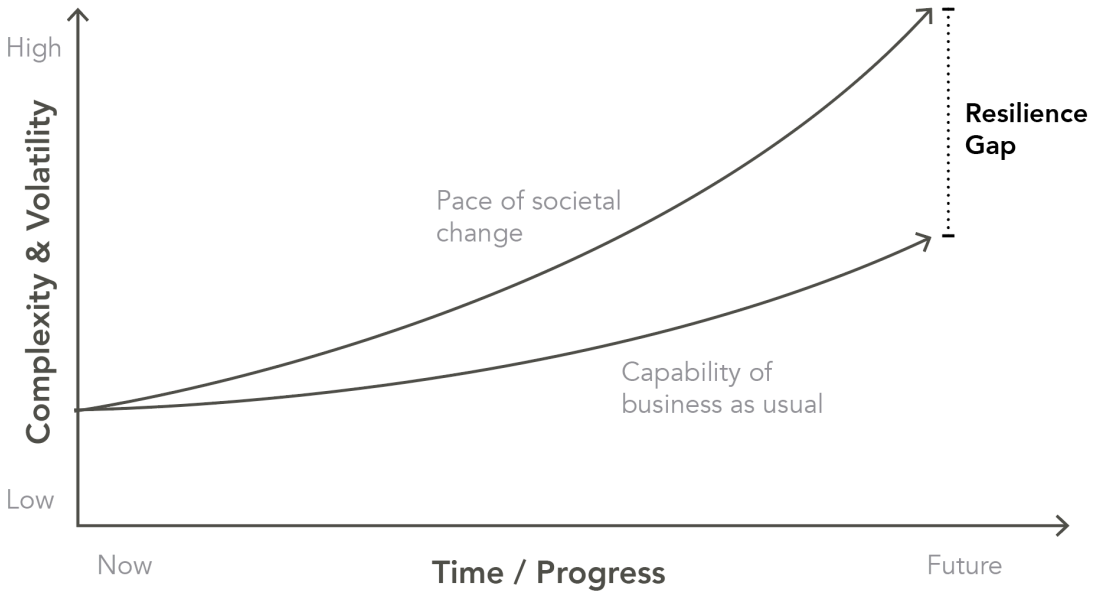

Figure 1: Resilience gap

Helping small and medium-sized enterprises (SME) to be resilient is especially important. They make up most of the registered enterprises and are particularly vulnerable to volatility and turbulence (Ismail et al, 2011). SMEs are sensitive to financial fluctuations, legislation and employment law, supply network relationship, technology changes, changing customer demands, and disturbances to national financial systems (Bhamra et al., 2011). And because they are constrained in resources, they tend to be reactive when it comes to strategic planning (Ismail et al, 2011).

Agile as Strategy

In environments where change is happening faster than what traditional strategy can keep up with, many organizations began adopting Agile not just as a software development methodology but also as a mindset for their strategy formation. This is particularly prevalent in the high-tech sector, where one executive remarked, "We run at breakneck speed in the world of high-tech and there isn't time to stop and do strategy. It will emerge naturally over time." (Martin, 2013). This Agile style of strategy is called many names: discovery-driven strategy, emergent strategy, lean strategy, or adaptive strategy (Martin, 2014).

Compared to classical or traditional strategy, the Agile or adaptive strategy is seen to be more effective in dynamic and uncertain environments. Whereas classical strategy is about prediction, top-down control, and separation of strategy from execution, adaptive strategy involves experimenting, working as a whole, and having iterative feedback between strategy and execution (O'Donovan & Flower, 2013; Gurteen, n.d.; Lucidspark, n.d). As a result, Agile or adaptive strategy provides more flexibility and enables teams to respond faster to changing conditions.

However, many organizations started to overly rely on Agile or adaptive strategy. They came to believe that agility can solve everything (Chiva, 2020). According to Marty Cagan (2020), a product management expert, most organizations don't have real product strategies. They have goals, roadmaps, and feature planning but no real strategy. Roger Martin (2013, 2014) noted that organizations cite high uncertainty as an excuse not to create strategies that require hard choices. Instead, they prefer simply to try things, see how it goes, and adjust on the fly. Then when surprises blindside them, they complain and feel there is nothing they can do (Martin, 2013).

Agile is tremendously beneficial in enabling an organization to respond to fast but minor changes in the market, especially change that only requires a short adaptation time and can be handled with limited resources. But it is insufficient for resilience—to protect an organization from significant unexpected disruptions. To put it into an analogy, Agile enables organizations to deal with bumps in the road, quickly adapting to foreseeable risks ahead. But Agile is not enough to foresee and avoid a cliff an organization may be heading towards, one that may require them to take an entirely different route to avoid (as illustrated in Figure 2). So what else could support an organization that has adopted Agile to be more resilient?

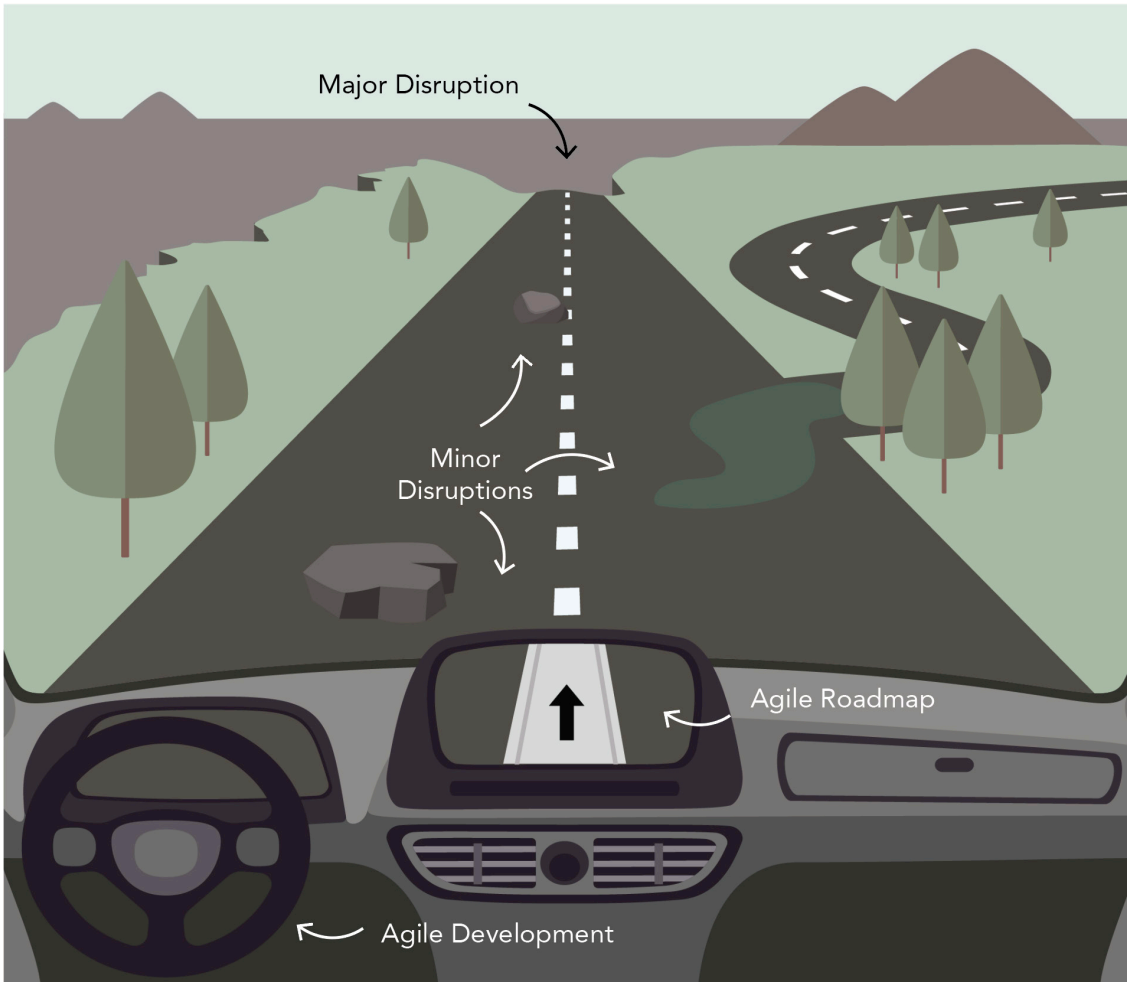

Figure 2: Analogy comparing Agile to a high performance car that can navigate around road obstacles (i.e. minor disruptions) but is ill-prepared to foresee or avoid a cliff in the distance (i.e. major disruption)

Strategic Foresight

We know there are other ways to support resilience. One of them is the ability to anticipate (Hillmann & Guenther, 2020). While not widely known in the software industry, Strategic Foresight is a discipline that can help organizations navigate volatile, uncertain, complex, and ambiguous environments. Strategic Foresight is not about predicting the future; it is about reducing the uncertainties of the future by exploring multiple possible

futures at various time horizons, commonly presented as scenarios (Dator, 1995).
For Strategic Foresight to be helpful, the implications of these scenarios are used in the present planning to be better prepared for the possibilities of the future and thereby increasing organizational resilience in volatile, uncertain or complex environments. For decades, Strategic Foresight has been used at a corporate level to assist with strategic planning, innovation initiatives, and change management (The Futures School, 2019). An empirical study of 77 firms found that Strategic Foresight activities add value to a firm by enhancing the firm's capacity to perceive, interpret, and respond to change (Rohrbeck & Schwarz, 2013). The most famous example of a private company successfully utilizing Strategic Foresight is the energy giant Royal Dutch / Shell. Using preemptive scenario planning, Shell was the only oil company that was able to adjust its business strategy successfully to overcome the oil crisis in the 1970s, helping them become a top leader in their industry (Mietzner & Reger, 2005; Ogilvy & Schwartz, 2004; Wack, 1985). Since then, many organizations have begun using Strategic Foresight as part of their strategic process, including Disney, Ford, and others (The Futures School, 2019). We see an opportunity to complement Agile with Strategic Foresight and look at how Strategic Foresight might integrate into organizations that practice Agile to develop more resilience.

Existing State of Research

Ample literature exists on Agile software development as well as Strategic Foresight. Both purport to help an organization succeed in environments with high degrees of complexity and uncertainty (Rubin, 2012; Sutherland, 2014; Stellman & Greene, 2013; Heger, 2020; Rigby et al., 2016b). They both embrace uncertainty and reject linear planning, albeit with different approaches—Agile adapts quickly to short-term changes, while foresight scans broadly to explore scenarios that anticipate mid-to-long-term systemic changes. A synergy between the two approaches could theoretically increase an organization's resilience against rising threats of disruption, yet, literature review shows a lack of research on how they might be integrated (Silva, 2015). There might even be resistance among Agile practitioners against any form of long-term thinking. Table 1 shows a comparative summary of Agile and Strategic Foresight.

We hypothesize that there is value in combining the two approaches for increasing the resilience of an organization's product strategies and, by extension, the organization's resilience.

	Agile	Strategic Foresight
Purpose	Rapidly and continuously adapt to changes in the organization's environment.	Explore possible futures to develop robust and resilient strategies
Mindset	Reactive, nimble, process-driven, fail-fast	Proactive, thoughtful, deliberate, creative
Activities	Iterative development, continuous feedback loops, collaboration, continuous improvement, reflection	Horizon scanning (weak signals), recognizing trends & drivers, developing scenarios, collaboration, reflection, implications analysis
Time Horizon	Immediate, short-term focused	Mid-to-long-term focused
Intended Environment	Product/service in defined sector(s); responding to changes to market, competitors, users. Measurable feedback	Organization's viability beyond the current sector(s); reducing uncertainty, complexity, ambiguity, and risk of being blindsided
Goal	Enable teams or organizations to adapt their products/services to change in the intended environment quickly and efficiently	Enable teams or organizations to better prepare for changes within and beyond the business environment or industry sector for their products/services

Table 1: Comparative overview between Agile and Strategic Foresight

The two different approaches fit the current research around organizational ambidexterity, which says that for an organization to survive over the long term, it needs to be able to both:

1. exploit the current business in times of incremental change, and
2. explore new opportunities and adapt radically in times of discontinuous change.

(Raisch et al., 2009, Tushman & O'Reilly, 1996, as cited in Rohrbeck, 2010)

With Strategic Foresight's ability to detect discontinuous change (Rohrbeck, 2010) and Agile's ability to adapt incrementally to maximize the current business, the two potentially make the ideal ambidextrous combination that ensures an organization's long-term viability.

For our project, we will use the definition of resilience as the ability of an organization to quickly return to a stable state when met with a significant change to its environment. We draw inspiration from past researchers' work around the overlap of agility, foresight, and resilience. This work includes Zubair's (2021) agility-resilience maturity model for Ontario SMEs and her view that agility is a necessary but insufficient condition for resilience; Devraj's (2021) research on how lean startups can be both "agile and anticipatory"; and Kesebi's (2019) work on adapting foresight to meet shorter-term pressures of potential disruptions. We extend the inquiry into this domain by proposing to evaluate how foresight might complement Scrum—the most widely adopted Agile framework—in developing resilient

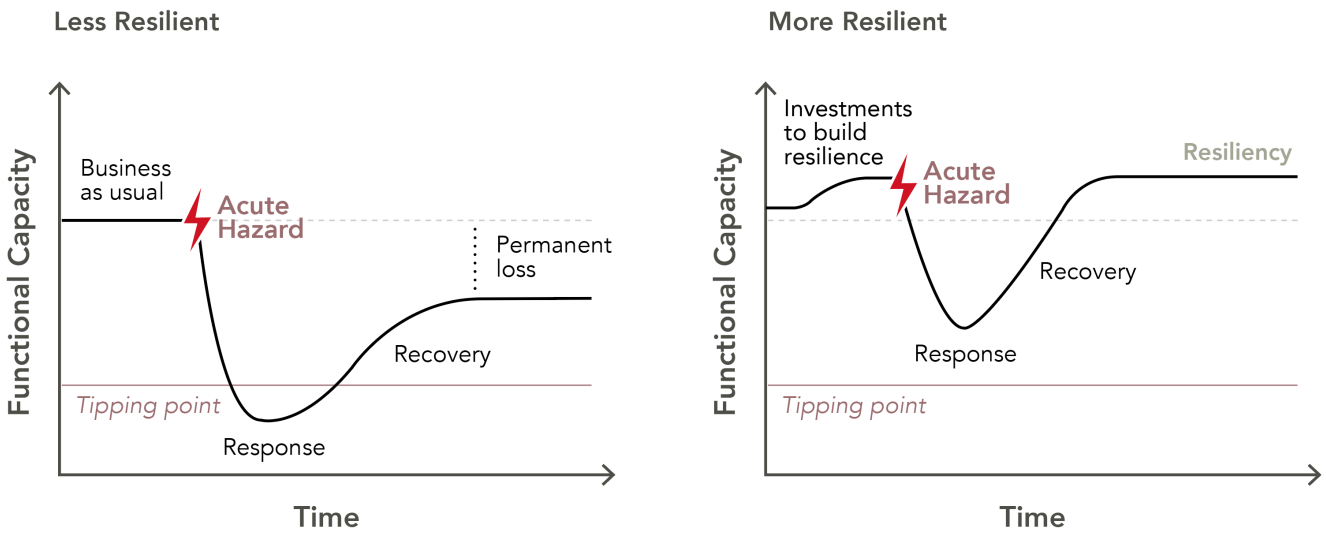

Figure 3: Less resilient vs more resilient.
Adapted from US Federal Government (2021)

product strategies from the perspective of Ontario small and medium-sized software companies.

The theory of resilience originated from Holling's seminal work on "Resilience and Stability of Ecological Systems" in 1973. It has since been applied across many contexts—ecology, supply chain management, metallurgy, individual and organizational psychology, strategic management, safety engineering (Bhamra et al., 2011; Linnenluecke, 2015). The meaning of resilience is similar across all contexts: the ability of a system to return to a stable state after disruptions, turbulences, discontinuities; it involves both the ability to withstand disruptions and the capacity to adapt to new environments (Bhamra et al., 2011). The US Climate Resilience Toolkit (US Federal Government, 2021) highlights the importance of building resilient capability to prepare for disruptions—when hit by a disruption, a business-as-usual system could go over a tipping point that results in permanent loss, but a system that proactively invests in its resilient capability is able to respond and recover to its original state (see Figure 3). In business literature, resilience has been mostly explored through supply chain management (Ismail et al, 2011) and safety engineering (O'Reilly, 2014), but we have not found anything related to product strategy for software companies. It is an opportunity area for research into how resilience could be applied to product strategy development for software companies.

There are also other gaps and limitations in the current literature. While Agile and Scrum have well-defined principles and processes (Schwaber & Sutherland, 2020), they lack details on how to apply product strategy. Several Agile experts have recommendations on how to develop a product vision and strategy for Agile teams (Schuurman, 2017; Cordrey, 2019; Pichler, 2020), but there does not appear to be consistency in how this is practiced in the industry. One example developed by Roman Pichler is seen in Figure 4, displaying the connections between product vision, strategy, roadmap, and backlog. Within Agile and Scrum, most literature references the product vision as a future state of the product, looking approximately 2-5 years out, and is generally a short statement used to inspire teams and stakeholders. The product vision seems to be the only practice commonly paired with Agile, which promotes forward-thinking that exceeds the next few months. On the other hand, product strategy is the actionable steps taken to achieve the stated vision, often broken

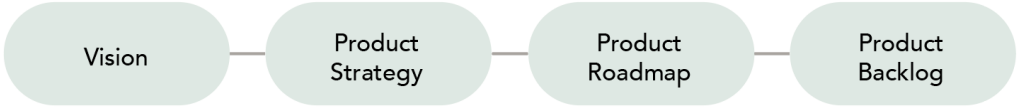

Figure 4: Example of connections between Agile product management processes. Adapted from Pichler (2018)

down into features or epics. These strategies are typically logged into the product roadmap, soon becoming "stories" in the product backlog. Due to the focus on short-term planning and constant iteration within Agile, some organizations mistakenly think that they no longer need an effective product strategy after adopting Agile methods and practices. Agile teams are too often narrowly focused on the present concerns of how to build the software rather than on what they should be building and its long-standing implications. This narrow focus can lead to products and features being developed regardless of their level of impact on the business or their users, putting the product at greater risk of failure and disruption from the market (Cagan, 2008).

There is also a lack of consideration for resilience in product strategy development, even though this is becoming an ever more important aspect in a volatile world. US Small Business Administration (2015) reports that 40% of businesses do not reopen following a disaster. Another 25% fail within one year. Over 90% of companies fail within two years of being struck by a disaster. Birkinshaw (2020) emphasized that the COVID-19 pandemic has shifted the organization's imperative from agility to resilience. But how can teams and organizations operationalize this in a practical way? We only found a limited number of sources that relate resilience to product strategy. According to O'Rourke (2021), it's no longer enough to just focus on the customer or the immediate market; a company needs to take a broader systemic view of all the interdependent relationships to stay resilient. Shafqat et al. (2019) says a resilient approach to product development requires a "monitor-and-adapt" mindset rather than the traditional "predict-and-plan", especially when it comes to managing unknown risks. In partnership with Mike Edmonds, Mural (n.d.) has created a Resilient Product Roadmap template that claims to develop products that withstand the test of time when faced with uncertainties. The template looks at not only the product vision and long-term goals but also environmental forces that can impact the product's success. All these different sources acknowledge the increasing uncertainty in the environment and the need to monitor more widely for unexpected events that can throw off a business' product strategy. However, we did not find any sources that might help Agile companies to integrate resilience in a practical way. We aim to address this gap with this research project.

Research Questions

This research project aims to help Agile software product teams become more resilient at the product strategy level, with the end goal of increasing their likelihood of successfully overcoming major disruptions. Our definition for resilience is one's ability to withstand a major disruption and return to a stable state. Our project studies specifically resilience at the product strategy level, which is different from the entire organization's resilience or the product's operational performance. However, resilience at the product strategy level could impact other aspects of the organization's resilience.

We designed a research plan to understand the current state of resilience that software product teams are experiencing. We then would identify areas of opportunity that can help these teams develop more resilience.

We applied boundaries to our project regarding geography, organization size, and Agile framework of choice to further focus our research. Specifically, we chose to study organizations operating within Ontario, Canada, to limit the potential cultural differences across regions. We also decided to study small and medium-sized enterprises (SMEs)—organizations with less than 500 employees—as they tend to be the most at risk of disruption. In addition, we chose to study organizations that specifically utilize Scrum, as it is the most popular Agile framework in the software development industry.

With these conditions in mind, we established our primary research question with three secondary questions.

Primary Question

How might SMEs operating within Ontario, who use the Agile Scrum framework to develop software products, create more resiliency at the product strategy level?

Secondary Questions

Does Scrum help software product teams develop more resiliency at the strategic level?

What is the relationship between Agile software development, long-term planning and future resiliency?

What factors affect resiliency at the strategic level for software product teams?

Methodology

To best answer our research questions, we wanted to ensure we designed a holistic research plan to gather various data for both quantitative and qualitative analysis. Therefore, we conducted a literature review to frame our areas of interest, interviews of experts for context, a survey to gather quantitative sampling, and interviews of product practitioners to uncover qualitative patterns.

Literature Review

A literature review was conducted to establish the theoretical ground of our research and check for overlaps or gaps in the existing literature. We searched academic journal articles and online articles on the history of Agile, Agile principles and methodologies, theory and applications of resilience, product management, product strategy, the use of Strategic Foresight, and works that relate agility with resilience.

Reviewing the literature also helped us become familiar with the language used by academic researchers in related domains and the language used by Agile practitioners in the field. This supported our ability to converse with them and relate our research to what is meaningful and important to them.

Survey

To gather a wide range of perspectives on the relationships between Agile software development, product strategy, and resilience, we conducted an anonymous online survey.

This survey included various questions to help us understand how SMEs in Ontario that utilize the Agile Scrum framework formulate product strategies and how well prepared those same organizations are for a major disruption.

65 participants responded to the survey, all of whom were working within a product department at an SME in Ontario that utilizes the Agile Scrum framework to develop software products at the time of the survey. It was important for our study to ensure we were gathering information from individuals who had a deep understanding of both the software development process and the business and product strategy process at their organization. Seeing as most job positions in technology put you on either side of the technology vs. business spectrum, we identified that Product Managers, Product Owners and other product positions often sit uniquely between these two departments.

The rationale of using an online survey specifically as one of our methods is that it enabled us to gather more diverse perspectives on the topic in a shorter amount of time through the ease of the internet. This allowed us to use the data collected to identify broader patterns and themes for our research.

The questions used in the survey can be found in Appendix A.

Background of Participants

The survey collected 65 responses from individuals with different product management backgrounds who work for organizations of various sizes, and maturity seen in Figures 5, 6, and 7.

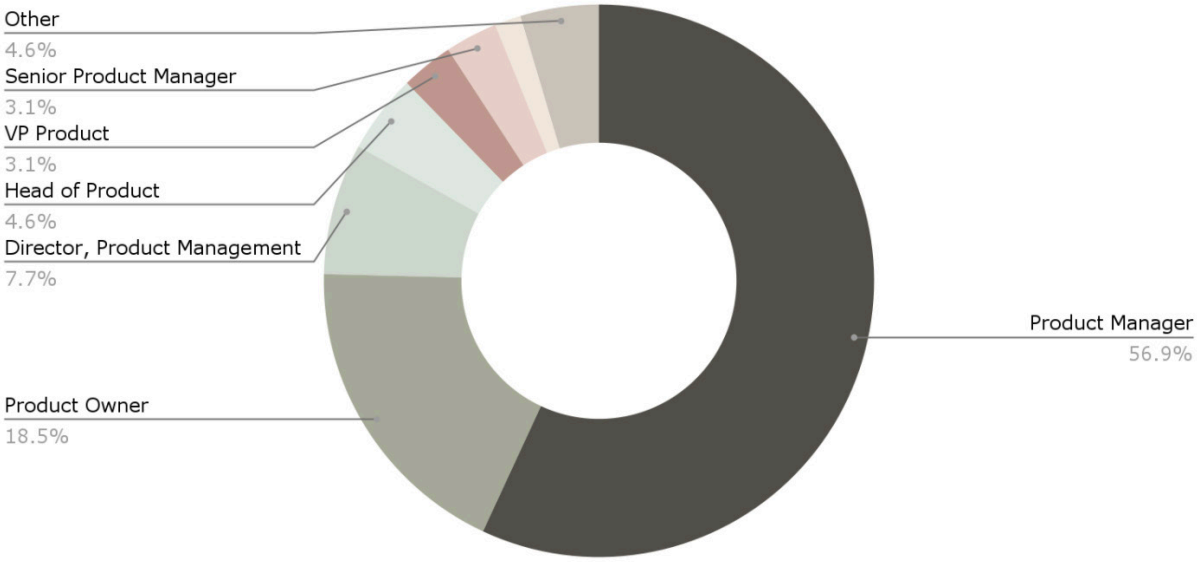

Figure 5: Job titles of survey participants

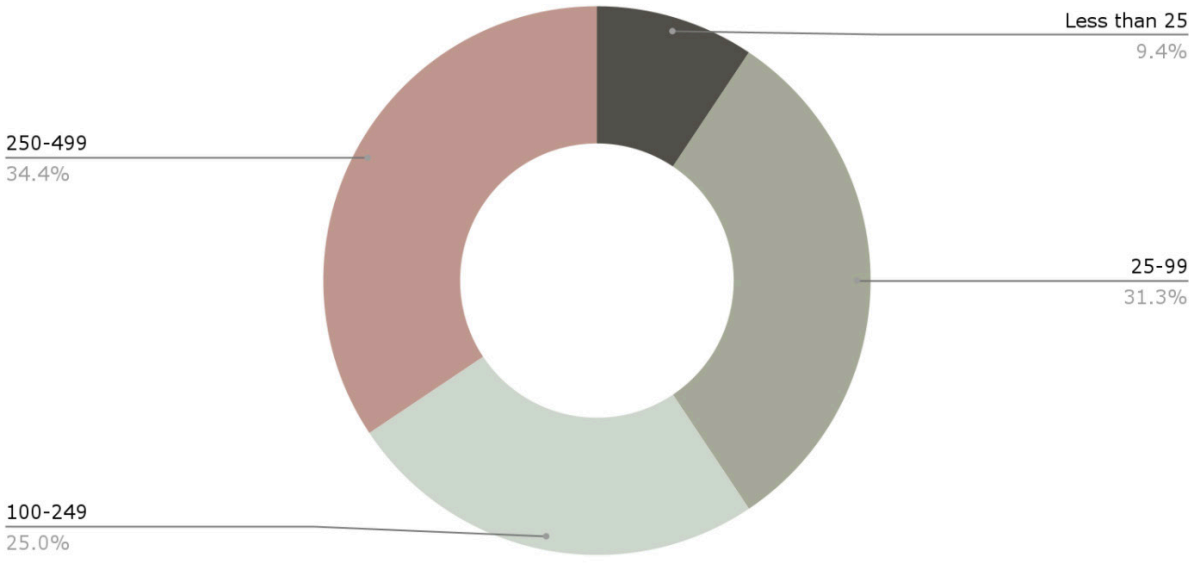

Figure 6: Organization sizes of survey participants

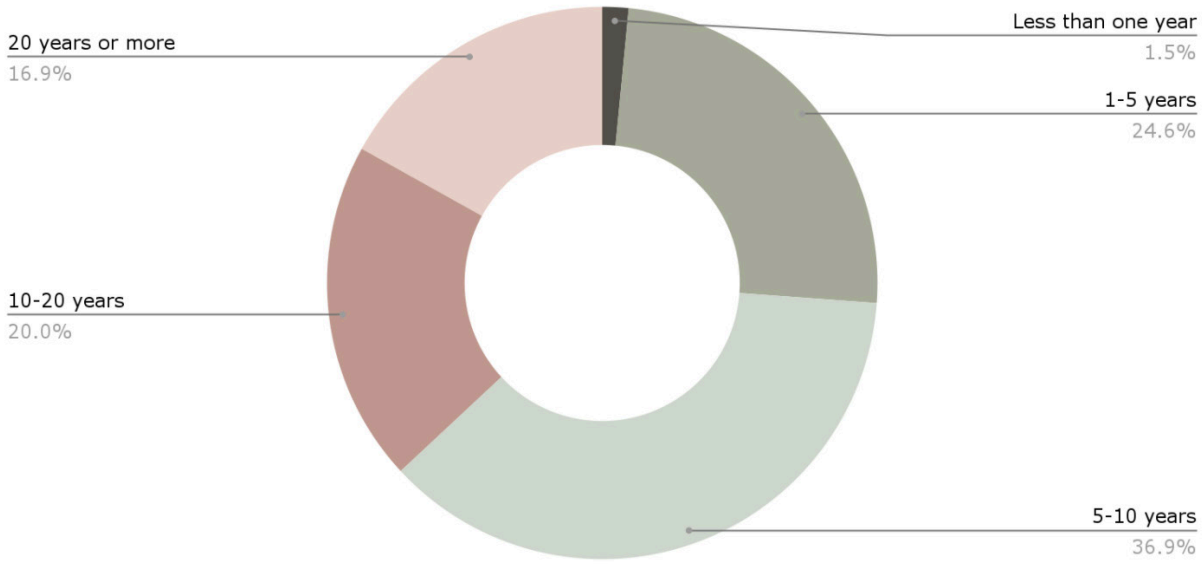

Figure 7: Years in operation for organizations of survey participants

Practitioner Interviews

To help us gain a deeper understanding of the relationships between Agile software development, product strategy, and resilience, we conducted a series of 30 minute confidential online interviews. These interviews allowed us to explore real-world examples and stories from those closely connected to our research topic, enabling us to draw further connections.

For our study, we conducted eight interviews, all of which were with either Product Managers or Product Owners who currently work for an SME in Ontario that utilizes the Agile Scrum framework to develop software products. This is the same participant criteria as our online survey; however, this method was significantly different in that we were able to ask much more specific and deepening questions to see a much richer picture of the unique perspectives of our participants.

We chose to conduct interviews to have dedicated time to hear specific examples from our participants on our areas of inquiry. We already understood that every organization is unique, and we wanted to complement and strengthen the data gathered from our online survey with further data gathering and rigour to ensure our research was both relevant and robust.

The interview guide for our practitioner interviews can be found in Appendix B.

Expert Interviews

We interviewed experts in Agile and product strategy to learn from their implicit and explicit knowledge accumulated from years of industry experience. The expert interviews provided a broader and deeper perspective than the practitioner interviews on how companies develop product strategies for Agile teams. As a result, the interviews helped deepen our understanding of both the problem and the opportunity.

Each expert we interviewed has ten or more years of experience working with tech organizations that develop software and is seen in the industry as an Agile methodology expert or product management expert.

The interviews were conducted over online video calls, lasting approximately 45 minutes each. The interview was then transcribed, coded and categorized for cross-analysis between all the interviews.

Due to the variety in the experts' experience and expertise, we developed unique questions for each interview. A generic version of our interview guide can be found in Appendix C.

The experts we interviewed included:

David Pereira

David Pereira is the Head of Product Management at Virtual Identity. He is a prolific writer on product management with Scrum, having written over 140 best-practice articles with over 1 million views. He regularly speaks and teaches to share his experiences to help other product managers and product owners. David is from Brazil and is currently based in Munich, Germany. https://davidavpereira.medium.com/

Florian Grote

Florian Grote is a Professor of Product Management at CODE University of Applied Sciences in Berlin. He has filled design and product roles in the music technology industry, working on innovative instruments for electronic music production. His research focuses on cognitive and systemic perspectives on learning organizations with special attention to resilience. Florian is based in Berlin, Germany. https://fgrote.com/

Mike Edwards

Mike Edwards is an experienced coach and mentor for Agile teams, organization culture, and leadership development. He is an Accredited Leadership Gift Program Mentor (The Responsibility Company), Certified Professional Co-Active Coach (CTI), Professional Certified Coach (ICF), Leadership Graduate (CTI), Organizational and Relationship Systems Coach (CRR Global), and IC-Agile Expert-Agile Coaching (IC Agile). Mike is based in Ontario, Canada. https://leadingforchange.ca/

Roman Pichler

Roman Pichler is a product management expert specializing in digital products and Agile practices. Roman has taught product managers and product owners and advised product leaders for more than 15 years; he has been involved in product management and Agile software development for more than 20 years. Roman is based in England, UK. https://www.romanpichler.com/

Data analysis methods

A mix of quantitative and qualitative analysis was applied to the survey and interview data. Additionally, we used our expert interviews to help guide us in our search for themes and patterns.

Quantitative

We analyzed the survey's quantitative data in several passes. We noted any prominent features and surprises on the initial pass, from which we formulated additional questions to frame our analysis in subsequent passes. We identified data metrics (proactive vs reactive, the effectiveness of strategy against potential disruptions) that are key to our research question. We then ran correlation analysis to determine whether these key data metrics are correlated with other data in the survey.

Qualitative

We analyzed the interview transcripts and qualitative components of the survey using thematic and pattern analysis.

To analyze the practitioner interviews, we began by familiarizing ourselves with all the collected data. We first transcribed our recorded interviews into a written format and read them thoroughly, ensuring all data was captured. We then wrote down our initial impressions individually, allowing us to cross-reference our notes after. Next, keeping in mind our research questions and project goals, we reviewed all the interview data with a critical and open mindset, allowing us to see any related findings. We began to see some similarities and patterns emerging from our data through our analysis. We then used these patterns to generate a list of themes.

Utilizing our list of themes as a starting point, we conducted a more thorough thematic analysis. We did this by coding all interview data into the identified themes and identifying and coding new themes as they were uncovered throughout the process. This was a highly iterative process requiring several passes through all the interview transcripts. After completing our thematic coding, we were able to identify new patterns in how the themes appeared participant to participant, question to question. This helped us see the relationships between the themes and their relationship to our research questions.

Finally, we did a thematic analysis on the survey participants' answers on their current strategy process and what they would change about it. The themes were analyzed together with the themes from the interviews for insights.

Research Findings

Through our detailed research data analysis, we answered our three secondary research questions with six key findings. Utilizing this new knowledge and perspective, we were then able to answer our primary research question of "How might SMEs operating within Ontario, who use the Agile Scrum framework to develop software products, create more resiliency at the product strategy level?". Our answers to our primary research question can be found in the Solutions section of this paper, starting on page 37.

Does Scrum help software product teams develop more resiliency at the strategic level?

Most software product teams have been relatively successful at navigating disruptions in the past, however not without struggles and costs.

Survey data shows that most respondents reported confidence in how their organization handled major disruptions in the past and in their capability to meet future disruptions.

When asked to reflect on the past, 48% of respondents stated they had experienced a major disruption in the past five years. However, of those respondents, 80% claimed to have adapted or reacted to their disruption successfully.

Then looking towards the future, most survey respondents expressed mild optimism that their current product strategy process would be effective against future major disruptions. The survey also revealed that only a small number of participants view their existing product strategy process as highly effective, indicating there is room for improvement as seen in Figure 8.

We note that a respondent's belief in having an effective strategy process does not necessarily mean that the strategy process is effective in actuality. The belief is more of an indicator of past performance than future

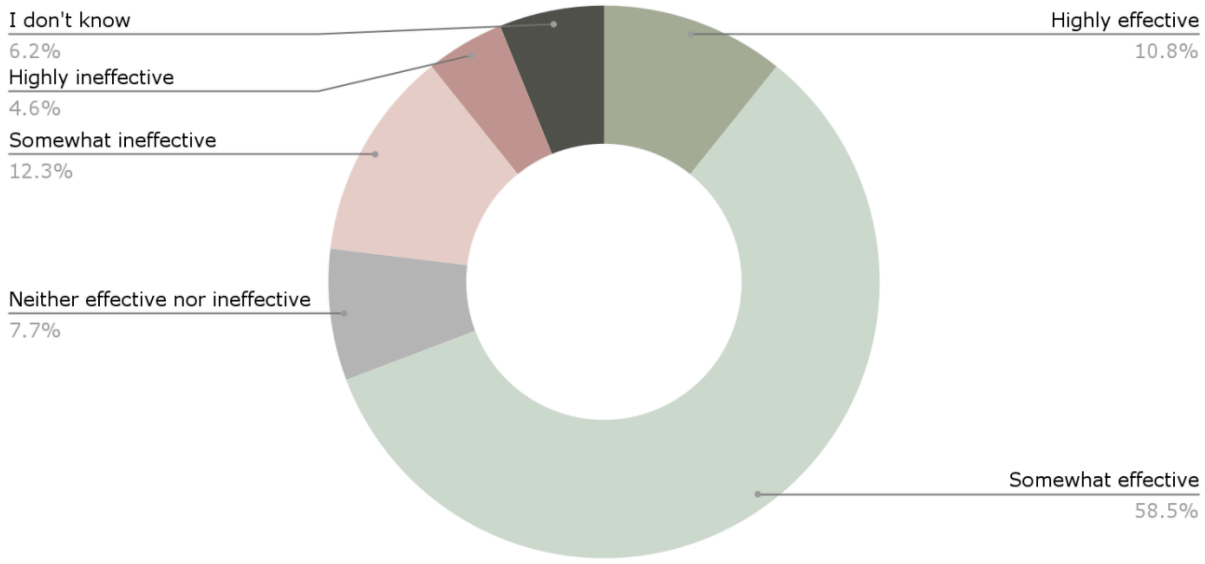

Figure 8: Responses to the question: "How effective do you believe your organization's current product strategy process would be at combating a major disruption or threat in the environment and/or market?"

performance. The belief may also reflect the respondent's bias based on their position in the company—the more involved they are in developing the strategy, the more likely they are to be confident in it. So the actual effectiveness is likely to be less than what was reported. Determining the real effectiveness, removed from any bias, is beyond this project's scope. For this project, the subjective view by the product community provides a sufficient indicator for us that there are opportunities to help organizations improve the effectiveness of their product strategy processes.

The practitioner interviews revealed more details on how teams, despite being successful at navigating disruptions in the past, also experienced struggles and/or associated costs. The interviewees' stories and examples revealed their journey, each with their pain points and lessons learned while navigating uncertainty. We identified that six out of the eight interview participants experienced what we would consider a major disruption at their organization. When asked to describe their organization or team's response to the disruption, most spoke of a delay in their ability to adapt, often leading to a decrease in revenue and negative impacts on their bottom line.

> *"There were times when our app couldn't make money because we couldn't do the turnover... Our contingency plan was stretched to the limits of what it could handle."*
>
> *- Interview participant*

The causes of these delays mainly stemmed from the organization not foreseeing the potential of the disruption before it happened, meaning they had insufficient contingency plans or strategies ready to handle the disruption. In all of our practitioner interview examples, their organizations were lucky enough to have sufficient capabilities (resources, cash reserves, and/or government support) to withstand the shock of their disruption and recover without losing the business entirely. In addition, many interviewees indicated that following Agile and Scrum helped their team react and pivot more quickly to combat the disruption. This demonstrates that Scrum did not help develop resiliency at the strategic level for these teams. Instead, it was used as a tool to help them execute on a reactive strategy created after the disruption was already happening.

This overall finding of teams being relatively successful at navigating disruption is interesting to us as researchers. However, we find it unclear on the level of risk these product teams and organizations are genuinely facing moving forward. We understand that not all organizations can overcome the same level of disruption. Organizations with more resources and deep cash reserves can choose to take more risks and throw money at an unexpected disruption if needed. But for organizations that have limited resources that operate in changing or uncertain environments, unfortunately, they are putting themselves at significant risk if they choose to ignore the unknown and not actively work towards improving their resilience at the strategic level. Overall, there is a lack of awareness about how to think proactively about

the future. Rather than exploring potential future disruptions, some teams are using their limited resources as a reason for pre-determining that there is nothing they can do.

> *"Let's say a big thing was coming or a big change was on the horizon. I honestly don't think we have the resources or the experience to say, 'Hey, this is coming. Here's what we should do to mitigate it or plan against it.'"*
>
> *- Interview participant*

Agile and Scrum, when done effectively, does contribute to resilience through improved adaptability. However, many companies are not effective at Scrum, and Scrum on its own is not enough to be resilient.

As noted previously, most product managers expressed confidence in their team's ability to navigate major disruptions. A big reason is how effective they react and adapt using Agile and the Scrum framework. However, interviews of practitioners and views from experts indicate that many teams are not fully effective in their adoption of Scrum.

The discipline of digital product management and product ownership is still new, and many in these roles are still learning. Companies are being sold on the benefits of Agile and Scrum, or are adopting it because of its popularity in other large tech companies, hoping it will help them attract good talent. The issue here is they often adopt the process mechanically by going through the motions. Yet, they ignore the spirit and culture of Agile, which is about being empowered, being collaborative, and learning quickly. Most organizations are still stuck in their traditional culture and are unwilling to change. Unfortunately, many product teams and those in product roles are not empowered. They are often tasked with leading a feature factory, as described by Marty Cagan (2019), where the team is constantly delivering features and not focused on delivering actual value.

> *"The product strategy process starts with a product brief… a document that talks about one thing that we want to build. And usually, that idea or that concept comes from leadership."*
>
> *- Interview participant*

This is echoed in David Pereira's observation that many Agile teams are not empowered to focus on user value and use the Agile process as a productivity tool to pump out features.

> *"Often teams are not empowered at all... Are the executives willing to define where to go and let the team figure out how to get there? Most of the companies that I know are not willing to do that."*
>
> *- David Pereira*

A contributing factor to the problem is that the education and training for the role of a product manager is lacking and not standardized. While there may be formal education and rigorous training to be a software developer or a project manager, it rarely exists for the role of a product manager. As a result, it is possible to take only a weekend course or an online exam

to achieve the certification of being a Scrum product owner.

Rather than having empowered Agile teams, most organizations still follow top-down linear thinking. Our interviewees shared stories of how new requests from upper management can override their roadmap and priorities. And while they may be using Scrum, they are following linear roadmaps, without the empowerment to use Scrum feedback loops to learn and adapt. Instead, their strategies come from the senior leadership team.

> *"I don't necessarily decide on the high-level missions of the projects, they just kind of appear one day, and then it's, oh, by the way, you're doing this, please do this."*
>
> *- Interview participant*

This lack of autonomy and empowerment is also reflected in survey responses from those asked to describe and critique their current product strategy development process:

> *"Siloed decisions at the top. Lack of transparency, inclusion, and autonomy."*
>
> *"The top-down decision makes it very difficult to work in an Agile methodology."*
>
> *"I'd want more of a place at the table, with data in hand to challenge WHY we need to do something."*
>
> *"Product managers should be more involved in the process."*
>
> *"Ideally we would improve the team autonomy on day-to-day decisions."*
>
> *"More transparency to reasoning why the strategy is laid out."*

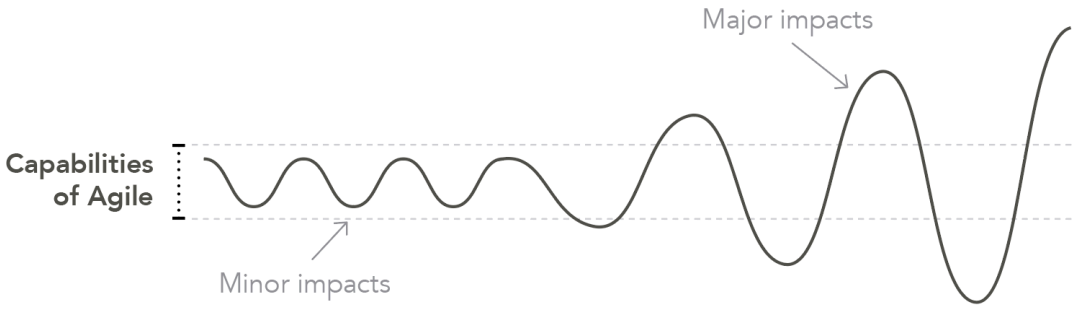

Figure 9: Limitation of Agile when dealing with major impacts

From Mike Edwards' perspective, many leaders and executives have been sold on the idea that Scrum will deliver more value in less time without really knowing what is required and that teams need to be empowered. It's not just adopting a framework; it's a culture change that takes a lot of work.

> *"Often leaders read the Agile pamphlet, and they're kind of skimming through it saying 'Oh, here's the new way.' Or some consultants sold them on how they can do things faster, better, cheaper. When the reality is, it's hard work."*
>
> *- Mike Edwards*

Those who have successfully transitioned into Agile and Scrum, both in terms of the methodology and the culture, develop confidence in their ability to learn and adapt in changing and uncertain environments quickly. However, while being agile and adaptable is a factor in resilience, it is by itself insufficient (Zubair, 2021). Successfully adapting quickly is only possible when the disruption is within a certain magnitude—when the time for adaptation is less than the time it takes for the negative disruption to cause irreversible damage. Relying just on adapting quickly is not helpful against more significant surprises as outlined in Figure 9. For those, more anticipation and preparation is required, giving teams a larger capacity to adapt when the surprises hit.

What is the relationship between Agile software development, long-term planning and future resiliency?

Agile and Scrum, when done effectively, encourages short-term flexibility. However, doing so can shift a team away from deliberate long-term thinking, an essential component to resilient strategizing.

Agile and Scrum encourage and promote short-term thinking. And according to our research, this is by design and often viewed as a positive quality.

> *"Absolutely Scrum encourages short-term thinking. And, you know, from everything I've read, seen and heard, there are no apologies about that."*
>
> *- Mike Edwards*

It is often seen as an improvement over traditional planning processes like Waterfall, which creates more rigid long-term plans that are incapable of adapting to changing circumstances. An effective Agile and Scrum process avoids committing to a fixed long-term plan. Instead, it empowers a team to focus on short-term deliverables and iterate through constant feedback. Staying focused on short-term adaptability is how most Agile and Scrum teams manage uncertainties and unknowns.

One of our practitioner interviewees stated that reducing their planning time horizon from three years to one year was one of the most significant improvements that their team made after being disrupted by COVID-19.

> *"Our shorter timelines have made us more agile, let's call it or more dynamic and more flexible... I think that's the biggest change we've seen, is that when something takes a hit, we're more okay with it than we would have been in the past."*
>
> *- Interview participant*

Previously, they invested time into planning future feature developments for up to three years away. To their surprise, the pandemic disrupted their strategy and rendered all their previous long-term planning to waste. This happened at a small-sized organization with minimal resources. To stay lean and flexible, they found it was more effective for them to have a shorter planning time horizon. It was also a humble acknowledgement of their lack of confidence and underlying assumptions in how the future will unfold.

This short planning time horizon of a year or less is common among other participants we interviewed. Detailed planning is typically done for the next quarter, a higher level roadmap is planned for the next two quarters, and there is some fuzzy planning for one year out. There might be ideas for longer-term initiatives, but they are often not actively investing or

planning for them. This appears to be the most commonly adopted planning approach for small to medium-sized organizations, which have limited resources and are trying to adapt to changing and uncertain environments.

A criticism of this short planning time horizon is that it makes it extremely difficult for teams to think holistically about longer-term unintended consequences of their products and the potential benefits or harms they may create. In addition, it doesn't enable teams to think holistically about potential long-term disruptions that may directly impact their products positively or negatively in the future.

> *"Scrum teams don't get a time horizon beyond their immediate development efforts. I think that is what is currently leading us to a lot of the problems that we have today."*
>
> *- Florian Grote*

Many companies have made, or are making, the transition towards Agile. But, if you ask Agile experts and coaches, this is a challenging transition. Most companies find it hard to shake off the habit of traditional strategic planning, which is assumptive, top-down, linear, and inflexible.

> *"My impression is that companies still use largely traditional planning approaches... But for me, that is the wrong attitude, that's the wrong approach, certainly, as long as there is a significant amount of uncertainty and change."*
>
> *- Roman Pichler*

In comparison, Agile is much more suited to today's environment with many complexities, changes, and uncertainties. However, when shifting from traditional long-term planning towards Agile, organizations may give up long-term strategic thinking altogether. From one perspective, it makes sense: why bother considering the long-term if there are so many unknowns and if anything and everything can change? Against the large swath of unknown and uncertainty, it is tempting to shrink one's strategic vision, stick to smaller steps and iterate. However, as mentioned previously, we see this as a significant vulnerability. These teams can only adapt to change or disruption that can be uncovered and dealt with in the time and resource constraints of Agile and Scrum. Any disruption that requires more time for strategizing or response development would significantly delay overcoming the disruption, putting these teams at risk. Alternatively, when thinking of opportunities, focusing exclusively on the short-term may result in a loss of future potential as specific opportunities may require a more long-term strategic mindset.

Organizations in our research are at various points in their journey of transitioning from traditional strategic planning to becoming more Agile. Traditional strategic planning and Agile processes represent two different attitudes toward uncertainties. Traditional strategic planning ignores uncertainties, while Agile acknowledges them and does so by being flexible to change in the short term. However, it is interesting to us that through our research, there seems to be a lack of awareness on alternative strategic development approaches that would allow these teams to face the uncertainties of the long-term.

> *"It's a misunderstanding to say Agile and longer-term planning don't go together. Agile and **traditional** longer-term planning don't go together, yes. Because **traditional** longer-term planning makes the assumption that we can anticipate the future in detail correctly."*
>
> *- Roman Pichler*

Organizations that use Agile Product Management do not appear to have knowledge of future thinking tools such as Strategic Foresight, which does not have the same linear, rigid, and assumptive qualities as traditional planning (see Figure 10 on the comparison between traditional planning, Agile, and Strategic Foresight). Therefore, we see this as an area of opportunity for these teams by combining divergent longer-term planning with the existing flexibility of Agile to help improve their resiliency.

With its focus on short-term delivery, Agile also seems to feed into today's trend towards more speed and efficiency—taking on attitudes of not overthinking and "failing fast" just to try things out and then iterate later. Under this pressure, Agile teams can become too focused on continuous delivery, turning into machines that always need to be fed new tasks. For example, one product manager we interviewed expressed how much time it takes for them to keep feeding the Scrum team to make sure they are busy, and as a result, they do not have enough time to think more broadly.

> *"As a PM, I feel like you're pulled in a bunch of directions. And the people who really pull you in are the engineering teams or the UX teams, and they want your attention, they need feedback, they want you to answer their questions… it's really hard to balance that as a PM. How do I be strategic, but also make sure the development [team] is satisfied so they can actually build things?"*
>
> *- Interview participant*

This optimization for speed and efficiency can take away the need to think systemically; it can remove the redundancies and reserves that are needed for resilience (Martin, 2019; O'Reilly, 2014).

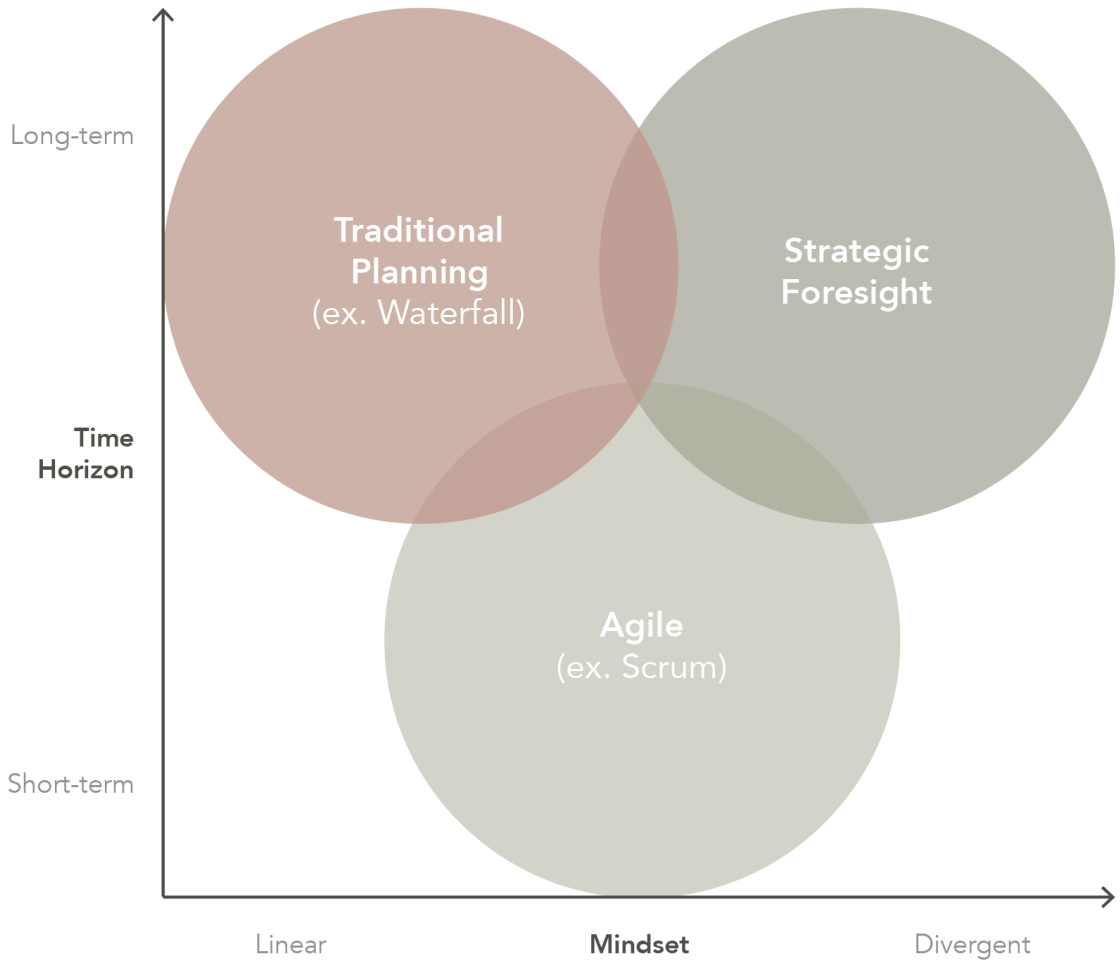

Figure 10: Comparison chart of traditional planning, Agile, and Strategic Foresight

What factors affect resiliency at the strategic level for software product teams?

Being proactive is beneficial to resilience; however, many organizations tend to be reactive.

During our practitioner interviews, we asked participants to describe a past example of a major disruption that significantly impacted their product or organization. Through our analysis of these examples and their team's ability to overcome these disruptions, we found that those who were more proactive with their strategy process were more likely to overcome their major disruption or threat. As an example, one team successfully overcame their disruption quickly by having strategic conversations about the potential impact of such an event before it happened.

> *"We were able to react in a proactive way, it wasn't something that we were completely blindsided by. And so as a result, we were able to come up with a pretty detailed [contingency plan]."*
>
> *- Interview participant*

From our practitioner interviews, all of the organizations that were negatively impacted by a disruption relied on a reactive approach and had no proactive strategy before the major disruption occurred. In addition, through our survey analysis, we discovered that product teams, who tend to be proactive with their strategic approach, are more likely to believe they have an effective strategy process capable of overcoming a major disruption or threat.

This evidence indicates that having a proactive strategic approach does help product teams and organizations increase their resiliency and ability to combat a major disruption or threat.

Although being proactive may help teams with their resilience, 49% of respondents to our survey indicated that they lean more reactive, with only 37% claiming to be proactive and the rest landing somewhere in the middle (see Figure 11). We see this as an opportunity to help tech product teams begin to think and strategize more proactively, helping to increase their resiliency.

While we know strategic proactiveness is related to successfully overcoming disruption, through our survey data we found that those who claimed to be more reactive also stated their belief that they had an effective strategy capable of combating a major disruption, just not to the same degree as those who were more proactive. Because Agile and Scrum promote a more reactive mindset by rejecting long-term planning, this could mean that the short-term adaptability of Agile does contribute towards some degree of effectiveness against major disruptions, or that following the Scrum framework is giving teams a false sense of confidence that they will be just as effective against a major disruption, even when only relying on a reactive Agile approach.

Selected survey responses to the question: "*In your own words, is there anything you would change about the process of formulating product strategies at your organization?*":

"Love to make it more proactive."

"We need a more strategic outlook on the engineering side to align goals/visions of the company."

"We're still very much reactive and can't strategize further than a quarter."

"More forward-thinking less reactive."

"Too much reactive decision making based on a competitor adding a feature."

Being reactive also lent itself to a few other relevant correlations in our survey data. Those who are more reactive tend to have either a low level of concern for the future or a high or even extreme level of concern. In comparison, those who have a moderate concern for the future are more likely to be proactive. Additionally, those who are reactive are more likely to follow a hybrid model of Agile and Waterfall, and they also tend to work for larger organizations. And finally, being reactive is also correlated with those who are less likely to scan and monitor their environment. This last point is significant because, with the absence of scanning and monitoring for potential disruptions or threats, these teams and organizations are further shortening their reaction time to pivot and react by not identifying risks early on.

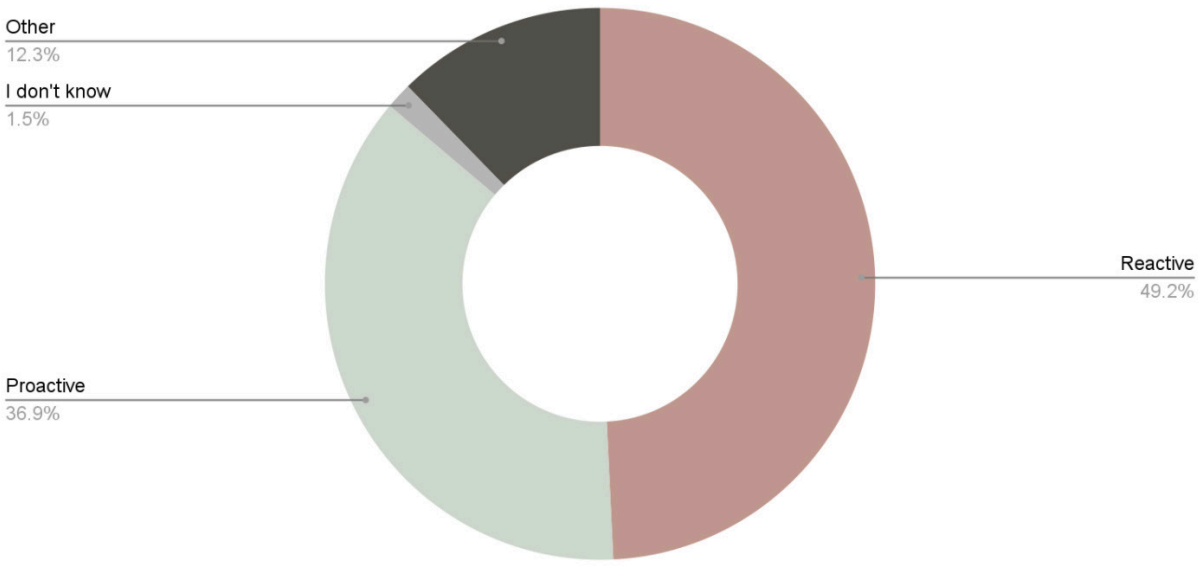

Figure 11: Responses to the survey question: "How would you best describe your organization's approach to change in the environment and/or market?"

The attention of most tech product teams is narrow and short-term focused.

Our survey and interview data revealed that the focus and attention of many product folks are exclusively on their immediate environment. The impact of this hyper-narrow attention means they are mostly blind to anything outside of it. In general, we found that teams are primarily focused on: their revenue targets, end-users, and competitors. A tiny percentage of participants indicated that they occasionally monitor their specific market for trends and changes; however, we did not find any example of teams having a documented or communicated process of doing so. This reveals that product teams generally lack any systematic approach to scan and monitor their environment, which could indicate a lack of scanning and monitoring capabilities in the overall organization, or that those capabilities are restricted to other areas of the organization and not communicated sufficiently to the product teams. In either case, the product teams show limited systemic awareness of the environments they operate within, lacking the capability to gather a broad range of insights to foresee potential risks, threats, or opportunities.

This narrow attention not only makes the product team blind to disruptive impacts from the surrounding system, but it also makes the team blind to the impact, positive or negative, it can have on the broader world around it. According to Florian Grote, an expert on product management regarding resilience, most product management practices are driven by user-centred design, but lack considerations on the impacts on other stakeholders, human or other. Having a wider contextual view is critical in a world that is becoming increasingly interconnected and volatile.

> *"User-centred design is selfish in a way because it only focuses narrowly on the end-user. It does not take into account all the other systems that are impacted by it or that can have an impact on it."*
>
> *- Florian Grote*

The narrow attention seems to be primarily due to a lack of resources and time at the product level. It is also sometimes caused by a top-down structure, where there is a lack of communication between upper leadership and the product teams. The pressure to deliver with limited resources forces product teams to prioritize their level of scope when looking for risks and opportunities, often eliminating anything outside their immediate control.

> *"We scan for very, very specific things, we scan in a very biased way rather than, you know, let's just scan for everything. And the problem is that you always have limited resources."*
>
> *- Interview participant*

The role of a product manager is, in general, often stretched thin and pulled in multiple directions. We found there to be a wide range of responsibilities that fall under the role of a product manager: leading a technology-focused development team, managing stakeholders, balancing the needs of users and the business, monitoring data analytics and market trends, generating marketing ideas, developing product strategies, prioritizing the product roadmap, as well as grooming the product backlog. While interviewees admitted that there were potential gaps in their attention, they also expressed that their attention is finite and that expanding their level of view would mean that something else would get put on the back burner.

> *"Anything could hit at any time, and I just have to figure it out or do it. I mean, I can try to stay on top of something as much as I possibly can. But at what cost? My attention is only finite."*
>
> *- Interview participant*

Not only do teams have narrow attention when they scan and strategize, they are also limited in how far ahead they look into the future. The nature of Scrum is to focus on the short term with fast and iterative release cycles. Most product teams rarely consider a time horizon beyond six months to a year away. This leads to situations where product teams are reacting to surprises and disruptions.

> *"Right now it feels very emergent, where we're making trade-offs on features. We're trying to prioritize X, Y, or Z features in the backlog only within the context of that. We're not sort of looking at the broader scope of where we actually want to be."*
>
> *- Interview participant*

The way some teams reacted to disruption was through having passive wishful thinking. They stated that they hoped the disruption would go away on its own or events would develop in accord with their best interests. In addition, we found evidence of teams choosing to ignore unknown risks on the horizon because they are unsure of what they can do about them. We see this as an interesting insight due to the sense of helplessness these teams feel about disruption or change to their environment, and their inability to control or overcome it. This active choice of ignoring unknown risks by avoiding scanning and monitoring the surrounding systems connected to their product or organization means they are further delaying their ability to respond and pivot successfully.

> *"But the pivot didn't happen, because, again, there was a lot of wishful thinking that this is just gonna pass, let's wait a few more weeks."*
>
> *- Interview participant*

Overall, this narrow attention and short-term focus cause teams to be in a position of vulnerability where they are being reactive

rather than proactive. Using Agile allows the team to be better at adapting than if they were using traditional strategic planning or “Waterfall”, but they are still limited in how much they can adapt than if they had considered more future possibilities.

Having a strong external network contributes to effective responses to disruptions.

Small-to-medium-sized organizations have strong dependencies on their partners, suppliers, and customers, some of which are larger than them. Through our practitioner interviews, we noted how having and maintaining a strong external network of relationships contributed to the team's response to disruptions. In particular, the external relationships helped them gather information about signs of change, collaborate on sophisticated responses, and co-create shared futures.

One product manager noted how their organization makes deliberate efforts to maintain and strengthen relationships with key platform partners. This allowed them to receive early notification about a change that would directly disrupt their strategy and roadmap, giving them more time to respond. These relationships also support a mutual exchange of market intelligence and data analysis, some of which small-to-medium-sized organizations would not have the resources to do by themselves.

> *"We have put a great amount of attention and priority into maintaining our partnerships with these platforms that we work with….we have extremely strict rules and policies on being very strong in communications….making sure that we're maximizing these relationships in both directions. We offer them as much value as we can, with the understanding that if we are a good partner, that we will get a lot of value back."*
>
> *- Interview participant*

Having solid relationships also makes possible a more comprehensive range of responses to the disruption than if an organization is acting on its own. For example, market disruption or change to the competitive landscape often requires organizations to quickly adapt their existing solutions or create new ones. Partners with complementary strengths allow an organization to quickly offer bundled and integrated solutions to changing customer demands.

> *"In this more competitive market, there are also more ways to partner."*
>
> *- Interview participant*

Easy integration with partners, however, requires the organization to develop products based on technology stacks that are modern and open. Conversely, products based on legacy technology and closed standards make it difficult to integrate and adapt.

Having strong relationships with partners and customers are also opportunities for the

organization to shape and influence a shared future. One small organization from our interviews regularly checks in with their large retailer customers on their long-term plans. They are also taking the lead in defining the new data standard and format in collaboration with their customers to support them in the transition towards digitization.

> *"We're working with retailers and brands to standardize and futureproof the business for us."*
>
> *- Interview participant*

As the market becomes more complex and interconnected, having a strong external network of relationships is key to having resilience at the product strategy level. Ultimately, contributing to the resilience of the partners, the customers—the entire ecosystem around the organization—also contributes to the organization's own resilience.

Summary of Findings

To summarize, below is a list of our key findings.

1. Most Agile software product teams have been relatively successful at navigating disruptions in the past, however not without struggles and costs.
2. Agile and Scrum, when done effectively, does contribute to resilience through improved adaptability. However, many companies are not effective at Scrum, and Scrum on its own is not enough to be resilient.
3. Agile and Scrum encourages short-term flexibility. However, doing so can shift a team away from deliberate long-term thinking, an essential component to resilient strategizing.
4. Being proactive is beneficial to resilience; however, many organizations tend to be reactive.
5. The attention of most tech product teams is narrow and short-term focused.
6. Having a strong external network contributes to effective responses to disruptions.

These findings helped us to note what is already working for the Agile product teams, and what are the gaps that need to be addressed to increase their resilience. From here, we turn towards designing potential solutions and interventions.

Solution Design Process

Having gathered our research findings, we looked to design a novel solution or intervention that can answer our primary research question of "How might SMEs operating within Ontario, who use the Agile Scrum framework to develop software products, create more resiliency at the product strategy level?"

Problem Framing

Based on our research findings, we identified the following critical points in this problem space that are opportunities for new interventions and designs:

- There is a gap around deliberate long-term strategic thinking when a team shifts from traditional strategic planning to Agile or adaptive strategic planning.
- The narrow attention and reactive tendency of Agile Scrum teams make them vulnerable to major disruptions.

We started to brainstorm new possibilities using the following questions:

- How might teams broaden their awareness?
- How might teams have more of a proactive orientation towards uncertainty?
- How might teams develop long-term strategic thinking without compromising short-term agility?

Intervention Points

Among the many possible points of intervention, we identified three key points: the input into the strategy process, the role of the product leader, and a quarterly strategic review.

We assessed the primary point of intervention to input into a team's strategy process as seen in Figure 12. To add more of a resilient outlook at the product strategy level, it is crucial to broaden the sources of input that inform the strategy. The strategy would then determine the roadmap and, in turn, the product roadmap.

We see the role of the product manager to be a point of leverage to introduce the new solution. Product managers are directly responsible for the product's success, and they sit at the

intersection between senior management, the Agile team and all other functional teams that contribute to the product (Fechter, 2020). Given its cross-functional reach, it is a role that we think is important to empower in the organization and the role that can lead the work to add more resilience to product strategies.

> *"I think I'm convinced that the medium-sized businesses that figure out how to empower those people truly as product owners, product managers, I think those are the ones that are gonna run over the big companies."*
>
> *- Mike Edwards*

We then identified the time between each quarter and the next to be the ideal time to introduce the new solution. The Scrum teams in our study typically plan their work in detail for each quarter. Therefore, the time between each quarter is ideal for reviewing the strategy and roadmap before starting the work for the next quarter. Reviewing your strategy quarterly is also the cadence recommended by Roman Pichler for "continuous strategizing" in an uncertain environment. According to Pichler, "the external uncertainty never goes away", so he suggests once a quarter as a rule of thumb to review and update the strategy and roadmap to make sure they are still valid.

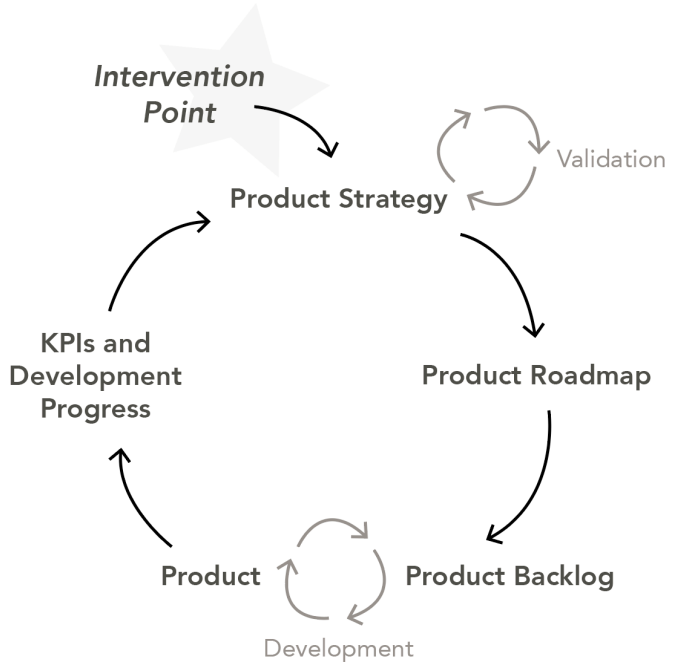

Figure 12: Intervention point into the product strategy. Adapted from Pichler (2020)

Integrating Strategic Foresight

We previously identified that the sources of input into the product strategy need to be broadened for a team to have wider strategic awareness. Teams that have truly embraced Agile find that it does not blend well with traditional strategic planning. This is because traditional strategic planning is inflexible, seeks certainty rather than embracing uncertainty, and is developed in silo rather than through collaboration (Conway, 2016). Strategic Foresight is a better fit with Agile, providing long-term strategic thinking without compromising short-term agility. Compared to traditional strategic planning, Strategic Foresight uses deeper and more diverse perspectives—through horizon scanning, systems analysis, scenario analysis—to come up with creative strategic responses in the face of uncertainties (see Figure 13).

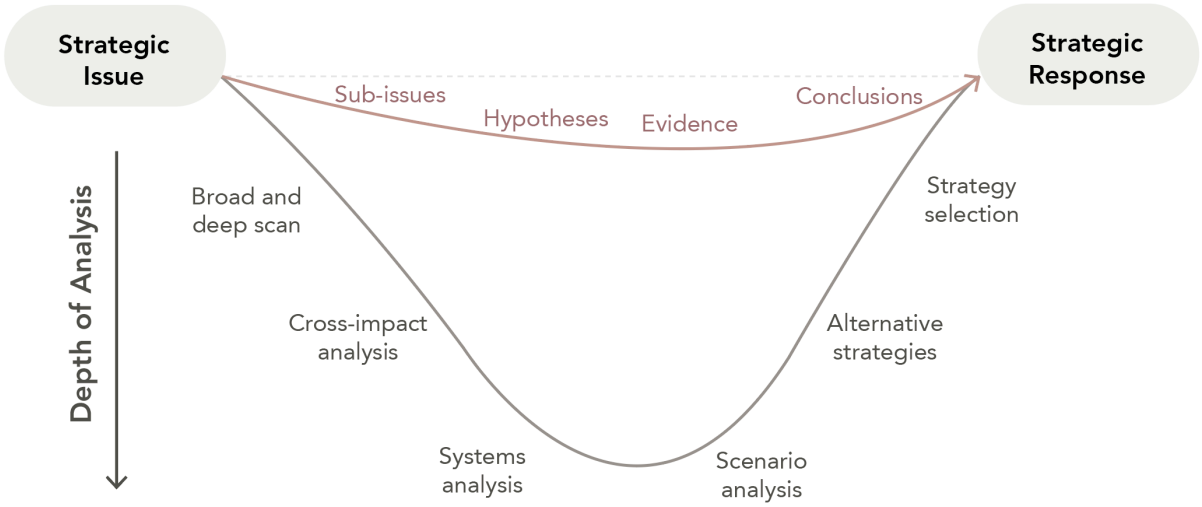

Figure 13: Comparing Strategic Foresight and traditional strategy process (adapted from Rohrbeck et al., 2018, cited in Gordon et al., 2019)

We wanted to see how we might design a toolkit that integrates Strategic Foresight practices with existing Agile processes. Strategic Foresight could complement Agile through different ways of exploring the unknown and uncertainties. Figure 14 shows how Agile has a focused attention on navigating what is immediate, while Strategic Foresight can provide a wider peripheral vision through horizon scanning and also an imaginary vision through scenarios. Each of the "visions" uses a different cognitive logic to proactively explore the uncertainties. The focused attention uses deductive logic to figure out what must be true according to data; the peripheral vision

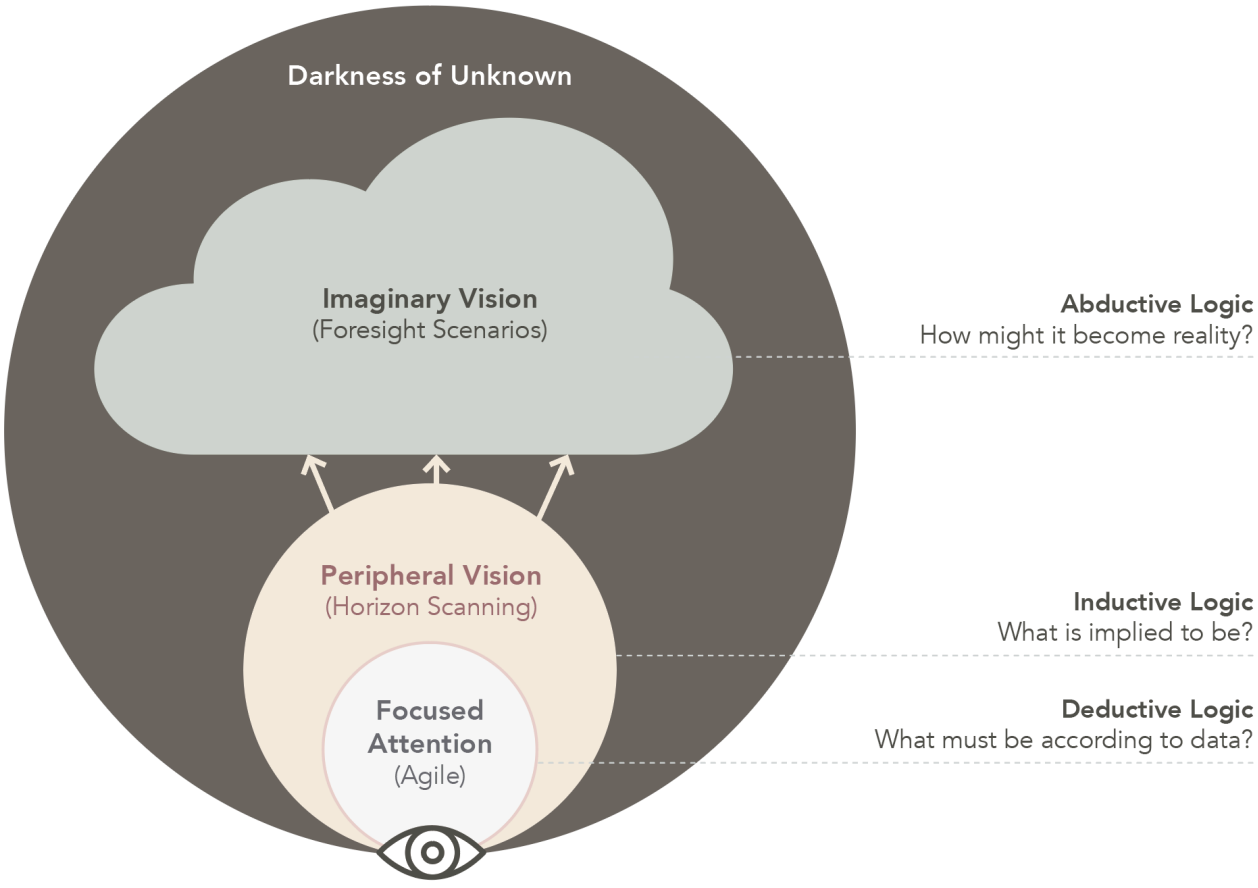

Figure 14: Levels of vision into the unknown

uses inductive logic to project the implications of weak signals; and the imaginary vision uses abductive logic to imagine how radically different futures might become reality. This integrated approach helps to overcome narrow attention, habitual assumptions, and bias towards only what can be measured.

The different levels of vision could also be the basis for different levels of implementations according to the needs and desires of an SME that is resource-constrained.

Design Considerations

We considered the following qualities for an effective solution:

- It must be lightweight, meaning it will not be a significant drain on resources and time.
- It must be easy to learn and adopt.
- It must be customizable and adaptable to the team's needs. I.e. the new solution is not rigid, allowing the team to change the process as the team's needs change.
- It must easily integrate into existing Agile processes and culture.
- It must have a way for teams to self-assess the solution's effectiveness. This would allow the team to evaluate whether they are getting value from the process and iterate and improve it.
- It must demonstrate a value that is easily understood and communicated.

Culture Fit

We already noted in our literature review that there is an overlap between the objectives of Agile and Strategic Foresight, which is that both reject traditional strategic planning in favour of approaches that allow an organization to adapt to change. Agile is biased towards exploring and reacting to changes in the present, while Strategic Foresight is looking farther towards changes at a longer-term horizon. However, both share the same goal: to be viable and deliver value in a changing and uncertain environment. It can be argued they can be the two arms that make an organization "ambidextrous".

Not only do they share a similar goal, but we also find that the Agile culture shares a lot of similarities with the ideal culture for Strategic Foresight:

- Respect for diversity
- Collaborative and cross-functional
- Transparent
- Continuous learning and improvement
- Self-organizing
- Empowerment and ownership
- Exploratory and curious

It is a culture that energizes the whole team to collaborate, learn, improve, and feel ownership of their collective future. This aligns well with many cultural elements needed for a mature future-facing organization: reflective, continuous improvement, embracing diversity, collaboration, and clear communications (Abdelkader, 2016).

Needs Assessment

Our consideration is that we are designing foresight practices for small resource-constrained organizations rather than governments and large corporations. Therefore, we looked for foresight frameworks and methods that would be valuable to Agile product teams and are lightweight and easy to adopt.

We looked at maturity models that measure the level and effectiveness of how foresight is integrated into organizations (Rohrbeck, 2010; Grim, 2009; Abdelkader, 2016). But we considered these maturity models to be too heavy-weight for our purpose. They are more suited for large corporations with the resources and ambition to practice Strategic Foresight to as full of extent as possible. We are looking for more lightweight practices that resource-constrained Agile organizations can integrate only as much as they find the need for.

How does an organization know how much foresight capability they need for a product strategy? The answer is that it depends on the complexity and volatility of the organization and its product's environment. The more complex and volatile your environment, the more foresight capability you need.

That's something we found to be missing in the existing maturity models — they measure the maturity of how well a team or organization is adopting foresight, however, they don't measure their level of need for foresight. We specifically want to help resource-constrained SMEs to assess for themselves how much foresight capability they need. One such assessment created by Day & Schoemaker (2005) in the Harvard Business Review article "Scanning the Periphery" seemed to hit the mark. This older article was actually a source of inspiration for the foresight maturity models. It specifically emphasized the organization's attitude towards the periphery. The article includes an assessment of how complex and volatile your environment is, compared with how well you are scanning the periphery. If you are in a highly complex and volatile environment and are not scanning widely and long-term, you are potentially "vulnerable". On the other hand, if you are in a simple environment and are still scanning widely, you are potentially overdoing it and being "neurotic". In other words, it is best to match your capability with your environment. In today's age, it is easy to sell a solution as the magic bullet. Fads come and go. Agile is the buzzword of the day. But we want to help organizations own the solution for themselves and implement it in a way that fits their purpose. The article's assessment does not wholly match the solution we are designing but gives an approximate sense of whether the organization is vulnerable or not. Because this research project's goal is not to design such an assessment and validate it, we decided to adopt this assessment as part of our solution toolkit.

Resilient Product Strategy Toolkit

A practical guide to help Agile product leaders improve the resilience of their product strategies

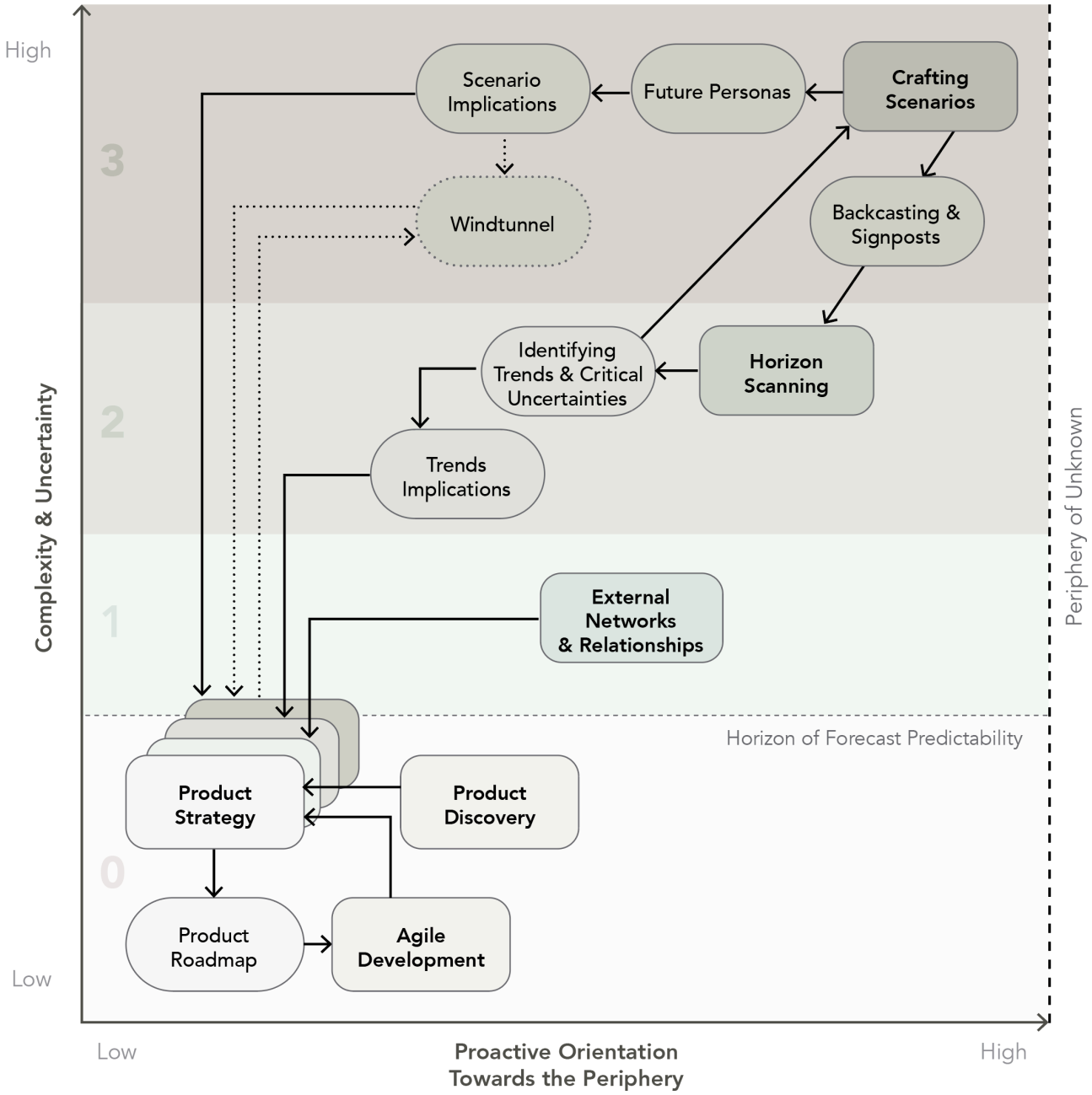

Figure 15: Diagram of the Resilient Product Strategy Toolkit

The Resilient Product Strategy Toolkit complements existing product strategy and Agile methods commonly used when developing software products. The toolkit introduces nine activities across distinct levels to help teams and organizations improve their resilience at the product strategy level. Our hope is the toolkit will help bridge the gap between Agile's short-term reactive mindset and the longer-term proactive strategizing required for resilience.

Multiple Levels

The toolkit has multiple levels, each with its own set of processes and activities contained within them. The toolkit is laid out in Figure 15, which includes two main axes, the first being the horizontal axis titled "proactive orientation towards the periphery". The periphery refers to the boundary of an organization's attention where unknowns, uncertainties, risks and/or opportunities exist in the environment (Day & Schoemaker, 2005). This is similar to peripheral vision in humans, where it is generally a difficult to see and blurry area; however, it can be essential for survival. All of the activities in the toolkit are placed along this axis depending on their level of proactive orientation towards the periphery, which increases as you move up the various levels. Processes at all levels are designed to proactively understand and deal with the periphery, just in different ways and to different degrees. The toolkit diagram's right-hand side includes a dashed vertical line titled "Periphery of the unknown". Past this line exist unknown changes, risks, disruptions, and opportunities. The vertical axis is a scale from lower uncertainty and complexity to higher uncertainty and complexity. All activities are placed along this axis depending on the environment they are most suited to address. The activities in the higher levels are capable of dealing with more uncertainty and complexity than the activities in the lower levels of the toolkit.

Just above level 0 on our toolkit is a horizontal line labelled "The horizon of forecast predictability". Here we indicate that forecast predictability has its limits when dealing with complex and uncertain environments, meaning the higher levels of the toolkit can help address this strategic gap.

The toolkit was designed using a variety of design considerations as identified in the design process. A primary consideration was ensuring our solution is customizable and adaptable to any team's needs and capabilities. By developing distinct levels, we have created a toolkit where the product leader of a team or organization can select which levels and activities they want to include in their processes based on their unique situation. The toolkit is not designed to be prescriptive. Like Agile and Scrum, the toolkit is best utilized iteratively and adaptively to achieve the best results based on the circumstances. Each level builds off the activities from the previous level; however, a team may select the number of levels they wish to include, ranging from all levels, or just level 1 depending on their needs and capabilities.

Each level feeds back into the product strategy allowing a team to create multiple proactive strategic options that may be utilized in the event of change or disruption in the environment. See Table 2 for the list of levels in the toolkit.

Level 0 of the toolkit is the baseline before implementing additional levels. It includes activities that most Scrum product teams are already doing—product strategy, product roadmap, iterative feedback through Agile development, and product discovery including market and user research. The activities in this level are not elaborated on as part of the toolkit due to these activities' existing general knowledge and popularity among Agile and product management professionals.

Levels	**Description**
Level 0	Existing Agile/Scrum product management practices to explore uncertainties
Level 1	Building an external network of relationships to gather new information
Level 2	Implementation of a horizon scanning process to be used as an early warning system to catch surprises
Level 3	Development of scenarios to proactively prepare strategies for the critical uncertainties of the future

Table 2: Levels in the Resilient Product Strategy Toolkit

Needs and Capability Assessment

Before diving into the toolkit, we recommend teams begin their journey by attempting to gauge their current need and capability for resilience. We suggest teams complete a self-assessment of their peripheral vision through the Peripheral Vision Scoring Tool developed by George Day and Paul J.H. Schoemaker (2005).

To conduct the assessment, teams are asked a series of questions giving them 2 scores, one assessing their need, and the other assessing their capability for peripheral vision. These scores will then be plotted on a 2x2 matrix, identifying if their team is "focused", "vulnerable", "vigilant", or "neurotic" as seen in Figure 16. Depending on this delta between a team's need and capability, the Resilient Product Strategy Toolkit is designed to help vulnerable teams improve their capability for peripheral vision, helping them become more vigilant and improving their resilience.

We understand that the assessment tool may not be a perfect fit for everyone; however, we feel strongly that it is a quick way to gauge a team's potential need and capability for peripheral vision as a starting point. We recommend having multiple team members and leadership conduct the assessment individually and then share back as a group. Even if a team finds their scores land in the "focused" or "vigilant" categories, we still encourage them to reflect on their processes and consider improvement areas. The entire assessment can be found in Day & Schoemaker (2005)'s article *Scanning the Periphery*.

As creators of the toolkit, we self-reflected on our solution's effectiveness at increasing the capability scores through the criteria listed in the Peripheral Vision Scoring Tool. We have identified that when utilizing the toolkit effectively, it is most likely to increase your scores in the following areas:

- Time horizon overall
- Organization's attitude towards the periphery
- Willingness to test and challenge basic assumptions
- Quality of data about events and trends at the periphery
- Experience with uncertainty-reducing strategies
- Use of scenario thinking to guide strategy process
- Number of alliance partners
- Flexibility of strategy process
- Resources devoted to scanning the periphery
- Accountability for sensing and acting on weak signals
- Early warning systems and procedures
- Readiness to listen to reports from scout on the periphery

After applying the toolkit, we recommend teams reassess their scores to measure if they have improved in these key areas.

Getting Started

After completing the peripheral vision assessment, teams should then discuss what

areas they may want to improve. Once the team has agreed, they should match that with the Resilient Product Strategy Toolkit levels that address those areas.

The Resilient Product Strategy Toolkit activities have been designed to be workshopped in a group environment, some of which include pre and post-work depending on the activity. We suggest inviting a cross-functional diverse group to each workshop to include a variety of ideas and perspectives. Additionally, the activities in the toolkit are not intended to be completed only once. To effectively increase resilience, these activities should be revisited regularly, ranging from quarterly to monthly depending on the activity and unique circumstances of the team or organization.

We recommend the toolkit be used as a starting point to introduce Strategic Foresight practices into your team or organization. A majority of the activities within the toolkit come from existing Strategic Foresight literature and methodologies, which can be understood more deeply through additional training and education. A useful resource to learn more about Strategic Foresight can be found on the Government of Canada's Policy Horizons website: https://horizons.gc.ca/en/home/

The following pages include a breakdown of each activity from levels 1-3 in the Resilient Product Strategy Toolkit.

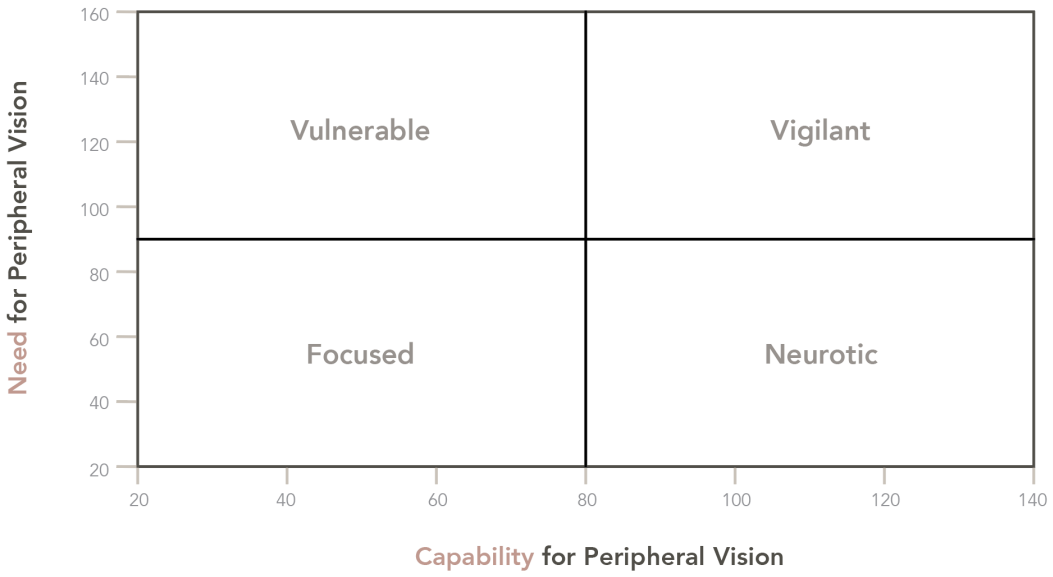

Figure 16: The Peripheral Vision Scoring Tool (Day & Schoemaker, 2005). A matrix used to plot a team or organization's need and capability for peripheral vision.

Level 1

Level 1 of the toolkit includes a single activity titled "External Networks and Relationships". This activity is geared towards empowering an organization to create and maintain a network of external relationships with various partners, stakeholders, or even competitors that operate within the same or similar environment. Working collaboratively with these external networks, teams will gather and share insights on possible future changes, risks and opportunities on the periphery that otherwise may have been missed or overlooked. Essentially level 1 is best suited for organizations with limited internal capabilities or resources to scan and monitor the environment independently, as level 1 will allow them to benefit from the additional findings and resources available through the network. The relationships developed in this level can also allow you to collaborate on scanning and scenario development in levels 2 and 3. The idea here is that as new information is captured and shared, the product strategy is discussed and potentially adjusted proactively as necessary.

External Networks & Relationships

This activity aims to establish a formal process to create and maintain a strong network of external relationships. "80% of all information is channelled through people", said a participant in a foresight study (Rohrbeck, 2010), which shows the importance of maintaining formal and informal networks of relationships to keep your organization alert towards potential disruptions or unexpected opportunities. In collaboration with this network, you will be able to gather and share insights on possible future uncertainties, risks, and opportunities, while also working together to help shape your futures together.

Steps

1. Create a three columned table with the titles "External relationship", "Who's responsible" and "Connection cadence" (see Figure 17).
2. Fill out the "External relationship" column by listing all existing key external stakeholders (e.g. partners, key customers, suppliers, industry associations, government, etc.).
3. For each external relationship, write down who in the team or organization is responsible for maintaining or strengthening that connection under the column "Who's responsible".
4. For each external relationship, write down the frequency of checking-in and connecting with that stakeholder (e.g. once per month, once per quarter) under the column "Connection cadence".
5. Add potential connections that may be valuable to build an external relationship. For example, someone who may have access to information or data you do not have access to. Then make a plan on how to create and maintain that new relationship.

External Relationship	Who's Responsible	Connection Cadence
Customer XYZ	Jane Doe - Sales Manager	Monthly
Partner 123	John Smith - Marketing	Quarterly

Figure 17: Example table to track external relationships

6. Add any informal relationships that would be valuable in strengthening.
7. Ensure everyone agrees on the responsibilities for building and maintaining these relationships.
8. Ensure there is an agreed process to report back the information gathered from the network.

External Conversation Tips

When having external conversations, use this list of questions to frame your mind towards gathering information about changes and uncertainties:

- What is your outlook on the market and the environment?
- What changes are you currently experiencing internally and/or externally?
- What threats and/or opportunities are you seeing on the horizon?
- What are your plans for the future?
- What information or insights can we offer to help you reduce any of your uncertainties?
- What are your potential assumptions or blind spots that we can help clarify?
- How might we collaborate on helping to build a preferred future for both of us?

Outcome and Next Steps

At the end of the workshop, you shall have a list of who is responsible for maintaining each external relationship, and an agreed-upon process to share the information gathered from external relationships within the product team.

Reference

Rohrbeck, R. (2010). Towards a Maturity Model for Organizational Future Orientation. *Academy of Management Annual Meeting Proceedings 2010* (1):1-6

Level 2

Level 2 is all about scanning and increasing a team or organization's internal capabilities to scan the periphery. This level includes three activities, "Horizon Scanning", "Identifying Trends and Critical Uncertainties", and "Trends Implications". "Horizon Scanning" aims to develop a framework and the internal capabilities to search for, categorize, and store weak signals of change that are on the horizon. "Identifying Trends and Critical Uncertainties" takes those insights and signals found and turns them into trends, while also identifying which of those trends are critical uncertainties. "Trends Implications" then considers the possible impacts those found trends may have on the product strategy or organization as a whole. Level 2 is best suited for those in more volatile or uncertain environments that require developing more internal capabilities to monitor and scan the environment for potential change, risks or opportunities.

Horizon Scanning

The objective of this activity is to search for early signs of change on the horizon. Horizon Scanning is the process of looking for emerging issues, trends, and "weak signals" that indicate changes that may one day result in significant disruptions and/or opportunities (Policy Horizons Canada, 2018). It is vital to scan broadly and systemically across various areas for unconventional sources of information. This is because change signals can come from anywhere, not just your immediate environment. This activity will set up your team with a regular scanning process to help inform, support, and de-risk your product strategy.

Steps

1. The first step is for your strategy team to identify your strategic issues and a time horizon to frame what you need to scan for. Write down key strategic issues you are facing right now. Then write down the time horizon into the future that you want to look at. Make sure they are long-term strategic issues and not short-term operational ones. The strategic issue may include a critical decision you need to make in the future or explore how to keep your product relevant amidst uncertainties. It is recommended to choose a time horizon that is five years or more. Or you can choose a shorter horizon if you are facing very high uncertainties. The point is for you to look far enough ahead where the future can have multiple distinct possibilities.
2. Create a series of nested circles like the example in Figure 18. The innermost circle represents your product or organization's immediate area of focus. The next circle out represents the general environment your product operates within. And finally, the outermost circle represents the wider environment or system. Feel free to create more layers as you see fit.
3. Map all the elements into the different layers that impact your product and/or organization. Feel free to utilize the example we have provided below as a starting point. Include both the most immediate elements (e.g. users, competitors, etc.) and the broadest (e.g. social, political, etc.), realizing that disruptive change can come from anywhere in an interconnected world.
4. Brainstorm and capture key issues or areas of interest within each area on the map (e.g. as stickies on the map).
5. Brainstorm and capture assumptions that your strategy depends on within each area on the map.
6. Assign an area of the map to each team member to scan for surprises, trends, emerging issues, and weak signals. Make sure all areas are covered.
7. Agree on a documentation system (e.g. shared doc, spreadsheet, database) and a scan "hit" entry template (see example).
8. Agree on the time that each member should dedicate to the scanning (e.g. an hour each week).

What to Scan For

You will be scanning for indicators for change. And here are some terms to help you understand what you are looking for (Conway, 2016).

- **Event:** an observable event that indicates change is happening
- **Trend:** a pattern of a group of similar or related events that move in a given direction
- **Emerging Issue:** an issue that is gaining recognition to have future importance
- **Weak Signal:** a signal with weak and fuzzy evidence, but points to a potentially significant change worth tracking

Scanning Hit Entry Template

Use the template to record any relevant "hits" during your scan. Adapted from Harfoush (2013-2018) and Conway (2016).

- **Title:** a short summary title
- **Date:** time stamp of the entry
- **What is Changing:** describe the scan hit and what is actually changing
- **So What:** describe possible implications and consequences
- **Category:** applicable category (ex. social, technological, political, economic, environmental, values, etc.)
- **Source:** cite the source
- **Name:** who found the hit

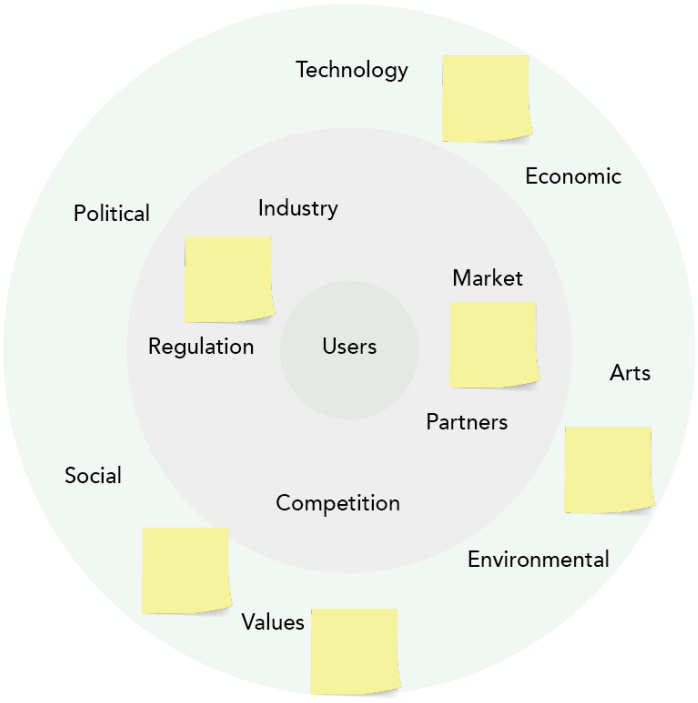

Figure 18: Example diagram of nested circles representing different areas for scanning

Scanning Tips

- Wear the right scanning attitudes: curious, receptive, sensitive to change, intuitive, think wide, think opposites, challenge assumptions.
- When deciding whether a "hit" is relevant, guide yourself with the following questions:
    - Is it relevant to our strategic issue and time horizon?
    - Does it seem different from our current understanding of our strategic issue?
    - Does it challenge the status quo?
    - Can it be highly disruptive to our strategy?
    - Can it prove our assumptions wrong?
- Remember to watch for weak signals that point to potential disruptions that seem unlikely but could have a significant impact. Because they lack evidence and data, you will need to use your intuition.
- Broaden your sources (e.g. newspaper, Twitter, websites, blogs, wikis, podcasts, videos, news sites, magazines, books, presentations, journals, reports, interviews, surveys, chat rooms, advertisers, researchers, multiple search engines and browsers, searching in other languages, etc.).
- Use additional keywords to your issues to uncover what is changing: *new, innovation, change, surprise, trend, emerging, opportunity, threat, crisis, unprecedented, driving, inspiration, growth, decline.*

Outcome and Next Steps

- At the end of the workshop, you shall have a list of assigned responsibilities for who is scanning which area for this next period. You will also have agreed upon a format for entering the scanning hits.
- Next, schedule a recurring review meeting (e.g. once a month) where the team will review the scanning hits and analyze the trends for implications (see "Identifying Trends and Critical Uncertainties" activity). At the next review meeting, also reflect on any changes you would like to make to the scanning process. It is recommended to rotate the assigned areas to include a fresh perspective continuously.

References

Conway, M. (2016). Foresight Infused Strategy: A How-To Guide for Using Foresight in Practice. *Thinking Futures*.

Harfoush, N. (2013-2018). *Strategic Foresight graduate courses*; Jefferson University.

Policy Horizons Canada. (2018). *Foresight Training Manual Module 3: Scanning*. https://horizons.gc.ca/en/our-work/learning-materials/foresight-training-manual-module-3-scanning/

Identifying Trends and Critical Uncertainties

This activity aims to organize the insights AKA "hits" found during Horizon Scanning to uncover trend patterns. From the trends, you will also identify "critical uncertainties"—highly uncertain factors that are highly critical to your product or organization. It is recommended to run this activity at least once every quarter to identify new emerging trends, monitor changes to existing trends, and make updates to your critical uncertainties.

Steps

1. Retrieve the scanning hits from the database.
2. Transfer each scanning hit onto a sticky note to place on a wall or virtual whiteboard.
3. Work as a team to move the sticky notes around to form clusters where the hits are similar or related to each other somehow. If a scanning hit belongs to more than one cluster, then duplicate the hit into new sticky notes.
4. From the patterns of clusters, identify trends that indicate a pattern of change towards a particular direction.
5. Make a note of any stickies that look like outliers. These may be emerging issues or weak signals that don't have much-supporting evidence but are still important to monitor and track.
6. For each trend / emerging issue / weak signal, discuss and write down the following:
    - Title: a short and catchy title to easily reference.
    - Summary: a short description for the trend / emerging issue / weak signal.
    - Extrapolation: what will the world look like (in your identified timeframe) if this trend / emerging issue / weak signal continues to develop?
    - Implications: how might this trend / emerging issue / weak signal impact your product and industry?
    - Counter Trends: what are possible trends that oppose this trend?
7. Utilizing the list of trends / emerging issues / weak signals for inspiration, identify a list of factors that are both critical in their importance to the product or organization, and are impossible to predict or control. These will be your "critical uncertainties" to track. We recommend making a list of 2 to 10 critical uncertainties.
8. Discuss if there are any missing critical uncertainties that need to be included but did not show up during the scanning.
9. Discuss what is unknown, what is uncertain, and what your assumptions are for each critical factor. Draw a line, and at the ends of the line, write down the two opposing possibilities of how this critical uncertainty can resolve within your future time horizon (see example in Figure 19). It can help to think about what you assume will be true, then reverse your assumption to develop the two opposing outcomes. Draw an "X" on the line to represent where you believe we are currently. At the next meeting, you can review where we currently are and discuss and update it if it has changed.

10. Prepare a report that includes all the trends, emerging issues, weak signals, and critical uncertainties that can be used for the "Trends Implications" activity.
11. This is also a good chance to review the scanning process. For example, is it generating the quantity and quality of hits that you want? Are you covering all elements of your environment? Are you catching enough weak signals?

Outcome and Next Steps

- At the end of the activity, you should have a report including all the trends, emerging issues, weak signals, and critical uncertainties you uncovered.
- Remember that Horizon Scanning is not an isolated activity. Continue to routinely monitor the horizon for potential change on an ongoing basis.
- Next, schedule a meeting for the "Trends Implications" activity to analyze the implications for strategy. If you also plan to implement level 3 of the toolkit to create scenarios, you will use the identified critical uncertainties in the "Crafting Scenarios" activity.

References

Alberta CoLab. (2017). *There May Be Zombies: A Field Guide to Strategic Foresight.* Retrieved from https://colab.alberta.ca/Pub/Documents/20190123_Foresight_Manual_WEB.pdf

Conway, M. (2016). Foresight Infused Strategy: A How-To Guide for Using Foresight in Practice. *Thinking Futures.*

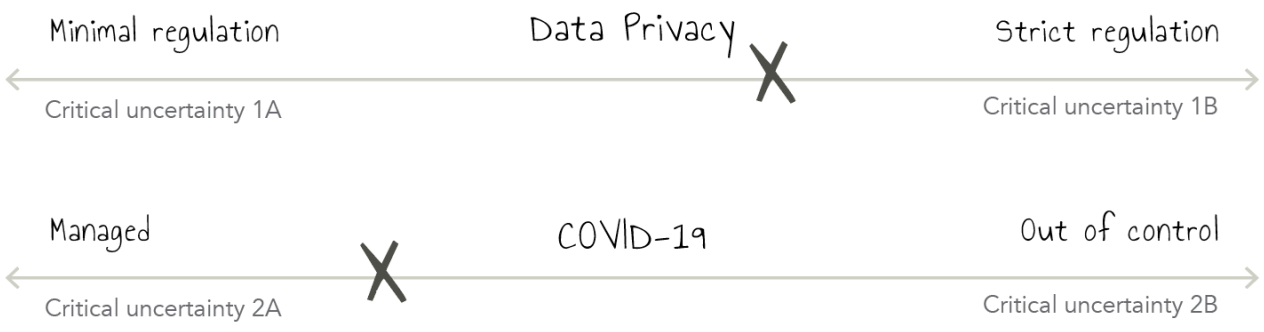

Figure 19: Example critical factors

Trends Implications

This activity aims to analyze the trends for implications to your strategy and roadmap. The "trends" in this activity encompass all the trends, critical uncertainties, emerging issues, and weak signals that were discovered in the "Identifying Trends and Critical Uncertainties" activity.

This activity assesses the relevance of the trends to your strategy. It is an adapted version of the Trend Relevance Assessment Guide from Shaping Tomorrow (Jackson, 2013).

Steps

1. Transfer each trend onto a sticky note to put on a wall or a virtual whiteboard. Then, place the stickies on a chart (see example in Figure 20) with the following two axes:
    - **Timeframe:** When might this trend begin to impact our industry and our organization? *(Hint: first assess the trend's current level of maturity and its rate of increase)*

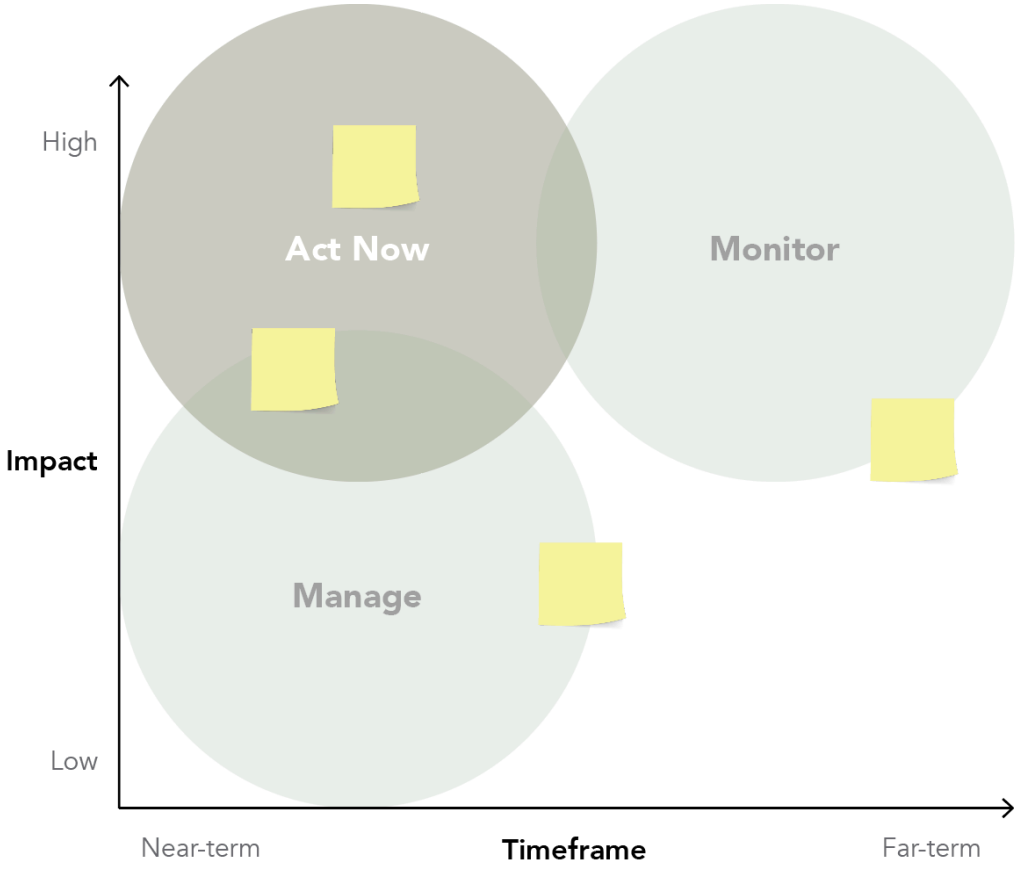

Figure 20: Example chart for assessing the relevance of trends

- Impact: How strong will the impact of this trend be on our industry and our organization? *(Hint: think also about how fast and how capable is the organization able to respond to this disruption)*

2. Group the trends under the following decision categories:
    - Act now *(high impact, near-term)*: consider what actions you can take now to respond to this trend.
    - Manage *(low impact, near-term)*: consider coming up with plans that allow you to act quickly if the trend continues to develop.
    - Watch *(high impact, far-term)*: these trends are unlikely to have medium-term impacts but continue to monitor its development to prevent future surprises.

Outcome and Next Steps

- At the end of the workshop, you shall have a summary report assessing the trends and the recommended decision categories.
- Next, share the report with the strategy team to adjust and update the product strategy and roadmap as necessary.
- Optionally, schedule meetings with key external partners to share your trend implications. This helps to add value to the relationship and get their perspectives.

References

Conway, M. (2016). Foresight Infused Strategy: A How-To Guide for Using Foresight in Practice. *Thinking Futures.*

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Level 3

Level 3 is a more rigorous and proactive approach to dealing with the periphery than other levels in the toolkit. Level 3 includes five distinct Strategic Foresight activities that will help a team or organization build up significantly more capacity to understand and deal with the periphery. The first activity of level 3 includes "Crafting Scenarios", where teams will first identify a list of underlying critical uncertain drivers uncovered through the "Identifying Trends and Critical Uncertainties" activity in level 2. They will then select the top two most critical and uncertain drivers and develop four distinctly unique plausible scenarios known as future worlds. The scenarios will then become the basis of the next two activities, "Backcasting & Signposts" and "Future Personas". The "Backcasting & Signposts" activity is used to identify possible events or signals of change that might indicate a particular scenario is becoming more likely. Proper monitoring of the signposts will allow the team or organization to pivot proactively, thus increasing their likelihood of resilience. "Future Personas" explores the evolution of future users or other stakeholders based on the scenarios, helping teams to identify new strategic options based on new goals, needs, and challenges. Following "Future Personas", the final two activities include "Scenario Implications" and "Windtunnel". The "Scenario Implications" activity is used to consider the possible impacts of the scenarios and future personas on the product and/or organizational strategy. "Windtunnel" is an optional activity that assesses the effectiveness of possible strategic options across each scenario to help narrow down or prioritize multiple strategic options.

Level 3 is suited for those who require significant improvements to their capability for resilience and/or are operating within an extremely volatile or uncertain environment.

Crafting Scenarios

Scenarios are commonly used to help organizations prepare for potential future disruptions and/or opportunities. They can also help build an organization's confidence when navigating complex and uncertain environments. For our purpose, we will be using scenarios to help us imagine potential futures as they relate to your organization's product strategy.

Scenarios are told as qualitative stories of how the future may look based on a specific time horizon with inputs from scanning and other relevant data and research. Scenarios are not about predicting the future but are used as a tool to explore multiple plausible futures and the impacts those futures may have on an organization, product, or strategy (Ogilvy & Schwartz, 2004; Policy Horizons Canada, 2018).

If you are serious about developing robust scenarios, we recommend bringing in an experienced foresight scenario facilitator. If not, the activity below is a lightweight version of scenario development that allows you to get started on building this capability in-house.

We are utilizing the 2x2 matrix approach for the scenarios activity to develop four contrasting and unique scenarios built on the critical uncertainties identified in the previous activity. The reason for this is that by exploring scenarios created through critical uncertainties, we are proactively reducing uncertainties, making it easier to strategize and navigate effectively. Through the activity, you will brainstorm and discuss the characteristics of each scenario based on your unique perspectives utilizing inputs collected through Horizons Scanning and other research. Keep in mind that reality will often exist between all of your scenarios, and the goal is not to simply focus on what is the most realistic but to explore scenarios that challenge and provoke your normal way of thinking. Scenario development can often feel uncomfortable; however, that is a key indication that you are pushing the boundaries of your normal assumptions (Dator, 2019).

Steps

1. Building off of your list of critical uncertainties identified in the previous activity, discuss as a group which ones are most critical and which are most uncertain—welcome diverse perspectives and viewpoints.
2. Identify which of your critical uncertainties are drivers. A driver is a significant driving force that has a broad influence on the environment in which the organization operates (Policy Horizons Canada, 2018). Ensure you have at least two drivers.
3. If you have more than two drivers, conduct a dot voting exercise to identify your top drivers. Each participant will have four votes—two votes for drivers that the participant considers the most critical, and two votes for drivers that the participant considers the most uncertain. We recommend everyone vote all at once or anonymously to avoid any biases.
4. Tally up the votes. The two drivers with the most votes will be your top critical uncertain drivers.
5. Create a 2x2 matrix as seen in Figure 21.

6. Select one of your top critical uncertain drivers and label the horizontal x-axis with the opposing states at either side.
7. Select the other top critical uncertain driver and label the vertical y-axis with the opposing states at either end.
8. Write your selected time horizon at the top of the scenario matrix. This may be the same time horizon chosen in the "Horizon Scanning" activity or slightly different depending on the critical uncertain drivers. Whatever you choose will be the year that your future scenarios will be based upon.
9. Begin to workshop and brainstorm characteristics of each scenario into the corresponding quadrants keeping

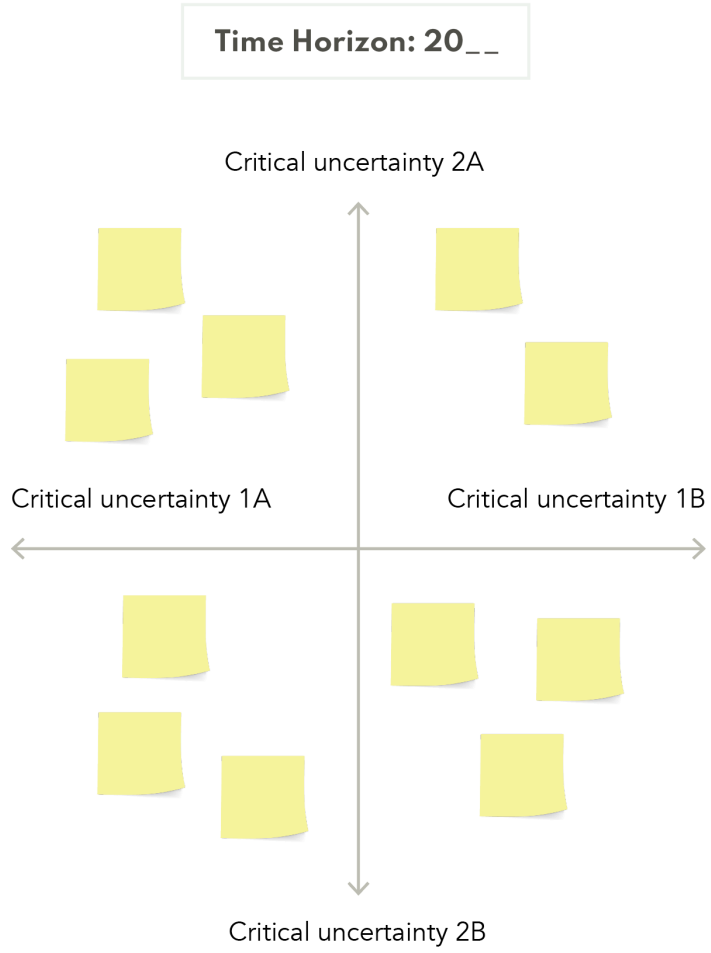

Figure 21: Example 2x2 scenario matrix

in mind the chosen time horizon. Each scenario should be as distinct from each other as possible. In order to achieve this we suggest developing each scenario in isolation through the use of breakout groups. Be sure to write your scenarios in the present tense as if you have time travelled into the future and can describe the scenarios firsthand.

10. If you are having trouble describing your scenarios, try swapping out one or both of your critical uncertainties axes until you find the right fit to meet your needs.
11. Project as many of your findings from your Horizon Scanning or other research into your scenarios as possible to make them more robust.
12. Once you are happy with your scenarios give them a unique descriptive name to help make them more memorable.
13. Discuss as a group which of the scenarios is most preferred and which is the most feared.

After you have completed your scenarios, it is recommended you revisit this activity on a semi-regular basis and make adjustments to your scenarios and/or top critical uncertain drivers as you see fit based on new findings discovered during the continued Horizons Scanning and research process.

Outcome and Next Steps

- At the end of the workshop, you shall have four distinct uniquely plausible future scenarios based on the selected critical uncertain drivers and time horizon.
- Next, schedule a meeting for the "Backcasting & Signposts" activity to identify the potential sequence of events that can lead the present world to the world in your scenarios, and from that to identify the early indicators to monitor for the emergence of one of your future scenarios.
- Additionally, schedule a meeting for the "Future Personas" activity to identify the evolution of the wants and needs of your users, partners, and stakeholders in the future scenarios.

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Backcasting & Signposts

Backcasting is an activity that identifies the events and turning points that might link the possible future scenarios to the present world to inform strategic decision-making (Kok et al., 2011; Conway, 2016). It works backwards from the future, making it different from forecasting, which projects the bias and assumptions of the past and the present into the future. Backcasting is also a way to validate the logical consistency of how a future scenario could become reality.

From backcasting, you can identify signposts, which are defined as "recognizable potential future events that signal a significant change" (Strong et al., 2007). Like a signpost on a highway, signposts are used to indicate what we can expect up ahead. This activity aims to identify various potential signposts that point toward your scenarios becoming more likely or imminent.

Once developed, signposts are a great tool to help you monitor your environment for change, allowing you to be more proactive in your strategic response (Strong et al., 2007). This is not just an exercise of analysis but of creativity. We encourage you to stretch your imagination to think of what could happen, no matter how unlikely it may seem today.

Steps

1. Create a 2x2 matrix (see example in Figure 22) that will represent your four scenarios created in the "Crafting Scenarios" activity. Label the axes with the same critical uncertain drivers used to develop your scenarios.
2. In the following steps you will do backcasting for all four scenarios as a group. Alternatively, you can also separate the task into smaller teams, where each breakout group that developed a scenario in the "Crafting Scenarios" activity is also responsible for doing backcasting for the same scenario.
3. Start with one quadrant and brainstorm a list of events and turning points in the environment that would lead the present-day world towards that scenario. Try to work in reverse sequence, starting with the future scenario and working your way back through a sequence of events until you reach the early indicators that may be found in the present day. Ask: "What would need to happen for this scenario to become reality?" "What news headlines would we see?"
4. Continue to add in events to fill any gaps in your pathway. By the end of this process, you should have a general idea of the possible key events that will signal the world is moving towards that future scenario.
5. Repeat for the three other scenarios. Remember to ensure all the events are lined up in a plausible sequence that links the present world to each of your scenarios. You may also wish to modify the details of your scenario narratives to make them consistent with the backcast.
6. Decide and label which of your key listed events have indicators that can be monitored or measured in the present day. These will be your signposts.

7. Assign one or multiple team members to regularly and routinely monitor for changes related to the signposts. You may find it helpful to conduct this monitoring in conjunction with "Horizon Scanning".
8. When signals of change are found during monitoring, document it and discuss as a team if the sign indicates a change in direction to any of your trends, critical uncertainties or if it indicates whether the world is moving towards one of your four future scenarios. Ensure that the product strategy is discussed and proactively adjust or pivot based on the new information.

Outcome and Next Steps

- At the end of the workshop, you shall have a documented list of signposts for each of your 4 scenarios.
- Next, continue to routinely and regularly monitor the signposts so that you can identify signals of change early and proactively strategize, helping to improve your resilience. We recommend this be done in conjunction with continuous "Horizon Scanning" work.

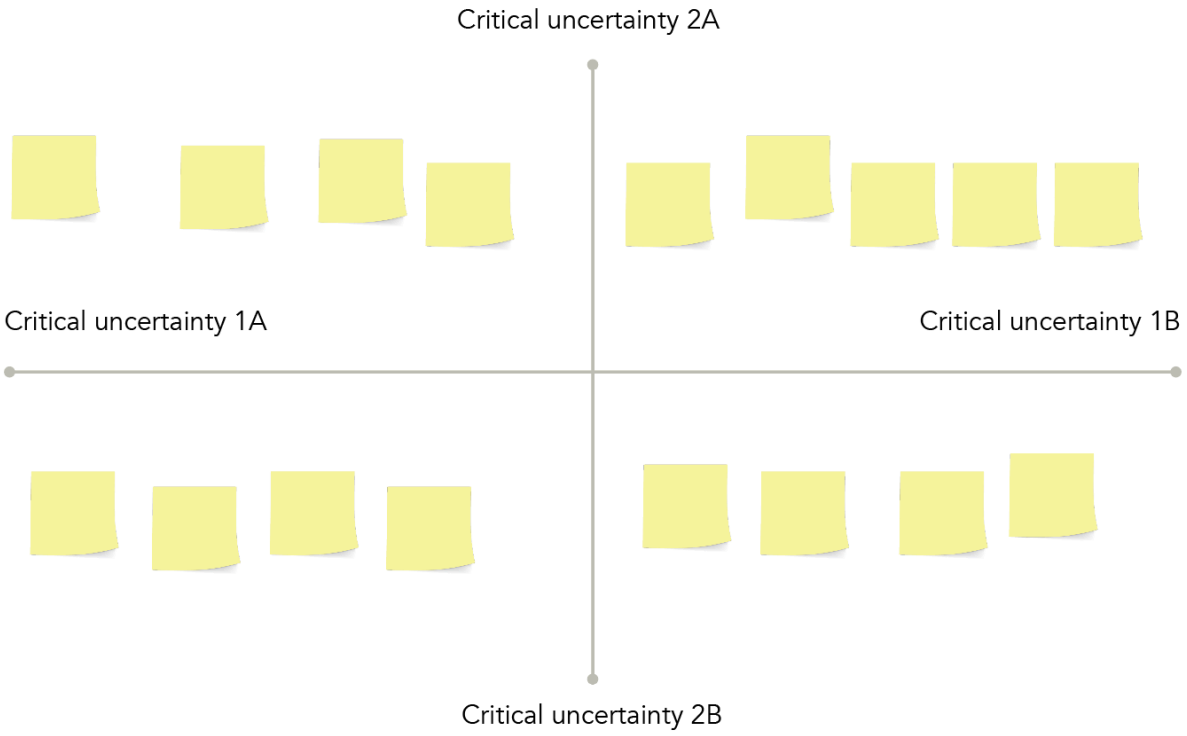

Figure 22: Example 2x2 backcasting and signposts matrix

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Future Personas

The objective of this activity is to reflect your current users, customers, partners, or stakeholders into your future scenarios to help identify possible changes to their wants and needs. This, in turn, may help you design more robust products and/or strategies that consider these possibilities. In addition, this activity will help add more robustness to your future scenarios by developing a fictional individual who lives in that world (Fergnani, 2020). Future Personas can be especially helpful for organizations already familiar with utilizing user personas when developing their products.

Steps

1. Create a box that will signify who your primary user is today (see example in Figure 23). Give them a name, age, and include any other high-level demographic characteristics as necessary. We highly recommend inputting data collected through user interviews and/or other research methods when developing your personas.
2. Based on the research data collected and the description you have written, include your user's goals, needs and challenges as they exist today.
3. Once you have completed your current user persona, begin to imagine who your primary user may be in each of your four scenarios.
4. Create a 2x2 matrix representing your four scenarios created in the "Crafting Scenarios" activity (see example in Figure 23). In the four quadrants, draw a box and write down characteristics of who your primary user maybe including their goals, needs and challenges, based on the scenarios they live within in the future.
5. Discuss how these users have changed in comparison to your current primary user.
6. Discuss the gaps your current product offering has when trying to meet the needs of these future users.
    - Are there any similarities between these personas?
    - What are the major differences?
    - What changes or tweaks can be made to your current product strategy that might better fit with the future personas?
    - What new strategies would best address the future personas' goals, needs, and challenges?
7. Repeat steps 1-6 by swapping out your primary user from today with other users, customers, partners, or stakeholders as necessary.

Outcome and Next Steps

At the end of the workshop, you shall have created new personas based on your future scenarios. This information should then be used in the "Scenario Implications" activity to analyze the implications of the scenarios to your product strategy.

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Fergnani, A. (2020). *The End of Boilerplate Scenarios: Let Your Scenarios Come to Life with Future Personas.* Predict. Medium. https://medium.com/predict/the-end-of-boilerplate-scenarios-let-your-future-scenarios-come-to-life-with-future-personas-b939721faaf

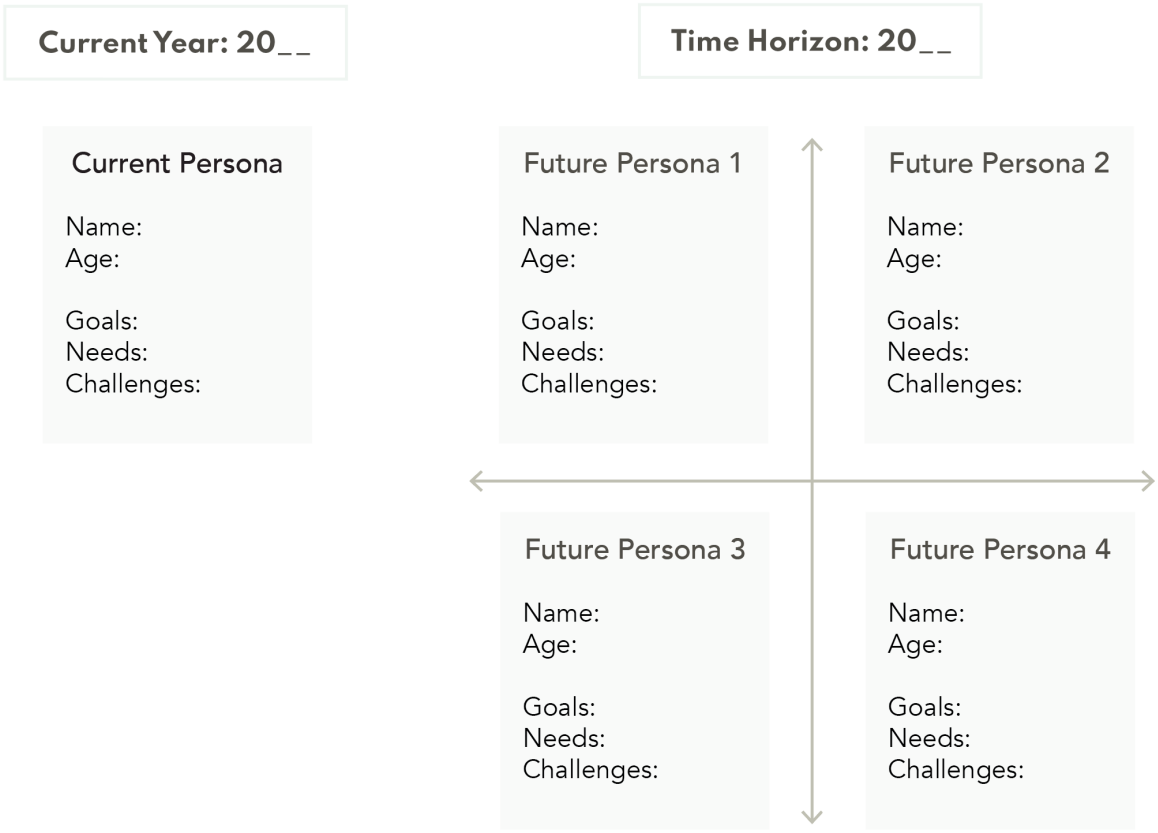

Figure 23: Example of current and future peronas

Scenario Implications

This activity aims to identify the various implications your possible future scenarios will have on your product and/or organization. These implications can range from potential major threats to major opportunities. Analyzing your scenarios for implications will enable you and your team to better strategically prepare for critical and uncertain changes that potentially lay ahead.

Steps

1. Create a four-column table and list your four scenarios across the columns on the top row (see example in Figure 24).
2. Begin with your first scenario and brainstorm possible impacts the conditions of the scenario and the future personas that you identified may have on your product and/or organization. These should include positive, negative, and neutral leaning implications. Ask: "*What are the potential changes and impacts this scenario will have on our revenue streams? Our customers? Our market? Our supply chain? Our strategy? Our goals? etc.*"
3. Repeat for the 3 other scenarios.
4. Review the lists of implications looking for similarities and differences across the whole table. Are there any similar implications that are in multiple scenarios? Any unique outliers?
5. Assess the list of implications looking for any significant threats and opportunities. Then, discuss as a team and make a note of these.
6. Brainstorm and discuss potential changes to your existing strategies and/or identify new strategies (AKA contingency plans) that may be able to overcome or midgate

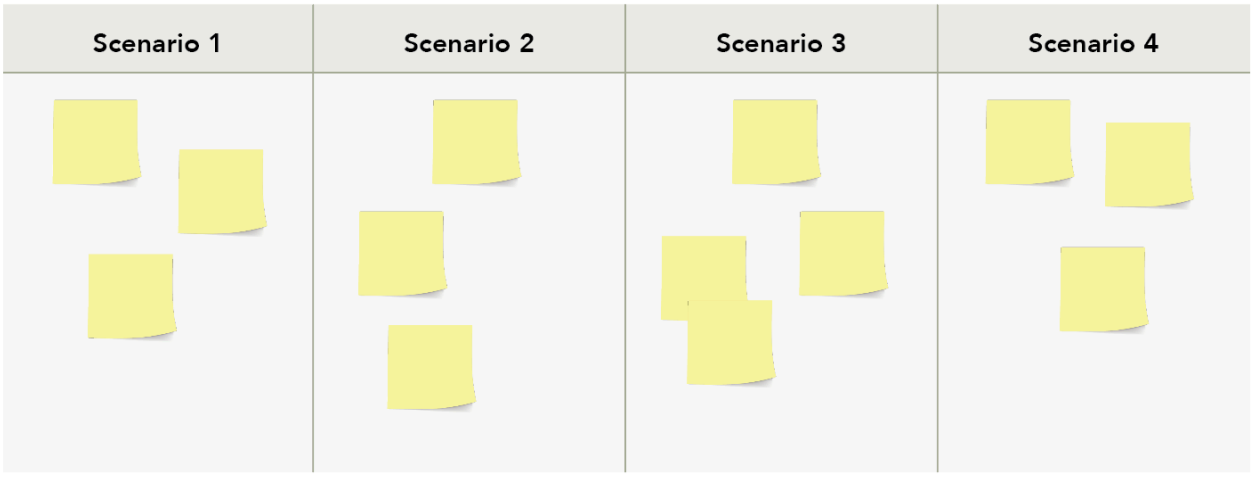

Figure 24: Example table for scenario implications

any significant threats. Additionally, brainstorm strategies that may take advantage of any important opportunities.

7. Document and share this information so it can be used to inform strategic decision-making in the present day when necessary.

Outcome and Next Steps

- At the end of the workshop, you shall have a documented list of implications to your product and/or organization based on your four future scenarios and personas. These insights can then be used to develop new strategic options, AKA contingency plans that feed directly back to the product strategy.
- Optionally, schedule a meeting for the "Windtunnel" activity to assess your strategic options' effectiveness in each scenario.
- Optionally, schedule meetings with key external partners to share and exchange your future scenarios.

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Windtunnel

This is an optional activity to be done after "Scenario Implications". You may also choose to repeat this activity when developing or prioritizing new strategic options.

This activity aims to evaluate strategic options based on the explorations of your future scenarios. This is done by identifying how well each specific strategy performs across the scenarios based on the unique conditions of each world (Ogilvy, 2015). If you think of designing a strategy like designing an airplane, the windtunnel allows you to test how well your strategy flies under different "winds" i.e. external conditions.

The future scenarios can be used to evaluate the resilience of your current strategy or help you to prioritize or choose between several strategic options (Foresight Horizon Scanning Centre, 2009). This activity assumes that you have several strategic options to evaluate, but you can also simply evaluate your existing strategy.

Steps

1. Create a 5 column table, listing your four scenarios along the top and your strategic options down the left side (see example in Figure 25).
2. Evaluate the performance of each strategic option in each future scenario. Give each strategy a rating based on how effective it would perform in the conditions of that specific scenario (e.g. high, medium, low)

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Strategy 1	low	low	high	medium
Strategy 2	medium	medium	medium	low
Strategy 3	low	low	high	low
Strategy 4	high	medium	high	high
Strategy 5	low	medium	low	low

Figure 25: Example table for windtunneling

3. Identify which strategies work well in all scenarios. These strategies should be considered a higher priority.
4. Identify which strategies work well in only specific scenarios. These strategies should be considered medium priority.
5. Identify which strategies do NOT work well in any scenario. These strategies should be considered lower priority.
6. Discuss how you might improve your lower-performing strategic options so that they may perform well across more or all of your future scenarios.
7. Discuss and add any new strategic options you might consider based on the qualities of the strategies that perform well across all scenarios.

Outcome and Next Steps

- At the end of the workshop, you shall have assessed and prioritized your strategic options based on their performance across your future scenarios. This information should then be used to help inform your product strategy in the present day as you see fit.
- Repeat this activity whenever you have new strategic options to consider.

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Next Steps and Discussions

Next Steps

The proposed toolkit from this research project is an initial design that requires thorough validation. Therefore, we propose sharing it with the local and global product management community and leading industry experts for detailed feedback. Specifically, we would be looking for feedback on the toolkit's compatibility with the existing practice of product strategy formulation for Agile teams and, most importantly, its efficiency at helping improve resilience.

To thoroughly evaluate the effectiveness of our proposed solution, the next step is running a long-term (six+ months) pilot with an organization that can test drive the toolkit and regularly assess if it has helped to improve their capability for resilience.

In addition to our proposed toolkit, this research project includes key findings with a plethora of knowledge and potential leverage points to improve a team or organization's resilience. This may lead to new alternative solutions addressing specific areas not covered by the toolkit.

Areas for Further Research

This research project has some limitations that indicate areas for further research.

Other geographical areas: It will be valuable to conduct similar research in geographics beyond Ontario, Canada, e.g. the US and Europe where business mindsets and culture differ, to discern whether the findings and solutions from this project are applicable elsewhere.

More detailed segmentation with SMEs: There can be research with more detailed segmentation within the SME category based on the product's maturity, the team's size, and whether it is B2B or B2C. Different solutions may be needed for these various organizations.

Needs and capability assessment tool: It was not within the scope of this project to design an assessment tool to go along with the toolkit designed to help teams assess their need for resilient future thinking, so an existing assessment tool was adopted. More research is required to design and validate an assessment tool that matches precisely with the toolkit's capabilities.

Resilient culture and resilient strategy: The proposed solution focuses on new processes.

There is an opportunity to research how resilient culture contributes to resilient strategy specifically. Resilient culture is a topic that one of our experts Mike Edwards briefly touched upon, but it is a possible area for further research.

Viable System Model (VSM) analysis: Stafford Beer's Viable System Model provides a framework to design organizations with subsystems and processes necessary for meeting external complexity. Applying VSM analysis to the solution design could provide further organization for how foresight and agile are integrated.

Implications

The project results have implications not only for organizations developing software but also for other organizations that apply Agile and foresight methodologies. In addition, the integration of these methodologies may support other organizations in increasing their resilience.

Organizations that are already practicing Strategic Foresight may also be interested in how they can integrate Agile to increase their flexibility and resilience.

Finally, while this project is about the resilience of the product strategy, and in extension, the organization's resilience, it also has implications towards broadening the attention of product teams so that they start to consider the resilience of the larger society around the organization. As they see the interconnections, their strategy may start to contribute to the broader resilience of their societal, economic, and environmental contexts.

Conclusion

How to be resilient in an unpredictable world is becoming an increasingly important but complex topic. This project specifically investigated how to develop resilient product strategies for Agile software teams in small-to-medium-sized organizations.

Through mixed-method research involving surveys and interviews, we discovered that many teams' capability to be resilient is limited by having narrow attention and short-term focus, which leads them to be reactive rather than proactive. In addition, the resource constraints of smaller organizations further limit their resilient capacity.

We found that Agile helps teams to adapt quickly to surprises. But the danger is when teams rely on Agile as a strategy, which leaves a gap regarding deliberate strategic thinking with a broad and long-term view.

We designed the Resilient Product Strategy Toolkit to help teams broaden their approach to managing uncertainty. It integrates existing Agile product management methodologies with proven Strategic Foresight practices to create more resilience at the product strategy level. It is designed to be lightweight and scalable to help resource-constrained teams to adapt it to their needs.

There are two common orientations towards uncertainty: 1) ignore or deny, 2) take small steps to be flexible and not overcommit. Traditional strategic planning and Agile exhibit these two orientations, respectively. However, a third, bolder alternative is possible: 3) neither ignore uncertainty nor shrink back but embrace it fully and orient oneself proactively towards all that are uncertain and unknown at every level, from execution to strategy. The Resilient Product Strategy Toolkit is such an alternative.

Finally, resilience is not just an individual quality but a collective one. The resilience of an individual is not possible without being sustained by the resilience of the whole. While this project is a small contribution towards increasing the resilience of individual teams and organizations, we hope it also leads to broader conversations around resilience for our society and environment.

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Appendix A: Survey Questions

In order to have a common understanding of some terms that appear in the survey, the following definitions have been provided:

The environment or market: The external area in which the organization operates within.

Major disruption: An external change within the environment or market that may cause significant threat to the organization's or product's ability to stay viable and/or succeed.

Product strategy: A high-level plan that describes what the product hopes to achieve as well as how and when it will do so.

1. How long has your organization utilized the Agile Scrum framework to develop software products?
    - Less than 1 year
    - 1 - 3 years
    - 3 - 5 years
    - 5 years or more
2. At your organization, how closely do you work with the Agile Scrum teams who are building software products?
    - On a daily basis
    - Multiple times a week
    - A few times a month
    - About once a month
    - Less than once a month
    - Never
    - Other: _____
3. At your organization, how closely do the Agile Scrum teams follow the common processes of Scrum as it is known and taught in the industry?
    - We follow it exactly by the book
    - We have a few different processes but generally we follow it closely
    - We use a hybrid approach of Agile and Waterfall methods together
    - We mostly follow unique processes that aren't common to Agile or Scrum
    - Other: _____
    - I don't really know
4. In your opinion why do you believe your organization has strayed away from some of the common processes of Agile and Scrum? (Select all that apply)
    - Not enough management buy in
    - Employee pushback
    - Other departments are still using Waterfall
    - Agile and/or Scrum have gaps that need filling
    - Company culture
    - Other: _____
    - I don't know
5. At your organization, what would you say gets the most focus and consideration when developing software products?
    - The product strategy / roadmap (what we should build and why)
    - The product specs / features (what will the software do)
    - The execution / implementation (how will we build the software)
    - All parts are considered equally
    - Other: _____

- I don't know

6. How would you best describe your organization's approach to change in the environment and/or market?
    - Reactive - we act in response to change as necessary
    - Proactive - we sense for possible change and act beforehand
    - Other: _____
    - I don't know
7. On a scale of 1-5 (5 being very successful, 1 being very unsuccessful) how successful do you believe the use of the Agile Scrum framework specifically has been at helping your organization to do each of the following:
    - Develop software products more quickly
    - Develop more reliable software
    - Improve process efficiency throughout the organization
    - Adapt to change in the environment and/or market
    - Develop more innovative and successful products
    - Prepare for possible major disruption or threats in the market
    - Create better strategic plans for the future
    - Improve team dynamics and trust
    - Drive more transparency throughout the organization
8. In the past 5 years, has your organization experienced any major disruption or threat from a competitor and/or market that required significant product strategy pivots or changes?
    - Yes
    - No
    - I don't know
9. Based on that experience, how would you rate the success of your organization's in adapting or reacting to the major disruption or threat in the environment and/or market?
    - Highly successful
    - Somewhat successful
    - Neither successful or unsuccessful
    - Somewhat unsuccessful
    - Highly unsuccessful
    - I don't know
10. In your own words, please describe at a high level the major disruption or threat that occurred and what was done (or not) by your organization. Please avoid using any specific products or company names in order to maintain the anonymity of this survey:
    - Open ended: _____
11. Does anyone at your organization do any monitoring or scanning of the external environment to help inform or de-risk the Agile Scrum team's current sprint work, backlog or roadmap?
    - Yes
    - No
    - I don't know
12. At your organization, what is being monitored or scanned for in the

environment? (select all that apply)

- New technologies
- Regulations
- Customer behaviour
- Competitors
- Market changes
- Emerging trends
- Disruptions or threats
- Other: _____
- I don't know

13. At your organization, how often is monitoring or scanning of the environment done?
    - On a daily basis
    - Multiple times a week
    - A few times a month
    - About once a month
    - About once a quarter
    - About once a year
    - Less than once a year
    - I don't know
14. In your own words, describe briefly the process of formulating product strategies at your organization?
    - Open ended: _____
15. When formulating product strategies at your organization, how common is it to have a contingency plan or process to help the organization react quickly in the case of a major change or disruption in the market?
    - Always, we are prepared for anything
    - Occasionally, usually more focused on minor changes
    - Rarely, but we will adapt if necessary
    - Never, we are too busy dealing with the "right now"
    - Other: _____
    - I don't know
16. What level of concern is there within your organization regarding unknown upcoming potential disruption or threats in the environment and/or market?
    - Extreme level of concern
    - High level of concern
    - Moderate level of concern
    - Low level of concern
    - No concern at all
    - I don't know
17. At your organization, how often are product strategies formulated?
    - On a daily basis
    - Multiple times a week
    - A few times a month
    - About once a month
    - About once a quarter
    - About once a year
    - Less than once a year
    - Never
    - I don't know
18. When formulating product strategies / roadmaps at your organization, how far out do the strategies typically look into the future? (select the top 3 that apply)
    - Focused on right now
    - 3 months ahead
    - 6 months ahead

- 1 year ahead
- 2-3 years ahead
- 3-5 years ahead
- 5 or more years ahead
- Other
- I don't know

19. At your organization, who is involved in formulating product strategies? (select all that apply)
    - The CEO or founder
    - Senior Management
    - Product Owner / Product Managers
    - The Agile Scrum teams
    - Design / UX
    - Marketing
    - Consultants
    - Real customers / users
    - Other
    - I don't know
20. At your organization, what information or research is used to inform the formulation of product strategies? (select all that apply)
    - Revenue goals
    - An employee's hunch
    - New technologies
    - The organization's business model
    - Market research
    - Competitive analysis
    - Quantitative customer feedback
    - Qualitative customer feedback
    - Product performance metrics
    - The product vision or mission statement
    - Other
    - I don't know
21. In your own words, is there anything you would change about the process of formulating product strategies at your organization?
    - Open ended: _____
    - Nope, it's perfect the way it is
    - I don't know
22. How effective do you believe your organization's current product strategy process would be at combating a major disruption or threat in the environment and/or market?
    - Highly effective
    - Somewhat effective
    - Neither effective or ineffective
    - Somewhat ineffective
    - Highly ineffective
    - I don't know
23. What is your current job title?
    - Product Manager
    - Product Owner
    - Other: _____
24. How many employees does your organization have?
    - Less than 25
    - 25-99
    - 100-249
    - 250-499
    - 500 or more
    - I don't know

25. In which industry does your organization develop software products?
    - Energy
    - Materials
    - Capital Goods
    - Commercial & Professional Services
    - Transportation
    - Automobiles & Components
    - Consumer Durables & Apparel
    - Consumer Services
    - Retailing
    - Food & Staples Retailing
    - Food, Beverage & Tobacco
    - Household & Personal Products
    - Health Care Equipment & Services
    - Pharmaceuticals, Biotechnology & Life Sciences
    - Banks
    - Diversified Financials
    - Insurance
    - Software & Services
    - Technology Hardware & Equipment
    - Semiconductors & Semiconductor Equipment
    - Communication / Telecommunication Services
    - Media & Entertainment
    - Utilities
    - Real Estate
    - Other: _____
    - I don't know
26. How long has your organization been in business?
    - Less than one year
    - 1-5 years
    - 5-10 years
    - 10-20 years
    - 20 years or more
    - I don't know

Appendix B: Practitioner Interview Guide

Thank you for taking the time to speak to us. I would like to remind you that this interview will be recorded for transcription and note taking purposes. It will remain confidential, and no identifiable information will be used in the final paper.

In order to have a common understanding of some terms that we will use throughout the interview, we have put together a few definitions:

The environment or market: The external area in which the organization operates within.

Major disruption: An external change within the environment or market that may cause significant threat to the organization's or product's ability to stay viable and/or succeed.

Product strategy: A high-level plan that describes what the product hopes to achieve as well as how and when it will do so.

Product Strategy

1. In your role what is your relationship with:
    - The Agile Scrum teams?
    - Product strategy?
2. What is the common process or steps taken to formulate product strategies at your organization?
3. What are the major goals that drive the product strategies at your organization?
    - How much of your product strategy is based on incremental innovation versus radical innovation?
4. What is your organization's planning time horizon, how far out do you look ahead?
    - Why?
    - Ever do any longer term strategizing?

Resilience

5. Can you describe a time at your organization when the company/product was met with a major disruption in the environment and/or market?
    - What was the disruption?
    - Was it completely unexpected or did the organization see it coming?
    - What was the reaction by the organization? What was done?
    - Was the organization able to recover?
    - Were there any learnings from the disruption? Did anything change?
6. Do you personally think your organization is facing any risk or threats they are unaware of?
7. Does your organization have a process to scan or monitor the external environment for potential changes, risks, or disruptions?
    - If so, who does the scanning?
    - What is being scanned? Emerging trends? Weak signals?
    - Does your organization develop plans to mitigate risks and manage disruptions that are possible consequences from the scan?

Agile & Scrum

8. What is the primary motivation or benefit in your organization for using Agile and Scrum?

9. Do you feel following the Agile Scrum framework encourages your organization to focus more on short term initiatives and strategies rather than longer term?
10. Do you feel Agile and Scrum processes have improved your organization's ability to adapt to change in the environment and/or market?
11. Do you feel there is any room for improvement with how your organization develops software products?

Appendix C: Expert Interview Guide

Thank you for taking the time to speak to us. I would like to remind you that this interview will be recorded for transcription and note taking purposes. We may cite quotes from this interview in our research paper, however, we will seek your prior written consent for any quote(s) we would like to use.

Experience and background

1. Can you share your own experience of working in the industry related to product strategy and/or Agile software development?
2. What is your view of the software industry overall in the effectiveness of how they utilize Agile and product strategy?

Explore their view of the topic

1. How important is product strategy to Agile software teams, in your view?
2. What is your view on potential disruptions faced by software companies today? Do you think they are prepared?
3. In your experiences of software companies in general, how often or how many have good product strategies that prepare them for disruptions?
4. Do you think Agile software companies think long-term enough?
5. Do you have stories of failure of software companies that are good at agile but didn't have an adequate product strategy?

Explore their view on the design opportunities

1. What do you think a resilient product strategy would look like? How would a company go about developing a resilient product strategy?
2. Do you have any thoughts on how a company may develop resilient product strategies?
    - If you have a recommendation, how do you think it can be integrated with the Scrum framework? What do you think are the key challenges or obstacles that would prevent agile teams from having a resilient product strategy?
3. Do you have stories or examples of companies who are successful at developing resilient product strategies?
4. Do you know of Strategic Foresight? If so, what do you think of the possibility of how it can support Agile software development?