Open-Innovation in Healthcare: an analysis of motivations, learning, and program outcomes

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners. I understand that my thesis may be made electronically available to the public.

Abstract

The goal of this study is to examine open-innovation programs run in two different healthcare settings. Open innovation is the process of engaging external sources of knowledge and capabilities in the pursuit of developing new products, services, and processes. The concept has been a source of active research, but there remains a need to better understand how it is approached in non-profit organizations who lack the financial motivations of for-profit firms. This study analyzed the open innovation programs of two non-profit healthcare organizations to obtain greater insight into the structure of the programs being run, the motivations for participating, and the role that the external sources of knowledge play in affecting innovation outcomes. A grounded theory methodology was used to analyze interview transcripts from 7 staff at each organization. In total, over 250 first-order codes were created and then grouped and sorted into 83 basic themes, 31 organizing themes, and six global themes. Findings show that the healthcare organizations engaged in the same set of innovation activities as for-profit firms, but did so with different levels of activity and for different reasons. On the surface, the two programs appear similar, but in practice are quite different. The locus of innovation and direction of knowledge flows differ significantly. These differences may impact changes in absorptive capacity and innovation outcomes, but further study will be required to confirm those findings.

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Chapter 1: Introduction

The goal of this study is to examine open-innovation programs run in two different healthcare settings. Open innovation is the process of engaging external sources of knowledge and capabilities in the pursuit of developing new products, services, and processes. Doing so deepens the pool of expertise available to innovation teams, which can create positive and negative outcomes.

The concept of collaborating on innovation initiatives is often appealing to organizations in the healthcare sector. Most healthcare organizations prioritize continuous improvement planning and initiatives that improve patient health outcomes. Yet they lack much of the organizational slack and knowledge bases required for creating new products and services. The implication is that healthcare organizations have control over, and a deep understanding of how to improve the processes involved with delivering care, but lack the knowledge and resources required for developing more advanced product and service innovations.

My interest in this topic comes from over a decade of working with the healthcare sector on change management and innovation projects. Through this work, I have observed plenty of solvable problems and opportunities for innovation. In response, I have helped develop a program that provides public service organizations with the capacity and skills required to engage in innovation by pairing them with entrepreneurially minded students. Some of those teams were placed with one of the organizations being studied in this research. By way of this work, I have come to recognize the potential value that more open approaches to innovation present to the healthcare sector, but several questions remained unanswered. I understand well the aims and motivations of the entrepreneurial students I work with, but several questions about the organizations supporting the program have piqued my curiosity. What are their aims and motivations for participating in the program? Why are they allocating resources towards it? How do similar programs in other healthcare settings function, and what can be learned by comparing them? Aside from the creation of new products and services, what reciprocity or lasting impacts are created for the healthcare organizations involved in open-innovation programs? These curiosities and questions were the inspiration for this study.

As an innovation manager myself, this study approaches these questions from the perspective of the innovation practitioner, aiming to uncover insights that deepen our understanding of how to design innovation programs in the public sector. Equally important, the study seeks to improve our understanding of how healthcare organizations participate in open-innovation programs and what benefits they may gain from their investments of time and energy.

Chapter 2: Literature Review

2.1 Background

The importance of innovation in the healthcare industry has long been recognized. Despite significant advances in medical services and technologies, the sector continues to provide untapped opportunities for innovation and new product development (Herzlinger, 2006). Those opportunities remain untapped for several reasons, one of which relates to the limited interaction between users/actors in the healthcare system (such as patients, physicians, and administrative staff) and the firms that actively manage and develop new healthcare products.

Kohler (2009) discussed this challenge in the service industry and framed it from the knowledge-based view of a firm. As he reported, it is widely accepted that a firm's ability to innovate is tied to the pool of knowledge available within an organization. Firms that rely on knowledge within their organization often have lower performance than firms that search for knowledge outside their organizational environment (Rosenkopf and Nerkar, 2001).

The concept of improving innovation performance by opening up the process to external sources of knowledge was popularized by Henry Chesbrough in the early 2000s (Chesbrough, 2003). He coined the term open innovation, which is the use of intentional inflows and outflows of knowledge to accelerate innovation processes. This concept has since been a source of extensive study, appearing in the title of more than 10,000 articles on Google Scholar. It is also a practice that is widely adopted. In a literature review of over 250 empirical studies on open innovation, Schroll and Mild (2012) conclude that "based on the current empirical evidence on open innovation adoption, it can be seen as a global trend occurring in almost all industries and markets."

Despite the growth in popularity of open innovation, the majority of research, both empirical and qualitative, examines open innovation in the context of private firms. There is still a need to better understand how the concept is approached in non-profit organizations who lack the financial motivations of for-profit firms. This theme was highlighted as a key area of research interest in a paper by West et al. (2014) and co-authored by Chesbrough. In the paper, they write that there is evidence that open innovation can benefit healthcare, and that "the potential for nonpecuniary open innovation research is ripe for greater inquiry."

The goal of this study is to answer the call for inquiry into the application of open-innovation processes in organizational contexts that lack financial motivations. Specifically, it will analyze the open innovation programs of two healthcare organizations to obtain greater insight into the structure of the programs being run, the motivations for participating, and the role that the external sources of knowledge play in affecting outcomes for the organizations. Before introducing the study in more detail, some background will be provided on the themes underscoring the research questions.

2.2 Examples and Management of Open Innovation Programs in Healthcare

There are examples of programs that have successfully connected multiple actors in healthcare systems for innovation purposes. In some cases, problems from healthcare organizations are curated and provided to the broader innovation community. In a qualitative study by Coccia (2016), this process of using validated problems as a key knowledge input for innovation management was found to be effective in initiating technology development in the healthcare sector.

A similar concept is applied through Stanford University's Biomedical Program, which places multi-disciplinary teams of graduate students into clinical healthcare settings, including operating rooms and Doctor's offices, allowing them to observe for inefficiencies, errors, or what they describe more generally as 'needs' (Brinton et al., 2013). This approach is sometimes referred to as needs-based innovation (Yock, 2014) and can be thought of as a form of open innovation. The knowledge available to the innovators is increased by way of the student's access to clinical settings. The impacts of the program have been profound, having led to the

creation of more than 25 companies, $200 million of follow-on investment, and the creation of over 500 new jobs (Brinton et al., 2013).

A common pattern through the aforementioned examples is that key knowledge inputs are provided in the early stages of product development. This is not a novel insight. In a qualitative study by Karkkainen, and Elfvengren (2002) the role of needs and customer voice (forms of knowledge inputs) were noted as predictors of success in innovation management and new product development, especially when those inputs are provided at early stages of development, such as opportunity recognition, concept generation, and product definition.

The management of innovation programs in healthcare has been the focus of many studies. It has been suggested that healthcare innovation programs should follow the same general patterns and stages of innovation in other sectors. A common methodology for organizing and managing innovation comes from the concept of stage-gates. Initially introduced by Cooper (1990), stage-gates were proposed as a tool to help manage the development of new ideas. In Cooper's model, new ideas for products or services move through a series of stages, including assessing the idea, preparing a business case for it, developing the idea, testing it, and then launching it in full. There is a gate between each stage in the form of specific conditions that ideas need to meet in order to proceed, which acts as a quality control mechanism. As Cooper describes, "the stages are where the work gets done; the gates ensure that the quality is sufficient."

Since its introduction, stage-gate management has become the focus of multiple studies on its role in innovation and new product development (Griffin, 1997; Engwall et al., 2005; Hermancloglu et al., 2007). For example, McDermott and O'Conner (2002) conducted a case-based study of ten large firms, and suggest stages-gate management can reduce risk and increase efficiency in new product development (NPD) processes. A study by Grunlund et al. (2010) looks at how stage-gate management can be applied to open innovation projects. They note that, while many of the same stages exist in open innovation projects as in more closed innovation, there are specific activities that require their own stage. Specifically, they suggest that activities related to seeking and evaluating opportunities for innovation are so prevalent in open innovation that they should be included as a stage. Similarly, an empirical study by

Cormican and O'Sullivan (2004) found that stage gate management in open innovation was effective but added that best practice should include activities focused on searching for new opportunities for innovation.

2.3 The Drivers of Innovation for Healthcare Organizations

Identifying an organization's motives for innovating helps us understand what forces drive innovation activity. In the for-profit sector, market forces, competition, and opportunities for entering new markets have all been essential drivers for innovation (OECD, 2005). But the drivers, primary objectives, and values related to innovation are contingent on organizational contexts, varying from one organization to another (Leiponen & Helfat, 2010; Berwick, 2003).

Healthcare organizations differ from the majority of the organizational contexts discussed in the innovation literature. They are generally not driven by competition or profits, but rather by a pursuit of efficiency and effectiveness (Bontis and Serenko, 2009). In many cases, those factors relate to the core mandate to deliver a high quality of care to the patient. However, non-medical factors can also influence the need for innovation in the health sector (Ankenroye, 2012). Further, a primary goal for many health care organizations is to reduce the frequency of bad results, which creates a somewhat novel orientation towards innovation (Merono-Cerdan and López-Nicolás, 2013).

The importance of reducing the frequency of errors and improving the overall quality of services has not been lost on the Ontario healthcare system. The Excellent Care for All Act (ECFAA) was enacted in 2010 and included regulations intended to ensure the needs of the patient come first through ongoing quality improvement measures. The regulations include requiring hospitals to create annual Quality Improvement Plans (QIPs) that contain numerous QIP objectives. Each QIP objective must be paired with a desired outcome and information about current performance and desired performance. In order to ensure compliance, the Act includes a provision that CEO compensation is linked to achieving QIP goals (Wylie-Toal et al., 2013).

A study by Chan and Hsu (2014) looked at the QIPs of 62 hospitals in Ontario to better understand what priorities where driving quality improvement planning and found five broad

categories: improving safety, improving the effectiveness of health services, improving access to health services, creating patient-centred services, and improving the integration of health services. While the ECFAA only applies to hospitals, most healthcare organizations regularly engage in quality improvement planning. While specific details of each organization's plans are not always available, the publicly available provincial data for hospitals gives some indication of the issues that drive healthcare organizations in the province.

Further, a paper by Ankenroye (2012) proposed a framework that outlines the core drivers of innovation for healthcare. The framework includes eight different drivers, which include factors not captured in the review of QIPs. Two of the drivers related to diverse and changing patient health needs, while operational and financial sustainability challenges were also introduced in the remaining six factors.

Understanding the strategic priorities of healthcare organizations provides valuable context for examining motivations to participate in open innovation programs. Very little is understood about open innovation in healthcare, and improving our understanding of how and why organizations participate, and more important, what outcomes they hope to achieve as a result, will enhance our ability to design programs that satisfy such goals. This study will contribute to this area of research by investigating the motivations of two organizations for participating in open innovation programs.

2.4 Absorptive Capacity and the Impact of External Knowledge

One of the additional benefits of open-innovation is that interaction with external groups and new sources of knowledge can result in more lasting, positive impacts not associated with a specific project or new innovation. Such impacts relate mostly to learning and an associated construct known as absorptive capacity. Absorptive capacity (ACAP) is the ability of an organization to find, assimilate, transform, and apply new knowledge in ways that make the organization more competitive. It is often associated with innovation performance, and has been the focus of thousands of studies.

The concept was introduced by Cohen and Levinthal (1990) and then later reconceptualized by Zahra and George (2002), who showed that absorptive capacity is multi-dimensional. They

demonstrated that ACAP can be broken down into two dimensions, each of which having two related sub-processes. The first dimension is potential-absorptive capacity, which relates to the ability of an organization to recognize and absorb new information. The concept is similar to potential energy in thermodynamics. The ability to produce work is there, but it hasn't been transformed and applied yet.

Potential ACAP is influenced by prior knowledge as it allows organizations to recognize the value of new information (Kogut and Zander, 1992). The more concepts and patterns we know, the more we can recognize and evaluate related patterns in the future (Bower and Hilgard, 1981).

The second sub-dimension is realized absorptive capacity. If the first step was to find and absorb new information, then realized ACAP relates to the processes through which the value of that knowledge is realized through transformation and exploitation. Building off the potential energy metaphor from above, this is the phase when the potential energy is turned into kinetic energy so it can do work.

Realized ACAP is also related to prior knowledge, but through different processes. Prior knowledge provides a foundation upon which new, related knowledge can be added (Cohen and Levinthal, 1990). It increases the ability to store new memories, and as important, improves the ability to draw on knowledge through improved recall. The deeper one's pool of knowledge, the more future knowledge we can absorb and store, and the better we will be at re-deploying it (Cohen and Leventhal, 1990).

Companies that routinely invest in R&D and that are in the habit of developing and commercializing products and services will have organizational structures that support the acquisition and exploitation of knowledge (Flor, 2018). Such organizational structures and processes are absent in most healthcare organizations, and very little is understood about the relevance of absorptive capacity to the healthcare sector. Harvey et al. (2010) discusses the theoretical relationship of absorptive capacity to non-market environments and argue that absorptive capacity should indeed apply to the public sector. It is imperative that research be

conducted in this space so we can develop a better understanding of how to manage and support the innovation performance of public organizations.

There are several reasons why absorptive capacity is an important to the public sector. First, as stated above, healthcare organizations do not routinely invest in the processes that promote acquisition of knowledge, nor the exploitation of it. The public sector has a reputation of being insular, meaning they are cut off from sources of knowledge that may improve their overall performance.

Further, investing in innovation is an inherently risky exercise. The final outcomes of innovation, research, and development activities cannot be known at the time that investment decisions are made, meaning there is a risk that the investments may produce limited or poor results. Public sector organizations are designed to be risk adverse, especially in healthcare where the consequence of making mistakes can have dire consequences. It is important to recognize, however, that supporting innovation projects is not a zero-sum equation, particularly in open innovation projects. Even if an innovation project fails to produce a viable product or service, the interaction of stakeholders from different backgrounds provides a mechanism for knowledge sharing. Further, collaboration on research and development will allow the partners to passively learn through exposure to new approaches and world views. In essence, open innovation projects should provide the organizational processes through which external knowledge can be found, acquired, transformed, and later exploited. Or, in other words, open innovation programs may allow healthcare organizations to develop their absorptive capacities.

Given how little is understood about absorptive capacity in the public sector, this study will make a contribution by providing deep insights into how two different innovation programs function and how those structures allow healthcare organizations to acquire and benefit from external sources of knowledge. While these results will not provide broad, generalizable results, they will provide valuable contextual information that can be used to structure subsequent empirical studies on absorptive capacity in the public sector.

2.5 The Need for Further Investigation

As stated above, the goal of this study is to analyze the open innovation programs of two healthcare organizations, with a particular focus on understanding how the programs are structured, why they were created, and what the outcomes have been. Such a study is relevant for a few reasons.

First, there has been a call for more research into open innovation in non-profit and public sector organizations. More specifically, there is a need to better understand how open innovation programs operate in healthcare environments. This includes the need to better understand product innovation management processes (Cormican and O'Sullivan, 2004).

To date, no scoping reviews have been conducted on open-innovation in healthcare. A conference paper by Amann (2014) presented the findings of a scoping review of online communities that support innovation in healthcare. The main findings of the review include how to define and design online communities as well as the main drivers for creating them. Unfortunately, the conference paper was not accessible for a full review of the finding. Further, while the review would provide some sense of the scale of research that has been conducted, the focus was specifically on web-based interaction between healthcare organizations and online innovation communities. As a result, the review was focused on a very narrow aspect of open innovation as a process and its relationship to the healthcare sector.

Wass and Vimarlund (2016) conducted a more broad review of research on open innovation in healthcare. The study used a literature review and content analysis to identify themes in the extent literature on the topic. Their initial search for "open innovation" and health yielded 66 articles, but only 14 met their full inclusion and exclusion criteria. This result on its own is relevant, as it highlights the dearth of studies in this space. The authors also noted a lack of research into how innovation processes in healthcare are managed, adding that "there appears to be a gap in open innovation research that studies the actual outcomes and experiences of open innovation in healthcare."

The review of Wass and Vimarlund (2016) focused on summarizing research related to the classification, stages of development, social contexts, and constraints of open innovation

processes. It appears that research on open innovation in healthcare has mainly focused on the inbound flow of knowledge and information, where the host healthcare organization reaches out to organizations and stakeholders in the external environment in pursuit of development partnerships, procurement, and learning. None of the articles they reviewed studied outbound knowledge flows, where healthcare information and knowledge would be offered to external organizations. Further, the papers reviewed referred to anticipated outcomes as a result of open innovation being applied in healthcare, suggesting that realized and observed outcomes were still emerging. The limited range and diversity of research point to a gap our understanding of how open innovation can and should be applied in healthcare contexts.

In response, this study will investigate the application of open-innovation processes in two different healthcare contexts. One program is run by a Pediatric Care organization, and the other by a Long-Term Care (LTC) organization. The specific research questions being explored are:

1) How are open-innovation programs designed and managed in differing healthcare contexts?
2) Why were the programs created, and what do those goals tell us about the organizational drivers for innovation in healthcare?
3) What is the flow of information within the programs, and what role and impact does the external partner have on program outcomes and the learning of staff who participate?

Chapter 3: Methods

3.1 Introduction

A qualitative approach was used for this study for several reasons. One of the goals of the study is to generate information that can be used to improve the management and efficacy of open-innovation programs in healthcare settings. The challenge, however, is that such approaches to innovation management are nascent and poorly understood. Before we can create more systematic and quantitative studies that might yield generalizable results, we first need to learn more about the systems these programs exist in, how the programs themselves are designed and function, and more importantly, how the people who operate within those systems perceive the programs.

Berkwits and Inui (1998) describe the importance of qualitative research methods, particularly concerning how to properly manage and improve healthcare programs:

> Consider the following situation: you have recently taken on administrative responsibilities at a new hospital where you are responsible for improving patient care programs and organizational efficiency in the general medicine outpatient clinics. You are familiar with your department's general objectives… but you want to optimize the transitions for all involved parties… You might want to learn what systems already work well in the clinics… You might also want to learn about employees' perceptions of their mission and service to identify strategies that could motivate them for change. The information to help you meet these objectives will come primarily from the people involved in your questions and plans… One can gather this information by talking to people informally. Alternatively, one can use qualitative research techniques for this purpose, particularly in new situations and environments.

The research questions being explored, which relate to staff members' experiences and motivations, are difficult to understand and assess through quantitative methods. Qualitative research methods were required in order to better understand the people and the organizations behind the innovation programs being studied. The study results will provide a rich account of the social context of the programs being studied and reveal patterns and trends that could be used for subsequent, more quantitative methods. Qualitative research methods

and semi-structured analysis of healthcare operations can reveal information that is otherwise difficult to discover through quantitative approaches, helping to create a complete picture of what is going on in the system being studied and what warrants further investigation (Berkwits and Inui, 1998).

In this study, grounded theory was used to analyze and interpret the collected qualitative data. The use of grounded theory was appropriate for a few reasons. As the methodology's name suggests, the approach is used to generate theories grounded in context and the social system being examined and in the data being analyzed (Strauss, 1967). For this reason, it is a helpful tool for studying new phenomena in the social sciences.

The methodology has also been noted as appropriate for novice researchers because of its clear and intuitive process (Chun Tie et al., 2019). Grounded theory has been used as a research method for decades, and as such, it has evolved and been adapted into new theoretical perspectives. Birks and Mills (2015) have re-conceived and conceptualized grounded theory in a way that makes it easier for novice researchers to understand and apply. Given this is a Master's level thesis and study, using a methodology that is easy to engage with and conceptualize helped me become more comfortable with the data and the conclusions and theories that might be posited.

The methodology has both a linear progression and constant, recurring processes. Raw qualitative data (interview transcripts, in this study) are first organized into raw codes. As first order codes, they have very little meaning on their own. However, after the first order codes have been created, they can be grouped into basic themes, organizing themes, and then global themes. As the codes move from first-order to second-order, to third order, and so on, they become increasingly abstract and discrete, helping to make sense of the data and the patterns within the data set (Noble and Mitchell, 2016; Chun Tie et al., 2019).

There are two other processes that occur throughout coding. The first is constant comparative analysis, which involves the comparison of data and their interpretations against each other. This comparative analysis allows for inductive reasoning, allowing for data to be organized into similar codes and categories. Because the comparative analysis is constant, the

codes and categories are rarely static but rather evolve as patterns and organizing principles emerge from the data.

Second, there is a continual process of note-making and memoing. This process allows for patterns and meanings in data to be captured as they are observed. They provide a record of the researcher's thoughts and interpretations and constitute a fundamental process for engaging with the research and making sense of the findings that emerge from the study (Stern, 2007).

3.2 Setting and Participants

The setting for this study was the province of Ontario. Two healthcare organizations were selected to be the focus of this study based on their participation in open innovation programs.

3.3 Procedures

3.3.1 Recruitment

The steps for recruitment started with outreach to senior staff at three healthcare organizations who participate in an open-innovation program to inquire about their interest in participating in the study. General interest in participating was confirmed by all three organizations, but one organization had only started running their program. This organization was left out of the study, and the other two were included.

The organizations were selected through purposive sampling based on their known involvement in open innovation. Within each organization, staff who participated in the innovation program and who support one or more innovation projects were asked to participate in a 40-55min interview. To ensure that a broad range of perspectives was included in the study, the researcher asked staff involved at the senior level, the management level, and the clinical/frontline service delivery level to participate. The only inclusion criteria was that the staff being interviewed fell into one of these stakeholder groups.

Recruitment of interview participants was facilitated by the organizations whose innovation programs are being evaluated. Both organizations have been running open-innovation programs for 2-3 years. Being run out of a pediatric care facility, the first program has been delivered in partnership with an innovation program at a local University. The other program,

run by a Long Term Care (LTC) organization, is delivered in partnership with a publicly funded Regional Innovation Center. Both programs focus on collaborating on innovation projects with groups internal and external to the organization.

An introduction to the study was then sent to the staff at three levels of seniority who participated in the open-innovation program: senior staff, including directors and CEOs; Managers; and frontline staff, including nurses, therapists and hospitality staff. An information letter was included in this introduction, as well as a consent form for participation in a 40-55min interview. These documents outlined the study's purpose and objectives and informed them that the study and questionnaire had received approval from the University of Waterloo's Research Ethics Office. Staff members interested in taking part then signed and returned the consent to participate form, and interviews were then scheduled.

3.3.2 Interview Questionnaire

A questionnaire was developed to ensure that data were collected related to the research objectives of the study (Appendix A). The research instrument included a brief script at the start of the questionnaire to re-introduce the study and the anticipated length of the interview. This script is followed by 20 questions, which were divided into five sections: program parameters, project-specific details, program outcomes, program weaknesses, and program benefits. The questionnaire structure was designed to create a conversation that goes from a broad, general discussion of the innovation program (Section 1) into questions and a conversation about a specific project (Sections 2, 3, 4, and 5).

The program parameter questions were intended to collect information about how the program is structured, why it was created, and what types of innovation projects have been supported. In the following sections, where a specific project is discussed, the participant is asked to break the project into three phases: beginning, middle, and end. That allows for a more detailed exploration of specific activities, roles, challenges, and benefits associated with projects from a given innovation program. No demographic data were collected. The only identifying information collected was the participant's role and seniority level within the organization.

The questionnaire was reviewed and given ethics clearance by the University of Waterloo's Research Ethics Office. It was also reviewed by a staff member from one of the participating healthcare organizations to ensure the questions were clear and appropriate.

3.3.3 Data Collection

Semi-structured interviews were conducted between September 2020 and October 2020 on the University of Waterloo sponsored Webex platform. The following participants were interviewed during that time frame:

Table 1: Interview participants by seniority and organization

Pediatric Care	Long Term Care
2 Frontline staff members	2 Frontline staff members
2 Managers	3 Managers
3 Senior staff	2 Senior staff

The Webex platform automatically transcribes the audio from web-conference recordings. These transcriptions were then manually edited for accuracy and to properly label the speakers.

3.3.4 Data Processing

The interview transcripts were then imported into NVivo qualitative data analysis software. As described above, a grounded theory methodology was used to analyze the data. This approach's basic premise is that there is no preconceived notion of what the codes should be (Attride-Stirling, 2001). The study does not use framework analysis or structured coding, where coding frameworks are created ahead of time, and interview data is assigned to them.

Interview transcripts were coded into first-order codes. The process required each sentence or string of thought to be de-coded to first understand the meaning of what each participant was saying. A first-order code was then assigned to provide a label for the information

contained within the coded text. Each code was essentially a succinct and meaningful label identifying points of interest in the interview data (Braun and Clarke, 2006).

Some codes were created using in-vivo or manifest coding. In other cases, latent codes were created, which involves inferring or 'reading between the lines' to create a code.

The first two interviews for each organization were coded line by line. This created a rich database of codes that, combined with constant comparative analysis, provided a framework for coding the remaining interviews for each organization. The codes generated out of the first two interviews were unorganized first order labels. These codes were then organized into themes and categories, and in some cases the labels for codes were adjusted to more appropriately represent the data they were assigned to. When coding subsequent interviews, data was assigned to the codes that had been generated by coding the first set of interviews. In some cases, new codes were created to reflect information that was not present in the first set of coded interviews. As well, as result of constant comparative analysis, codes and labels were adjusted and refined over time to ensure they reflect the range of data they capture.

This study's unit of analysis was the healthcare organization, meaning that two cases were created to support analysis: Pediatric Care and Long Term Care. This unit of analysis was used to address most of the research questions. In a few cases, it was also helpful to compare the data based on the seniority level of those who participated in the innovation programs. For this unit of analysis, there were three cases: frontline/hospitality staff, management staff, and senior staff. These units of analysis were used to compare data and look for trends, patterns, and interesting findings. These findings were revealed by comparing the frequency of codes based on organization and/or seniority in each organizing theme.

Chapter 4: Results

4.1 Introduction

This section will introduce and discuss the findings from the interviews, coding, and data analysis. It will begin with a summary of the coding results and a general overview of the organizations being studied. More detailed findings will then be presented and organized under the global and organizing themes that emerged out of the interview data. Specific results will be discussed after they are introduced. A more general discussion of the primary findings will be presented in Chapter 5.

4.2 Coding Results

Over 250 first-order codes were created and then grouped and sorted into 164 basic themes, 31 organizing themes, and six global themes. For example, the basic theme of "Innovation-Lead created as an official role" was one of several other basic themes grouped under the organizing theme of "Approaches to operationalizing innovation internally." This organizing theme was then grouped with eight other organizing themes to create the global theme of "Facilitating Factors". As another example, "Desire to create a process that clarifies how new ideas can be developed and implemented" is a basic theme under the organizing theme of "Desire to create more robust infrastructure for innovation", which was part of the global theme "Motivation and Drivers." Figure 1 provides a visual summary of the basic, organizing, and global themes that emerged out of the data. The colour coded sections refer to all the codes within a global theme, with the area of each section representing the relative frequency of references coded to that theme. Table 2 provides a coding summary of the transcripts.

Table 2: Codes and Number of References from Interviews

Global Themes	Number of Organizing Themes	Number of Basic Themes	Total Number of Coded References
Facilitating Factors	9	47	70
Motivations and Drivers	2	31	130
Perceived Benefits	7	36	134
Perceived Challenges	4	13	44
Program Activities	3	18	101
Program Constraints	6	19	123

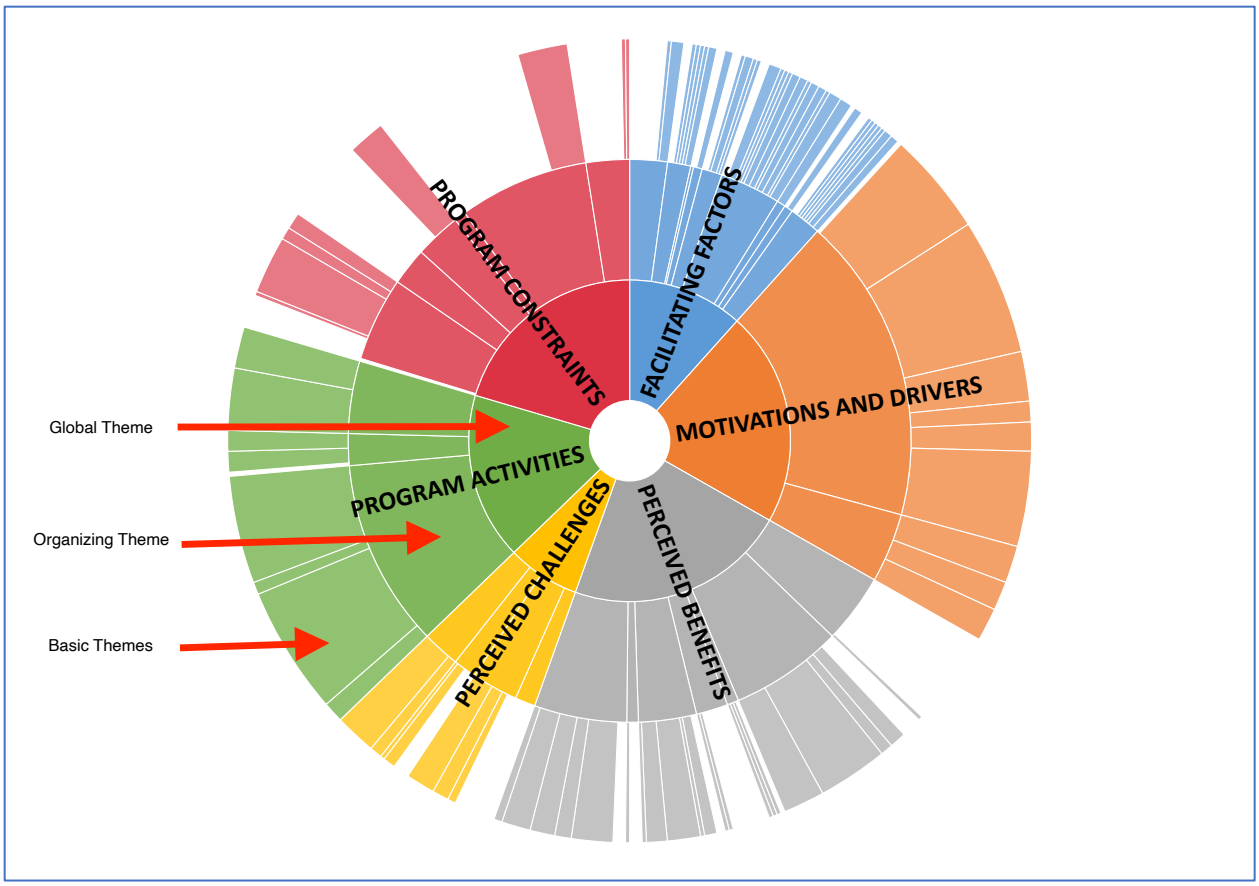


Figure 1: Visualization of Coded References

4.3 Overview of Organizations and Programs Being Studied

Staff were interviewed at two different healthcare organizations: a Pediatric Care organization and a LTC organization. The staff interviewed at the Pediatric Care organization included two front line clinical staff, two managers, and three senior staff. Two front line staff were interviewed at the LTC organization, along with three managers and two senior staff. The progression of interviews started with staff at the pediatric care facility, followed by interviews with the staff from the LTC homes.

4.3.1 Pediatric Care Innovation Program

The Pediatric Care organization is located in Southern Ontario and is comprised of a central health services facility and two satellite hubs to serve nearby regions. The central facility has been running an innovation program since 2019. The program is led internally by a small, inter-

department planning committee of 6-7 staff. The program is also supported by external partners. Staff from an innovation management program at a local university provide innovation management and planning support. Students are also involved and take a lead role in planning and executing innovation projects.

Innovation projects of the Pediatric Care program proceeded are as follows. First, the internal committee identifies organizational or client-facing challenges appropriate for supporting innovation projects. Some examples of challenges include difficulty scheduling client appointments and the inability of some clients to engage in spontaneous play. These challenges are then turned into projects and assigned to teams of students, who receive support from both the pediatric care facility and the innovation program at the local university. Each project and team are assigned a staff member from the pediatric care facility as a liaison. The staff member's primary responsibility is to be a broker between the external student group and the internal organizational environment. This usually involves answering questions, facilitating shadowing of client appointments, and making introductions between the project team and other staff members. In some cases, the staff members also collaborate on different activities that take place during the project.

4.3.2 Long Term Care Innovation Program

The innovation program in the LTC organization has a different structure. First, the organization is comprised of a network of 19 individual LTC homes. Due to the size of the organization, there are two levels of management: central support to manage the network of LTC homes, and management at the individual LTC home level. For the innovation program being studied, a central senior staff member manages and helps coordinate innovation projects at multiple facilities. The program has been running since 2019. Eight of the 19 LTC homes supported innovation projects. Each home that participated had an innovation committee, with a designated staff member as the committee lead. The responsibilities of committee members were evenly shared, with the committee leads taking on the added responsibility of attending quarterly meetings with all other project leads from the other homes.

The program is run in partnership with a Regional Innovation Center (RIC), one of 17 RICs across the province of Ontario. The RIC provides innovation planning and management support to the central staff member and each innovation project at each of the eight homes. The RIC offers staff training and support on design thinking and other processes for managing new product development and innovation.

An innovation project at any one of the eight homes proceeds as follows. With the RIC's support, planning meetings are used to identify challenges that staff are interested in solving. Once a specific challenge has been selected, staff on the internal committee play a lead role in advancing the project. Projects advance through stages and activities with the support and guidance of the RIC. Committee members spend a lot of time interviewing other staff and residents of the long-term care home, as well as discussing as a group at monthly committee meetings.

4.4 Innovation Activities and Planning

4.4.1 Innovation Activities

The data for this section came from interview responses to questions 1, 6, 7, and 8 of the interview questionnaire (Appendix A). A total of 87 interview excerpts were organized into eight basic themes relating to innovation activities. These basic themes were then sorted into three organizing themes: activities that took place during the beginning, middle, and end of a project. The types of activities that respondents described taking place at each phase of the project were very similar. As Figure 2 illustrates, there were two primary sets of activities in each stage.

Figure 2: Type and frequency of innovation activities by stage of a project

At the beginning of a project, innovation teams would start by identifying opportunities for innovation, which were generally high-level problems experienced by staff or clients of the healthcare facility. For example, one LTC team explored the problem of over-prescribing anti-psychotic medication to residents. In contrast, a team at the Pediatric care facility looked at some of their clients' inability to engage in spontaneous play. Once a general area of focus was established, projects in both programs moved into a range of activities that helped team members better understand the context of the problem they selected. This information collection period included interviews, shadowing client appointments, and other forms of research. There was a strong focus in this part of the project on looking for the root causes of the orienting problem they selected. This work allowed teams to select a more specific and narrowly defined root cause, which becomes an important input for the activities in the middle of projects. A few other activities also took place in the beginning, such as taking part in innovation management training and building relationships with the external partners supporting the innovation projects.

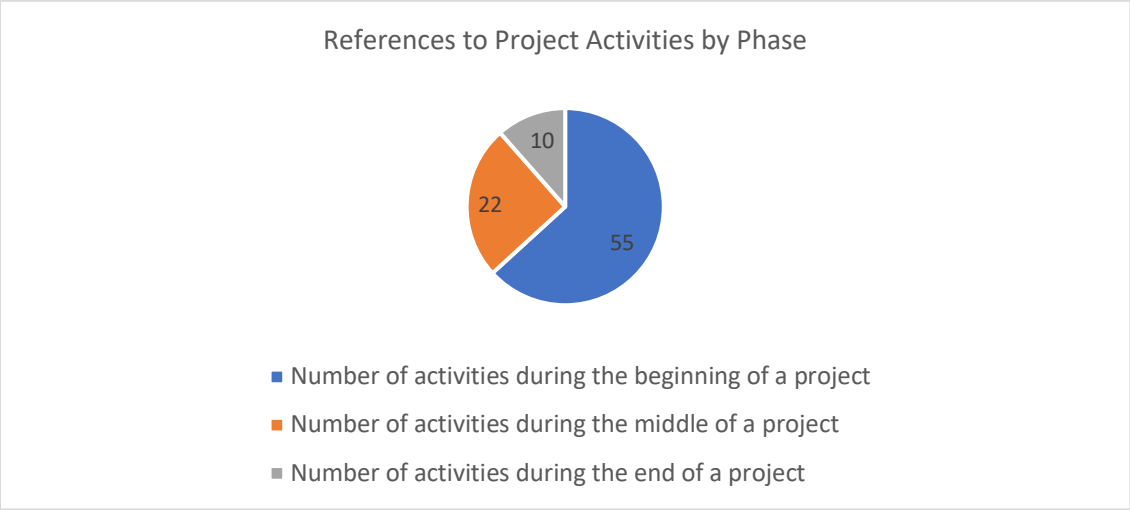
The middle of a project was generally made up of two activities. With the high-level problem having been well studied and a more specific, narrowly defined root cause identified, each project proceeded into a period of generating, exchanging and evaluating ideas for possible

solutions that address the root cause. This period of brainstorming was often collaborative, involving both internal and external team members. After ideas were generated, a final solution was selected for further development and testing.

At the end of a project, many teams formally presented the solution they selected and began creating and executing plans to test and evaluate the solution. Only three projects were referenced as being completed, with the remaining projects being still in developing, being cancelled, or being interrupted. This finding is discussed in more detail below.

4.4.2 Activity Levels

In looking at the total number of references to activities by stage, it is evident that levels of activity are highest at the start of a project and then declines steadily from there. As Figure 3 illustrates, the number of references to project activities for the start of a project is more than double the number of activities referenced for the middle of a project and more than five times



greater than those mentioned for the end of a project.

Figure 3: Frequency of Activities by Stage of Project

A proper explanation for this pattern is not entirely clear. Given that most projects were never completed, it makes sense that the last phase of a project would be the least active. Another possible explanation is that the activities conducted in the first phase of a project are more individualistic and time intensive. As discussed above, many of the activities at the beginning of a project included shadowing, interviewing, and researching problems. These

activities were done individually during shifts, and then discussed as a group during innovation team meetings. Meanwhile the activities in the middle of the projects (creating and evaluating ideas for solutions, proposing solutions) were all group work, meaning they could be completed more expeditiously.

It is also worth noting that the total activity levels and degree of drop off in activity between the two programs is asymmetrical. As

Figure 4 demonstrates, when looking at activity levels by organization, the LTC program has a much higher overall level of activity at the start of a project compared to the Pediatric Care program. The LTC projects also have a much steeper rate of decline in activity from the beginning of a project to the end. The activity level of the Pediatric Care organization also declines over time, but the rate of decline is more linear.

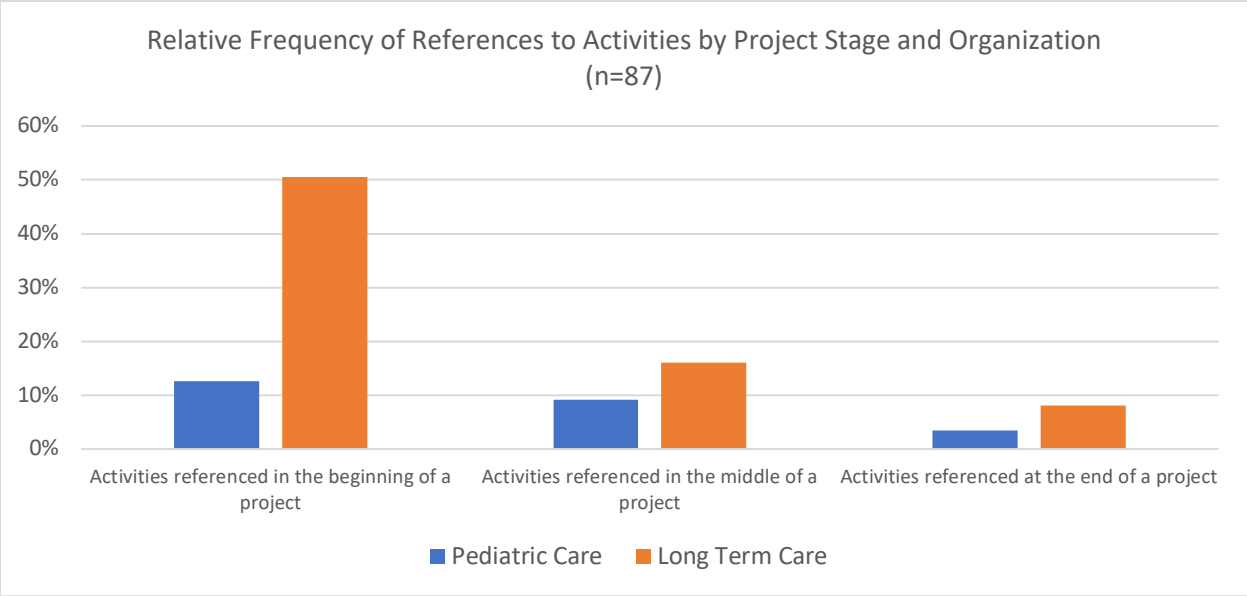


Figure 4: Relative Frequency of References to Activities by Project Stage and Organization

Two possible interpretations for this pattern come to mind. It is possible that the asymmetry relates to a higher level of involvement of LTC staff in their projects, as they were completing all project activities on their own. Meanwhile, staff taking part in the Pediatric Care program had the support of students for each project, which would explain a lower overall level of activity. Further, interviews were a commonly cited innovation activity, but only by LTC staff. Interviews

were also only conducted during the beginning of a project. The frequency of this activity at the start of a project may help explain why there is a large drop-off in activity level as LTC projects progress.

4.5 Drivers of Innovation

The data for this section came primarily from interview responses to questions 2 and 10 of the questionnaire (Appendix A). A total of 123 responses were coded as references to motivations. Organizational motivations and personal motivations emerged as primary organizing themes, with six and three basic themes respectively. Personal motivations were cited less often (24 references compared to 99 for organizational) with basic themes relating to personal interest in innovation, a desire for more responsibility, and, in the case of the Pediatric Care facility, a desire to teach and mentor students. References to personal motivations were nearly evenly split between the two programs.

There was a stark contrast in frequency between the two programs for references to organizational motivations, with respondents from the Pediatric Care facility providing nearly three-quarters of all coded references. See Figure 5 for details.

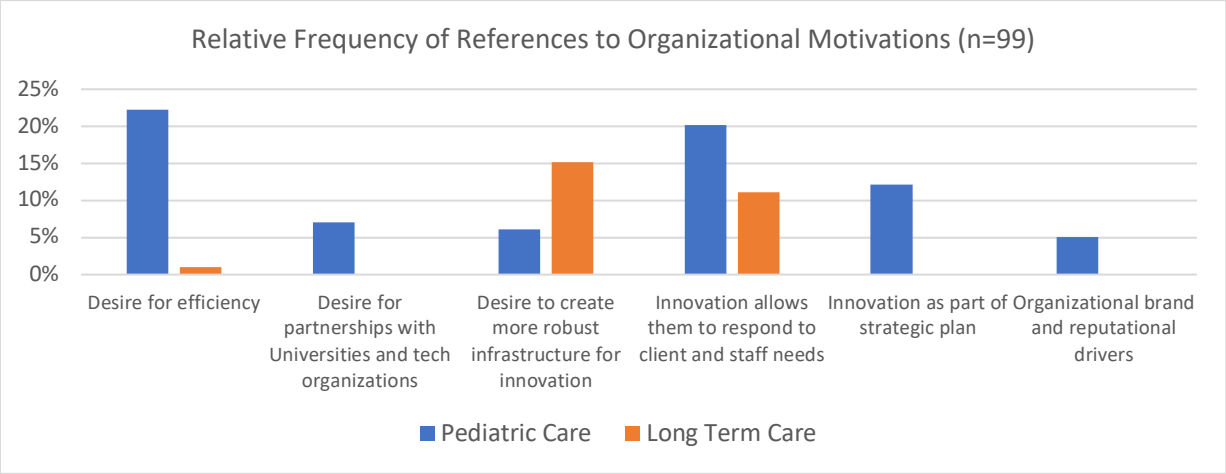


Figure 5: Relative Frequency of References to Organizational Motivations for Participating in an Innovation Program

In looking at Figure 5 more closely, there is a diversity of motivations for the Pediatric Care facility's participation, with three themes containing more than 10% of all references: a desire for improved efficiency, a desire to improve quality of care for their clients, and the ability to

act on the innovation mandates in their strategic plan. Basic themes of a desire for improved efficiency relate mostly to resource scarcity and long wait times for services:

> "[I]nnovation has been driven due to external forces like wait times and just service demands, resource pressures, those types of things. Those pieces have driven that need to innovate."
>
> *-Pediatric Care Respondent*

> "If we're not filling therapist calendars by scheduling them completely, then we're not getting the kids off the waitlist as quickly as we should be. So it's all linked to efficiency."
>
> *-Pediatric Care Respondent*

There were several references to having difficulty taking action on the innovation mandates within their strategic plan. The innovation program gave them an opportunity to follow-through:

> "We have had (innovation) as one of our strategic priorities for the last four years. It's written around, you know, using technology to eliminate barriers."
>
> *-Pediatric Care Respondent*

> "To be perfectly honest — we kind of mould lots of things into making it fit into that strategic priority."
>
> *-Pediatric Care Respondent*

> "I think it's very much, you know, reflected at the frontline level as what is in our strategic plan. We have these bright minds in this community, and we have these clients that have needs. There's some really cool synergy that can happen there."
>
> *-Pediatric Care Respondent*

For LTC respondents, there were two main motivations. One related to improving the infrastructure for innovation, which was also cited, although less often, by respondents from the Pediatric Care facility. The majority of the references related to a need for better systems for supporting innovation, as well as recognizing the value in the innovation skills they were developing.

> “The infrastructure just wasn't there to support [staff] to innovate, right? They get back to their village, I'm a PSW, I really wanna do this, but how do I even start, right? Do I go talk to the leadership team?”
>
> *- LTC Respondent*

> “I know my group- my committee... enjoyed having a, like I said, it's kind of a toolkit... to move things forward and to find those innovative ideas.”
>
> *- LTC Respondent*

The LTC staff also reported a desire to improve residents' quality of care as a motivation. However, this motivation was more often cited by respondents in the Pediatric Care program.

> “One of the things we always talk about is service innovation and how do we come up with new ideas and respond to needs in the community and respond to needs of our families”
>
> *-Pediatric Care Respondent*

> “We're presented with fascinating challenges all the time with our clients. Often every client and need is slightly different, and we do really have fairly limited technology knowledge. We certainly don't have staff on board that have that knowledge and experience.”
>
> *-Pediatric Care Respondent*

> “The quality of life for the people that we serve, so the residents that are in our care, we want to be able to provide the best service for them. To do that, you need to always know what's the new and best thing out there and look at creative ways to solve problems.”
>
> *- LTC Respondent*

Another way to assess the priorities of each organization is to count the references to different themes and keywords from the interviews. The data were obtained by running a word frequency search for all interviews, and then isolating the top keywords. Top keywords were then sorted by organization. As Figure 6 demonstrates, there is a significantly higher frequency of references to engineering and technical keywords from the Pediatric Care program.

Meanwhile, in the LTC program (Figure 7), there is a much larger frequency of references to keywords related to innovation processes, such as design thinking and interviewing.

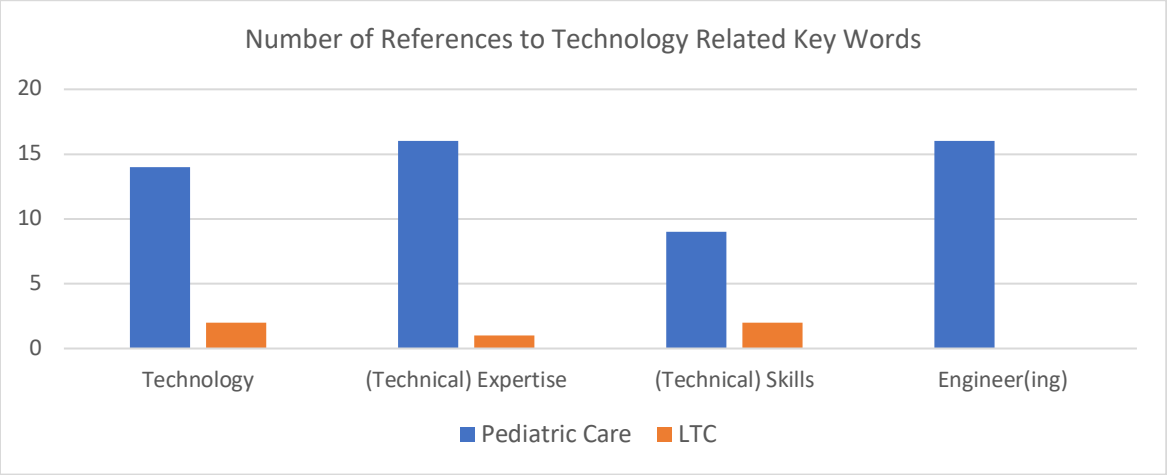


Figure 6: Number of References to Technology Related Key Words

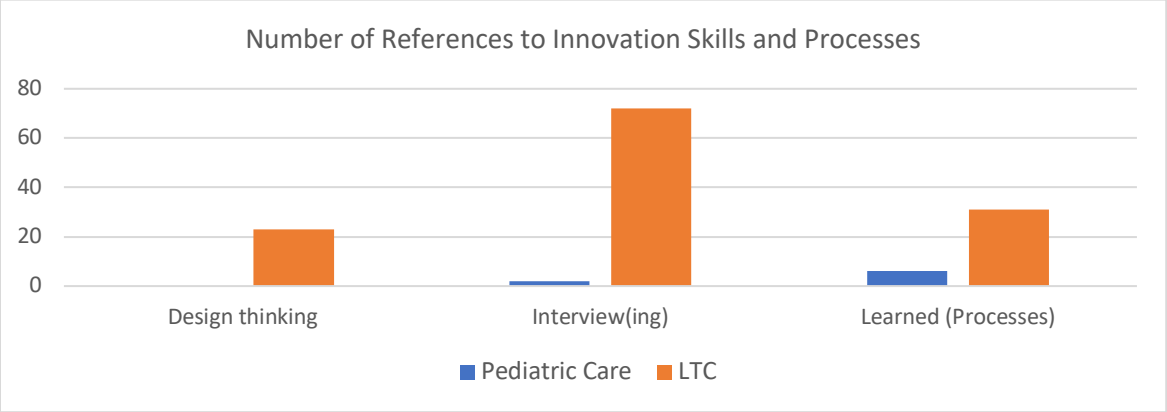


Figure 7: Number of References to Innovation Skills and Processes

These results suggest that healthcare organizations can have different motivations and desired outcomes when participating in open-innovation programs. Responding to the needs of clients and residents was the only common theme between both groups. These results will be discussed in more depth in Section 5.2.

4.6 Role and influence of the External Innovation Partner

4.6.1 Role of the External Partner in the Pediatric Care Program

Data for this section came from interview responses to questions 3, 4, 5, and 16 from the interview questionnaire (Appendix A). As Section 4.3 introduces, the external partners played

different roles in their respective innovation programs. In the Pediatric Care program, there were two external partners: 1) an innovation program from a local university and 2) students from mostly engineering programs. As a result, the Pediatric Care program's external knowledge included technical and engineering knowledge coming from the students and innovation management knowledge coming from the innovation training program.

Innovation projects at the Pediatric Care program are managed by the external partner. The students, not the staff, select a specific problem to solve, propose a solution to build, and do the development and testing. The staff of the Pediatric Care Program are more passive participants in the projects. They mediate the external team's access to relevant clinical and administrative information within the organization. This access to the internal organizational environment helps the external team better understand the context of the problem being solved through the innovation project. In the projects that were referenced most often during the interviews, the solutions focused on technically complicated solutions requiring a high level of hardware or software engineering knowledge.

4.6.2 Role of the External Partner in the LTC Program

The structure of the partnership in the LTC program was very different. The external partner played a training and supporting role for internal staff. A high level of process knowledge was possessed by this partner, which related to innovation and change management projects within large organizations. This knowledge was passed to individuals on innovation teams in the LTC program through formal training, on-going collaboration and project support.

In the LTC program, the internal staff select a specific problem to solve and complete all the tasks required to study that problem, propose a solution, and conduct the development and testing of ideas. Staff do not play a mediating role for the external partner but rather work with the external partner to learn how to complete innovation projects independently.

4.6.3 Types of Innovation

Data for this sub-section came from responses to question 3 of the questionnaire, where respondents were asked whether the program allowed them to develop new products, services, and process improvements, along with examples of projects. Respondents were asked

to provide a yes/no response for each type of innovation. The tally of "yes" responses for each innovation type is presented in Figure 8. As the graph illustrates, the Pediatric Care program had a large variance in types of innovation project that were initiated, with a mix of product, service, and process innovation. Examples of innovations that were developed include new hardware to improve the rate of communication for non-verbal youth (product innovation), software to reduce coordination time for scheduling (service innovation), and improving the process for transitioning youth clients into adult services (process innovation).

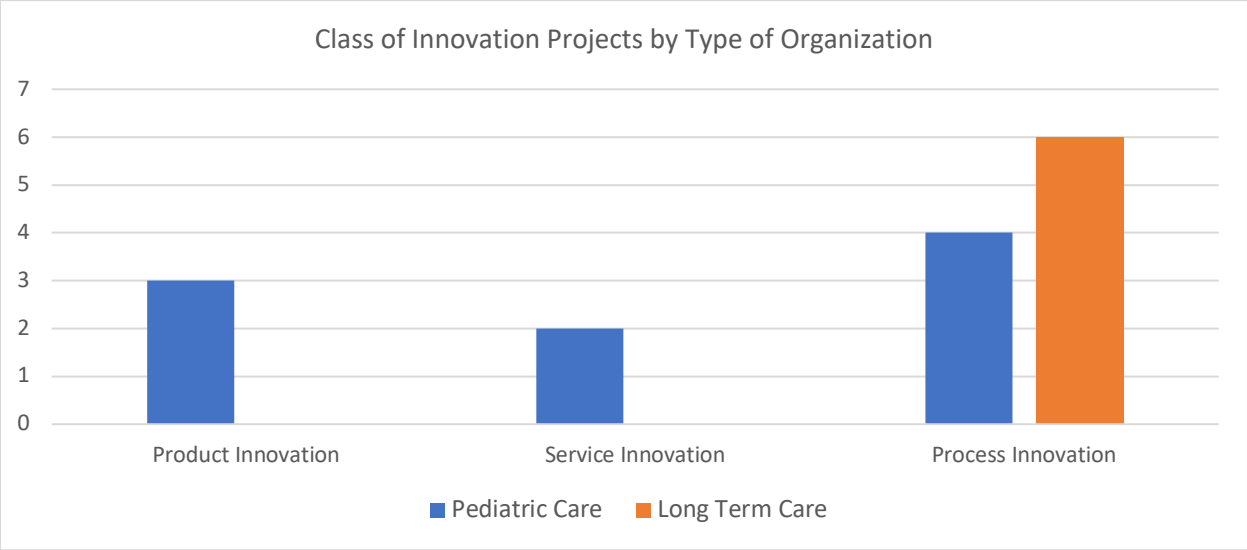


Figure 8: Class of Innovation Projects by Type of Organization

There is no variance in the type of innovation projects for the LTC program. Each respondent referenced only projects focused on process innovations. Examples of process innovation projects from the LTC program include new protocols for reducing the use of anti-psychotic medications and new processes for improving communication between staff when new residents move into a facility.

The LTC program was limited to process innovations because they lacked the knowledge and expertise required to engage in innovation projects focused on developing new products and services. In the Pediatric Care program, innovation teams are supported by students with knowledge and expertise in hardware and software engineering. Combined with clinical knowledge of patient needs and innovation management knowledge coming from the university innovation program, the teams at the Pediatric Care program had a combination of

knowledge that made different types of innovations accessible and feasible. However, technical knowledge was absent from the collaborations in the LTC program. The knowledge in that program was a combination of innovation management knowledge coming from the external partner, and the internal knowledge of organizational and clinical needs. As a result, they were limited to process improvement projects. This result will be discussed in more depth in section 5.3.

4.6.4 Dependence on External Partner

Data for this subsection came from interview responses to question 4, where respondents were asked whether they could have initiated the development of the innovation projects without the external partner. For the Pediatric Care program, all but one respondent indicated they needed the external partner to engage in innovation projects. Inversely, for the participants of the LTC program, all but one felt that the external partner was not essential to carrying out the projects. See Figure 9 for details.

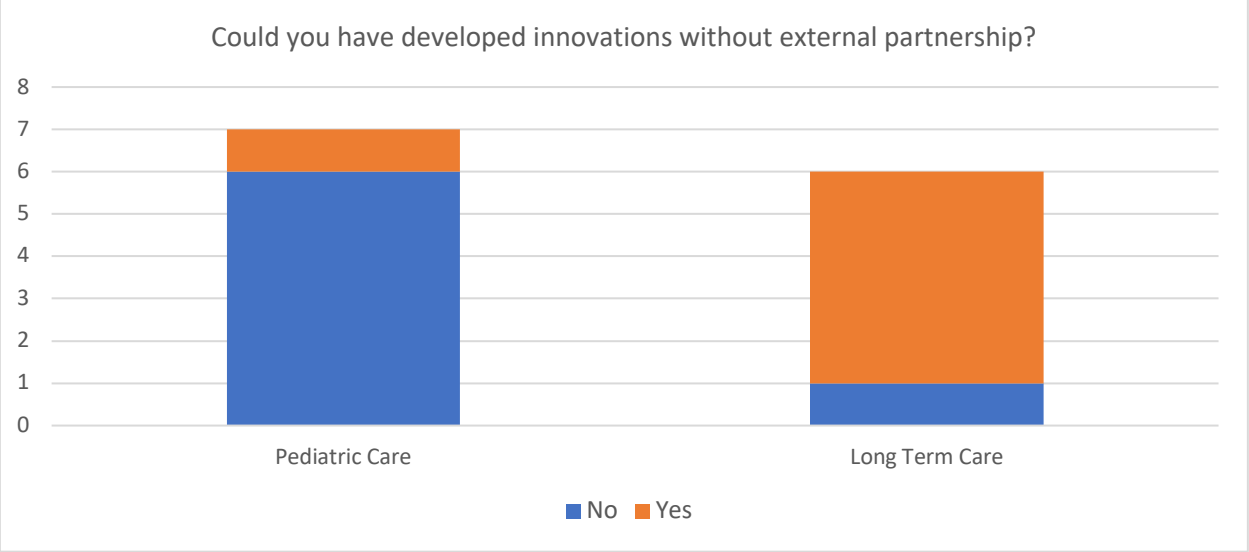


Figure 9: Perceived Dependence on External Partner

This finding is also a result of the role of the external partner. In the Pediatric Care program, the external partner plays a lead role in the innovation projects, which increases the organization's dependence on the external partner. The projects also involve the development of a range of innovation types, including new technical products and services. The complexity of these new solutions further increases the organization's dependence on the external partner.

For the LTC program, staff are leading the projects themselves and are relying on the external partner for training and support on how to manage projects. Because the staff of the LTC program are managing the projects themselves, and not engaging in complex innovation projects, they are less reliant on the external partner for engaging in the types of innovation projects they have been developing.

4.7 Perceived Benefits

Data for this subsection was intended to come from question 19 (Appendix A), but in practice, perceived benefits were mentioned throughout the interview by most respondents. A total of 123 responses were coded and organized into seven organizing themes, which were then grouped under the global theme of perceived benefits. As Figure 10 illustrates, the programs differ in the types of perceived benefits reported by participants.

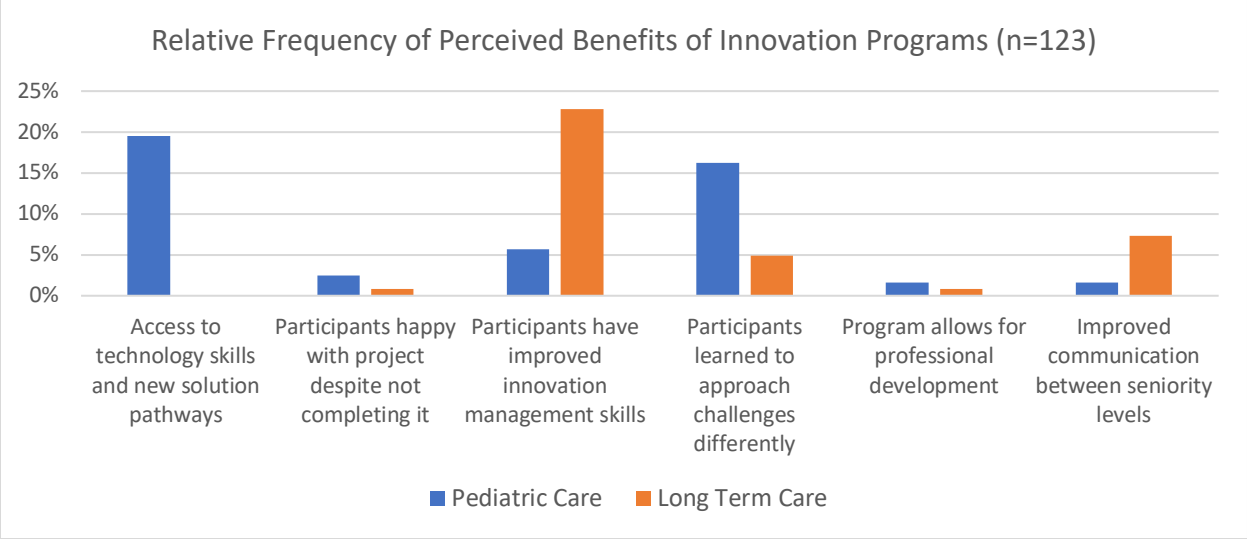


Figure 10: Relative Frequency of Perceived Benefits of the Innovation Programs

4.7.1 Perceived Benefits in Pediatric Care

The participants of the Pediatric Care program reported a high level of benefits resulting from working with an external partner. Specifically, the Pediatric Care participants felt they had access to technical knowledge and skills that brought new types of solutions within reach. A related benefit is that many participants cited an ability to see problems as more solvable:

> "I feel like specifically the (redacted) innovation teams that have driven that product development, they just have a set of skills that just couldn't be accessed through what (our organization) has

> internally, and then I think having (the program) there is the conduit to get those groups involved"
>
> -*Pediatric Care Respondent*
>
> "I feel like there can be so many benefits to bringing in fresh eyes, especially fresh eyes that bring different skill sets… having that bit of the external lens, I feel like is the opportunity to generate new and creative ideas that perhaps those of us who are in it day-in, day-out, have a hard time stepping away from it and visualizing some of those other solutions"
>
> -*Pediatric Care Respondent*
>
> "[P]artnering with the (external partner) is an opportunity to explore things that are outside of our reach"
>
> -*Pediatric Care Respondent*

A possible explanation for why "improved access to technology" was cited so often by Pediatric Care staff relates to the nature of the clients they serve. The Pediatric Care organization's mandate is to serve children and youth under the age of 19. As a result, many of their clients are more technology oriented, especially in comparison to residents in LTC organizations. Further, a large proportion of the youth they serve have severe disabilities that limit their quality of life. As one participant describes, the needs of individuals with disabilities have not been a source of innovation and technology development:

> Well, I mean, if you sort of think back into the history of disability …solutions for people with disabilities used to be either completely inaccessible either because nobody knew how to do it, or it was so prohibitively expensive.

The same participants goes on to explain that technology can be helpful in creating or restoring some quality of life, even if the technology is not overly complicated:

> (Years ago) a group of volunteers came together. They were electricians or plumbers or engineers, or like, you know, carpenters or people who just had some of those skills. When a client would present with a problem, they would put their heads together and they would figure out a very low cost way to solve that problem that was not commercially available. So, I recall a person who had been a concert violinist, and as a result of a

> stroke, lost use of his arm. Really hard to play the violin with only one arm. And so this very low tech solution was made. It had a stand that the violin rested on that went on the shoulders…It was all very low key, and all of a sudden, this person's life opened up again.
>
> *-Pediatric Care Respondent*

This sentiment was echoed by most staff of the Pediatric Care program. There was a recognition that technology presented an opportunity to improve the wellbeing of their clients, but the organization lacked the skills and expertise required to act on those opportunities.

4.7.2 Perceived Benefits in Long Term Care

LTC program participants report positive results relating mostly to managing innovation and learning. Specifically, over 20% of all references to positive outcomes came from LTC staff talking about how they have learned to test assumptions, solve problems, and create new ideas- all skills related to innovation and innovation management:

> "I learned that you can't jump too many fences. That you got to, you got to take your time and really dig down and find the root of a problem."
>
> *- LTC Respondent*
>
> "I learned a lot of the benefit of doing that interview process that (the external partner) kind of introduced as one of their first steps is, a lot of times when you see a problem and you think of a solution, you're not necessarily solving the problem for what's causing it. What you should be doing is talking to everyone that's affected by the problem and asking for their input"
>
> *- LTC Respondent*
>
> "It is a great tool to keep in your toolbox that allows you to kind of root out some of the problems or opportunities for change that that can make a world of a difference"
>
> *- LTC Respondent*

Another benefit disproportionately referenced by LTC staff is that the program created a clearer communication system between different seniority levels within the organization. Of

particular value seemed to be that there were clear channels and processes for communicating with senior management at both the individual LTC home level, as well as at the central support level:

> "[W]ithout the innovation (program), we have a lot of ideas, but we cannot incorporate them because we need the permission from the management"
>
> *-LTC Respondent*

A possible explanation for the high frequency of perceived benefits relating to managing innovation and creating communication pathways may relate to the size of the LTC organization. It is comprised of a network of individual LTC homes with a centralized business unit that provides a range of support services to individual homes. Each home has multiple levels of seniority, including Frontline staff, Managers, and Directors. There is then another level of seniority at the Central Support level with Central Managers, Directors, and Corporate Executives. The result is that staff at the service delivery level can feel isolated and limited in their ability to take action on some of the challenges they encounter as part of doing their job. As the quotes below highlight, creating a program that allows for both interaction across those levels of seniority as well as a process for allowing frontline staff to enact change was viewed as a positive outcome:

> "[H]aving that connection and direct line to someone so high up in management was very helpful, and they can give you that instant feedback that you might be looking for, or connect you to resources that you didn't know were available, or even just open up lines of communication that are otherwise a little harder to get through when you're on the front line."
>
> *- LTC Respondent*

> "One of the reasons that those quarterly innovation meetings became so popular and valuable for the directors at the support office level is because they just didn't have that level of awareness of what was happening in the villages…They have very little interaction with frontline team members and direct support team members."
>
> *- LTC Respondent*

4.8 Perceived Challenges

Data for this section mostly came from responses to question 17 (Appendix A). Although, as with perceived benefits, references to perceived challenges were mentioned throughout interviews for most respondents. A total of 43 references were coded to four organizing themes under the global theme of perceived challenges. While the Pediatric Care program respondents reported positive experiences as a result of working with external partners, the collaboration was not without challenges. A third of all references to challenges between both programs came from Pediatric Care program staff concerning difficulties working with external partners or difficulties in the partnership structure. See Figure 11 for details.

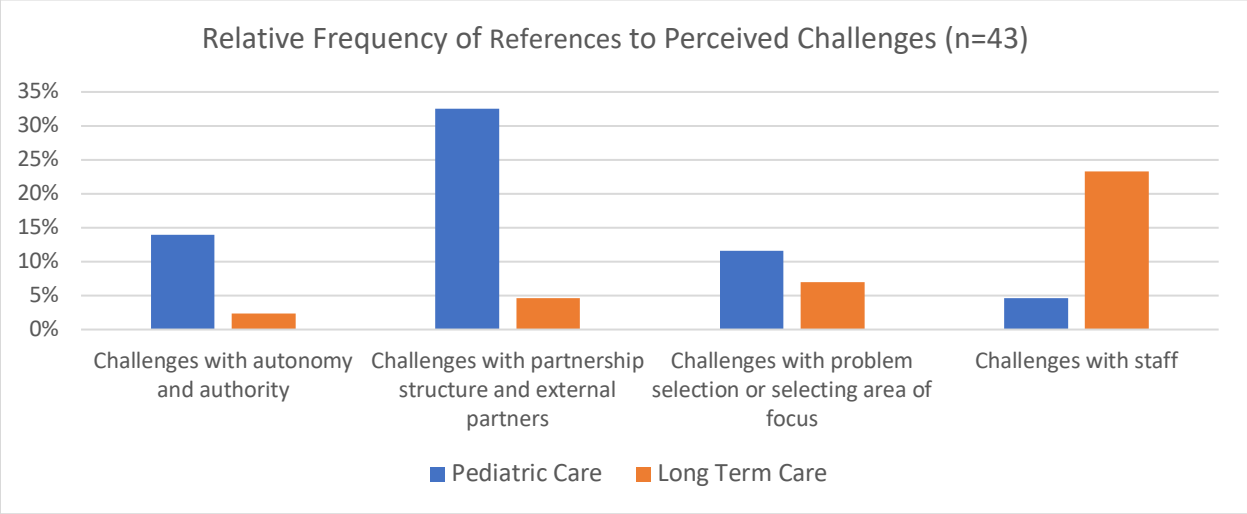


Figure 11: Relative Frequency of References to Challenges and Negative Experiences

One reason this challenge was cited so often is that the Pediatric Care program staff were working with students from a local university. As a result, issues centred around working with student schedules and, in some cases, the limited understanding students had of the healthcare environment. A few other issues were related to an unclear partnership structure with the students in terms of their timelines and deliverables.

> "I think some students are graduating and moving on or, you know, they got what they needed. And, you know, they're taking their master's degree or taking another job somewhere. You know, the priorities change."
>
> *-Pediatric Care Respondent*

> "I think around the middle stage, that's probably around where we had the students that were thinking like... They were thinking a little big."
>
> *-Pediatric Care Respondent*

> "[Y]eah, I don't know much about (the partnership) structure, to be honest. That's embarrassing…"
>
> *-Pediatric Care Respondent*

There were also challenges in the projects of the LTC program. Specifically, there were several references to resistance from staff to the solutions being developed and implemented. The perception was that the new behaviours and routines required of new solutions created a resistance to change:

> "I think mainly just resistance from people. I think that, you know, this is probably one of my personal beliefs, but if you have people that have a can't do attitude, rather than a can do attitude, you're at a disadvantage right from the start."
>
> *- LTC Respondent*

> "One of the things I've realized is, you know what, number one: people don't like to change. Right? You get into a routine and a certain way of doing things. And you know, it's habit-forming. And after people have been doing it for 20 years, they don't want to change what they're doing."
>
> *- LTC Respondent*

4.9 Project Outcomes

Both programs reported having difficulties completing their projects and implementing proposed solutions (see Table 3 for details). There were a variety of reasons for this outcome. Many projects were interrupted by the COVID-19 pandemic, while in other cases, the solutions being developed were so technically complex that they remain in development at the time of writing. In a few instances, projects were reported as hitting dead-ends and being closed or being met with resistance from staff and the innovation not "sticking."

Table 3: References to Innovation Projects Not Being Completed

Organization	References to projects not being completed
Pediatric Care	6
LTC	8

Even though many projects were never completed in both programs, the participants seem to perceive the program as being overall beneficial. By calculating the average number of references to perceived benefits and challenges, we can get a picture of participant's overall perception of the program. Pediatric Care and LTC staff referenced an average of 10.29 and 8.86 project benefits respectively (Figure 12) compared to an average of 6 and 5.57 references to negative outcomes respectively.

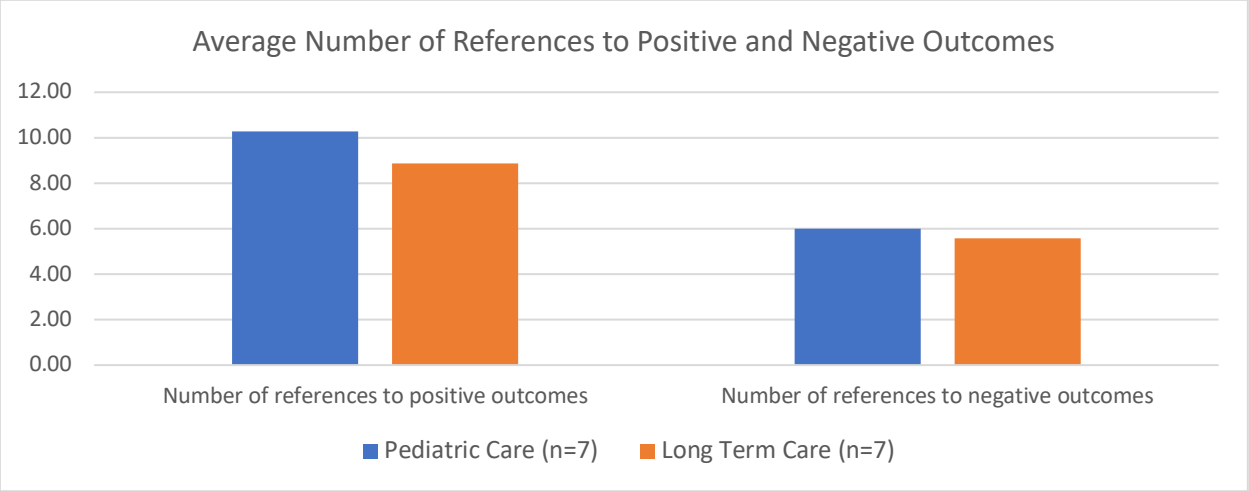


Figure 12: Average Number of References to Positive and Negative Outcomes by Organization

It is surprising that positive outcomes were cited as often as they were given that so many projects were never completed. This result is likely related to the motivations each organization and staff had for participating in the program. As mentioned above, each organization had different reasons for participating in their respective innovation program. For the Pediatric Care program, they were seeking more access to technology skills and knowledge. For the LTC program, they were seeking a more robust climate for supporting innovation within the

organization. In both cases, satisfying those motivations are not necessarily connected to the success of individual projects.

Further, in the case of the Pediatric Care program, some projects are still underway, or have allowed the organization to solve the innovation challenge through other measures. In at least one case, an innovation team was working on linear optimization to make it faster to schedule multi-clinician client appointments. The project was eventually closed. Yet, as the excerpt below describes, the Pediatric Care facility was able to work with their incumbent service provider (Gold Care) to bring that functionality into the organization:

> *Pediatric Care Respondent*: Well, on that (scheduling) project, we kind of reached an impasse. You know, there was a technical issue in our client information system that we needed to, you know, overcome in order to progress any further. And we couldn't finish it...
>
> *Researcher*: "What was the eventual outcome of that?...
>
> *Pediatric Care Respondent*: So we are now working with GoldCare to do the exact same thing but in Gold Care.
>
> *Researcher*: OK. So you might still get there, just not necessarily directly as a result of the team.
>
> *Pediatric Care Respondent*: Yeah.

Chapter 5: General Discussion

This study's purpose was to examine open innovation programs in different healthcare contexts to get a better understanding of the motivations for participating in such programs and how they are managed and structured. The study results indicate that while the two programs look similar from the outside, from the inside they operate very differently and for different reasons. An important finding is that the role and type of knowledge being contributed by the external partner may have a large influence on the experience and learning of program participants, as well as the innovation outcomes for individual projects.

5.1 Innovation Activities and Planning

5.1.1 Innovation Activities

The management of innovation programs in healthcare has been the focus of many studies. It has been suggested that healthcare innovation programs should follow the same general patterns and stages of innovation management as other sectors. A common methodology for organizing and managing innovation comes from the concept of stage-gates.

Since its introduction, stage-gate management has become the focus of multiple studies on its role in innovation management and new product development (NPD) (Griffin, 1997; Engwall et al., 2005; Hermancloglu et al., 2007). As noted in the literature review, stage-gate management includes assessing ideas, preparing a business case, developing the idea, testing the ideas, and then launching the new idea in full. Also, open-innovation projects should include stages related to seeking and evaluating opportunities for innovation (Cormican and O'Sullivan, 2004).

While stage-gate management was not explicitly referenced in the interviews, the tool provides a useful model for describing the phases of development that new ideas typically progress through. Indeed, the findings indicate that the open innovation programs being studied proceed in a way similar to that found in stage-gate processes. There appear to be discrete stages for the innovation projects in both programs, with a linear progression from one stage to the next. Notably, the most active stage in both programs was the stage related to seeking and evaluating opportunities for innovation. This finding supports the position that

open innovation projects include a stage that precedes the screening of ideas for new products, services, and processes (Cormican and O'Sullivan, 2004; Grunlund et al., 2010).

A few notable differences emerge from the programs being studied when compared to the literature that discusses stage-gate management. The addition of activities related to opportunity-seeking has already been introduced. The other differences relate to the absence of formal business planning as a stage or set of activities. Activities were referenced that relate to other stages of assessing, developing, and testing ideas. Developing business cases or proposals that outline how the idea being pursued meets the needs of the organization were not referenced.

In one sense, this absence of business planning and evaluation for projects makes sense. Both programs are run by non-profit organizations that are at least partially funded through Provincial Ministries. The majority of the literature on innovation management and open innovation focuses on how these processes can be used to achieve pecuniary objectives (Guan et al., 2009). As was introduced in Chapter 2, those motivations are not primary drivers for healthcare organizations, including the organizations being studied. From this perspective, the absence of business planning makes sense.

On the other hand, at its core, innovation is less about helping organizations achieve pecuniary objectives and more about problem-solving through the creation and execution of new ideas that add value to the organization. When looking at innovation from a more holistic value creation perspective, it seems that both programs would benefit from a stage where the value being created by new ideas is defined, articulated, and evaluated. Azis and Osada (2013), for example, proposed a model for managing innovation in healthcare that follows a lean design and six sigma methodology. The model has eight stages that closely follow NPD stage-gates, with the notable exclusion of business-case planning. Instead, the model includes stages related to interpreting and translating the value being created by a project.

The purpose of a business plan is to outline how the value being created for a customer (functional, financial, psychological, or social value) will be converted into net positive value for the firm (usually financial value in the form of sales and revenue) (Chesbrough, 2007). While

the goals, actors and forms of value being captured may be different in public sector organizations, and healthcare organizations more specifically, there still exists a need to evaluate a) *what* relevant value will be created, and b) *how* that value will be created and captured. The absence of activities related to this type of planning and evaluation highlights a possible gap in the way that open-innovation projects in healthcare are planned and managed.

5.1.2 Project Planning

One of the other interesting findings is that the two programs appear to differ in the degree of planning that was involved. None of the Pediatric Care program respondents reported setting explicit goals for the innovation projects they were working on. In LTC, however, seven of the respondents mentioned explicit goals for their projects. Some of this difference is likely attributed to the fact that the external partners were leading the projects in the Pediatric Care program. It is possible that goals were established, but not communicated to the staff participating in the project. Either way, the Pediatric Care program staff appear to be operating in a less goal-oriented program than in the LTC program.

The consequence of managing innovation through formal processes versus more ad-hoc processes remains unclear, and in many cases, contradictory. In a multi-variate analysis of the impact of management variables on project success, Shenhar et al. (2002) found that detailed project planning can be important for innovation projects, especially complex ones. In contrast, Salomo et al., (2007) found that overly structured project planning can create constraints that are counterproductive for highly innovative projects. Complicating things further, Tatikonda and Montoya-Weiss (2001) found that more formal processes in innovation management can positively impact project outcomes, while Griffin (1997) found no connection between process formality and development of new products.

A paper by Harmancioglu (2007) summarized the literature on the role of project planning in innovation management nicely:

> Formal processes, clear project goals, and senior management supervision may provide efficiencies and reduce conflicts. Flexible processes and informal interactions facilitate sharing and creativity, but over-reliance on brainstorming and informality may add to operational costs, cycle time, and organizational frictions.

> Hence, innovators face the challenge of balancing formality and flexibility.

This statement is particularly relevant to the two programs being discussed in this study. It appears that each program is at opposite ends of the spectrum with respect to the level of planning involved. In the LTC program, clear goals were established, the process was well defined by the external partner, and the importance of having senior management involved was cited numerous times. Meanwhile, the Pediatric Care program appeared to involve much less planning, with frequent interaction with the external partner focused on creative exercises like brainstorming and co-creation. As one respondent noted, “once there was some idea generation that was happening, it was them often reaching out to us to say, ‘Hey, can we run these ideas by you, we'd like your feedback on A, B, and C.’ ”

Several references from respondents of the Pediatric Care program related to the challenges in working with the external partner, and an ambiguity about how those partnerships are structured:

> I don't know much about (the partnership) structure, to be honest. That's embarrassing.
>
> -*Pediatric Care Respondent*

> I feel like it's just this unclear dance between what that relationship is between us as an organization or my role as a clinical expert and consulting with the team because there isn't that formal connection.
>
> -*Pediatric Care Respondent*

Quotes such as these suggest that the Pediatric Care program's low level of formality may have led to tension within the organization. These findings appear to support the claims made by Hermancloglu et al. (2007), although more empirical data would be required to make more firm conclusions.

5.2 Drivers of Innovation

Identifying an organization’s motives for supporting innovation helps us understand what forces drive innovation activity. Healthcare organizations are most often motivated by

efficiency and effectiveness (Bontis and Serenko, 2009) and delivering high-quality care to the patient.

Other studies (Chan and Hsu, 2014; Ankenroye, 2012) have identified general categories of factors that motivate change in healthcare organizations. These include improving safety, improving the effectiveness of health services, improving access to health services, creating patient-centred services, improving the integration of health services, responding to financial pressures, as well adapting to the pace of change in technology.

5.2.1 Needs of the Client as a Common Driver

This study's findings provide a few notable contributions to the discourse on drivers for innovation in the healthcare sector. The perception that innovation allows the organization to respond to their clients and residents' needs had the highest combined relative frequency, with 31% of all references to organizational motivations (Figure 5). This finding is consistent with the findings of other studies and program reviews.

5.2.2 Motivations for Long-Term Care

The two healthcare organizations differ significantly in terms of the remaining perceived drivers for innovation. There is little overlap in organizational motivations beyond responding to the needs of clients. For the LTC participants, except for 1% of references to efficiency, the only other driver that was referenced was that the program allowed the organization to create the tools and processes required to support innovation. This motivation differs from those referenced above as common motivations among healthcare organizations. The process-focused motivations referenced in the LTC program suggest that there is a desire within the organization to improve staff's ability to engage in developing new ideas generally, regardless of the specific objective for the project. For example, when asked why the program was created, one of the respondents stated: “The whole purpose of this innovation program was just to provide that infrastructure so that ideas that are at, I guess the grassroots level could actually get legs, grow legs and become something.”

This motivation to allow for grassroots ideas to take hold and “become something” should be considered along with other findings related to the program's perceived benefits. The two

most commonly cited benefits (Figure 10) from LTC participants relate to improved innovation management skills and improved communication pathways, especially with senior staff. Given the motivations and benefits that were most often cited in the LTC program, it is not surprising that staff seemed to have an overall positive attitude towards the program despite not being able to implement many of the solutions they worked on.

One of the benefits of focusing on learning processes as a goal, rather than achieving innovation outcomes, is that it reduces perceived risk. Ensuring that learning occurs is easier to control for than ensuring that innovations are created and implemented. Innovation projects in all sectors have a notoriously poor success rates, with some studies finding that over 60% of new initiatives fail (Azis and Osada, 2013). The healthcare sector is no exception, with similar success rates having been reported (Birken, 2012).

While it is evident from this study that creating procedures for supporting innovation was a primary goal for the LTC organization, it remains unclear why that was their goal. Several references were made at the senior staff level that related to challenges associated with staff turnover, and a related desire to bring more meaning to roles of frontline staff. For example, one Director mentioned that staff are reimbursed for the time they spend on innovation projects, and that funds are provided by the home's Professional Development and Learning budget.

It is possible that in the case of the LTC organization, the goal of supporting innovation had less to do with problem solving and producing new knowledge and more to do with providing staff with roles and opportunities to contribute to the organization that extend beyond typical staff duties. Such motivations would represent a novel approach to innovation not currently captured in the literature on innovation in the healthcare sector. Further study will be required to understand whether this is a spurious result, or a pattern that is consistent with organizations in the LTC sector, or the healthcare sector more broadly.

5.2.3 Motivations for Pediatric Care

Meanwhile, with the Pediatric Care program, there was both a higher total volume of references to organizational motivations (almost 3-1) and much more variance in the

motivations cited. This result is somewhat confounding, with no obvious explanation. One possible reason for the variance in motivations is that the program may have meant different things to different people because of the ad-hoc and informal nature of the program. The projects of the Pediatric Care program did not have explicit goals, meaning that the purpose of the projects could be left open to interpretation.

What is clearer from the results is that the Pediatric Care program had a much higher prevalence of patient-centred motivations. Just over 40% of all references to organizational motivations come from a combination of a desire for efficiency (which is mostly related to improving access to care) and the desire to respond to client needs. This result is consistent with other studies that examine motivations for supporting innovation in healthcare. Improving access to care, and the overall quality of care being provided were the most common areas of focus for quality improvement planning for Ontario hospitals (Chan and Hsu, 2014). In this particular case, the motivations for participating in open-innovation do not differ from motivations to participate in innovation more generally in the healthcare sector.

There are notably fewer references from Pediatric Care program staff to the motivations related to processes and practices to support innovation. Given this result, one might expect that innovation outcomes would need to be satisfied in order for the staff to feel like the project was successful. If the reason for participating is that the project yields a new solution that benefits clients, you would expect there to be a high level of disappointment that none of the innovation projects were cited as being completed. However, that was not the case. As Figure 12 illustrates, positive impressions of the projects were cited nearly twice as often on average as negative comments.

Part of the reason for the discrepancy may relate to the fact that while none of the projects were completed, they were still considered successful. One of the projects referenced most often involves the development of new augmentative communication devices. The hardware and software required to complete this project are highly advanced, and development is still continuing. In another project, the team was working on linear optimization to make if faster to schedule multi-clinician client appointments. As mentioned in Section 4.9, the project was

closed, but as a result of the work that was started, the Pediatric Care facility was able to work with their incumbent service provider to bring the desired functionality into the organization.

The staff also reported feeling more aware of how existing technologies could be used to be to solve client problems, suggesting that the drive to use the program to benefit clients may be satisfied more through staff learning than through direct development of new solutions. The idea of learning as an outcome will be explored in more detail in the next section, but these quotes help clarify how staff may perceive their motivations as being satisfied:

> Since they've come in some of the other problems that we've identified, some of the other tech companies have come up with new improvements that maybe are, I think, make my radar a little bit more...
>
> - *Pediatric Care Respondent*

> I've been recognizing that those little things about the technology our clients use, we don't have to just be ok with that. So just like, trying a bit harder to figure that out. Or emailing our reps to see if their software developers can do something different. So, feeling like we have a bit more agency in that sort of stuff. Knowing that it's… maybe not easy, but it's possible. It's worth asking.
>
> -*Pediatric Care Respondent*

One final finding worth discussing about organizational drivers for innovation in the Pediatric Care program is that there was a relatively high frequency of references to the connection between innovation and the organization's strategic plan. Just over 10% of all references to organizational motivations related to innovation being a mandate that the Pediatric Care organization had trouble taking action on. Notably, it seems that innovation was an ambiguous goal, leading them to label existing programs as part of their innovation activities: "To be perfectly honest — we kind of mould lots of things into making it fit into that strategic priority." The organization is not unique in its confusion around innovation. The literature on innovation can scarcely agree on a single definition, and healthcare executives and practitioners have been found to have fragmented views on innovation as well (Thakur et al., 2012). It would be difficult to take action on a strategic priority if you don't first know what that priority means. It is possible that the need for clarity on how to engage in innovation influenced one of the other

drivers that were mentioned by the Pediatric Care facility around wanting to connect with local universities and the growing tech community: “I think it's very much, you know, reflected at the frontline level as what is in our strategic plan. We have these bright minds in this community, and we have these clients that have needs. There’s some really cool synergy that can happen there.”

5.3 Influence of External Knowledge and Absorptive Capacity

5.3.1 External Knowledge, Locus of Innovation, and Type of Innovation for the Pediatric Care Program

The results of this study illustrate that external partners can play distinctly different roles in open innovation collaborations. Both organizations in this study sought external expertise to help them meet their innovation goals, but how those partnerships were structured and the knowledge being contributed in each program were drastically different. In a seminal book on the knowledge-based view of the firm and the dynamics of innovation, Nonaka and Takeuchi (1995) highlight how the internal capabilities of an organization can be complemented by external sources of knowledge and skills. They state that outside sources of knowledge and competence are often required to complement an organization’s internal capabilities. Complementarity is especially relevant to an organization’s pursuit to develop innovative products, processes or services. The need for this interaction and access to complimentary external knowledge grows in line with the complexity of the innovation being developed. In other words, simpler ideas may require less net new knowledge, while complicated projects require more.

In addition to improved innovation performance (Caloghirou and Kastelli, 2004), this interaction with an external partner produces two outcomes: first, processes are established to facilitate knowledge flows in or out of the organization; second, it improves the capability of an organization to create new knowledge, disseminate it throughout the organization and embody it in products, services and systems (Nonaka and Takeushi, 1995). These two outcomes, combined with the concept of innovation complexity requiring new sources of knowledge, provide a useful way to frame the role, contributions, and effects of the external partners in each of the two organizations studied.

It has been well established that firms interact in various ways to access knowledge outside their organizational boundaries (Caloghirou and Kastelli, 2004). In the Pediatric Care program, it is important to revisit the structure of the program, which includes partnerships with a local University and students, most of whom are from Engineering programs. The innovation projects are led by the students, with innovation management support being provided by the university. The staff of the Pediatric Care program provide access to the organizational environment and knowledge of clinical needs. As a result, the locus of innovation is outside the boundaries of the firm, with clinical knowledge flowing out of the organization and into the external team. Concurrently, the external team is being trained on innovation and product management processes by the University innovation program. See Figure 13 for a visual representation of the knowledge flows and locus of innovation in the Pediatric Care program compared to the LTC program.

Considering that the external partner is comprised of engineering students, three types of knowledge and skills are involved in Pediatric Care projects: innovation management knowledge, technical/engineering knowledge, and clinical/contextual knowledge. As a result of technical knowledge being a part of the innovation process, project teams were able to initiate projects focused on three types of innovations: new hardware products, new software services, and new processes. Without the external sources of knowledge, the Pediatric Care program could not have been able to initiate the development of such complicated technologies. Similarly, the students creating the technologies could not have initiated the development of appropriate technologies without the clinical knowledge provided by the Pediatric Care organization.

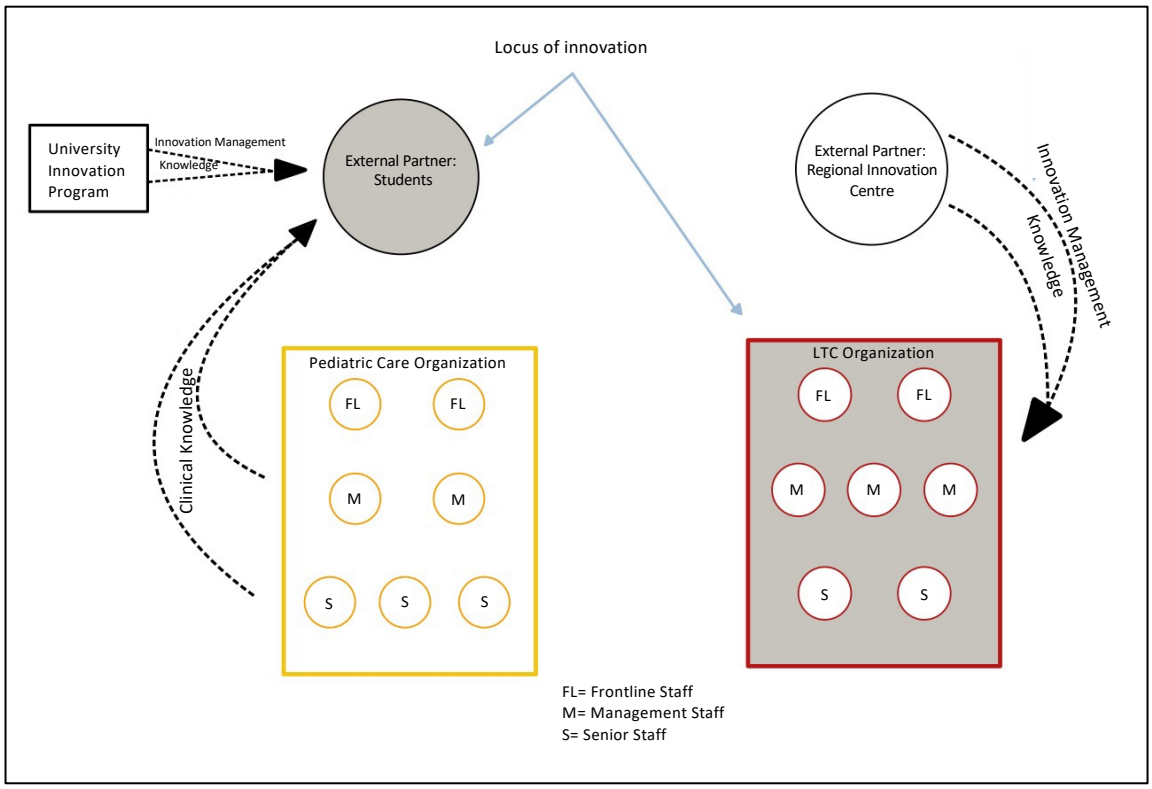


Figure 13: Comparison of Knowledge Flows and Locus of Innovation

Given the Pediatric Care program's motivations (use technology to better meet client needs and create more efficiencies) this partnership structure and combination of knowledge is beneficial. The complexity of their client's needs has a spillover effect on the complexity required of new solutions. A certain level of technical and engineering knowledge is required to solve the problems at the centre of each innovation project. Since those competencies and knowledge are not possessed by the Pediatric Care facility, new knowledge was required in their innovation teams to generate the desired outcomes. Further, because the program included complementary sources of engineering knowledge, the program was able to engage in more complicated projects, such as speech generation devices and linear optimization of scheduling.

As Nooteboom (1999) notes in his book on innovation and learning in organizations, complexity and variability of technologies increases the need for external partners for complementary cognition. In the case of the Pediatric Care facility, partnering for innovation

was essential for them to achieve their innovation goals. Without external partners, they would have lacked the complimentary cognition and knowledge required to generate new products and services. This represents a significant finding, and suggests that healthcare organizations, and perhaps public sector organizations more broadly, may need to pursue partnerships and open innovation collaborations in order to meet their quality improvement goals.

5.3.2 External Knowledge, Locus of Innovation, and Type of Innovation for the LTC Program

For the LTC program, there was no mention of a need for technically complex products and services. Instead, their motivations centred around building the internal climate required to support grassroots innovation projects from individual LTC homes and frontline staff. In their case, the partnership structure involved just one external partner in the Regional Innovation Centre, which provided innovation management support to internal innovation teams comprised of internal staff. In this program, the locus of innovation was within the boundaries of the firm, with projects being led by staff themselves. The flow of knowledge in this program was from the outside in, where it was assimilated by program staff as they learned the tools required to manage their innovation projects. See Figure 13 for details.

The types of knowledge involved in the program include managerial knowledge from the external partner and knowledge about the needs of clients and LTC processes. The combination of knowledge in this partnership, combined with an absence of technical and engineering knowledge meant that projects were limited to one type of innovation: process improvements. Examples of new process improvements include new protocols to reduce the use of antipsychotic medications and improved communication processes between staff when on-boarding new residents. Producing new products and services would have required other sources and forms of complimentary knowledge and skills.

5.3.3 Learning and Absorptive Capacity

While the role of the external partners and direction of knowledge flows differ between the two organizations, there is evidence of important learning among all the staff who were interviewed. As Figure 6 illustrates, a unique feature of the Pediatric Care program is that staff not only referenced the “need for technology” as a motivation for the program, it was also a

source of key learning. Several of the staff reported seeing problems as more solvable as a result of working with an external partner:

> "Like, if you don't see a solution, it's hard to really see it as a fixable problem. So for them to come in and say, this is actually something that we can improve, it kind of shifted our thinking a little bit to maybe trying to problem solve that a little bit harder, instead of saying, you know, that's kind of the nature of the beast."
>
> - *Pediatric Care Respondent*

> "I think just for me, it was so refreshing to hear some of the things that I identified as barriers and just assume that there were barriers as perhaps actually having a solution."
>
> - *Pediatric Care Respondent*

This outcome is a noted benefit of open innovation, as more open approaches to innovation allow for the discovery of new products that would otherwise be hard to foresee (Almirall and Casadesus-Masanell, 2010). For the Pediatric Care program, it is also noteworthy that, while the primary flow of knowledge was from the inside of the organization out, there was also a passive flow of information into the organization. As the quotes above help to illustrate, staff learned how different technologies could be used to solve some of the problems they routinely observe. Meanwhile, as noted in Section 4.7.2, staff involved in the LTC program reported that learning about innovation was a primary benefit of the program.

Both these examples of learning as a result of collaborating on innovation projects may have implications for absorptive capacity in the public sector. As noted in the literature review, absorptive capacity (ACAP) is the process through which an organization finds, acquires, transforms, and later exploits or benefits from new knowledge. Most of the literature studies ACAP from the perspective of for-profit firms. As a result, changes in ACAP and the exploitation of knowledge is often operationalized and measured through factors such as increases in sales, number of new patents, and number of new products produced (Murovec and Prodan, 2009). Different operationalizations would be required to measure changes in ACAP and how knowledge is exploited in the public sector.

Both the LTC and Pediatric Care program provide helpful context for considering how to operationalize and measure ACAP in the public sector. Several anecdotes from the interviews are particularly helpful. For example, in Section 4.9, a respondent describes the story of how an innovation project being led by a student group was closed because they reached a technical impasse with their service provider. However, before the project was concluded the student group outlined and built software that used linear optimization to solve a scheduling problem that initiated the project. While the software the students built could not be integrated into the client management software being used, the staff now had the model and language required to lobby their incumbent service provider to address the issue. As result, the scheduling functionality they desired was provided, but through a different process than originally intended. Further, the anecdotes from above that related to seeing problems as more solvable suggest other processes through which knowledge may be internalized and later exploited by staff.

Meanwhile, in the LTC program, the primary goal of the open-innovation partnership was to create the processes and policies required to allow staff to support innovation projects independently. Several staff referenced feeling like they had the "tools" needed to support future innovation projects. Further, some of the organizational structures that were put in place have promoted the flow of information internally. Staff innovation teams now have clear processes for working with external innovation partners, and for communicating and coordinating with senior staff. Likewise, senior staff now have processes to better understand the priorities and projects of frontline staff. Such results suggest that the organization now has structures in place to allow for external knowledge to flow into and within the organization, and for that knowledge to be assimilated and applied for their benefit. Such structures and processes likely have positive impacts on the LTC organization's absorptive capacity.

These results and anecdotes provide helpful examples of how external knowledge can identified, absorbed, rearticulated, and then ultimately exploited for benefit in healthcare contexts. As a result, it also suggests that the absorptive capacity of the organizations involved may have been impacted. While it was beyond the scope of this project to evaluate changes in

absorptive capacity, the study does provide some context and clarity on how future research could be structured.

5.3.4 Opposite Trade-Offs

As a final observation, it appears both organizations made implicit trade-offs in terms of the outcomes of the programs they operated, and that these trade-offs can be connected back to the organization's motivations for participating in the program. As Figure 9 illustrates, the two organizations had opposing views on how essential their respective external partners were to their innovation projects. The staff of the Pediatric Care program felt the external partner was essential, while staff of the LTC program had the opposite opinion.

This finding implies that the LTC facility staff have more agency and direct control over their innovation activities going forward. This was not an accident, as one of the main motivations cited by respondents was to create an internal climate that allowed new ideas to grow, develop, and be implemented. The LTC program's trade-off is that the improved agency comes at the expense of diversity of innovation types and innovation complexity. While the innovation process itself is being directed by an external partner, the staff are conducting the processes themselves. As a result, they are limited to the knowledge within the organization when proposing new ideas. While the LTC organization has a high level of control over what projects they initiate, the limited pool of knowledge they are operating with leaves them able to produce only low complexity process improvements.

The staff of the Pediatric Care program made the opposite trade-off. There is a low sense of agency and control over the innovation projects, but their partnership with complementary sources of external knowledge means that a wider variety of innovations are accessible, as well as innovations of greater complexity. As with the LTC program, this result was not an accident. The organization had a clear interest in creating partnerships that would improve their access to technical knowledge and expertise. Their ability to continue to engage in such projects will be moderated by their ability to continue accessing complementary sources of knowledge. They have traded control over their projects in exchange for the ability to engage in more complex and advanced innovation projects.

Chapter 6: Future Research and Limitations

6.1 Future Research

This study provides deep insights into the motivations and challenges of two different types of healthcare organizations. The results help us understand possible trends and patterns that may warrant further analysis, particularly through future empirical studies. In particular, it would be worth investigating the impact that open innovation programs have on the absorptive capacity of healthcare organizations. This study provided some context to help inform how the construct and dimensions of ACAP could be operationalized and interpreted in the public sector. For example, rather than measuring changes in ACAP through factors such as volume of sales, or number of new patents, it may make more sense to measure it through other factors related to performance in the public sector. For the organizations studied in this research, benefits were realized through improved ability to solve problems, manage knowledge, and create efficiencies. None of these outcomes are directly observable, meaning challenges will be presented when trying to find a common measure of performance across a variety of organizations.

It would also be relevant to conduct further study on the role that locus of innovation and forms of knowledge play in determining innovation outcomes in the healthcare sector. The two programs studied here differed on these dimensions, and that appeared to influence the types of innovation outcomes they were able to achieve. Was this a spurious result, or is it a sign of a pattern that exists more broadly in open innovation partnerships in the public sector?

There are other results that require further study. While there are a few possible explanations, it is unclear why project activities decline over time. This pattern needs to be better studied to understand if it is common in healthcare projects, and if so, why. If it is a common feature of healthcare innovation projects, that has implications for complex innovation projects, which often have long life-cycles. A consistent decline in activity may further complicate the success rate of innovation projects, which are already low. It is possible that a short-term commitment to projects may be responsible for the poor success rate of innovation projects.

There is also a need to better understand how healthcare innovation projects can use value creation and capture as an evaluation tool for innovation projects. Time is such a precious resource in healthcare that it would make sense to include activities in innovation projects that ensure staff time is being reserved for high value projects. Neither of the organizations in this study referenced engaging in such activities. It would be helpful to understand if such activities have been used in other contexts, and if so, how.

6.2 Limitations

As an inductive, qualitative analysis of open innovation in healthcare, the results of this study have several limitations. As with most qualitative studies, the external validity and generalizability of the findings are limited. Further research will be required to understand whether any of the patterns and findings from this study can be generalized more broadly in the healthcare sector. The external validity of the study could be improved through the application of triangulation methods. However, subsequent studies that use empirical methods will be the best approach to improving external validity.

Given the limited sample size of the study, there is also a risk that some of the findings are the result of spurious associations and influences from the researcher. The impact of these limitations could be minimized if information was collected over a longer period of time, with a more sustained presence of the researcher. Such approaches have been found to minimize the role of researcher bias, reactivity, and spurious associations (Feldman et al., 2004). Triangulation and the use of mixed quantitative and qualitative methods could also help to reduce the possible effects of researcher bias.

Chapter 7: Conclusion

This study provided a thorough analysis of two disparate approaches to open innovation in healthcare settings. The results suggest that similarities in goals, processes, and outcomes are not uncommon. Both programs followed the same general set of innovation activities and were able to use innovation as a tool for improving the level of care they are able to provide to their clients and residents. Yet, despite the similarities, the differences in the programs are more pronounced. These differences were not apparent at the start of the study. They emerged by studying the motivations, program structure, and project outcomes in more detail.

Such observations provide useful information for innovation practitioners and healthcare organizations interested in designing their own programs. The difference in motivations suggest that there is likely no single set of optimal program design guidelines. Rather, each organization will need to consider the motivations at play, and then decide on what type of external partners, sources of knowledge, and management structure fits those motivations best. For organizations interested in creating a climate for supporting innovation internally, there should be a focus on partnerships that bring external sources management knowledge into the organization. Conversely, for organizations interested in creating complicated technical products and services, there will be a need to engage external partners with engineering and technical knowledge. What is less clear is whether the locus of innovation for such projects needs to be outside the organization, as was the case with the Pediatric Care program. What might the outcome have been if the projects were located within the organization, and the staff had been more actively involved in leading the development of projects? Such questions require further study and exploration.

Appendix A: Interview Questionnaire

OPEN INNOVATION IN HEALTHCARE - PARTICIPANT INTERVIEW QUESTIONS

INTRODUCTION SCRIPT

Hi, my name is Brendan Wylie-Toal. I am a researcher working on a study investigating open innovation processes in healthcare. I'd like to thank you for your agreement to participate. It will only take 45-55 minutes. I will be recording the interview to make it easier to transcribe your responses. Do you agree to proceed?

If the participant refuses: **Thank you for your time.**

If the participant accepts: **Thank you. Your identity will be kept confidential, and your identity will not be used in reporting your responses. You do not have to answer any questions you don't want to and you may stop the interview at any time.**

PROGRAM PARAMETERS AND FRAMEWORK

To start, I'd like to ask you some questions about the innovation program you've been participating in. We'll start with general questions, and then get into more specific questions about a specific project and your involvement in that project.

Researcher to provide a brief overview of innovation being run by the organization.

1. Please describe the innovation program you have been participating in, as you understand it. How does it work, and who is involved?

2. In your view, why was the program initially created? Why did your organization participate in it?

3. Has the program allowed you to develop new products, services, policies, and/or process improvements? Can you give me any examples?

4. *(If yes)* Could you have initiated the development of those examples without the program? Why/Why not?

5. Has the program improved your access to new knowledge or skills? Where did that new knowledge and skill come from?

PROJECT SPECIFIC DETAILS

I would now like to ask a few questions about a specific project that was supported through the innovation programs at your organization. We'll start with a few questions about your role in supporting the project.

Researcher to provide a brief overview of The Project that will be discussed in this section.

6. If you were to break The Project into three phases (beginning, middle, and end), how would you describe what happened in the beginning phase? Can you give me an example?

7. What happened in the middle phase? Can you give me an example?

8. What happened at the end of The Project? What were the final outcomes or outputs? Can you give me an example?

9. Were new roles required of you from supporting The Project? These might include coordination tasks, training, mentoring, or educating. [ ] Yes [ ]No

   (If yes) Can you give me any examples?

10. In thinking of all your responsibilities, where did participating in The Project rank in terms of overall priorities?

11. Approximately how much of your time was spent supporting innovation activities in:
    a. The beginning phase of The Project? _____?
    b. The middle phase of The Project _____?
    c. The end phase of The Project _____?

PROGRAM OUTCOMES AND THE ROLE OF NEW KNOWLEDGE SOURCES

At this point we will move away from discussing your specific role in The Project, and shift towards questions about what the outcomes have been, and the role that new knowledge played in The Project.

12. In thinking of The Project, which specific partners were involved and how were those partnerships structured?

13. Where there any explicit or stated goals for The Project? What were the goals supposed to be?

14. Who are the intended beneficiaries of The Project?

15. In practice, who were the beneficiaries of The Project?

16. Personally speaking, did you learn anything in working with the external partners? Can you give me any examples? Have you used that learning in a similar or different context?

PROGRAM WEAKNESSES

Next I'd like to discuss some of your impressions about The Project. Specifically, I'm interested in your opinion of what worked well, and what did not work well. We'll start off by discussing any potential challenges you have may have noted about The Project.

17. From your point of view, what parts of The Project didn't work as well as they should? Can you give me an example?

18. For the challenges you have observed, which ones are of the highest concern and why?

PROGRAM STRENGTHS

In the next set of questions, I'm going to transition from the challenges associated with The Project to some of the advantages it may generate for you, or your organization.

19. From your point of view, what are some of the benefits to you/your organization as a result of The Project? Can you give me an example?

20. For the benefits you have observed, which ones would you say are most important and why?

That's all the questions I have for you today. Thank you for your time.

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