Frugal Inclusive Design

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Submitted to OCAD University in partial fulfillment of the requirements for the degree of Master of Design in Strategic Foresight and Innovation

Toronto, Ontario, Canada, April, 2018

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Abstract:

While Inclusive Design and Frugal Innovation have gained separate academic interest in recent years, there lacks research on their integration. This Master's major research project asks *How might social enterprises in Ontario integrate Inclusive Design with Frugal Innovation to maximize economic and social value?* The following theoretical framework is put forth: *a harmony of Inclusive Design and Frugal Innovation would add value to the social enterprise model by using minimal resources to design for the maximum amount of people.* This paper begins with an introduction to the subject matter by outlining key concepts and situating them within the research context. A literature review is then put forth to examine the research about Inclusive Design, Frugal Innovation, and social enterprise to provide a rationale for the theoretical framework. The Methodology chapter explains how using qualitative interviews and General Morphological Analysis as a foresight tool explore how these concepts could exist in a symbiotic relationship to make Frugal Inclusive Design. The Findings & Discussion chapter explores the opportunities and barriers for social enterprises to adopt this new concept as an integral part of their business. The research shows that social enterprises have adopted Inclusive Design and Frugal Innovation principles with varying degrees of success. It is suggested that social enterprises use lead user theory to strengthen the relationship between Inclusive Design and Frugal Innovation. This paper ends with a conclusion and suggestions for areas of future research.

Table of Contents

Preface

I was born with a mild form of Cerebral Palsy on my right side. This results in a lack of range of motion, dexterity, and strength probably most evident in my leg. I used to go to physiotherapy as a child and used to wear a foot brace to support dorsiflexion, which is the ability to walk on the heel, and what is integral for proper gait. My body is inherently asymmetrical right down to my feet, which are different sizes. Sandals, scissors, driving, and other products in daily life all present some level of difficulty. I realized that the world is seldom designed for me.

It seemed natural for me to be attracted to Inclusive Design. I was excited about the prospect of designing for me; maybe we could redesign a piano to account for my fingers' stiffness. I thought it would be great to redesign our spaces to accommodate everyone so they would not have to endure the feelings of frustration and embarrassment related to their most vulnerable differences. However, I was also aware of the simple economics that is referenced throughout this research paper. Unless it is someone's pet project or a wealthy benefactor has commissioned such work, designing for the disabled is a hard sell. Indeed, designing for any niche market is difficult. It can be expensive to make and the perceived notion of a small market makes people fear that they will not recoup the costs.

This is understandable. This is why I was also intrigued by Frugal Innovation. It seemed to be a much easier sell than Inclusive Design; that you can still innovate and add value using minimal resources. It is also not a foreign concept, everybody does it, but it's normally under the adage of *where there's a will, there's a way*. An example is my Birkenstock sandals. My pair had a strip of leather around the heel to ensure my foot wouldn't slip out. Of course, it still did because I was wearing size 13 sandals when my right foot is a size 10. Tightening the back didn't work, so I had to punch new holes with scissors to tighten it further until I fixed the issue. Simple but effective.

I then thought about how these concepts could be combined. After all, it seems like a great idea to design for the maximum number of people while using minimal resources. I wasn't the only one to think this combination could work. In their book, *Frugal Innovation*, Navi Radjou & Jaideep Prabhu argue that

Frugal Innovators could use Inclusive Design to foster an organization's Frugal culture. I was hooked. Not only would the profit margins be huge, I thought, but there would be potential to positively impact someone's life. Thus, the time for an integration of these concepts has come.

Chapter 1: Introduction

1.1: Research context

The living and working environments are generally designed for "mainstream" individuals with according needs. "Mainstream" refers to individuals who fit the status quo by belonging to a majority population or having little to no physical or mental impairments. Figure 1, which can be seen in the Appendix, shows a scatterplot of needs whereby the central cluster refers to needs that are met by current designs and market conditions. The further the dot is from the centre, the less likely they are to have goods that suit their needs. Because of this, mainstream populations have little trouble using mainstream products and services. This contrasts marginal groups, including people with disabilities, who experience high levels of product dissatisfaction, not to mention face challenges even when using assistive devices (Conradie, Herregodts, De Marez, Saldien 2016). An appropriate design response to these peripheral dots is called Inclusive Design.

Inclusive Design can be defined as the "design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible ... without the need for special adaptation or specialised design" (Clarkson, Coleman, Hosking, Waller 2007, pg. 1-7). It can also be defined as design that recognizes "the full range of human diversity with respect to ability, language, culture, gender, age and other forms of human difference" (Treviranus 2007, pg. 1). I will consider the latter definition for the purpose of this MRP.

Inclusive Design has many offshoots. It is known as such primarily in the UK. It is known as *Universal Design* in the USA and Japan and *Design for All* in the Nordic countries. The different terms reflect the circumstances out of which they emerged and their different applications. USA's focus had been on the rights of people with disabilities to access public spaces and the environment. The UK broadened the design approach to include access to services, whereas Europe expanded to include access to information and ICT. Europe's *Design for All* movement has generally been applied to the public sector in the realm of government and policy. UK's *Inclusive Design* has been aligned with the private

sector; business, industry, and market driven. True to its name, *Universal Design* is positioned as catering to both private and public sectors. This MRP will examine the business-focused *Inclusive Design* approach.

Inclusive Design arose in the mid-1990's as a combination of various initiatives and experiments dating back to the 1960's (Clarkson & Coleman 2015). It was an effort to link design to social need due to misguided assumptions about age, disability and social equality. There was a need to shift the conversation specifically about age and ability. There was the medical model of disability, where people were considered disabled or incapacitated by a physical or mental condition they had been born with or acquired. The desire was to shift to a social model, where disability was the result of having exclusionary services and environments, cultural stereotypes, and inadequate design being thrust upon them. (Clarkson & Coleman 2015).

Such exclusion coupled with the global economic recession starting in 2008 has given rise to doubts about the public and private sectors' ability to respond to and fulfill consumer needs. As a result, the social enterprise has gained popularity, acting as the middle ground between the two sectors by using market logic to advance a social goal rather than solely seek profit. The social enterprise has many definitions, including "a business venture owned or operated by a non-profit organization that sells goods or provides services in the market for the purpose of creating a blended return on investment, both financial and social/environmental/cultural" (Flatt, Daly, Elson, Hall, Thompson, & Chamberlain 2013, p. 4). I will consider this definition for this MRP.

Social enterprises can be manifested through for-profit, non-profit, charity, and other types of organizations. They can be in any industry including retail, food, and consulting. They can exist for many purposes that are akin to the public sector, including addressing environmental concerns, reducing poverty, or providing employment opportunities. Some purposes are aligned with the private sector, like revenue generation. Many social enterprises serve some peripheral dot, or marginal need. In Ontario alone, there are more than 1000 social enterprises that serve the disability, Aboriginal, and elderly populations, among other niche markets.

Certain populations are excluded from mainstream products and services because of numerous factors. One being the 80/20 rule as put forth by Koch (1999). He demonstrated how this rule plays out in different areas of organizational management, like how 80% of sales comes from 20% of clients, or that 80% of work and accomplishments come from 20% of our effort. There is little focus on the other 80% of clients (i.e. the peripheral dots) which indeed require more than 20% of our effort. This is a difficult proposition to consider because of the economics of this mentality. Catering to the needs of the central cluster dictates the economies of scale, making it cheaper to produce goods for that population. This is a problem for marginal populations because they will likely have less wealth considering their goods will cost more. This is the essence of the Pareto principle from which the 80/20 rule derives. The 20% of lucrative clients become more so and the 80% of poor clients become poorer. Organizations often rely on economies of scale as an important factor for success, excluding certain populations because they are seen as an economic liability. An underlying factor that plays a role is the organization's culture. Many corporate cultures forsake niche markets in favour of the more lucrative mass markets. Changing culture from one of exclusion to inclusion is a difficult process. The reluctance to change is best encapsulated by the statistic that ~70% of all change initiatives fail (Nohria & Beer 2000). Most organizations are the cautionary tale, leaving others to remain static.

This is where Frugal Innovation can add value. Frugal Innovation is the ability to use minimal resources to one's advantage. In their book, *Frugal Innovation*, Radjou & Prabhu (2014) define it as "the ability to 'do more with less' - that is, to create significantly more business and social value while minimising the use of diminishing resources such as energy, capital and time" (Preface). In that same book, the authors propose that Frugal Innovators could use Inclusive Design to foster an organization's Frugal culture. They claim that the principle of simplicity that underpins Inclusive Design could reduce complex products with overloaded features for elderly consumers, who experience physical limitations as they age. Better yet, reducing complexity would lower costs by improving usability. Yet, Frugal Innovation is not simply about lowering costs and improving economies of scale, it is about maximizing business and social value; making money and making good.

1.2: Research question

This research paper examines Radjou and Prabhu's proposition in depth. Given each concept's potential for economic and social benefit, which is explained more fully in the literature review, it would seem like a strategic fit for social enterprises, which often claim a harmony of economic and social benefit, some even calling it the economic engine of the future (Harding & Cowley 2004) and the main vehicle for Corporate Social Responsibility (London & Morfopoulos 2010), which is an organization's commitment to bettering the communities in which they serve. Thus, this paper asks the following research question:

How might social enterprises in Ontario integrate Inclusive Design with Frugal Innovation to maximize economic and social value?

This MRP proposes that a harmony of Inclusive Design and Frugal Innovation would add value to the social enterprise model by using minimal resources to design for the maximum amount of people. A successful integration might be called Frugal Inclusive Design. While these concepts have been individually subjected to academic research over the years, there lacks research on their integration. However, the Director of the Inclusive Design Research Centre, Jutta Treviranus, acknowledges the cost challenges associated with Inclusive Design (Treviranus 2018). This research paper specifically contributes to the Inclusive Design literature with particular reference to Donahue & Gheerawo's (2007) assertion that Inclusive Design needs to engage with other research communities if it is to become a mainstream ideology and practice. It needs to engage with Frugal Innovation, which has been a topic of discussion in research communities and disciplines, most notably, management studies.

This paper begins with a literature review of the three main concepts, Inclusive Design, Frugal Innovation, and social enterprise. Next, the methodology chapter outlines the two research methods used in this study, qualitative interviews and General Morphological Analysis combined with a foresight component. This encompasses how these methods have been used in research related to the subject matter as well as this study's research process and data analysis. The Findings and Discussion chapter outlines

the results. This paper ends with a conclusion, limitations of the study, and suggestions for future research.

Chapter 2: Literature Review

2.1: Introduction

There has been much research on the topics of Inclusive Design, Frugal Innovation, and social enterprise. This review examines the above concepts and brings the topics of Corporate Social Responsibility (CSR) and social finance within the scope of research. The main theme connecting these topics is the changing nature of the public and private sectors, that is, the opportunities and concerns surrounding the pursuit of economic and social goals. This literature review attempts to find the similarities and differences between all these concepts to give a rationale for the research question and theoretical framework.

2.2: Literature Review

Inclusive Design originated in product design related to disability and aging (Clarkson & Coleman 2015, Donahue & Gheerawo, 2007). The design approach has numerous commercial product examples such as Health Buddy, which elderly patients can use to manage and communicate their health conditions with their care providers from the comfort of their own homes. Another example is the Fiat Autonomy Programme, which explores the ways in which technology and ergonomics could meet the needs of both elderly and disabled users (Clarkson, Coleman, Keates, Lebbon 2003). Health Buddy reduced emergency room and hospital visits with according healthcare cost savings. The Fiat Autonomy Programme adds value to users who have been traditionally excluded from the design process by improving usability and accessibility. Fiat also sells around 20,000 cars a year through this program. The organization thus positions itself well to meet future demand stimulated by disability legislation (Clarkson et al. 2003).

It makes good business sense to design for these populations considering that the aging baby-boomer demographic was projected to control 70% of the US disposable income by 2017 (Radhou & Prabhu, 2014) and the disability market had a Canadian population of 6.2 million people with a

disposable income of $46.6 billion in 2013 (Donovan 2013). There is also a dearth of Canadian companies that has had the success, not to mention the market reach or infrastructure like Fiat. Out of 282 Canadian publicly-traded companies, 34% of these businesses acknowledge the value of disability to their organizations (Donovan 2013).

Indeed, Inclusive Design has traditionally been aligned with the private sector. It is market driven, more so than its European or American counterparts (Clarkson & Coleman 2015). Given its industry focus, Inclusive Design recognizes the commercial constraints associated with designing for a particular target market. Inclusive Design is not a simple stage that can be added to the design process nor is it implying that it is possible, appropriate, or obligated to design one product that addresses the needs of the entire population. It aims to counter *design exclusion*, a concept that recognizes that no one product or service will work perfectly for everyone. Rather design for everyone (like Design-for-all or Universal Design), the process for identifying the target market can go from *whole population → ideal population → included population → negotiable maximum population → target population.* Inclusive Design also recognizes the diversity within the target population. This considers the dynamism within the population as well as legislative and safety requirements that reinforce exclusion (Keates & Clarkson 2003). Hosking, Waller & Clarkson (2010) note that the practice should not only consider the diversity of abilities, which is dynamic and existing on a wide spectrum of severity, but also diversity of population demographics like gender, culture, lifestyle, and aspiration. Traditional market segments alongside personas are used to encapsulate such diversity and situate it within a business context. Additionally, simulation tools have been developed to assess usability (Cardoso & Clarkson 2012, Radjou & Prabhu 2014).

Attempts have been made to disseminate knowledge, tools, methods, and skills about Inclusive Design to a multidisciplinary team of professionals and users (Clarkson & Coleman 2015). This has been done most notably through the 10-year *i~design* (2000-2010) research program, funded by the Engineering and Physical Sciences Research Council (EPSRC). The first (2000-2004) of which laid an academic foundation for Inclusive Design. The second phase (2004-2007) specifically explored how

businesses in the UK could engage with Inclusive Design. This resulted in a new British Standard, BS7000-6 2005, which offers guidelines for adoption of inclusive practices to the design of products and services in multiple industries including retail, healthcare, and transport. The Inclusive Design Toolkit was also released. Large corporations, namely Microsoft, has made similar toolkits for Inclusive Design. The third phase (2007-2010) focused on the designers' interactions with real people by generating tools to provide accurate data on capability diversity within the population, as well as tools for calculating levels of inclusion. On a side note, the EPSRC also funded *Design Our Tomorrow*, a research project aimed at engaging secondary school teachers with Inclusive Design principles and practices to educate students.

Industry has been generally slow in adopting Inclusive Design despite the practice being more aligned with business than Design-for-all (Nordic) or Universal Design (USA & Japan). Common reasons include scarce time and resources, lack of access to and experience working with users, and insufficient demand and support from commissioners of works (Keates & Clarkson 2003). This disconnect between designers and the organizations that commission their work is due to the former often taking a human or user-centric design approach while the latter being profit-oriented (Clarkson & Coleman 2015). Inclusive Design has had commercial success with important case studies, as noted above. But consider that around 40 years ago, the relative cost of a pocket transistor radio and a transistor-based hearing aid was 40 - 150 times the cost. Papanek (1971) noted how a Japanese transistor could be purchased for roughly $4 while hearing aids could be sold at prices between $147 - $600 despite being slightly more sophisticated than the transistor and a little more costly to produce: $6. That cost ratio is very much similar to today (Clarkson & Coleman 2015). Indeed, Inclusive Design is seldom frugal. Inclusive Design typically targets niche markets, which is rarely conducive to mass market appeal and adoption.

Inclusive Design has many challenges if it is to become a mainstream ideology and practice. Herriot (2013) noted that as the design process for products and assistive devices progresses, inclusive designers often fail to consider user input. He reported that only 4.5% of 66 cases completed all six steps in the Engineered Design Centre (EDC) Inclusive Design Process, with 39.3% reporting just one step of completion. Given Inclusive Design's general nascence, strong local and regional approaches and

differences have also emerged as a result of historic, cultural, and economic factors (Clarkson & Coleman 2015). The discipline also has limitations like its primary application to product design and age and ability. Inclusive Design should engage with other research communities and broaden its definition of inclusion to address the full spectrum of human experience in relation to race, gender, culture, history, technology, and geography (Donahue & Gheerawo 2007). It has been suggested that Inclusive Design could help foster a company's frugal mindset. That is, Inclusive Design could be co-opted by Frugal Innovation (Radjou & Prabhu 2014). Frugal Innovation products developed using Inclusive Design principles could lower costs by eliminating features that hinder usability. By doing so, organizations can widen their market reach (Radjou & Prabhu 2014).

Frugal Innovation is a business concept defined as the ability to minimize resources like time, energy, and capital while maximizing social and business value (Radjou & Prabhu 2014). It follows and complements *Jugaad Innovation*, a similar concept originating in developing countries where they have big problems and little resources (Prabhu, Ahuja, Radjou & Roberts 2013, Radjou & Euchner 2016). Zeschky, Widenmayer & Gassmann (2011) define frugal innovations as "good-enough, affordable products that meet the needs of resource-constrained consumers" (pg. 38). Knorringa, Pesa, Leviveld & van Beers (2016) note that Frugal Innovation involves "(re)designing products, services or systems to significantly cut costs, without sacrificing user value, so as to reach a mass customer base, especially in low-income settings" (pg. 144). In addition to appealing to markets in developing countries, it also has potential to appeal to cost-conscious consumers in North America and Europe. Frugal Innovation is aimed toward developed countries and large corporations while Jugaad Innovation generally applies to developing countries and markets (Micaelli, Forest, Bonjour, & Loise, 2016).

Examples of Jugaad Innovation are seen in India, where a fridge made of clay that uses no electricity retails for only $40 (Radjou & Euchner 2016) and can help the 240 million people who have no access to electricity. Another example is a billboard in Peru that transforms the humidity in the air into drinking water, taking advantage of the country's 95% humidity level (Radjou & Euchner 2016). A Frugal Innovation example is Renault-Nissan, a car manufacturer that made a car for $6000. Another

example is the Ford Motor Company setting up a 24/7 prototyping studio where employees can ideate, tinker, and design potential innovations. After three years, Ford managed to increase its patentable ideas by more than 100% without investing more into R&D (Radjou & Euchner 2016).

Frugal Innovation has spawned different types of innovations, including cost (same functionality at a lower cost), good-enough (tailored functionality at a lower cost), resource-constrained, trickle-up, and reverse innovations (selling low-cost innovations in emerging markets to developed countries). These differences reflect the motivations, value propositions, and methods for value creation unique to each offshoot (Zeschky, Winterhalter & Gassmann, 2014). Specifically, reverse innovation has gained considerable academic and managerial interest in recent years (Zeschky et al. 2014). This type can be any other type of frugal innovation (itself described as new functionality at a lower cost). Agarwal & Brem (2012) contrast this view by suggesting that frugal innovations are incubated in and tailored to developing markets with no intention of worldwide distribution. Reverse innovations are still incubated in emerging economies but with the intention to sell to developed markets. An example of such is Haier's washing machine, designed for small, daily loads for typically cramped, Chinese households (Hang et al., 2010). This and other examples demonstrate that the flow of innovation is no longer solely from west to east, but increasingly east to west (Govindarajan & Ramamurti, 2011).

There are thus opportunities for innovation for Base of Pyramid (BoP) markets. The BoP refers to the 4 billion people who live on less than $2 a day (Prahalad 2004). These markets have been a topic of discussion in recent years (Prahalad & Hart 2002, Prahalad 2004, Hammond & Prahalad 2004). Researchers have suggested that strategic innovation for BoP markets are not so much focused on the *who*; that is, who are the customers organizations are targeting. Rather, it is focused on finding a new *what* and *how*: what the product/service is and how organizations are delivering it. Value chains can be reconfigured accordingly by considering the 4 A's: acceptability, affordability, availability, and awareness (Anderson & Markides 2006). Indeed, Inclusive Design has been explored in resource-constrained areas like India, from which Frugal Innovation originated. The study examined how Inclusive

Design could help street vendors overcome the challenges they face, including low sales, police corruption, harassment, and evictions (Mahadevia 2014).

Frugal Innovation implies it is inclusive by nature. This is because it originated in the homes and alleyways of resource-constrained areas like India, making its way to the West, specifically to businesses and R&D labs, in recent years. Though, scholars call the degree of inclusivity into question. Some critics doubt Frugal Innovation's ability to create equitable and sustained economic growth and inclusive forms of innovation. It is suggested that it could instead benefit a privileged few by encouraging capitalist exploitation of low-income areas (Knorringa et al. 2016). Given the income disparity between Western multinationals and low-income consumers, some question Frugal Innovation's ability to address these power dynamics at a local and global level (Knorringa et al. 2016). Furthermore, scholars have asked if inclusion can be addressed solely through innovation outputs or by including marginal populations in the innovation process. If it is the latter, research has pointed to two concerns: the person or group who is currently marginalized and needing to be included, and in what aspect and capacity they should be included (Heeks et al., 2014). Evidence for including marginalized populations in the innovation process is seen in Conradie et al. (2016). They note that people with disabilities exhibit characteristics associated with lead users, namely, product dissatisfaction. Lead users are users who face needs months or even years ahead of the general marketplace. This theory was put forth by Eric von Hippel as part of a larger concept of democratizing innovation (1986, 2017). Twelve percent of Conradie et al.'s participants generated ideas that were applicable to non-disabled populations. Similarly, India is construed as a lead user market (Herstatt & Tiwari 2017). This is in accordance with Soni & Krishnan's (2014) proposition that Frugal Innovation's processes and outcomes would be greater in lead markets where customers demand good-enough, low-cost products and services. Thus, Soni & Krishnan (2014) argue that lead markets such as India could encourage Multinational Corporations (MNCs) to experiment with Frugal Innovation.

Still, there are barriers to Frugal Innovation's adoption in MNCs. Frugal Innovation has a branding issue. Consumers often equate frugality with poor quality. Cannibalization is another concern

because a frugal solution could undermine more expensive products. Sales teams generally work on commission that incentivize them to sell high-end goods rather than low-cost goods. To sell the latter might mean organizations accruing less revenue. This makes the organization unsustainable and lead to eventual bankruptcy. This is similar to another concern: market pressures. This can worry executives who believe frugal goods will plummet their stock price because they think frugal goods have lower margins compared to higher end products (Radjou & Prabhu 2014). This could also mean the organization accruing less revenue and possible bankruptcy. It also proposes significant changes to the innovation value chain because it calls for reconfiguring business models and redesigning products to cater to new customer segments: marginalized populations who face affordability constraints (Knorringa et al. 2016). This is sometimes with according costs that seem antithetical to Frugal Innovation's philosophy. As Radjou puts it, "some companies will spend $1 billion to create a product that is 20 percent cheaper than what they sell today. They create a Manhattan Project merely to create something that is cheaper" (Radjou & Euchner 2016, pg 13). These barriers may be attributed to the "bigger is better" mentality that Western organizations have adopted (Radjou & Prabhu 2014). In 2015, the 1000 largest companies increased their R&D spending by 5.1% to $680 billion. Budgets not only enable an attitude that values complexity as progress but consider frugality as an economic step backward. They rarely consider a social goal like sustainability to be a source of competitive advantage, as does Frugal Innovation (Radjou & Prabhu 2014).

The propositions that Inclusive Design and Frugal Innovation can be sources for both business and social good echo the sentiments of Corporate Social Responsibility (CSR). CSR has as many as 37 definitions that outline an organization's commitment to bettering the communities in which they serve (Dahlsrud 2008). However, Dahlsrud (2008) note that most definitions describe CSR as a phenomenon rather than defining the social responsibility of business. Despite this ambiguity, organizations have been under pressure to engage with CSR (McWilliams & Seigel 2000, Dahlsrud 2008, Jenkins 2009). Such pressure arises from factors like changing customer expectations and environmental concerns (Waddock & Graves 1997, Radjou & Prabhu 2014).

The link between CSR and profitability has been researched with positive (Waddock & Graves 1997, Grayson & Hodges 2004) and neutral (Aupperle, Carroll & Hatfield 1985) results. This is known as the business case for CSR, other scholars call it *profit-seeking CSR* (Lee, Herold & Yu 2016). Grayson & Hodges (2004) outline *corporate social opportunity*, that which advances some dimension of sustainability while being a commercially viable option for the organization. Businesses typically focus on the business case, that is, how social, environmental, and economic considerations might financially contribute to the organization. An example is seen in Starbucks collaborating with various NGOs in the early 2000's to sell Fair Trade coffee and ensure that smaller farmers received a living wage in an attempt to bolster their credibility in social responsibility (Argenti 2004). More scholars have outlined further examples of CSR business benefits like efficiency gains, differentiation, tax advantages, financing advantages, risk reduction (Schaltegger & Figge 2000), market and product development, increased recruitment potential, risk management, and image improvement (Nielinger 2003), among others (Schaltegger & Burritt 2005, Heal 2005, Hansen 2004). However, Bondy, Moon & Matten (2012) conclude that MNCs are moving away from an understanding of CSR as one that addresses the systemic problems associated with the market economy to one that is instead co-opted by the dominant market logic and used as a business innovation tool to generate profit. Nevertheless, the business case for CSR has been researched extensively in recent years (Carroll & Shabana 2010, Saltzmann, Ionescu-Somers & Steger 2005) with some attempting to measure CSR's business impacts (Weber 2008) and others suggesting that there are appropriate levels of CSR that organizations can undertake given their size, industry, and organizational structure (McWilliams & Seigel 2001).

CSR can manifest differently depending on the context (Lee, Herold & Yu 2016). As such, CSR is manifested differently in small to medium sized enterprises (SMEs). Given their relative size, SME behaviour largely reflects the entrepreneur, or owner-manager's values and beliefs (Jenkins 2009) and are thus adaptive to not only changing market opportunities (Jenkins 2009) but to the extent to which SMEs engage with CSR (Lee, Herold & Yu 2016). This is in accordance with Jugaad Innovation's third principle: *Think and act flexibly*. Fisher, Geenen, Jurcevic, McClintock & Davis (2009) argue that

Canadian SMEs have significant social capital; the relationships that help organizations succeed. More specifically, social capital is the product of cooperation between multiple stakeholders. Such social capital helps SMEs achieve CSR by establishing agreed upon expectations that are built over time through collaboration. This notion that social capital is a product of cooperation and collaboration echoes Frugal Innovation's, and similarly, Jugaad Innovation's principles': *Co-create Value with Prosumers* and *Include the Margins*, respectively. SMEs use Frugal tactics to enable CSR in their organization, knowingly or not.

Whether CSR in SMEs is a clear and linear path to profit is another matter. Lee, Herold & Yu (2016) note that communication about CSR within Canadian SMEs is sparse and informal, despite playing a pivotal role in adopting and realizing a CSR strategy. According to them, this is a distinguishing factor between SMEs and MNCs. This lack of communication stems from a lack of resources and management skills. It ultimately makes CSR a profit-sacrificing activity. The Canadian Business for Social Responsibility (2003) found similar cases in Canada; that economic performance and sustainability is closely tied to CSR implementation and related activities within SMEs. This is to say that some Canadian SME's lack the resources, tools, and procedures to ensure that CSR is positively correlated to profit, or in other words, that a social goal can be synonymous with an economic goal.

This dichotomy is similar to the description of a social enterprise. Social enterprises are described as organizations that use income earned to advance a social cause (Bull 2008). However, it is also acknowledged that the term *social enterprise* is a category that encompasses multiple types of organizations (Dees 1998). This extends to Canada, and more specifically, Ontario (Brouard, McMurtry, & Vieta 2015). This reinforces Bull's (2008) notion of how social enterprises are often hailed as the answer to public and private sector failures, straddling both sectors. Social enterprises are not necessarily formed for the sake of profit. Rather, any surplus generated is reinvested to further the enterprise's social cause. Profit and social goals are not contradictory. Effective financial management is thus necessary for sustainability (Cornelius, Todres, Janjuha-Jivraj, Woods & Wallace 2008). Social enterprises are touted as both the economic engine of the the future (Harding & Cowley 2004) and the main vehicle for CSR (London & Morfopoulos 2010).

Inclusive Design and Frugal Innovation have similar claims. Inclusive Design is underpinned by the economic argument that increasing the amount of people who can use inclusively designed products would expand an organization's market share and increase business profitability (Clarkson et al. 2003). Treviranus et al. (2011) note that inclusively designed ICT could increase employment among persons with disabilities and add $44.5 million in employment income and $283 in GDP per capita. This is in tandem with Inclusive Design's social imperative; that it offers equality of social opportunity to marginalized groups to foster a more inclusive society (Clarkson et al. 2003). Frugal Innovation is considered to be the future of innovation management (Khan 2016), appealing to developing and developed nations alike due to its lower costs and no-frills structure (Rao 2013). Indeed, research has examined how Western MNCs might be organized to capitalize on Frugal Innovation (Zeschky et al. 2014, Radjou & Prabhu 2014). Khan (2016) posits a link between Frugal Innovation and social sustainability. His case studies of frugal innovations include Vortex Engineering, which makes solar powered ATMs; SELCO, which brings solar power to underserved businesses and households; Jaipur Foot, a low-cost prosthetic; and M-Pesa, a mobile phone-based money transfer system. These case studies addressed several social sustainability themes such as poverty reduction, human well-being, and social inclusion, among others. This is reminiscent of CSR's definition; bettering the communities in which organizations serve.

Cheng, Ioannou & Serafeim (2013) conclude that firms with positive CSR performance have better access to capital. Social finance has emerged as a research area since the global economic recession created doubts about the public and private sectors' ability to fulfill their responsibilities (Hangl 2014). Social finance is the use of financial resources for social and environmental returns, and sometimes a financial return (Canadian Task Force on Social Finance 2010). Social finance allow organizations, social enterprises included, to engage in activities for the purpose of social innovation, which is "any product, process, design, initiative, or program that is created to address a social problem or need and that ultimately profoundly changes the flow of resources, authority, and meaning of the social system in which it is created" (Westley & Antadze 2010, pg. 354). Moore, Westley & Nicholls (2012) note that

conventional finance is not generally designed to support social goals for fear that it will have a negative Return on Investment (ROI), thus marginalizing those who would benefit from the innovations catalyzed by such finance. Conventional finance faces barriers such as legal risks, knowledgeable investors, and ambiguity surrounding social performance metrics, among others (Moore et al. 2012). Historically, social entrepreneurs often seek funding from government grants and contracts because the public sector is typically tasked with addressing social aims while the private sector is concerned with financial returns (Moore et al. 2012).

However, this is not always the case. Elson, Gouldsborough & Jones (2009) note that social enterprises in Ontario, including non-profits, have three types of institutions from which organizations can seek funding. The first is micro-finance and enterprise funds, which are micro-loans undertaken by SMEs and larger for-profit enterprises with a social purpose. Second, there are social enterprise funds, which are funds dedicated solely to social enterprises and non-profits. Lastly, there is state finance, which is government funding that may or may not be targeted toward social enterprise. In a study conducted by the MaRS Centre for Impact Investing (2016), it was found that many for-profit social enterprises believed that Ontario's social capital market offers too little investment for optimized growth, resulting in a 2016 capital gap of $45 million - the difference between the capital sought and raised by social enterprises.

Frugal Innovation has helped social enterprises turn such lack of funding, among other resources, into opportunity. Singh, Gambhir, Sotiropoulos, & Duckworth (2012) examined Frugal Innovation's impact on social enterprises in India. They note that securing funding in India is difficult, like Ontario. Faced with this challenge means that social enterprises must optimize its use and impacts, thereby embracing Frugal Innovation to give people wider access to public services such as health care, potable drinking water, and proper sanitation facilities. Many Indian social enterprises have managed to keep service quality high while keeping costs low like Aravind Eye Care System, which provides cataract surgeries to poor patients for £25 (~$45 CAD), compared to £2000 in the US (~$3600 CAD) in an effort to prevent blindness. Patients receive the surgery for free if they cannot pay. Only 30% of patients can

pay the full price. While having the clear social goal of preventing blindness, Aravind operates on a commercial basis and adds a small surcharge to the remaining 70% of wealthy patients who can afford the £200 (~$360 CAD) service in private hospitals. This business model has delivered a positive economic ROI and has allowed Aravind to expand its operations debt-free. Indeed, the Canadian non-profit organization Network for Business Sustainability urges organizations to incorporate Frugal Innovation when trying to innovate for sustainability (Adams, Jeanrenaud, Bessant, Overy & Denyer 2012), thereby making the same connection between Frugal Innovation and sustainability as does Radjou & Prabhu (2014) - that sustainability is a source of competitive advantage.

There is a dearth of research exploring the link between Inclusive Design and social enterprise. However, it is important to note that social enterprises, specifically in Ontario, typically serve some marginal population whether it be Aboriginal communities, immigrants, and much like Inclusive Design's primary focus, the elderly and disability demographics. For example, CyberQuality Inc. is a social enterprise in Toronto that provides access to computers and the internet to the disability and elderly demographics, among others. Professor Sir Christopher Frayling says this about Inclusive Design:

> *The challenge of designing inclusively for the whole population is not just a matter of social urgency - it has become one of the defining business priorities of the age. The social argument plus the business argument have in my view become inevitable… The challenge of inclusive design is not just about offering equality of social opportunity. There is also a huge business opportunity. Markets previously excluded by design are large and growing - and will reward those manufacturers and service providers who bring them in from the cold.* (Clarkson et al. 2003, Foreword)

The purpose of the social enterprise echoes that of Inclusive Design; creating a mixed return on investment, both financial and social, environmental, or cultural. Frugal Innovation also has a similar definition; minimizing resources while maximizing business and social value.

There are numerous examples of social enterprises using an integration of Inclusive Design and Frugal Innovation. One example can be seen in a research project called BIG IDeA (Business Innovation Guide for Inclusion Design and Accessibility), which is housed at OCAD University's research centre, the Inclusive Design Research Centre. BIG IDeA facilitates hackathons and design jams to solve

accessibility challenges. Participants frugally prototype using arts & crafts supplies like Lego, popsicle sticks, and even 3D printing in the hope that businesses refine and implement the solutions generated. This is an effort to promote Inclusive Design in business by incorporating elements of Frugal Innovation. Ultimately, this example shows an attempt to bolster people's capacity for innovation that has both an economic and social aspect. The Canadian company, Wheelchair Friendly Solutions Inc. is another example. Founded by Wade Watts, who uses a wheelchair due to his Multiple Sclerosis, the company develops low-cost accessibility solutions. While outlining the economic potential of designing for people with disabilities demographic, the economic and social dichotomy is embodied by a quote on their About Us page: *It's not just the right thing to do, it is the profitable thing to do.* A third example could be LegWorks, a Toronto-based for-profit social enterprise that develops leg prosthetics for everyone, including amputees living in developing countries. They do this by partnering with NGOs that subsidize the cost of a prosthetic to those who would otherwise lack access. These NGOs work in countries like Myanmar, Cambodia, and Sri Lanka. Each example uses different Frugal techniques like keeping costs low and collaboration. They still serve the disability market, as per Inclusive Design's original focus. A fourth example is Open Bionics, a company that develops affordable, high-performing prosthetics. They address the inequality of access faced by many limb-different peoples worldwide by offering a Frugal solution, to the point that they want to make it "super accessible and radically democratic" (Pradeep 2018), akin to Inclusive Design. Their additional value proposition is that their products are open-sourced, allowing developers and hobbyists alike to tinker and improve upon the products to fit specific needs. This is aligned with both Inclusive Design and Frugal Innovation, including innovative friends in the innovation process.

2.3: Conclusion

Inclusive Design, Frugal Innovation, and social enterprises share many similarities. First, they are concerned with addressing basic human needs. Inclusive Design initially served the needs of the elderly and people with disabilities. Frugal Innovation began out of necessity, serving BoP populations. Social

enterprises are designed in such a way to serve all three populations and more. Thus, each concept, particularly Inclusive Design and Frugal Innovation, serve niche markets that are not addressed by mainstream products and services. They all strive for a blended ROI, both economic and social as a result (refer to Figure 2 in the Appendix for a Venn diagram of the concepts' similarities).

As these concepts have matured, they have aligned themselves with the private sector. Inclusive Design has cousins such as Design-for-All and Universal Design, popular in Europe and USA, respectively. These disciplines differ from Inclusive Design by addressing public sector and government issues. Although, they still address issues related to age and accessibility like Inclusive Design. Frugal Innovation has been amended for a Western MNC audience, having originated in the similar concept *Jugaad Innovation*, taking its name from a Hindu colloquialism meaning "a quick fix; hack". Like Inclusive Design, Frugal Innovation has derived offshoots under different circumstances. The social enterprise uses market logic for a social purpose and can manifest in for-profit, non-profit, or charity organizations. This liminal space within which the social enterprise operates makes it the best model to embody Inclusive Design and Frugal Innovation since it considers the main goals of both the private and public sectors, economic and social ROI, respectively.

Each concept has been promoted as a tool for both commercial growth and social equity. Yet, scholars have questioned Inclusive Design and Frugal Innovation's capacity to deliver on both promises. They cite inherent power dynamics to be at play between the providers and recipients of such goods, namely, large corporations and marginalized populations, respectively. This may result in commercial growth at the expense of social equity. This dichotomy echoes CSR, a concept that demands businesses engage in ethical and responsible conduct. CSR manifests differently depending on the size and context of the organization. MNCs often have the budget and communication that SMEs lack to make a case for CSR adoption. Although, critics note that MNCs focus on the business case for CSR; that commercial opportunity lies in serving the social and environmental goals of the community and society at large. Such a case has been explored to fit a SME agenda, as well. Social enterprises are ingrained with that idea. Financial wellbeing is not sacrificed for a social goal, nor is the reverse true. The two exist in a symbiotic

relationship to sustain the organization. As such, organizations with positive CSR performance have better access to capital. They can use this capital for their social goals. Capital used in this way has been called social finance. However, social enterprises in Ontario believe the social finance infrastructure is lacking. This gives credence to the proposition that social enterprises should specifically engage with Frugal Innovation considering their lack of resources, namely, funding.

The problem at hand is twofold. The first is the difficulty in making Inclusive Design widespread; a viable business option. Adding Frugal Innovation to Inclusive Design could help solve that challenge. Doing so could allow social enterprises to use minimal resources to design for the maximum amount of people, thus addressing the second problem: maximizing economic and social value. I posit this for two reasons. The first is definitional while the second is theoretical. Inclusive Design attempts to design products and services accessible to as many people as reasonably possible while Frugal Innovation's main attraction is using whatever resources are available, however scarce, to embark on such design and innovation. This it to say that Frugal Innovation is the method by which we can design inclusively. This might result in Frugal Inclusive Design. Inclusive Design could co-opt Frugal Innovation instead of the reverse as Radjou & Prabhu (2014) suggest. One reason for this is because Inclusive Design is inherently broad, thus having room to incorporate Frugal Innovation to address economic difference as a feature of design exclusion, which Inclusive Design purports to address. This would perhaps allow products and services to be accessible to a wider range of people on both the ability and economic pyramids. Inclusive Design is arguably not as widespread as it could be because costs are relatively high, making it a poor economic investment. Inclusive Design also needs to move beyond its current application, disability and age, if it is to become mainstream. Adopting a Frugal mindset may help solve that challenge. This is not the same as saying Inclusive Design is the method by which we can frugally innovate, resulting in Inclusive Frugal Innovation. Indeed, the literature shows that Frugal Innovation is inherently inclusive, but Inclusive Design is not inherently frugal. While the literature demonstrates attempts made to diffuse Inclusive Design with important case studies, there lacks a watershed moment for the discipline. This is

the gap in the literature: how Inclusive Design could be made Frugal so it can become a mainstream business ideology and practice.

The social enterprise is the best conduit for an integration of these concepts to manifest. This is because of the second, theoretical reason for my proposition. The social enterprise is focused on a blended Return on Investment: economic and social. The social enterprise shares this dichotomy with Inclusive Design and Frugal Innovation. The social enterprise is designed in such a way that adopting Inclusive Design and Frugal Innovation would allow for not only the potential for commercial growth in industry but the social equity for everyone, in which Donahue & Gheerawo (2007) propose Inclusive Design could be adept. Given social enterprises' nascent funding mechanisms, frugality is often the only option. Conversely, *choosing* that option may present valuable opportunities. Indeed, social enterprise is the preferred model to adopt Inclusive Design and Frugal Innovation principles because it could complement and thus reinforce the social enterprise's economic and social goals. Perhaps more importantly, making Inclusive Design frugal, or rather, engaging in Frugal Inclusive Design could diffuse Inclusive Design and make it a viable business option.

Chapter 3: Methodology

3.1: Introduction

This research expands on Radjou & Prabhu's (2014) proposition that Inclusive Design could be used in tandem with Frugal Innovation to use minimal resources to design for the maximum amount of people. This chapter outlines the research methods used in the study. This includes the research design chosen for the project and the rationale for the choice. This chapter also includes each research method's brief histories and applications to similar research subject matter. It also details this study's research process, how the methods were used, and the instruments used to collect data. The chapter ends with an in-depth look at the methods used and process taken for data analysis.

3.2: Research Design

This research methodology was designed as qualitative research. As a result, I approached the research through an interpretivist paradigm. Interpretivism posits that there are multiple and equally valid realities (Schwandt 1994), opposing the positivist stance that accepts an objective reality. In other words, reality is constructed by the research participant. The research methods in this study are thus inspired by grounded theory as put forth by Glaser & Strauss (1967) in the sense of building concepts with participants. Grounded theory methods are suitable for studying individual processes and the reciprocal effects between individuals and larger social processes (Charmaz 1996). As such, I decided to gather data about typical social and psychological topics such as motivation, personal experience, emotions, and cooperation and conflict, which are appropriate topics in grounded theory and more particularly, to this research.

I used two research methods to collect data and answer the question of how social enterprises might integrate Inclusive Design with Frugal Innovation: qualitative interviews and a foresight workshop. Because there is lack of literature focusing on these concepts' integration, I employed semi-structured interviews for the former method. This was designed as an exploratory method rather than a conclusive

one. This was done to understand the nature of the problem at the crux of the research question and to explore the validity of the theoretical framework. The latter method was built upon the former to be more conclusive in the hopes of offering an answer to the research question. The foresight component, a card game, was initially developed as an experiential futures method. While the philosophy of experiential futures was underpinning the use of the game, it was not used as a true experiential futures method. I adapted it to fit the purpose of the workshop. It acted as an introduction to the study's subject matter, methods, and facilitation. Moreover, the goal of this game was to provide the topic or object that would be subject to GMA.

3.3: Interviews

The first research method I used to collect data was the qualitative interview. Definitions vary slightly between scholars such as Odum & Jocher (1929), Cannell & Kahn (1953), Alvesson (2003), and Platt (2001). Such differences can be attributed to semantics, different research fields, and history. Interviewing has been a popular research method ranging from structured, semi-structured, unstructured, and focus group approaches. Some consider semi-structured interviews to be the most common of all qualitative research methods (Alvesson & Deetz 2000). This interview type involves questions guided by themes with probes meant to elicit more information. The semi-structured approach is meant to be flexible, accessible, intelligible, and approached in a way that allows the interviewee to reveal their perspective of the topic under study. Interviews have become a part of everyday life, some going so far to say we are an 'interview society' (Edwards & Holland 2013).

I chose this method primarily because interviews enable dialogue between researcher and participants, allowing for a deeper exploration of the topic at hand. This echoes Qu & Dumay's (2011) assertion that interviews reveal the private and sometimes abstract social world of the interviewee and to provide a glimpse into other assumptions and perspectives. Interviews give both the interviewer and interviewee, both considered 'participants', the opportunity to learn about subject matter and each other, ultimately informing participants on the nature of social life, including thoughts, feelings, perceptions,

and goals (Weiss 1995). Interviews provide meaning to events and perceptions. This was the type of data I was gathering. I was not necessarily searching for facts; instead, perspectives, specifically on Inclusive Design, Frugal Innovation, and social enterprise.

The use of this method was reinforced by its extensive use in research related to Inclusive Design. As part of their study on simulation tools in user-centric design, Cardoso & Clarkson (2012) interviewed participants about performing everyday tasks. This ultimately helped them propose a new capability-loss simulation toolkit. Judith Payling (2003) interviewed a couple with disabilities about the constraints they face in daily life, which encompasses social attitudes, poorly designed products, and legislation. Daniel Hunter (2003), working on a project that encouraged people with disabilities to pursue design professions, interviewed designers with disabilities to learn about their career development, which guided the entire project. The previously mentioned *i-design* program organized interviews to explore people's views on independence. Patmore & Mahoney (2003) used the Scenario-based User Needs Analysis (SUNA) methodology to understand the user and their requirements regarding internet usability. This methodology makes use of qualitative interviews (for a closer look at how interviews have been used in Inclusive Design, refer to Clarkson et al. 2003). On a side note, Macdonald (2013) expressed that his method for obtaining feedback in his study was flawed, suggesting semi-structured interviews would have been more accurate.

Interviews have also been used in research related to Frugal Innovation. UK's innovation foundation, Nesta, interviewed over 130 participants that ranged from Indian policymakers, academics, and entrepreneurs in a study on India's Frugal Innovation System (Bound & Thornton 2012). Zeschky et al. (2011, 2014) used semi-structured interviews in their studies, as did Argawal & Brem (2012). The Centre for Social Innovation interviewed participants such as funding agencies and policymakers in their report, *Policy Brief: Funding Frugal Innovation* (Granqvist 2016). In his research on BoP innovation, Prahalad (2004) extensively interviewed people living at the BoP in countries such as India, Mexico, Peru, Venezuela, and Brazil. He also interviewed participants working at organizations, both large and small.

Interviews have also been used in research regarding social enterprises, and more generally, socially responsible organizations. In his study on the corporate social opportunity in SME's, Jenkins (2009) used interviews with UK SME owner-managers to develop case studies. Brouard, McMurtry, & Vieta (2015) also used interviews to develop case studies in their study of social enterprises in Ontario, Canada. And while not academic research, The Ontario government's Ministry of Economic Development and Growth, in collaboration with KPMG, interviewed members of the Social Enterprise Impact Measurement Task Force about their practical knowledge and experience with impact measurement (2017). This resulted in an action plan for bolstering impact measurement activities in the province.

Interviews are often intended to lay the foundation upon which another research method is to be laid. They are sometimes employed to gather preliminary data for a subsequent survey (Qu & Dumay 2011). The SUNA method uses both qualitative and quantitative methods. In addition to interviews, SUNA uses focus groups, storyboards, and surveys. Video-based ethnography can use the interview alongside video diaries and cultural probes. Stanton & Young (1998) note that common assessment methods that can be used throughout the (inclusive) design process includes interviews, questionnaires, checklists, and user trials. Some scholars (Zeschky et al. 2011, Argawal & Brem (2012) used interviews to develop case studies. It is therefore common to use interviews in conjunction with other research methods.

This brings forth the debate regarding which communication channel is best suited for interviews. Face-to-face (FtF) interviews are the most common, but digital media have proliferated the number of platforms through which interviews could be conducted; including email, telephone, and social networking platforms. Opdenakker (2006) notes the differences between these methods; namely the (a)synchronicity of time and place. FtF interviews are synchronous in both time and place, allowing the interviewer to observe social cues such as voice, intonation, and body language (Figure 3 shows a table of the interview techniques divided by their [a]synchronicity). Zeschky et al. (2014) used face-to-face and telephone interviews. Opdenakker (2006) notes that all techniques are adequate for conducting interviews

in research. While they each pose different challenges and benefits, they share common principles. That is to say, they aim to achieve common ends.

3.4: General Morphological Analysis and Foresight

Interviews laid a foundation of knowledge upon which I used my second research method, an integration between General Morphological Analysis (GMA) and a foresight component, specifically, experiential futures. GMA was developed by Swiss astrophysicist and aerospace scientist Fritz Zwicky while he worked at the California Institute of Technology in the 1940's. Originating from the Greek word *morphe*, meaning *shape* or *form*, morphology is the study of a form or pattern. In other words, morphology examines how individual parts of an object conform to create a whole, or *Gestalt*. Morphology had typically been applied to hard sciences such as botany, linguistics, geology, and biology.

The Morphological Approach, as Zwicky called it, was conceived in response to what he thought were the increasing complexities of life. Two World Wars, overpopulation, and environmental degradation were signs that the world was changing at a rate unknown to humans. This complexity diminished people's capacity for deep contemplation. These circumstances fostered a need to reevaluate overall conditions and people's place within the world if it were to be made more satisfactory. Zwicky posited that two goals must be prioritized for this. Firstly, people must ensure that conditions do not deteriorate. Secondly, our mental world image must be clear and enriched, so that people can visualize the interrelations among all things, material and spiritual. People must then plan and construct a better world inspired by these visualizations (Zwicky 1967).

Zwicky proposed the Morphological Approach as a method for planning and constructing a better world. It is used to explore all the possible solutions to a multi-dimensional, non-quantified complex problem. It allows for implementing and integrating our knowledge of all the interrelations among objects, phenomena, and concepts, and to explore the results gained from the construction of a sound world. Such research in totality, as Zwicky called it, necessitated a generalized approach. Zwicky thus applied GMA to the soft sciences. This is because complexity requires knowledge about as much as

possible. The objects under examination can be physical (eg. an organism), social (eg. an organization), or mental (eg. a linguistic system) (Ritchey 1998). Since Zwicky, GMA has been applied to numerous and disparate disciplines including policy analysis, future studies (Alvarez & Ritchey 2015), product design (Belaziz, Bouras, & Brun 2000), architectural design (Proposka 2001), Western apparel (Chen & Lai 2010), and many more (see Alvarez & Ritchey 2015 for a full list). General Morphological Analysis thus identifies and examines the set of relationships or configurations in a given problem. It can investigate problems that are unquantifiable and cannot be treated with mathematical formulas and statistical models. It aims to test the limits and extremes of the parameters, including their boundaries. GMA is important to this study because it answers the *how* question; that is, how these concepts could be integrated. In other words, GMA investigates the relationship between Inclusive Design and Frugal Innovation. It answers this question by assessing the validity of the end result, pointing out any (in)consistencies across parameters. It also provides a clear "audit trail" of the thought process and documentation for the end result.

The end result, as implied above, is a better world, generally speaking. Therefore, I used a foresight component alongside GMA. Foresight, also known as Futures Studies, is a growing field of inquiry that involves a methodological approach to thinking about alternative futures. It uses specific values, theories, and methods such as horizon scanning and roadmapping to make the future more known to humans and to restore a sense of agency over the future by preparing for the unpredictable (Bell 2004). Foresight ultimately engages in under-investigated modes of expressions, thoughts, and knowledge (Candy & Dunagan 2016). Much like GMA's ability to bridge the hard and soft sciences, foresight practice has generated a body of work that integrates influences and ideas from the arts and sciences (Kelliher & Byrne 2015). In fact, many leading practitioners in foresight have been outside the self-defined futures community. This includes artists, designers, video game creators, filmmakers, and science fiction authors (Raford 2012). The liminal space within which foresight operates makes it important for futurists to use these methodologies in tandem with other forms of research and analysis. Raford (2012)

argues that doing so would improve everyone's foresight practice by bringing new insight and rigor into the design process.

It would also reflect the growing trend of various disciplines incorporating futures thinking (Kelliher & Byrne 2015). A specific example of this trend is the marrying of foresight with design, evident by self-described futurists' affiliation with design initiatives and organizations (Candy & Dunagan 2016). One such method that arose from this trend is experiential futures, a foresight method which evolved from a collaboration between Stuart Candy and Jake Dunagan in 2006. Experiential futures allow participants to critically think about and experience not just the world in which they presently live but also the products, services, and stakeholders that exist in this future scenario by using multiple media and storytelling to offer rich, textured, alternative worlds (Raford 2012) (Figure 4 is a visual explaining the difference between experiential futures and other methods). This practice complements a growing body of methodologies in the foresight field (Kelliher & Byrne 2015), such as design fiction, scenarios, and critical design. Candy (2010) argues that the output of experiential futures is not an end in itself, but rather used as a means to discover, suggest, and provoke.

Indeed, Inclusive Design was catalyzed by foresight. Various design exhibitions in the 1980's led to the coinage of the term in 1994. In 1986, the *New Design for Old* exhibit projected an age-friendly future that focused on the needs, lifestyles, and dependencies of older people and assistive devices (Clarkson & Coleman 2015). In 1989, the *Designing for our Future Selves* exhibit examined how design and ergonomics could foster independence and social integration using a human-centred design approach. In that same year, Peter Laslett's *A Fresh Map of Life* described a 200 year process that shifted age demographics in the UK, showing that the country had doubled its life expectancy and tripled the number of people aged 60+ (Laslett 1989). The Centre on Sustainable Consumption and Production (CSCP) has conducted visioning sessions with major organizations to show how products and services need to be revisited to cater to future needs (Radjou & Prabhu 2014). Inclusive Design requires a foresight mentality. A contemporary example of the relationship between foresight, Inclusive Design, and indeed, Frugal Innovation can be seen in the social enterprise Open Bionics. Not only do they serve the low-income

market by offering a Frugal solution, but they partnered with the makers of Deus Ex Machina, a video game series that takes place in 2040, to manufacture a prosthetic arm found in that game. In short, they took something that existed in science fiction and made it in reality.

Foresight has also been used in research about social enterprise, specifically social entrepreneurship. Ramos & O'Connor (2004) explored the relationship between foresight and social entrepreneurs, concluding that there were certain aspects of foresight being used to create innovation based on triple bottom line sustainability measures. The foresight methods and theories referenced in their study are not experiential futures methods but rather those from Richard Slaughter, a known foresight practitioner, particularly the theory of social foresight potential. In fact, this study was done two years before experiential futures began to form. However, it is worth noting that Stuart Candy wrote the foreword to *Toward a Preemptive Social Enterprise* by Matthew Manos. Candy calls for foresight work, including experiential futures, to be added to the repertoire of the social entrepreneur.

I used an experiential futures card game developed by Stuart Candy and Jeff Watson called The Thing From the Future (see the Appendix for an overview of how the game is facilitated). I used it because I needed products and/or services that would be subject to GMA. Therefore, I used it in the way Candy (2010) argued; as means rather than an end. This game was used as a precursor to GMA to answer the *what* question; that is, what it is that participants are designing. This game was developed to democratize foresight tools and allow everyone to explore and experience possible futures (Opensourcing the future, 2016) (see the Appendix for an overview of the game's rules). This is the reason why I used the method: to introduce participants to foresight at a high level. In other words, to democratize foresight so participants can think like a futurist. Additionally, it was used as a catalyst to imaginative thought, which Dunne & Raby (2013) argue is the purpose of futures. Participants used the game to ideate objects that would be found in future scenarios. It was an effort to challenge preconceptions, assumptions, and expectations about the role products play in everyday life, akin to speculative design's purpose (Dunne & Raby 2013).

The foresight component allowed for what might be called a "blank slate Thing" that participants could then use GMA to inject a mix of Inclusive Design and Frugal Innovation principles from conception. This was an effort to be aligned with Clarkson et al.'s (2007) proposition that Inclusive Design is not a stage that could be simply added to the design process and instead needs to be ingrained into the innovation from the start. I was also taking Radjou's quote into consideration where he mentions organizations spending more money just to be Frugal (this quote can be seen in the literature review). I felt that it would have been difficult to reverse-engineer existing products to be aligned with these concepts. The foresight component offered a vision of a better world and GMA acted as the method to construct that world, as Zwicky intended for his method. True to the definition of morphology, GMA was used for the purpose of understanding how individual parts, or parameters, could help create a whole "Thing"; that is, a frugal and inclusively designed object.

3.5: Research process and data collection

I aimed to interview three types of participants: those working in accessibility research, social enterprise, and caregivers of people living with a disability (see Figure 5 and 5.1 in the Appendix for a full list of interview participants and the methods used for data collection for each participant). I sought to understand participants' narratives and perspectives on the barriers and opportunities of Inclusive Design, their personal connection to the subject matter, and mental models about innovation. I chose these types because they are typically at the front end of inclusivity and accessibility. These groups are particularly adept at recognizing exclusionary goods for their patients and clients. The first and third groups were important because I believed that their close relationships with their patients and clients allowed them to see what Conradie et al. (2016) concluded were high degrees of product dissatisfaction amongst persons with disabilities.

I recruited potential participants in numerous ways. I used my personal network to start. This method created a snowball effect, whereby one participant often lead me to another. I also reached out using my social networks, mainly Facebook and LinkedIn. This method transcended physical boundaries

and allowed for a wider reach of publicity. I was able to recruit a breadth of participants through this method. Relatedly, I reached out to OCAD's communications coordinator in the hope that they could post my recruitment poster on OCAD's social media channels. While they confirmed that they had, it did not yield any new participants. A total of nine participants were interviewed (see Appendix for a full list of interviewees). There were two participants in research, six participants in social enterprise, and one participant who was a caregiver.

There were variables in the ways I conducted interviews. The geographical span of these interviews predominantly took place in Toronto with an outlier interview taking place via a Skype call to Bangladesh. Interviews took approximately 30 - 45 minutes to complete, except for one interview going for ~1.5 hours. I used different communication channels when conducting interviews, FtF and telephone. I gave participants an overview of the project and explained the main terms. Participants did not receive a set of questions before the interview. For researchers and participants working in social enterprise, I inquired about strategy, process, values, affordability & funding, and resources. I interviewed the caregiver participant about stakeholder involvement, specifically the government's role in providing products and services for the disabled community. I also inquired about stigma surrounding disability, and the role of disability in innovation.

Audio recordings have been used in qualitative interviews (Wellard & McKenna 2001, DiCiccio-Bloom & Crabtree 2006, Edwards & Holland 2013). I recorded eight out of nine interviews. The outlier did not consent to being recorded. It was difficult to juggle the responsibilities of conducting the interviews, responding appropriately to interviewee responses, and taking notes. This last point has been reported to distract the interviewer, resulting in a loss of critical information (Britten 1995). I therefore chose to record the interviews because it allowed for a deeper understanding of participants' answers during data analysis. I opted for a digital approach. I alternated between using an application on my phone and my computer as the means for recording. The audio quality, data storage, recording capabilities, potential for digital editing, and effort of transcription all benefit from a digital approach (Fernandez & Griffiths 2007).

GMA was carried out through the Morphological Box method (Zwicky 1967) (see Figure 6 and 6.1 for an overview of how the exercise is facilitated). I aimed to gather between 6 - 10 participants, mainly students. I chose this because I believed students to be more willing to attend a workshop, more patient when asked to do an activity for which they had little to no prior knowledge, and more inventive with their responses and deliverables. I recruited participants much in the same way as I had for interviews. I used my personal and social networks. A total of eleven participants attended the workshop. Four participants were not students. Instead, they worked at organizations ranging from the banking to consulting industries.

The workshop was an effort to provide a more conclusive answer to the research question; that of *how these concepts might be integrated.* I divided the participants into three groups. Two groups had three participants and one group had four. I then explained how the foresight game was supposed to work. Each participant was to lay down one card of the four types until they agreed upon a "Thing" that they felt they would want to use for the Morphological Box. The game not only acted as an icebreaker but provided the topic that would be subject to the Box. For this portion of the workshop, I chose 7 principles and ideas akin to Inclusive Design and Frugal Innovation. Participants were to choose 4 categories and come up with 3 to 5 solutions for each category. Once the Box was populated, participants were then asked to simply choose solutions across categories to develop a final deliverable that was most aligned with Inclusive Design and Frugal Innovation, followed by a short presentation of their "Thing" and process of choosing categories and ultimately, their final deliverable. Like the interviews, I used audio recordings to collect data on the presentations. I also provided paper, markers, and post-it notes for participants to draw their ideas, a valid method of data collection as Mok & Krause (1994) argue. This was done so I could better understand their process as well as examine their deliverables (figures 7, 8, and 9 in the Appendix) during data analysis.

3.6: Data Processing and Analysis

The purpose of interviewing participants was to understand their perspectives and relationships to the subject matter. I analysed the data for describing, summarizing, and comparing the variables. I was inspired by and thus closely follow Burnard's (1991) method of analysing qualitative interviews, which takes inspiration from grounded theory as theorized by Glaser & Strauss (1967). However, not every step was followed exactly as proposed nor was every step followed. This is doubly due to the dynamics and limitations of the study. The former refers to the combined GMA and experiential futures component for which interviews were used as a foundation to build upon. The latter is expanded upon in 4.4. The following describes which and in what ways steps were taken.

Step 1: Starting with the interviews, I made brief notes about the topics discussed during the interview rather than doing so after the interview. These notes served as memos about ways of categorizing data. These memos encompassed everything that attracted my attention as a researcher.

Step 2: I transcribed interviews. Having used digital means to record, I was able to upload the audio file to my computer with no loss of audio quality. I then used software that allowed me to slow down or speed up the recording accordingly for transcription and subsequent coding. However, I did not finish transcription. I instead opted for playback. I was still able to immerse myself in the data, and thus the frame of reference of the participant as Rogers (1951) argues is the aim of data immersion.

Step 3: Audio recordings were played back repeatedly to ensure all relevant data was described. Data was then categorized based on nominal similarity. Many categories were generated in this stage.

Step 4: The list of categories were examined more deeply and grouped together under higher-order headings (Figures 10, 11, 12). Like step 3, the higher order-headings were created based on nominal similarity of categories. It became clear that certain categories were describing similar phenomena. However, I was initially unaware what it was describing. I grouped them together and questioned what exactly these categories were describing. The higher-order headings came to be after the categories were

grouped and acted as an encapsulation of categories that describe the higher-order headings in greater detail.

Step 5: Like step 4, the higher-order headings were cross-examined for repetition. Similar headings would have been eliminated. This was not the case.

At this stage, I focused my attention to my second research method. Many of these steps I just outlined were repeated. I used the recordings I made of each group's presentation of deliverables and, like Step 1, noted any ideas that were remotely interesting. What I deemed interesting was based on its similarity, support, or opposition to the data found in the interviews. This time, notes were made after the workshop had concluded. Like step 2, I did not transcribe these recordings. I used the playback method followed by note-taking. I then categorized this data akin to step 3, 4, and 5. Once finished, I cross-referenced the data from the workshop with the data from the interviews and went through the analysis process again (Figures 13, 14, and 15 in the Appendix show the workshop deliverables cross-referenced with the interview data). I noted any similarities and differences. Indeed, not all data was similar across methods. There were some categories particular to each method.

Chapter 4: Findings & Discussion

4.1: Introduction

This chapter describes the findings that were gathered from the data analysis followed by discussion on how it relates to the literature and provides new insights. Data was obtained through nine semi-structured interviews (see Appendix for a list of participants) as well as eleven workshop participants. Interview data was analysed to explore participants' relationships and perspectives on Inclusive Design, Frugal Innovation, and social enterprise. The workshop data was analysed to further such relationships and explore how these concepts could exist in a symbiotic relationship.

The aim of this study was to examine how social enterprises in Ontario could adopt Inclusive Design by incorporating Frugal Innovation principles with Inclusive Design principles. The data analysis resulted in three overarching themes: funding, disability, and social impact. Each contained categories that explained the main themes more fully.

4.2: Funding

Two workshop groups ideated "Things" that would be affordable through government funding mechanisms. Interview participants noted that "*funding is the most challenging aspect of doing research*" (Tom Chau, participant, personal communication, January 2018). As such, participants viewed funding as a highly contingent factor for success. Funding thus affected organizations pursuing innovation but also families and caregivers who used governmental support to care for people with disabilities. Participants felt that Canada has a complex funding and regulatory system for disability, evident by this quote:

> *"There is no guidebook given to you as to how to navigate a very fragmented system that's full of different silos of funding, silos of support that don't talk to each other, and each silo of funding or support have their own rules and regulations of how to access support, how to maintain the support, how to use the support. And so, it is exhausting"*, (Karen Castelane, participant).

The difficulty in navigating this system, and thus funding generally, was attributed to several factors. One was that investors, in this case, the government, has to see a Return on Investment to provide

funding for a project. This required those seeking funding to find as broad an application for their innovations. Relatedly, another participant noted that their organization attempted to do just that because they were trying to commercialize their accessibility-related innovations by finding industry partners. It also aimed to provide another revenue stream which would be reinvested into research and development.

Many participants resorted to frugal techniques in absence of funding. Frugality was thought to impact participants' respective organizations in both positive and negative ways. The former assertion is supported by some participants feeling that frugality spurred creativity. One participant said they learned new skills that they were able to incorporate into one of their service offerings because they lacked the funds to outsource that skill. Another participant likened frugality to being nimble. Yet another participant, who served the emerging market in Bangladesh through their healthcare company viewed frugality as an opportunity because Bangladesh has a high population, which was considered an asset. Their product offering was appropriately frugal, which meant potential for the organization to scale and grow into other emerging markets like India and African countries. They noted that the Bangladeshi government was very supportive of innovation and the country was thus treated as an experimental ground. However, they noted that the reason why the government was supportive of innovation was likely due to their previous lack thereof. They noted that the Bangladeshi mindset used to be one of outsourcing innovation. Other participants based in Ontario felt a similar mindset, viewing frugality as a sign that their organizations would always remain cash poor. Consider this quote:

> *"The market doesn't have recognition for a frugal, low-tech, hacking mentality",* (Luisa Ji, participant).

Interviewees, who often conflated Frugal Innovation with frugality, felt that frugality fostered a scarcity mindset, which was to their detriment when competing in a market economy that valued abundance over scarcity. This mindset makes them think that they can only achieve so much with so little resources, including funding, at their disposal. Some felt that while frugality may have been beneficial in developing short term solutions, it may have prevented participants from considering a semblance of strategic foresight, or relatedly, long-term planning. This point is supported by the following quote:

> *"We have to be selective in where to put our focus. We don't have the resources, time, and bandwidth to bat at everything...Energy is spent on solutions that fulfill the current needs without addressing the bigger problem",* (Sharon Wong, participant).

It was noted that teams must therefore "hack" together different methodologies to achieve certain objectives, often taking on multiple responsibilities to deliver certain results.

Many of the findings echo the literature. One organization's pursuit of commercialization is akin to what Clarkson & Coleman (2015) noted was Inclusive Design's focus, the private sector. The idea that the definition of disability should be expanded echoes the desire to change the mental model of disability from a medical perspective to a social one (Clarkson & Coleman 2015). Doing so enabled the organization to find new customer segments. This showcased the innovation's applicability and perhaps, mass market appeal, which would have hoped to attract more funding opportunities, particularly from the government.

Additionally, participants in social enterprises felt that investors did not know how to fund them, because as one participant noted, *"we are in a weird middle space"* (Janelle Hinds, participant, personal communication, January 2018) between public and private sectors. This gives credence to the MaRS Centre for Impact Investing's finding that social enterprises believe the social capital market in Ontario was underdeveloped and offered too little investment for optimized growth, making a strong case to adopt Frugal Innovation given the lack of funding.

Participants' reliance on frugality is in line with much of the literature on Frugal Innovation. This is found in participants learning new skills and being adaptable and nimble in their organizations because of frugality. Thus, their lack of resources offered other opportunities, making it a case for being considered Frugal Innovation, as per Radjou & Prabhu (2014). The findings also supported the literature regarding the barriers to adopting Frugal Innovation. Namely, that the market does not recognize a Frugal approach. This could be because of Radjou and Prabhu's (2014) assertion that people often equate frugality with poor quality. More generally, a lack of market recognition may be because, as Radjou & Prabhu (2014) believe, that the West has adopted a "bigger is better" attitude.

Interestingly, the link between frugality and strategic foresight is not seen in the literature and is thus a new development. While the topic of "Frugal management" has been explored in MNC's (Micaelli et al. 2016) and Frugal Innovation's sixth principle is to *make innovative friends*, i.e, to extend the boundaries of innovative communities, which, as a reminder, is from a book geared toward Western MNCs, there is evidence to suggest that frugality might detriment social enterprises' organizational capacity for strategic foresight, or long-term planning. However, it is important to note that this link was a commonality across participants who worked in organizations operating within Ontario, despite a few participants noting that frugality forced them to adapt to make the best of their circumstances, that is, a lack of resources. The one participant who served Bangladeshi markets had little issue with turning frugality into Frugal Innovation. This may be attributed to the government's role in innovation, demographic features of respective areas, or the mental models used to think about innovation. The findings suggest that participants' working in Western social enterprises often do not equate frugality with Frugal Innovation.

The implications of this finding are important to the theoretical framework. This is because social enterprises in Ontario may find difficulty in adopting Inclusive Design particularly because of their general inability to turn frugality, or minimal resources, into an opportunity, i.e, Frugal Innovation. There can be little expectation for change toward the theoretical framework if one of its integral elements restrict an organization's ability to look forward, plan accordingly, and ultimately change.

4.3: Social Impact

Many results that participants were pursuing were not just economic, that is to say, not for the purpose of ROI and therefore funding, but for a social imperative, as well. One such responsibility that multiple participants were undertaking was the development of an economic and social evaluation framework. This theme was consistent between participants, including one workshop group who suggested a framework akin to the above. Additionally, one participant noted that there was more to value

than just economic benefit. Indeed, some participants felt that economic and social goals were often competing rather than cooperating.

All workshop groups came up with "Things" that related to social impact; whether it was an app that showed users the carbon footprint of their consumer choices, a possible future where everything would be recycled and reused, or a device that monitored physical and/or mental health conditions. More specifically, these "Things" dealt with sustainability, despite no group choosing the *How might this be sustainable, reusable, recycled?* parameter. Instead, two thirds of the groups chose *social impact/awareness* as a parameter, yet sustainability still pervaded into all groups. This was substantiated by an interview quote:

> *"We are trying to realize that we need to do things that help society rather than just do things that make money",* (Naitik Mehta, participant).

Relatedly, one workshop group came up with their own parameter, *values*. Their options under that parameter was not economic, but social. This confirms the Frugal Innovation literature by asserting that sustainability, and thus social goals, can be a competitive advantage. The participant responsible for the above quote noted that their organization was trying to create social impact through their business model.

Still, the definition for *social enterprise* was not uniform across participants. One participant was reluctant to call their organization a social enterprise, citing the many definitions of the term, and thus, ambiguity. Others considered it a term describing certain types of businesses. More specifically, some felt the term was used to encapsulate an organization's economic and social goals. Some considered their organizations to be social enterprises because social impact was woven into their business model. Participants recognized that social-related work is worth the effort because of the potential for impact, despite such work serving niche populations, which was conflated with sacrificing profit. However, some participants felt that pursuing social impact was not a widely shared view amongst other organizations.

Some participants cited that one way this mindset shift might be facilitated is by a success story that would champion the cause. Others noticed a growing trend of socially responsible businesses, citing

TOMS as an example. This is a reference to the organization's practice of subsidizing their social contributions in developing countries with proceeds gained from their primary customer segments.

Other participants felt that that another way for this mindset shift to occur was to address the stigma surrounding disability. One participant felt there was prejudice against people with disabilities. Consider this interview quote:

> *"But with disabled people, I think* [non-disabled people] *think that somehow* [people with disabilities, parents, and caregivers] *had a black cloud over them, that they caused this. This was sort of their fault, that they're low income, they're dirty, they're stupid, all of the negative things"*, (Karen Castelane, participant).

This prejudice affected funding opportunities, particularly for caregivers, who felt guilted into giving up certain levels of support and funding so it could be allocated to others who needed it. One workshop group exacerbated the concept of stigma by suggesting their "Thing" would direct where people were able to go based on their sicknesses. The more diseased you were, the less places one would be able to go. This echoes one participant's anecdote about taking their patient to the theatre and being asked to leave because the patient was apparently causing a disturbance due to their disability.

Participants' pursuit of a social and economic evaluation framework is similar to the business case for CSR, also known as corporate social opportunity, as per Grayson & Hodges (2004). The first quote in 4.3 echoes scholars' arguments that organizations have been under pressure to engage with CSR (McWilliams & Seigel 2000, Dahlsrud 2008, Jenkins 2009). This is likely because of Radjou & Prabhu's (2014) assertion that consumers are increasingly becoming values-conscious and support companies aligned with their values. Interestly, the quote did not seem to imply pressure. Instead, that businesses realized on their own accord that it makes good business sense to be socially responsible. The reason why participants were developing social/economic evaluation frameworks may be attributed to their circumstances; that they were operating within a market economy and thus had to abide by such logic. This suggests that SMEs, specifically social enterprises, are not different from MNCs in using CSR as a business innovation tool, as per Bondy et al. (2012). However, it was not clear whether the evaluation framework was well communicated across organizations as per Lee et al. (2016), and thus resulted in

profit, as the CBSR posit (2003). Additionally, the findings suggested that it was too early to conclude whether a prioritization of CSR, or rather, simultaneous pursuit of economic and social goals, resulted in better funding opportunities, as per Cheng et al. (2013). This might be due to two reasons. Firstly, the research showed that social enterprises already have difficulty securing funding likely due to their social goals. This is regardless of any evaluation framework. Many participants' thus undertook this activity to show both economic and social ROI in an attempt to fix this funding issue. Secondly, the evaluation frameworks were still in its infancy, so it was difficult to determine its effect on funding opportunities.

The findings about the definitional ambiguity surrounding *social enterprise* were consistent with the literature, including Dees (1998) and Brouard et al. (2015). Participants agreed that the economic and social dichotomy was inherent in social enterprises, as per Bull (2008). No participant corroborated Harding & Cowley's (2004) claim that social enterprises are the economic engine of the future nor London & Morfopoulos's (2010) assertion that social enterprises are the main vehicle for CSR. The findings suggest that the social enterprise concept is still rather fledgling, this extends to the state of evaluation frameworks and ultimately the state of (social) finance, making it too early to confirm, or even consider such claims.

These findings pose new considerations for the social enterprise concept within the theoretical framework. The general nascence of the social enterprise compounded with the research findings that show economic and social goals are still often in competition, might suggest that social enterprises may still have to choose which goals, economic or social, they would have to prioritize at the expense of the other. They may prioritize the former if they seek better funding opportunities, especially from the government. They may prioritize the latter if they seek deeper social change. If social enterprises still pursue both goals simultaneously, they would still have to address the power dynamics at play between the providers and recipients of goods and services, the organizations and marginalized populations, respectively, as noted in Knorringa et al. (2016) to ensure there is no exploitation of the latter. As to what metrics are used to draw the line between exploitation and true social change, it seems like participants' organizations should further develop their evaluation framework. However, many participants'

organizations were including patients, families, and customer segments into the research process. This could be an attempt to address any power imbalances by having the marginal populations to which organizations are catering to have a voice regarding their care options.

Social enterprises can still incorporate Inclusive Design and Frugal Innovation principles. Indeed, they have, knowingly or not, as per the literature and this study's research. However, the theoretical framework might be have to be reconfigured. It might be that *social enterprises could integrate Inclusive Design and Frugal Innovation principles to maximize economic or social value.*

4.4: Disability

One participant felt that disability was not typically valued in organizations, categorically speaking. Another finding was that accessibility research is fragmented across the world. This meant that there were relatively few players in the assistive technology space, which ultimately acted as a barrier in one participant's opinion. This contrasted other participants' belief that the lack of competitors was advantageous. This is because they were able to cater to what they believed to be huge populations of students with disabilities that had so far been underserved.

Multiple participants believed in designing for marginal populations. Some specifically noted the value of designing for disability. Consider this quote:

> *"If you design for disability, you design for everyone",*
>
> (Janelle Hinds, participant).

To do this, one participant was quoted as saying, *"Generally speaking, many groups benefit [from these innovations]. So first, you have to expand the notion of disability"* (Karen Castelane, participant).

Yet, participants felt it was difficult to justify designing for disability because disability is so particular and dynamic that a one-size-fits-all approach would not necessarily work for everyone. Organizations also felt like they lacked the organizational capacity and resources to

redesign their products and services. Participants were at the whims of the marketplace and could not afford designing for a population segment that were not recognized by the marketplace as lucrative. Still, the workshop saw an effort to appeal to marginal populations, namely the disabled and elderly, with two groups choosing *the functional/simple to use* parameter.

To make matters more complicated, multiple participants felt that there were so many aspects of inclusivity that it was difficult to simply include everyone. Not only would the definition of disability need to be expanded, as noted above, but some participants recognized the spectrum of disability, which was any physical, mental, learning, addiction, or mental health issue. Another participant phrased their customer segments in a similar way: visible and invisible disabilities. However, they also noted that gender and ethnic diversity was often talked about, leaving cognitive diversity in the background. Still, one participant noted that *"Everything starts with inclusivity in mind"* (Gilad Cohen, participant, personal communication, January 2018). They were specifically referencing the design of their annual exhibition. They noted that they attempt to include people with different abilities, particularly those who are hard of hearing, in the design process.

Similar to this, another noted that their organization included patients' families in the research process. This was mentioned because they felt that diversity was a contributing factor to innovation. Another participant echoed this sentiment by stating:

> *"The more you bring people into the innovation process, the less likely they are to make mistakes [of exclusion]",* (Luisa Ji, participant).

This is because, as one participant put it, "There is value in difference" (Tom Chau, participant, personal communication, January 2018). Many participants noted that their teams were multidisciplinary. A contributing factor to this was that their teams consisted of immigrants

with different life experiences and values. One participant noted the opportunities organizations miss by lacking a diverse employee base.

The findings show that Inclusive Design still generally applies to disability, with little consideration for age, of which both realms were the primary applications for Inclusive Design when it emerged. It aligns with the literature, particularly Donahue & Gheerawo (2007) by suggesting that Inclusive Design has not moved drastically beyond disability. This perhaps influenced participants' familiarity, or lack thereof, with the concept. However, many arguably followed an Inclusive Design process, perhaps most akin to the EDC waterfall model (Clarkson et al. 2013), whether knowingly or not.

The findings also echo Donovan's (2013) assertion that a small amount of Canadian companies acknowledge the value of disability to their organizations. Additionally, they show evidence of using Frugal Innovation principle, particularly principle five, *Co-create Value with Prosumers.* These findings substantiate the notion that Inclusive Design and Frugal Innovation already have much in common.

The findings add to the literature because the first quote in 4.4 suggests that participants displayed lead user sentiments, as per von Hippel (1986, 2017). Conradie et al. (2016) conducted a study on lead user characteristics in people with disabilities. They assessed the idea quality, which was based on user value, originality, and feasibility, of participants', all of whom were living with a disability, and concluded that idea quality is highly dependent on product dissatisfaction. Thus, this own research's findings add to the literature by marrying Inclusive Design and Frugal Innovation with lead user theory.

Lead user theory fits within the larger framework of democratizing innovation, which has been von Hippel's area of study for decades (1986, 2017). There are arguably some

commonalities this topic shares with Frugal Innovation, namely regarding the aim of providing the tools and resources to enable one's capacity to innovate. Frugal Innovation does this by spurring innovation in some of the most unlikely of places, the streets and back-alleys of developing countries. The innovations that emerge from these areas are arguably due to the possession of lead user characteristics, namely, product dissatisfaction. In other words, mainstream markets do not meet these users' needs. They are the peripheral dots.

The implications this has on the theoretical framework is important. Perhaps Frugal Innovation fits more cohesively within the lead user theory and open innovation framework. This is because Frugal Innovation allows for democratization; eliminating the barriers to innovate and allowing people to innovate who would not traditionally innovate or are excluded from the innovation process. Lead users, who can be anyone with an extreme need that is not met by the current market but will be met in the future, often innovate themselves since the market has not addressed their needs yet. Lead users could arguably be any marginal group who faces design exclusion as per Inclusive Design's goal (see the Figure 16 in the Appendix for a visual of the relationship between lead user theory and the other concepts). In other words, innovation could be enriched by including lead users, or those excluded by design and current markets (the peripheral dots), because there is value in difference. We can see lead user theory underpinning the Frugal Inclusive Design examples of social enterprises seen in the literature review. BIG IDeA, LegWorks, Wheelchair Friendly Solutions, and Open Bionics generally serve the disability market. This is to say that the Frugal Inclusive Design innovations exist because their customer segments have needs that are not yet met by the general marketplace. In other words, the Frugal Inclusive Design innovations exist because their users are lead users. If we use the analogy seen in the Appendix (Figure 17), lead user theory encompasses the three main concepts

and acts as the funnel through which Inclusive Design, Frugal Innovation, and social enterprise integrate to make Frugal Inclusive Design. Reframing their users as lead users, whether knowingly or not, catalyzed their Frugal Inclusive Designs. Reframing marginal populations as lead users will catalyze the process necessary to achieve a blended ROI.

4.5: Conclusion

I suggest lead user theory answers the research question. This is because the research question is one of *how*; how these two concepts could be integrated. I posit that lead user theory could strengthen the cohesion between Inclusive Design and Frugal Innovation which this study has shown to be presently nascent, as participants' organizations seem to engage with certain aspects of Inclusive Design and Frugal Innovation, namely, collaborating and co-creating value with marginal populations. The research question is reiterated below followed by a definitive answer:

How might social enterprises in Ontario integrate Inclusive Design with Frugal Innovation to maximize economic and social value?

Social enterprises in Ontario could view marginal populations as lead users to strengthen the fledgling relationship between Inclusive Design and Frugal Innovation, thereby maximizing economic and social value.

One need not go to India or another emerging market to access lead markets as Soni & Krishnan (2014) argue. There are lead markets in Canada like the disability and elderly markets to which social enterprises in Ontario, and specifically in this study, cater.

Lead user theory has been applied to both Inclusive Design and Frugal Innovation (Conradie et al. 2016, Soni & Krishnan 2014). Marginal populations would be reframed from being a perpetually niche customer segment with little to no lucrative potential to a presently niche customer segment with needs that will diffuse and become general and thus addressed in the future marketplace, thereby having at least some lucrative potential. Indeed, it may seem like designing for lead users might be expensive in the short-term, but it will likely be cost-effective in the long-term, not to mention inclusive.

Viewing marginal populations as lead users could address the issues and implications raised throughout this chapter. Lead user theory could increase funding opportunities by expanding the definition of disability and thus addressing the issue of inclusivity and social impact. For example, when innovating for mobility, people who use a wheelchair because of Multiple Sclerosis or Cerebral Palsy may be grouped together with people with an ankle sprain, expectant mothers, or similarly, people navigating strollers. Consider a study that found that respondents with rare diseases developed self-help innovation since their disease affected a small portion of the population. Combining all the rare diseases together with those afflicted viewed as lead users made for a sizable portion of the population (8% worldwide). Thirty six percent of 500 respondents reported developing solutions that they considered novel (Oliveira, Zejnilovic, Canhão, von Hippel 2015). This could be the main takeaway of Frugal Innovation; while sharing many similarities with Inclusive Design, to reiterate a previous point (found on page 45), Frugal Innovation may instead be best considered as a part of Lead user theory given their preponderance to enable consumers to produce their own solutions and/or innovations, regardless of their skill and background in doing so. Their extreme needs catalyzed the innovation process. A similar thing can be said about the relationship between Inclusive Design and Lead user theory; that the former can be co-opted by the latter because those excluded by design can be viewed as lead users. Thus, the answer to the research question. Lead user theory could increase funding opportunities because organizations would be able to find the commonalities between traditionally disparate users, creating new customer segments in the process. This could help the transition from a medical model of disability to a social model. While this study showed that a participant's organization was doing this; that is, finding new customer segments, a purposeful use of lead user theory could make clear which aspects of Inclusive Design and Frugal Innovation would be most cohesive. Using lead user theory to strengthen the connection between Inclusive Design and Frugal Innovation could enhance the probability of an organization's capacity to maximize economic and social value. Additionally, it can also "future-proof" organizations by positioning them to capitalize on coming trends.

This study is important because it closely examines the relationship between Inclusive Design and Frugal Innovation. Such a topic has not been explored in the Inclusive Design research community nor the Management Studies community, which often uses Frugal Innovation as a topic of discussion. Thus, it adds insight to each respective research community by showing that these concepts do work together, yet, with varying degrees of integration. Additionally, it establishes a relationship between Inclusive Design, Frugal Innovation, and lead user theory. Lastly, it shows that in order for social enterprises to begin considering Inclusive Design and Frugal Innovation as beneficial for their organizations, then it would be advantageous to take into account the three main themes found in this study; funding, social impact, and disability to understand the barriers and opportunities to adoption.

Chapter 5: Conclusion

5.1: Conclusion

The world is still very much designed for "mainstream" users. Populations that are excluded by design because of such differences like age, ability, or socio-economic status are likely to remain so if something is not done. This exclusion has far-reaching implications. People will experience difficulty in finding goods that suit their needs, which will cost more because the economics are not conducive to mass markets. Essentially, those excluded pay more for less, whereas the inverse is true. Inclusive Design is an attempt to solve this issue by catering to marginal populations first.

The same can be seen on a national level. Developed countries have the resources to better their positions on the world stage. Developing countries who lack such resources often struggle. It is the old adage of *spend money to make money*. The question is, of course, what happens when there's no money to spend? Frugal Innovation has tried to answer this question by viewing a lack of resources as an opportunity instead of a barrier. The results of these efforts has seen developing countries and emerging markets gaining gravitas on the same world stage as their developed counterparts.

Inclusive Design and Frugal Innovation share similarities. The most evident is arguably their focus on niche markets that are not addressed by mainstream products and services. Inclusive Design initially served, and continues to serve, the needs of the elderly and disabled. Frugal Innovation often focuses on BoP populations. The efforts directed to marginal groups seems like a socially responsible move. It is also aimed to be an economically responsible move. Organizations can be profitable by serving untapped markets. Social and economic goals are to be cohesive. Radjou and Prabhu (2014) called for an integration of these concepts.

This dichotomy underpins the social enterprise, which uses generated revenue for social good. This concept is often seen as the answer to public and private sector failures, thereby straddling the line between. It manifests through different types of organizations, whether it be for-profit, non-profit, or

charity. Social enterprises also generally serve marginal populations. In Ontario alone, there are more than 1000 social enterprises focused on poverty reduction, Indigenous groups, women, immigrants, and a plethora of social purposes, demographic groups, legal structures, and industries.

This study aimed to answer the research question: *How might social enterprises in Ontario integrate Inclusive Design with Frugal Innovation to maximize economic and social value?* The proposed theoretical framework was that a harmony of Inclusive Design and Frugal Innovation would add value to the social enterprise model by using minimal resources to design for the maximum amount of people. Two research methods were used to collect data in an attempt to answer the research question: qualitative interviews and General Morphological Analysis. The latter was combined with a foresight, specifically, an experiential futures method. The interviews were to explore the subject matter and provide a foundation upon which the next method was to offer a more conclusive answer to the research question.

The outcomes of this study show that many social enterprises already use Inclusive Design and Frugal Innovation principles together, knowingly or not. However, there was a lack of a formal process to integrate these concepts. The research found three overarching themes that are to be considered when thinking about the utility of both concepts, funding, social impact, and disability. The research found that frugality is not conflated with Frugal Innovation and in fact acts as a barrier to long-term planning. This is important because that relationship of *how Frugal Innovation might restrict strategic foresight and long-term planning* has not been explored in the Frugal Innovation literature and is thus a new addition to such. It also found that the social enterprise concept is still fledgling and thus has difficulty striking a balance between economic and social goals, suggesting that organizations may still have to prioritize one over the other. This is important because it confirms much of the literature about the ambiguity surrounding social enterprise and critics' doubts about delivering on both fronts. However, the current lack of a social and economic evaluation framework makes it difficult to assess the harmony and the impact of social and economic goals. Lastly, it found that participants expressed lead user sentiments, suggesting that there is a relationship between Inclusive Design, Frugal Innovation, and lead user theory. This is important because lead user theory might be crucial to making Inclusive Design widespread across social enterprises.

In fact, I posit that lead user theory could help social enterprises strengthen the relationship between Inclusive Design and Frugal Innovation. This is supported by lead user theory's application to both Inclusive Design and Frugal Innovation. This theory shows the value of marginal populations to innovation. Indeed, I suggest that social enterprises reframe the ways in which marginal populations are viewed in the marketplace. They need not be seen as unworthy of investment due to their population size but rather as sources for innovation whose needs could guide the direction of the marketplace. Reframing marginal populations as lead users might have potential to address the concerns raised in the findings of this study. Specifically, it can address the three themes, funding, social impact, and disability by expanding the definition of disability, thereby gaining more options for funding opportunities, which can then be used toward the organization's social impact goals.

This study is important because it adds to the literature about both Inclusive Design and Frugal Innovation. Research regarding their integration is lacking in both research communities. The study's findings confirm the literature in some ways and present new considerations in other ways. Importantly, this research presents the connections between Inclusive Design, Frugal Innovation, long-term planning, and lead user theory. Perhaps most importantly, the use of lead user theory could help organizations address the 80/20 rule. By targeting the 80% of marginal users who are excluded by design, social enterprises could enlarge their customer base, reduce economies of scale, and ultimately break the cycle of marginal users being less wealthy because their goods cost more. The reverse might happen. Users could save their wealth in the long-term because innovations will be addressing their needs that will become mainstream in the marketplace. Marginal lead users would be in a better position to move up the economic pyramid, as well as benefit their personal wellbeing, and reach their potential, which is currently hindered by bad design.

5.2: Limitations and future research suggestions

The purpose of this study was to examine how social enterprises might adopt Inclusive Design by integrating Frugal Innovation principles. Aspects examined were organizational strategy, innovation

process, mental models, and the Canadian funding landscape. The entire research process began in late December 2017 and ended in early February 2018. Interviews spanned between 30 minutes - 1.5 hours. I interviewed nine participants, two of whom were researchers in accessibility, six workers in social enterprise, and one caregiver of a child with a disability. The workshop spanned two hours and consisted of eleven participants ranging from university students to working employees.

Both research methods were limited in time. More time would have enabled me to find more participants for the interviews and the workshop. A larger sample would perhaps have allowed for more generalized findings. As such, this study's sample size is not unbiased. In the future, it be advantageous to have interviewed caregivers for children with other complex needs, and even caregivers of adults to understand their perspective regarding stigma, disability, and (inclusive) design.

As research progressed, it was clear that interviews with those working in government and social innovation labs would have benefitted the study. In fact, I reached out to the Centre for Impact Investing at MaRS where they specialize in social finance. However, they did not respond to an interview request. They could have provided insight into policies and funding mechanisms regarding social enterprises, specifically the government's (social) innovation policies, and how Ontario differs from other provinces in this regard and also mental models used when thinking about these concepts.

The GMA workshop would have provided more in-depth data if it went through a Cross-Consistency Analysis (CCA) (Figure 18 in the Appendix provides a detailed description), as it typically should. This likely would have helped participants decide on a final combination of solutions by eliminating combinations that were invalid based on logical contradictions, empirical inconsistencies, and normative constraints. With more time, further research could use GMA to include more parameters and use a CCA to find more robust combinations. It might also be beneficial to use existing goods as the topic for GMA. Future researchers could then compare their findings with those of the GMA used in this study, which used future objects as the topic. This could also shed light on valid, feasible, and viable combinations.

I believe the workshop suffered from the lack of time more evidently. Typical GMA workshops may take as little as a weekend and as much as a few months to get to the level of detail required. Participants were not knowledgeable of the method. Nor did they have any stake in the study, attending only out of respect for the researcher. This arguably impacted their level of commitment to participating. While it was a useful exercise to demonstrate how Inclusive Design and Frugal Innovation principles are similar, going so far as to explore which respective ideas and ideas could work together, it seemed to be on a rather superficial level, calling into question its ability to address any and all concerns raised during the interviews. Indeed, most of the findings came from the interviews. The limitations that the GMA workshop faced seemed to hinder its utility.

Future research could more deeply examine how frugality, and specifically, Frugal Innovation might enable or restrict strategic foresight and long-term planning. This is important because the conclusions drawn in 4.2 beg the question of which respective principles would work best together to allow social enterprises to strategize and plan for the future. We see the 80/20 rule at play here. The 20% of organizations who can capitalize on Frugal Innovation can drive down costs, increase revenue and profit, secure more funding, and thus be in a position where they can strategize for the long-term future. The 80% of organizations who cannot will have high costs, forsake revenue and profit, have limited opportunities for fundings, and thus always be responding to short-term issues. The cycle becomes circular. Further research could explore the "bigger is better" mentality that Western organizations have seemed to adopt.

Another future research direction might be oriented toward the social enterprise conceptual framework, specifically about the social and economic evaluation framework; what the process is for development, impact measurement metrics, how it might be used and perhaps standardized, and how its development in Ontario might differ from other provinces and countries. This is important because the findings suggest that the present nascence of the social enterprise concept might hinder its ability to have much impact in any regard. The social enterprise does not seem to be well understood or considered a legacy institution, which are the institutions upon which contemporary society was built, like financial

institutions. The social and economic evaluation framework needs to be developed further before any conclusive assessments of social enterprises' capacity for change.

An additional future research area could further explore the relationship between Inclusive Design, Frugal Innovation, and lead user theory. This is where more interviews with caregivers, people with disabilities, BoP populations, or anyone excluded by design could provide more insight. Research might be oriented toward uncovering new ideas for products aimed at inclusion, frugality, and ultimately, open innovation, as per von Hippel (1986, 2017).

Inclusive Design has had contact with Frugal Innovation. This shows that Inclusive Design has taken the next step in becoming a more common mentality and approach to business. Indeed, it is not quite status quo, or "business as usual". Yet, Frugal Innovation offers a glimpse into how Inclusive Design may be democratized, and thus business as usual.

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Appendix A: List of Figures

Figure 1: Cluster of needs

Akin to an exploding star, this visualizes the needs of groups of people. The large, central cluster shows people who belong to some type of majority group. Their needs are met by current designs and market conditions. The dots on the periphery represent the people whose needs are not met by such designs and market conditions. These dots represent difference. This includes minorities, the disabled, and anyone else who may be marginalized. Their needs are not met by current designs and market conditions.

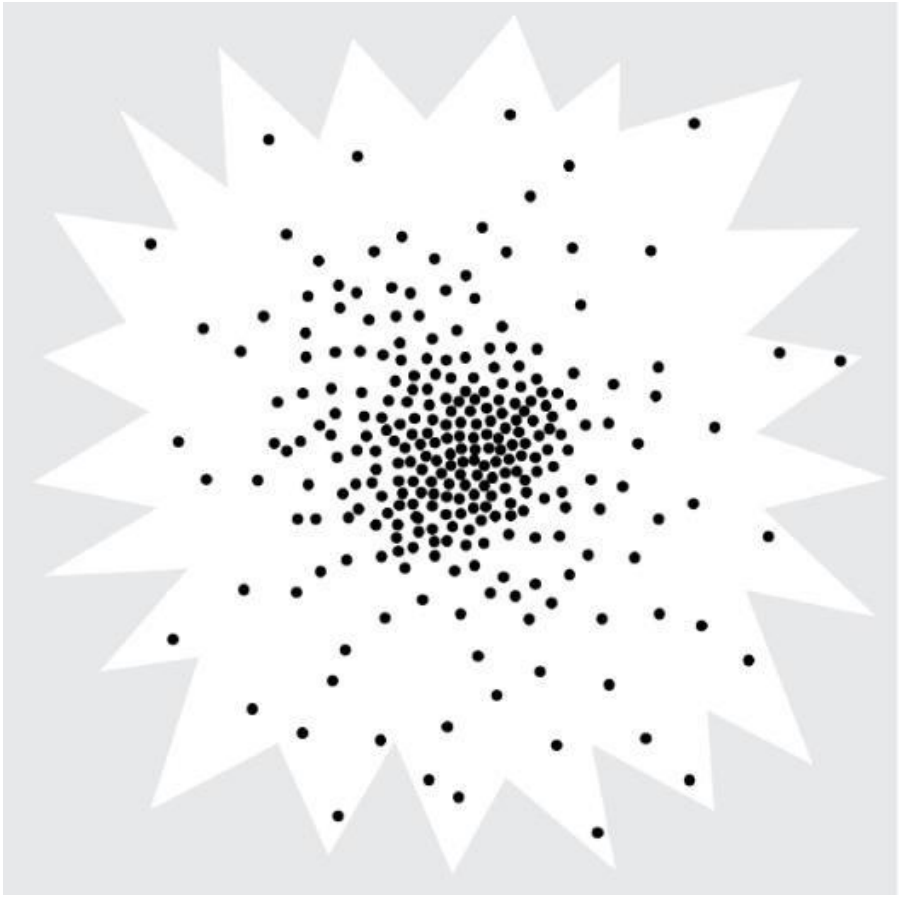


Figure 2: Venn Diagram

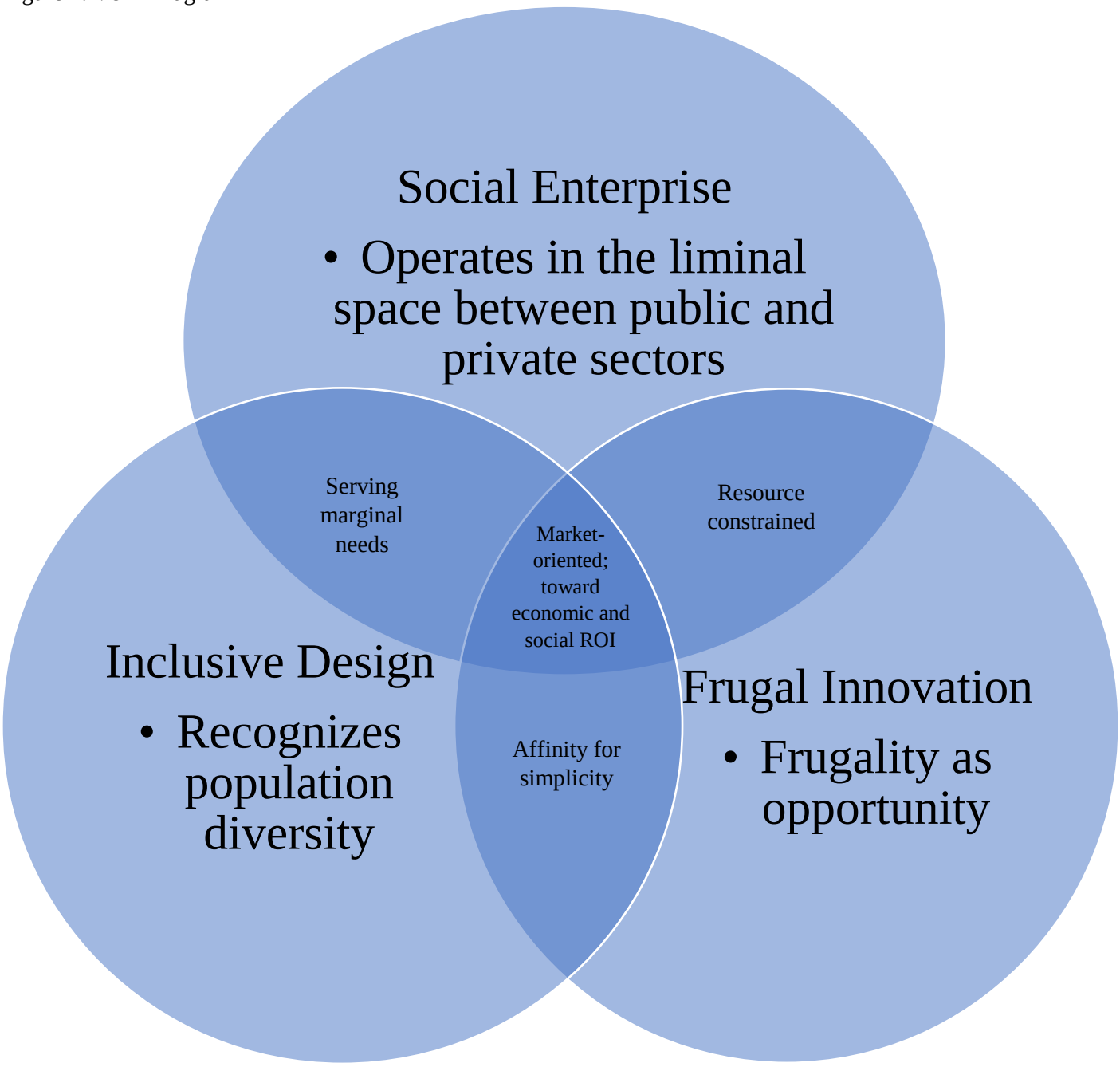


Figure 3: Interview communication methods table

FtF interviews are synchronous in both time and place, as seen here. I used FtF and telephone methods, the latter is synchronous in time, not space.

	Time	**Place**
Synchronous communication	FtF MSN messenger Telephone	FtF
Asynchronous communication	E-mail	E-mail MSN messenger Telephone

Figure 4: Experiential futures vs. design fiction/speculative design

This visual shows the difference between experiential futures and other futures methods. Design fiction and speculative design features futures ideas, usually by using tangible objects or media such as film that explores ideas/products about futures. Experiential futures allows participants to immerse themselves, sometimes quite literally, in an experience. Practitioners of this method can use a wide variety of media, including board games.

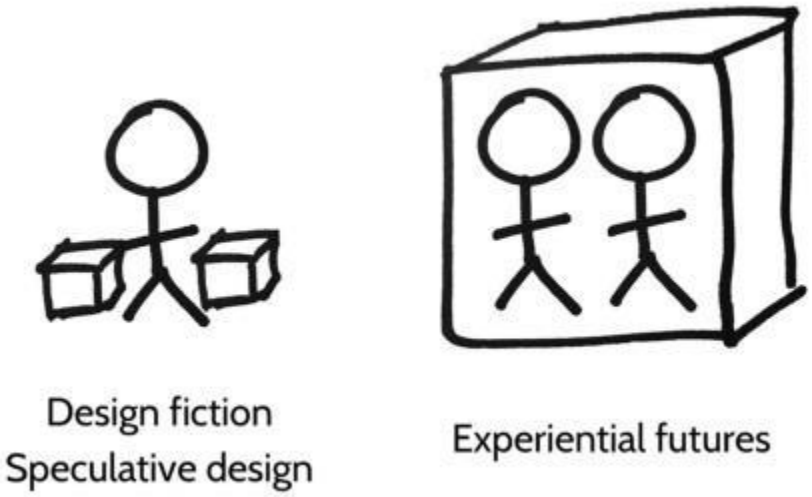


Figure 5: List of qualitative interviewees

Karen Castelane, Caregiver
Karen's son has quadriplegia Cerebral Palsy, meaning that all four limbs are affected with a loss of motor control. Her knowledge of Canada's regulatory and legal framework regarding disability provided a look into how the system has changed over the past 25 years.

Janelle Hinds, Founder & CEO of Helping Hands
Helping Hands is a social enterprise that helps students develop their careers through skills-based volunteer work. Her first-hand experience in running a company provided insight into organizational capacity and the funding mechanisms surrounding social enterprise.

Gilad Cohen, Founder & Executive Director of JAYU
JAYU is a charity that shares human rights stories through the arts. Gilad contributed through his passion for inclusivity, insight into leadership styles, and knowledge of arts & culture funding in Toronto.

Luisa Ji, Co-Founder & Product Owner of Milieu
Milieu is an organization which aims to increase and support civic engagement in urban planning. Luisa uses a human-centred design approach to her work. She offered her perspective of inclusivity in tech, the market recognition for a Frugal Innovation approach, and the application of design thinking methodologies to civic tech and innovation.

Deborah Mills, Founder & Managing Director of PersonaGrata Consulting
PersonaGrata Consulting is an education-based organization that specializes in career and life coaching. Deborah has unique knowledge of education, social enterprise and impact, and culture and power dynamics as it relates to inclusivity.

Naitik Mehta, Co-Founder & CEO of NextBillion.org
NextBillion.org is a platform that connects students living with disabilities to mentors working in the tech industry in the interest of career development. Naitik contributed through his knowledge of impact measurement as well as the value of having social impact woven into a business model.

Sharon Wong, Director of Commercialization at Holland Bloorview
Holland Bloorview is Canada's largest rehabilitation hospital focused on improving the lives of children with disabilities. Sharon is responsible for finding industry partners for the innovations developed at Holland Bloorview's research labs. She understands the accessibility tech space and the barriers and opportunities to diffusing and democratizing healthcare innovations.

Tom Chau, Vice President of Research at Holland Bloorview
Tom leads the PRISM Lab and focuses on access pathways for children with severe physical impairments and helps them gain and improve communication abilities. Tom has worked between the public and private sectors for 20 years and provided insight into public research funding, the value of diversity in innovation, and the state of disability and accessibility research worldwide.

Khondaker Mamun, Founder of CMED Health Ltd.
Based in Bangladesh, CMED Health allows people to do regular health monitoring for and by themselves. In tandem to his role as the Director of AIMS Lab at United International University, Khondaker offered his insight into the intersection of education, disability, and health. He also commented on the opportunities and barriers of Frugal Innovation in developing markets.

Figure 5.1: Table describing the methods used for each interview

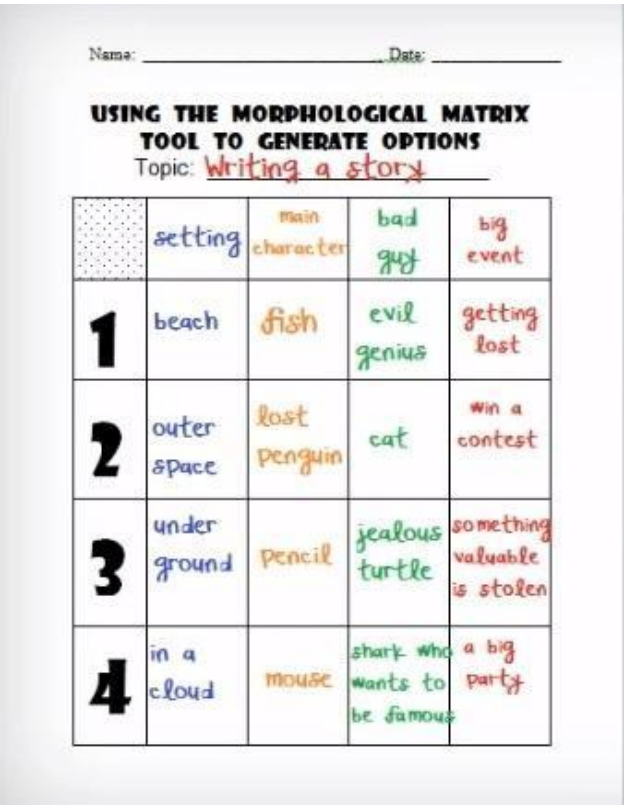
Participant	Interview communication method	Device used for audio recording
Karen Castelane	Face to Face interview	App on cell phone
Janelle Hinds	Face to Face interview	App on cell phone
Gilad Cohen	Face to Face interview	App on computer
Luisa Ji	Telephone interview	App on computer
Deborah Mills	Telephone interview	App on computer
Naitik Mehta	Telephone interview	App on computer
Sharon Wong	Face to Face interview	App on cell phone
Tom Chau	Face to Face interview	App on computer
Khondaker Mamun	Skype interview	App on cell phone

Figure 6: Morphological Box explanation

GMA is carried out through the Morphological Box (see below). The box, or typological field, is populated by parameters that are then set against each other. Each parameter contains solutions, or values. One value from each parameter is chosen, thus revealing a particular state or solution to the given problem. Figure 6.1 shows a completed Morphological Box. The end result is is the combination of one solution per parameter (eg. beach, pencil, cat, a big party). There are 256 possible combinations for this topic. The objective is to examine which solutions are possible, viable, practical, interesting, etc.

Parameter A	Parameter B	Parameter C	Parameter D	Parameter E	Parameter F
Condition A1	**Condition B1**	Condition C1	Condition D1	Condition E1	Condition F1
Condition A2	Condition B2	Condition C2	**Condition D2**	Condition E2	Condition F2
Condition A3	Condition B3	**Condition C3**		Condition E3	**Condition F3**
Condition A4	Condition B4	Condition C4		**Condition E4**	Condition F4
Condition A5		Condition C5		Condition E5	
				Condition E6	

Figure 6.1: Completed Morphological Box



Name: _____ Date: _____

USING THE MORPHOLOGICAL MATRIX TOOL TO GENERATE OPTIONS

Topic: Writing a story

	setting	main character	bad guy	big event
1	beach	fish	evil genius	getting lost
2	outer space	lost penguin	cat	win a contest
3	under ground	pencil	jealous turtle	something valuable is stolen
4	in a cloud	mouse	shark who wants to be famous	a big party

Figure 7: Team Clean's workshop results

Team Clean played a different version of the foresight game that was developed for the Singularity University Canada Summit. They chose the following cards:

In a *sterile* future
There is a *job*
Related to *security*

Their Thing was more of a scenario than an object. They envisioned a future where fertility rates would drop and human reproduction is scarce. The rare birth means that the baby would be put a rigorous training and education system, complete with staff that cater to their every need. Parents would be responsible for giving love and affection but the child is essentially a ward of the state. There was a passing reference to a second scenario that focused on sterility of the environment. That is, everything is recycled. However, this was not expanded upon. The group chose the following parameters:

1. Social impact/awareness
2. Populations excluded?
3. Affordability?
4. Values

The last parameter was also of their own making. They reasoned that since their Thing was a scenario rather than object, the *values* parameter helped to identify what would be important to the population in this scenario. The group cross-referenced solutions across parameters and they concluded the following (see below):

1. The caregivers of these children would be exempted from tax by virtue of their job. However, these jobs would be commensurate to the amount of babies that need care.
2. The men and women who could not conceive any children would be excluded/not applicable to this service.
3. As the group discussed the issue of sterility, they imagined a future where sexual intimacy would be generally contaminated. People would then need to pay a fee to have sex in a clean environment. Thus, only rich people could afford this service because cleanliness is highly valued.
4. This scenario would be driven by the need to sustain the human race. Therefore, there was an implicit value for human life.

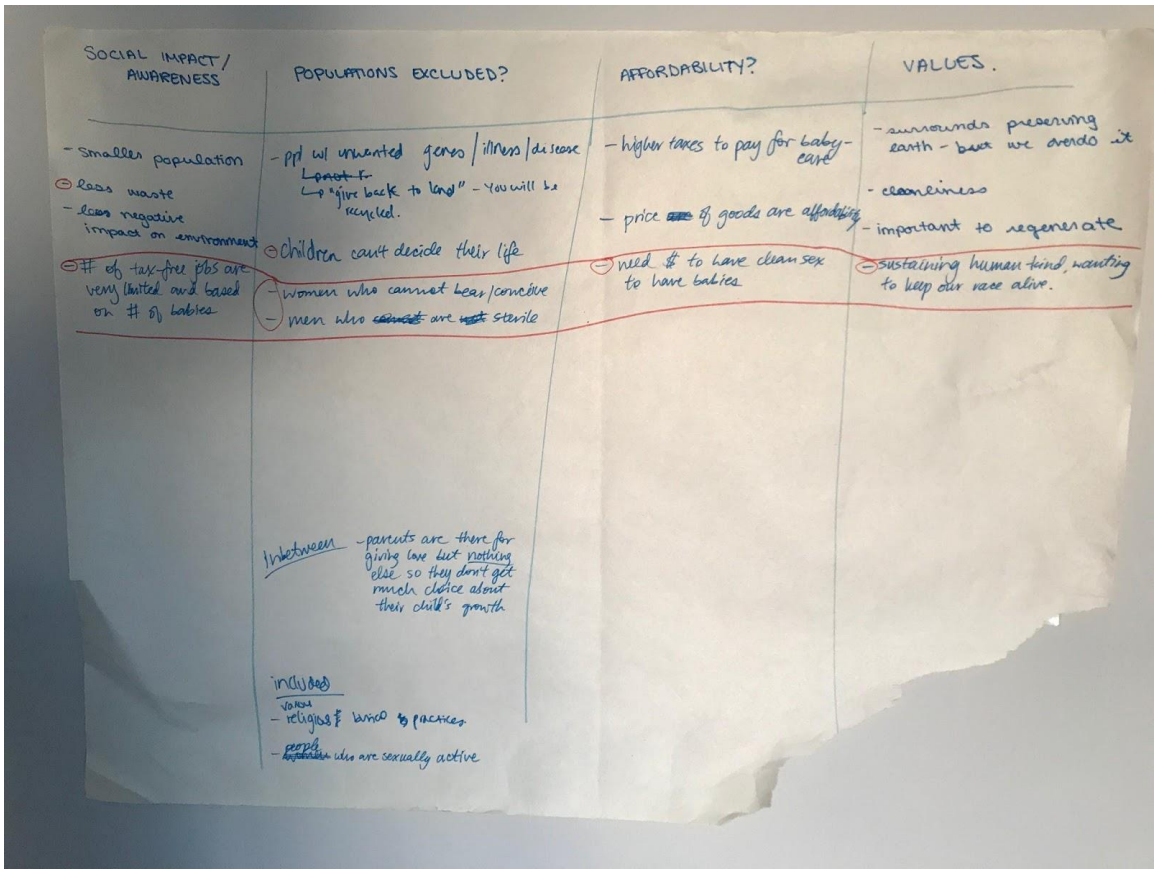

SOCIAL IMPACT/ AWARENESS
POPULATIONS EXCLUDED?
AFFORDABILITY?
VALUES.
- Smaller population
- less waste
- less negative impact on environment
- ppl w/ unwanted genes / illness / disease
- "give back to land" - You will be recycled.
- higher taxes to pay for baby-care
- surrounds preserving earth - best we overdo it
- cleanliness
- important to regenerate
- price of goods are affording
- # of tax-free pts are very limited and based on # of babies
- Children can't decide their life
- women who cannot bear/conceive
- men who are sterile
- need $ to have clean sex to have babies
- sustaining human kind, wanting to keep our race alive.
in between
- parents are there for giving love but nothing else so they don't get much choice about their child's growth
included
- religious & land practices
- people who are sexually active

Figure 8: Team Butterfruit's workshop results

Team Butterfruit chose the following cards:

Arc: Collapse
Terrain: Disease
Object: Passport
Mood: Sadness

Their Thing was a passport that acted not only as a geographical tracker but also a repository of a user's medical history. It is embedded within users when they are born and it constantly monitors your vitals. When travelling, airport security would dictate where and when someone could travel. The population is segregated through this Thing. The group chose the following parameters:

1. How might this have social impact/awareness?
2. How might this be functional/simple to use?
3. How could this be affordable to make/buy (business model)?
4. How might previously disadvantaged communities be benefitted or included?

The group had issues with ideas regarding the third parameter. They imagined that this Thing would be The group did not deliberately cross-reference solutions for a final scenario. However, their presentation yielded the following scenario (see below):

1. It could create more awareness for mental illness because it will monitor your vitals and brain activity.
2. This Thing would be government funded and given out to every citizen. The long-term vision was that the Thing would recommend ways to become healthy through diet and exercise. Thus, people would be using healthcare services less, saving the government money because they no longer need to fund healthcare to the present-day degree.
3. It could also monitor pre-existing medical conditions such as diabetes. Another case would be the elderly, who may be at risk for a heart attack. An alert would be sent to the hospital in case of such an event. This Thing would essentially standardize healthcare products.
4. This could help people who would otherwise lack the resources for this or a similar type of service

How might this have social impact/ awareness?	How might this be made functional/simple to use?	How could this be affordable to make/buy? (business model)	How might previously disadvantaged excluded communities be benefitted or included?
• Create more awareness about mental illness. • The statistics if this device can help to better identify areas & their specific needs to know where/what is critical • Could help to challenge social assumptions & medical conditions. (ex. malnutrition).	• can be used to monitor pre-existing medical conditions (chronic) • can be used as a "self-security" system - sending out alerts in case of a heart attack (or something similar) • Embedded into your physical person.	• In the long-term citizens will have a better/longer life expectancy & won't rely on gov provided services saving them money, making it well worth the initial investments. • Kill everyone.	• Would bring in people suffering from mental illness by making their conditions 'tangible'. • People who may not have previously had access to standardized health services, will have better access to diagnosis & hopefully treatment.

Figure 9: Team Ten Seconds's workshop results

Team Ten Seconds chose the following cards:

Arc: Grow
Terrain: Environment
Object: Map
Mood: Curiosity

Their Thing was an app where users could take a picture of something they would be purchasing and the app would be able to tell users the environmental effect of their decision. For example, buying a t-shirt would reveal whether it was ethically sourced and the ultimate effect of that t-shirt being manufactured. The group chose the following parameters:

1. Which populations could be excluded?
2. How might this be functional/simple to use?
3. How could this be high quality?
4. How can both sides of the equation (business and individuals) benefit from this?

The last parameter was of their own making. Instead of cross-referencing and choosing one solution, this group cross-referenced and chose multiple solutions. For parameter 1, they primarily focused on *people who don't care about the environment*. The following parameters were solutions to incentivize them to think otherwise. However, this is not all they ideated, as the image below shows.

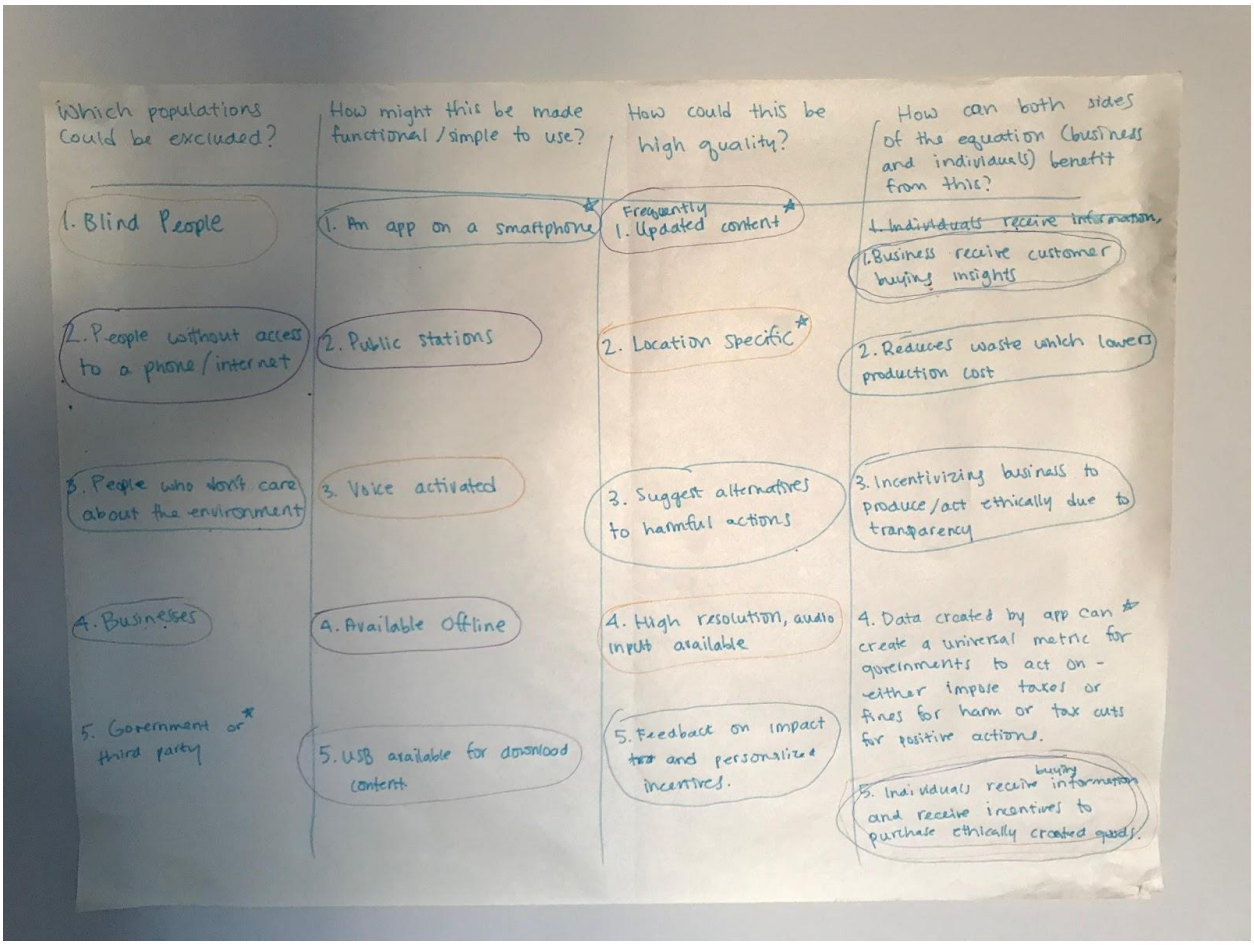

Which populations could be excluded?
How might this be made functional / simple to use?
How could this be high quality?
How can both sides of the equation (business and individuals) benefit from this?
1. Blind People
1. An app on a smartphone
Frequently 1. Updated content
1. Individuals receive information,
1. Business receive customer buying insights
2. People without access to a phone / internet
2. Public stations
2. Location specific
2. Reduces waste which lowers production cost
3. People who don't care about the environment
3. Voice activated
3. Suggest alternatives to harmful actions
3. Incentivizing business to produce / act ethically due to transparency
4. Businesses
4. Available Offline
4. High resolution, audio input available
4. Data created by app can create a universal metric for governments to act on - either impose taxes or fines for harm or tax cuts for positive actions.
5. Government or third party
5. USB available for download content
5. Feedback on impact and personalized incentives.
5. Individuals receive buying information and receive incentives to purchase ethically created goods.

Figure 10: Funding theme and categories

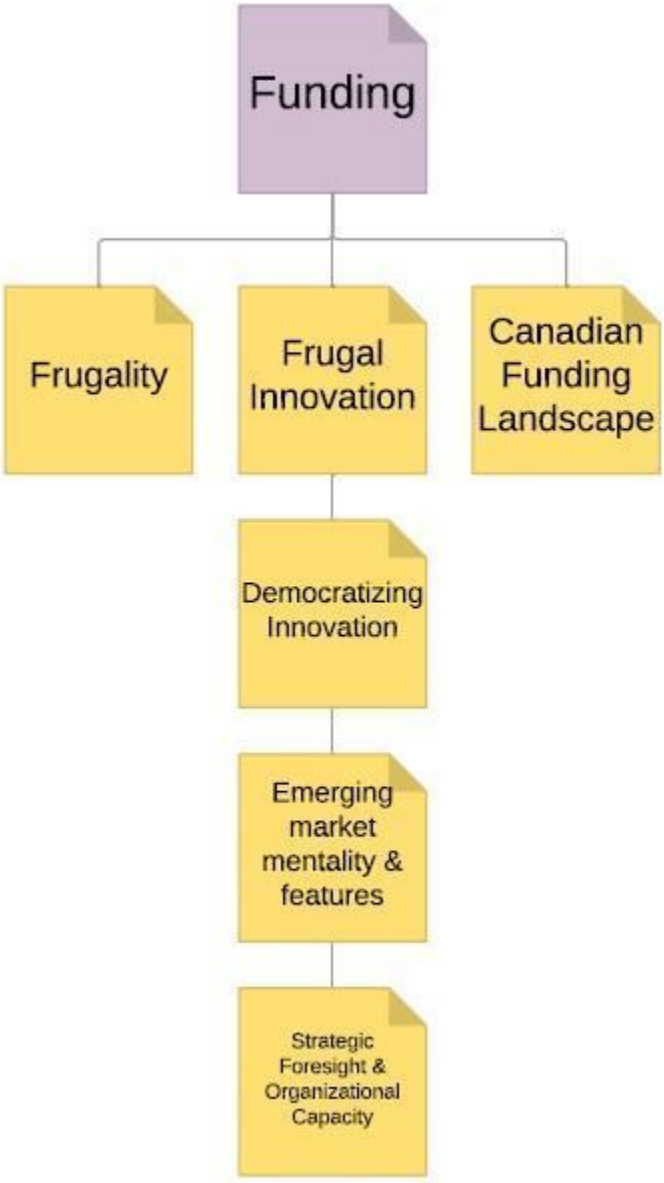


Figure 11: Social Impact theme and categories

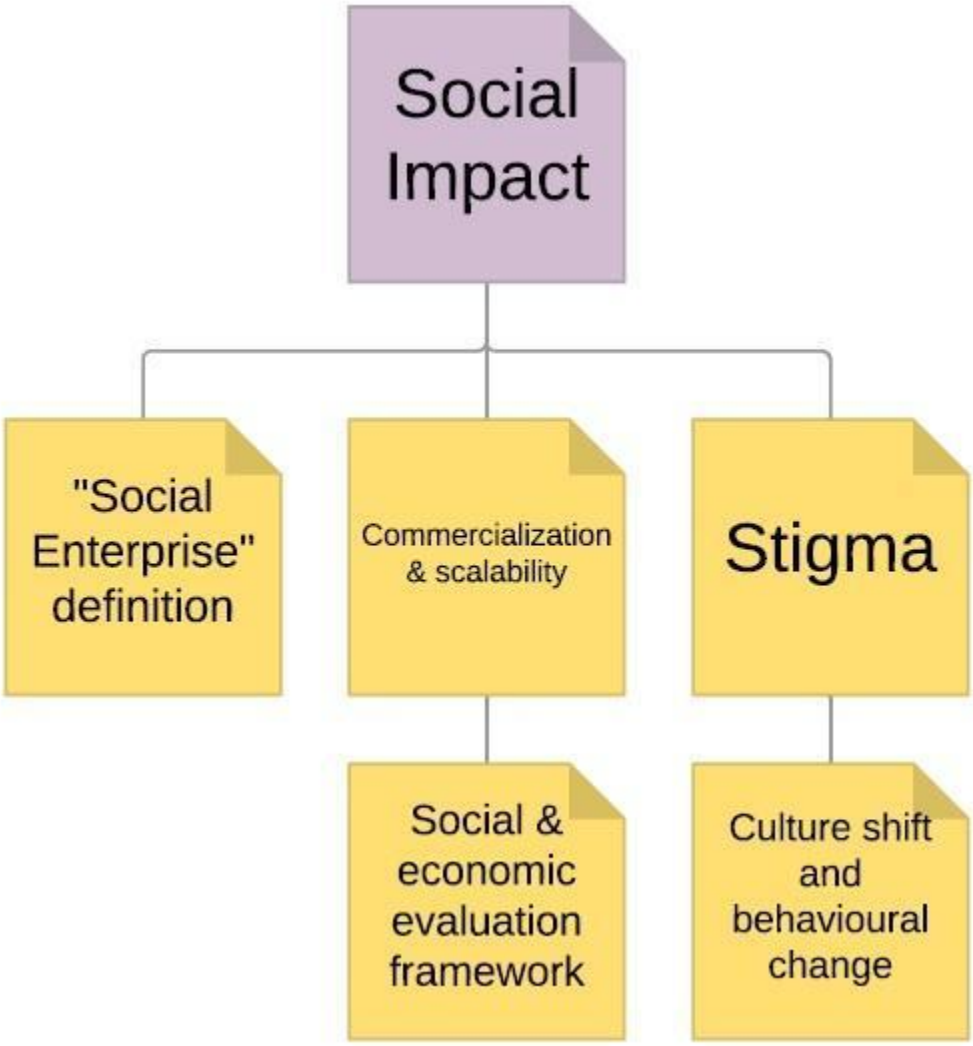


Figure 12: Disability theme and categories

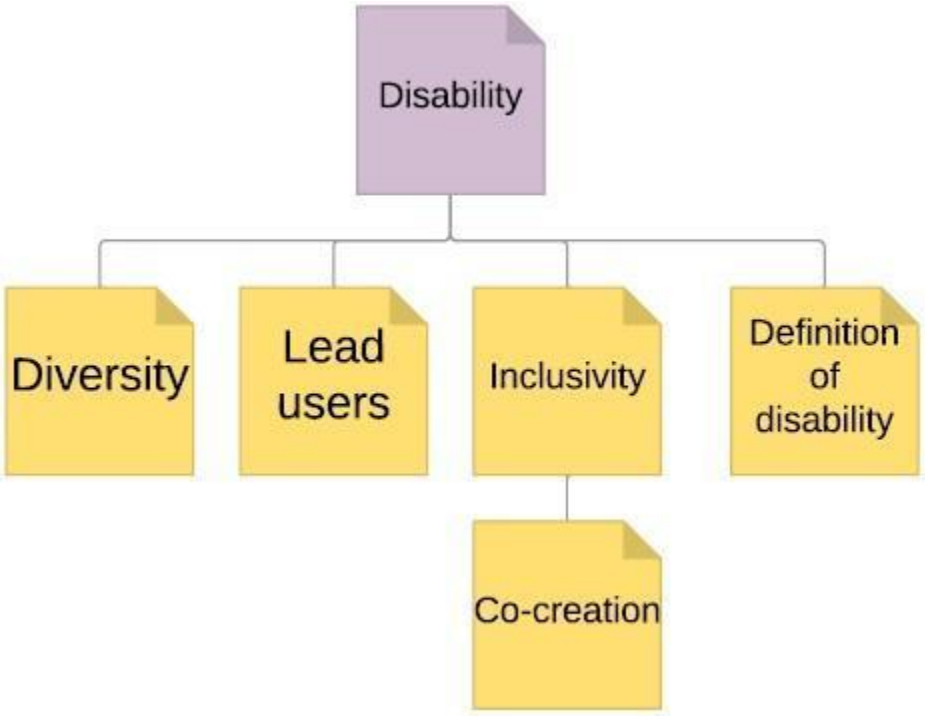


Figure 13: Team Ten Seconds cross-referenced results

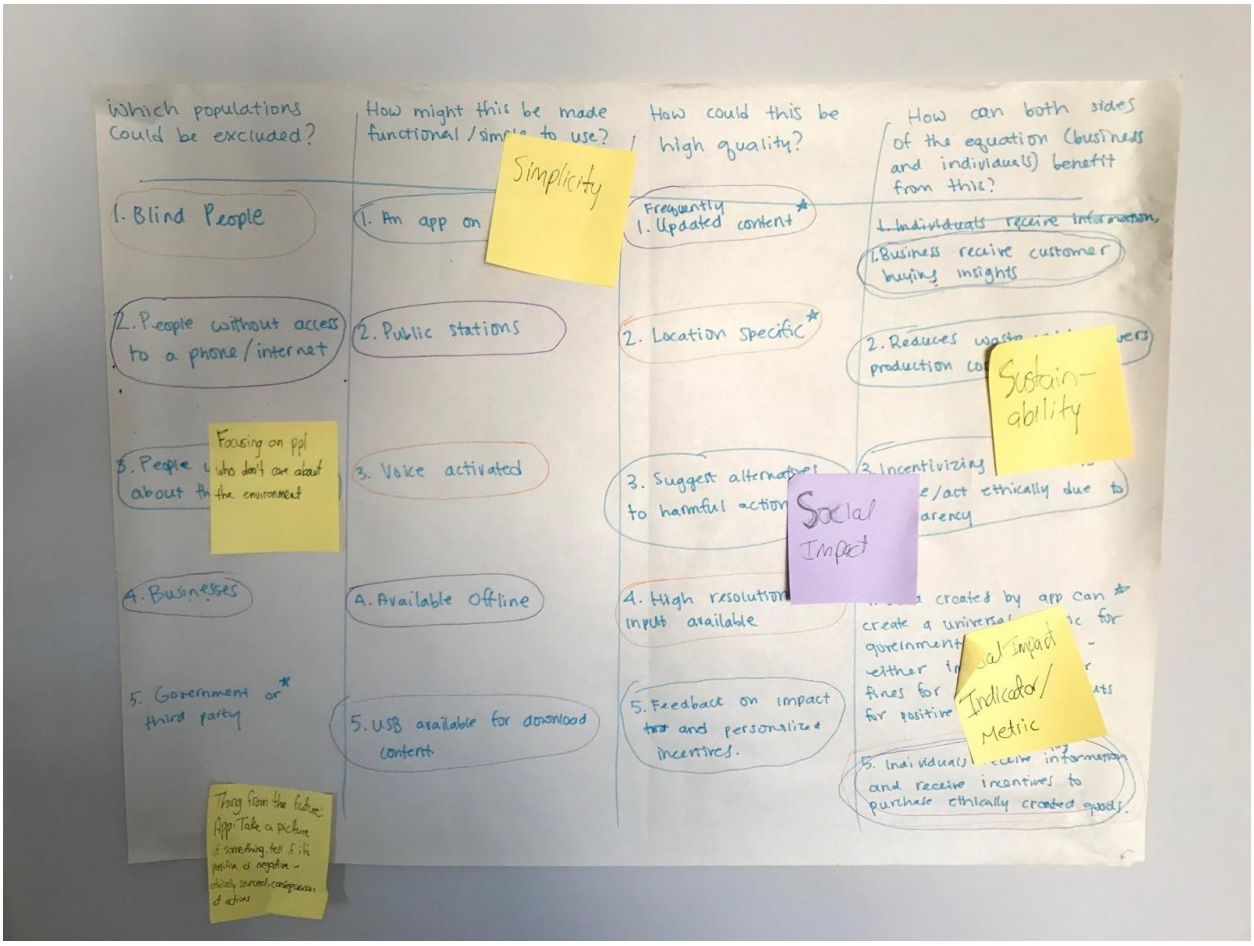


Figure 14: Team Clean cross-referenced results

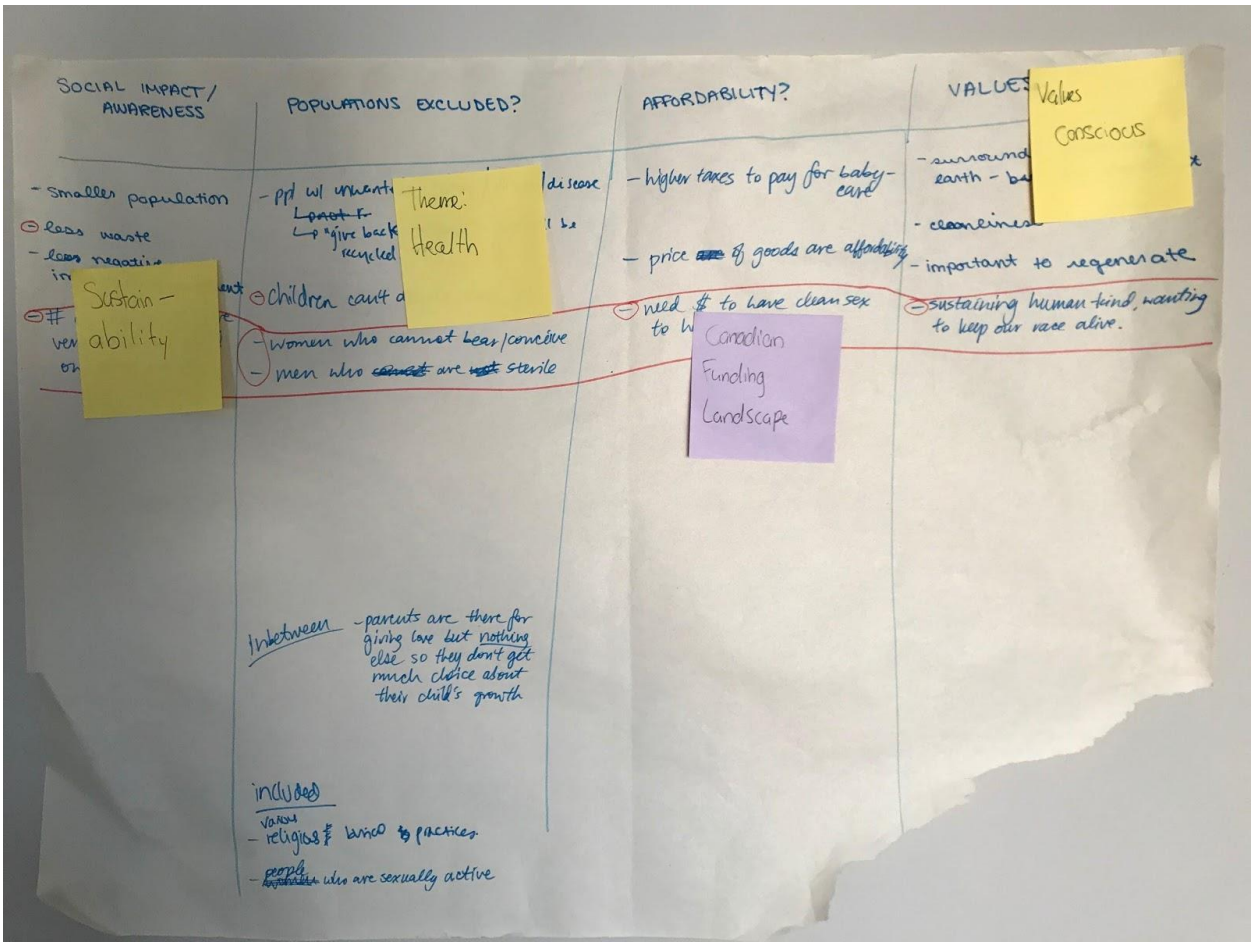


Figure 15: Team Butterfruit cross-referenced results

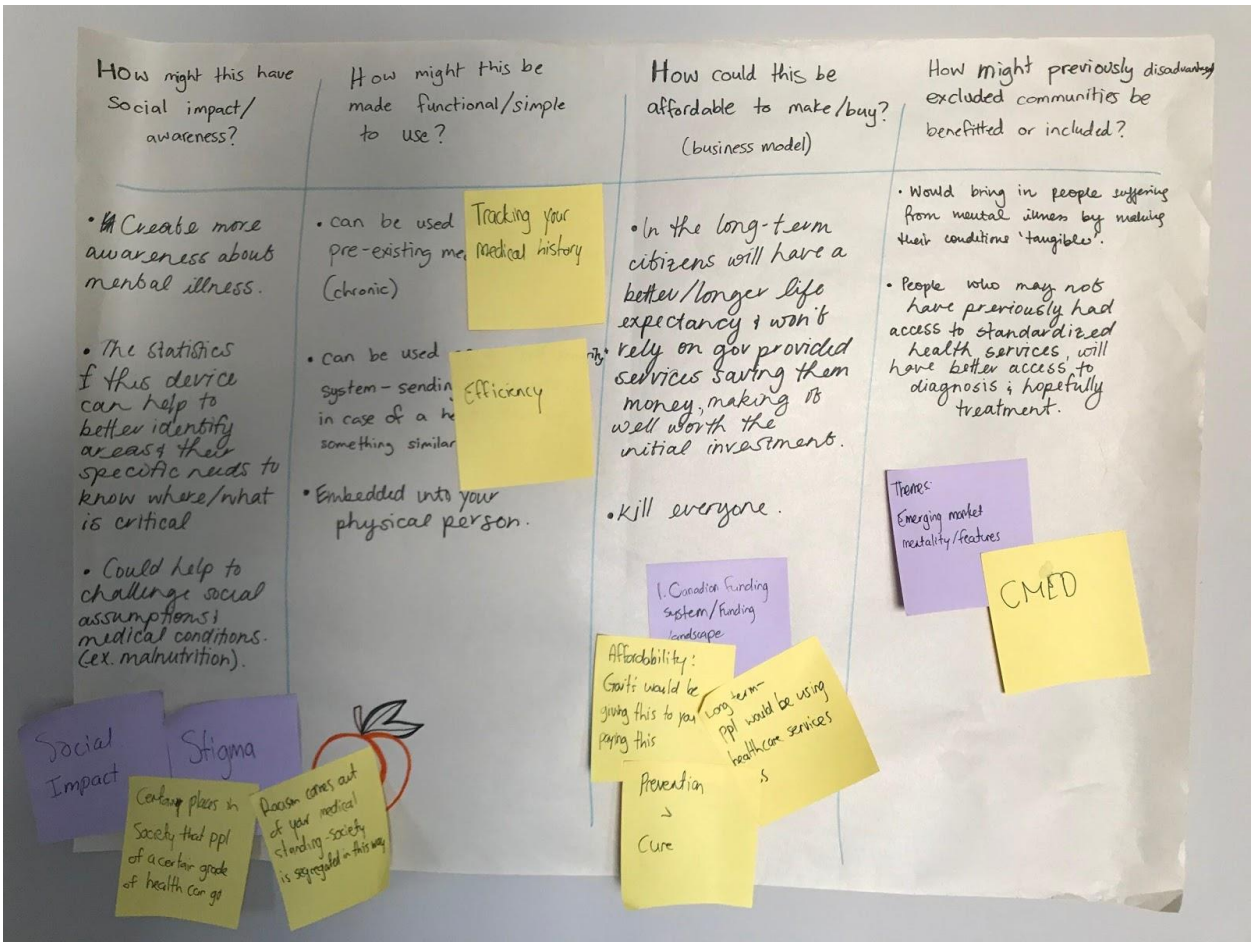


Figure 16: Second Venn Diagram

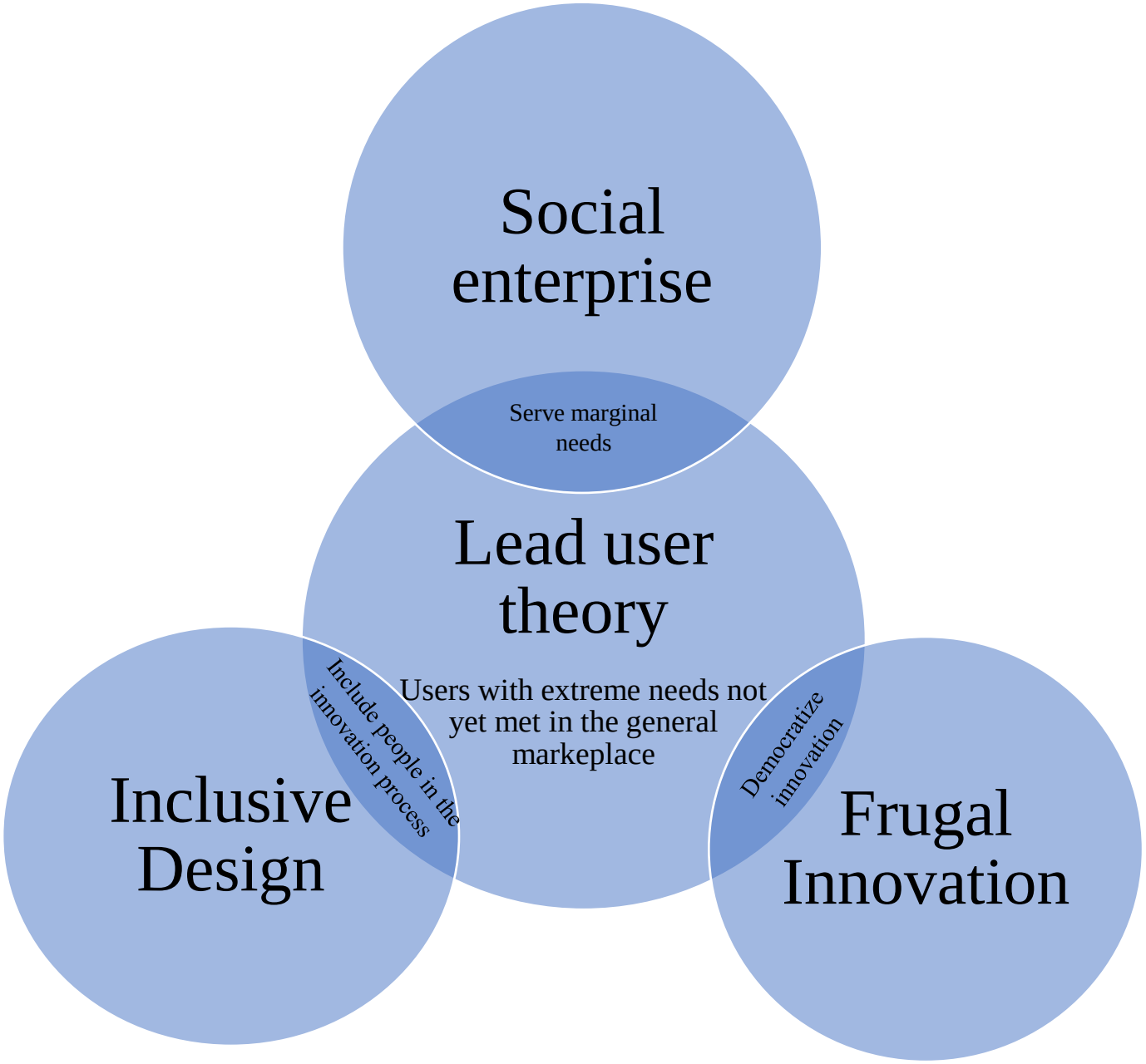


Figure 17: Funnel

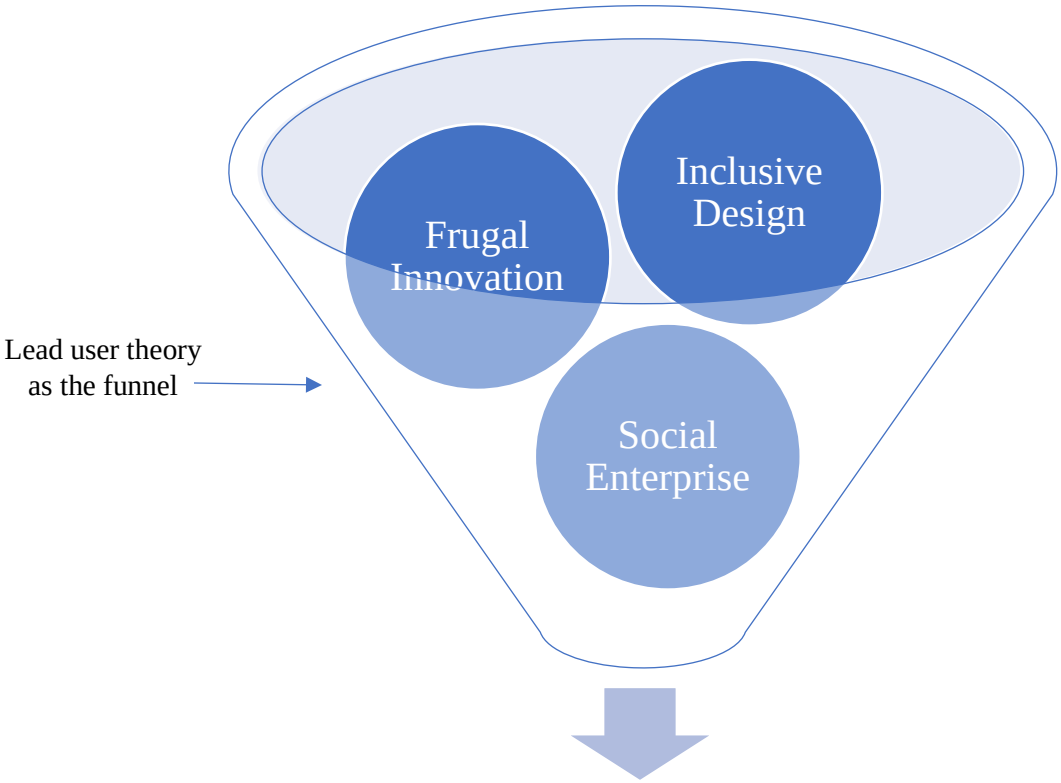


Figure 18: Cross-Consistency Analysis

The Morphological Box goes through a Cross-Consistency Assessment. This assesses the consistency between a pair of values, upon which a judgement is made as to whether or not such values can coexist. There is no reference to direction nor causality, only consistency. Using CCA can often reduce the number of solutions by ~90%. The metrics used to judge (in)consistency fall under three categories: logical contradictions (those based on the nature of the concepts involved), empirical constraints (relationships that are improbable or implausible based on empirical grounds) and normative constraints (relationships ruled out on personal grounds eg. ethical or political perspectives). Normative constraints should not initially influence the CCA. Only logical and empirical inconsistencies should be initially considered. It is important to determine what is possible before deciding what is desirable. Even so, the CCA allows for concentration on a manageable number of consistent configurations. The Box then becomes an inference model once the morphological field is cross-referenced and synthesized. This means that any parameter can be selected as either an input or output.

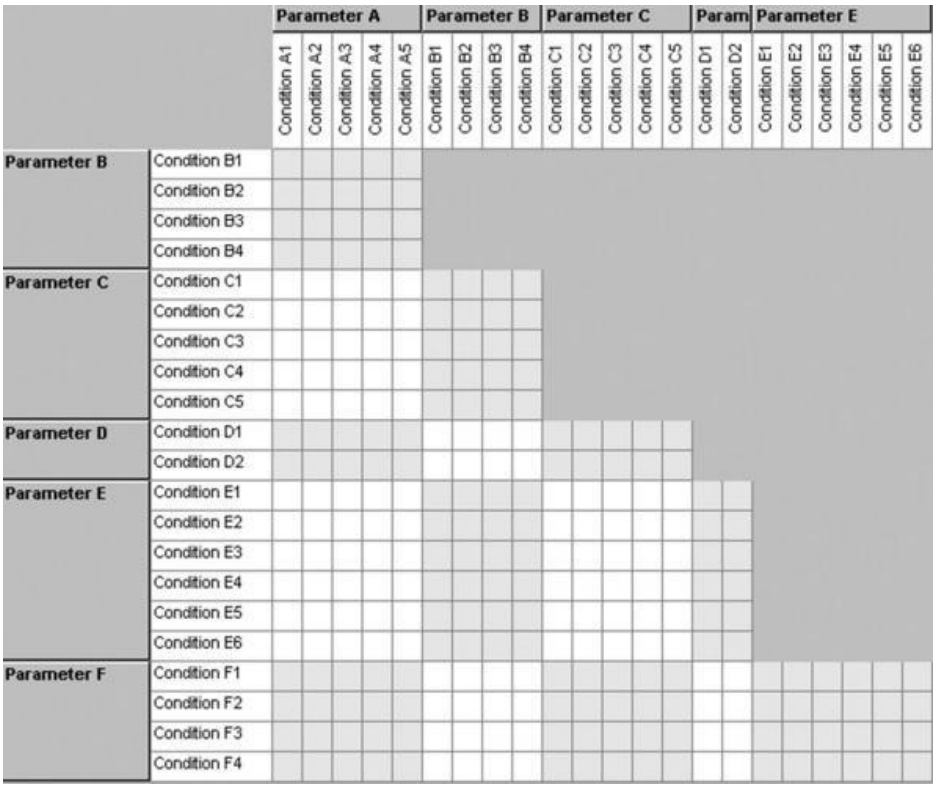


Figure 19: REB Approval Letter

November 30, 2017

Dr. Alia Weston
Faculty of Liberal Arts & Sciences & School of Interdisciplinary Studies
OCAD University

File No: 101128
Approval Date: November 30, 2017
Expiry Date: November 29, 2018

Dear Dr. Alia Weston, Mr. Daniel Ura,

The Research Ethics Board has reviewed your application titled 'Frugal Inclusive Design - Daniel Ura'. Your application has been approved. You may begin the proposed research. This REB approval, dated November 30, 2017, is valid for one year less a day: November 29, 2018. Your REB number is: 2017-56.

Throughout the duration of this REB approval, all requests for modifications, renewals and serious adverse event reports are submitted via the Research Portal.

Any changes to the research that deviate from the approved application must be reported to the REB using the amendment form available on the Research Portal. REB approval must be issued before the changes can be implemented.

To continue your proposed research beyond November 29, 2018, you must submit a Renewal Form before November 22, 2018. REB approval must be issued before research is continued.

If your research ends on or before November 29, 2018, please submit a Final Report Form to close out REB approval monitoring efforts.

If you have any questions about the REB review & approval process, please contact the [redacted]Manager, REB secretariat at [redacted]

If you encounter any issues when working in the Research Portal, please contact our system administrator via [redacted]

Sincerely,

Nancy Snow
Acting Chair, Research Ethics Board