

# Generation of a Business Model to help address food and nutrition security in the Baie Verte Peninsula

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# Project Report

## **Generation of a Business Model to Help Address Food and Nutrition Security in the Baie Verte Peninsula**

*To provide a framework for self-sustaining efforts to bring food and nutrition security to remote communities in Newfoundland and Labrador.*

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## Executive Summary

Food and nutrition security (or lack thereof) has many implications for the physical and mental health of people who live in communities where access to sufficient nutritious food is inadequate. The Project aimed to address local food production by generating a business model for a commercially viable social enterprise, which could help provide a scalable and transferable solution to food and nutrition security in the Baie Verte Peninsula. The Project used two different but interrelated methodologies to complete the Project's deliverables. To design the business model for the social enterprise, the Project used the lean start-up methodology. The lean start-up methodology prescribes an iterative process by which the Project formulated and validated the different problem, product, and customer hypotheses throughout the Project's lifecycle. The lean start-up methodology is becoming a pervasive part of entrepreneurial communities although its application for social innovations has been sporadic. The Project was among the first to try this approach in the context of food and nutrition security. To help develop the proposed solution to the aforementioned problem, the Project employed the translational research & development methodology. The translational research & development methodology is a structured framework based on best practices that greatly improves the likelihood of delivering a product in time, within budget, and to specification. It explains how to initiate, plan, execute, and close a translational research & development project conducted within an academic institution with the intent of bringing a product to market.

At the heart of the business model is the value proposition, which comprises the benefits that the community can expect from the social enterprise, i.e., products and services that will help address the need for adequate and reliable access to quality and healthy produce. To help deliver the value proposition to the community, the Project designed and proposed an offering based on the urban farming solution developed by Greenspace Urban Farms—an award-winning student-operated social enterprise that offers lowest-cost alternatives to urban farming initiatives by building systems from upcycled industrial materials. These systems are highly customizable, allowing for the design of very efficient units that can use hydroponic or soil-based alternatives to provide a rich variety of crops. To help scale and transfer the proposed solution to the entire Baie Verte Peninsula (and beyond), the Project designed a path to commercialization by following an ecosystem approach. Sequencing the commercialization of an innovation based on this strategy involves three components: minimum viable footprint, staged expansion, and ecosystem carryover. The Project designed but did not implement the staged expansion and ecosystem carryover phases. These will be part of the social enterprise's future activities.



Food and nutrition security in rural Newfoundland and Labrador is a very difficult problem. The problem has persisted over the years precisely because it resists easy solutions. The Project does not claim to have solved the problem of food and nutrition security in the Baie Verte Peninsula, far from it! The Project attempted to “make a dent in the universe” of the problem by employing and proposing new, alternatives ways of confronting and dealing with food and nutrition security in the Baie Verte Peninsula. The main contribution of the Project is the framework that it leaves behind so that the community of the Baie Verte Peninsula can start implementing alternative methods for local food production. Furthermore, this report has been written as a comprehensive guide for other communities in rural Newfoundland and Labrador to follow suit and explore this “path less traveled” that could provide the desired results where other methods have failed.

The Project Team  
August 2019

## Project Background

As part of *The Way Forward*, the Provincial Government and the Newfoundland and Labrador Federation of Agriculture have jointly developed the *Agriculture Sector Work Plan* (Government of Newfoundland & Labrador, 2017). The Plan aims to achieve the collective goal of growing the agriculture industry and stimulating new private sector employment in the province. One of the growth targets set forth in that document is to increase Newfoundland and Labrador’s food self-sufficiency from the current ~10% to at least 20% by 2022. Concomitantly, the community of the Baie Verte Peninsula has identified similar goals in the summary report *Baie Verte Peninsula Thriving Regions Workshop* (The Harris Centre, 2018). Figure 1 shows the Baie Verte Peninsula on the northwest coast of Newfoundland. Under the “food security” priority theme the Summary Report reads, “People throughout the Baie Verte Peninsula should have access to affordable nutritious food, and regional approaches to developing a more sustainable and self-sufficient food supply are necessary. One way to move this forward is by growing more food locally on the Baie Verte Peninsula...” (The Harris Centre, 2018). Food and nutrition security carries not only significant benefits for human health, but also serves as the basis for achieving sustained economic growth (International Food Policy Research Institute, 2016). Without sustainable food and nutrition security there will be a continued negative effect on human capital that will prevent the community from exercising a healthier lifestyle, causing deleterious effects in every facet of society. Appendix A provides relevant demographic data for the Baie Verte Peninsula.



Figure 1. Baie Verte Peninsula corresponds to Economic Zone 11 of Newfoundland and Labrador.

The Project argues for the commercial viability of a social enterprise whose value proposition could help fulfill the elusive goal of a more sustainable produce supply in the Baie Verte Peninsula. Measuring progress toward this goal will not be easy. The diversity of sectors and disciplines for which food and nutrition security is relevant provides a great variety of measurement tools to assess progress. However, this complicates rather than simplifies the efforts since it may not be always clear how the measures differ in their conceptualizations of food and nutrition security. In order for a measurement tool to be valid, the social enterprise will need to work with the community to identify the purpose for which the metric will be intended. Identifying the intended use of such a tool and understanding the underlying construct(s) that it measures are critically important for determining which metric to use (Jones et al., 2013). In addition, the Project posited that the potential benefits from its outcomes could extend beyond the priority theme of food security for the Baie Verte Peninsula. Nonetheless, given the multidimensionality of the problem at hand, establishing adequate metrics to assess progress in those areas will be even more difficult to do, especially in the short-term. Notwithstanding, the Project investigated and made some recommendations on the most expeditious ways of measuring the additional impacts of the food and nutrition security efforts that will be brought about by the operation of the social enterprise.

“It takes a village to raise a child” is a proverb meaning that it takes an entire community of different people interacting with the children in order for them to experience and grow in a safe environment (Cowen-Fletcher, 1993). Paraphrasing... “It will take a village to grow food locally” in the Baie Verte Peninsula. Literally! For the social enterprise to be successful, the entire community will need to come together and participate to the best of their individual abilities during and after the launching of the social enterprise and the implementation of its value proposition. The entire community of the Baie Verte Peninsula will need to take township and help operate the social enterprise if it were to help provide food and nutrition security in the region. Likewise, the scalability and transferability of this business model will depend on the community’s efforts along with the continued support of local, provincial, and federal governments.

On June 7<sup>th</sup>, 2018—while the project application was still under consideration—the Project Team travelled to the Baie Verte Peninsula to present the initial project idea to the community during the *Second Thriving Regions Workshop* organized by The Harris Centre. The objective of this visit was to share the urban farming concept developed by Greenspace Urban Farms, highlight the benefits of social enterprise, and collect relevant information from those in attendance. The Harris Centre held the session at the Baie Verte campus of the College of the North Atlantic and it was well attended by participants that traveled from different towns throughout the Baie Verte Peninsula. Members from the education, industry, business development, and government sectors participated along with a significant number of community volunteers. They were an engaged group and presented thoughtful and challenging questions to the Project Team. Their questions and comments helped shaped the next phase of the research and project planning and final application. The experience of visiting with the community also helped the Project Team reinforce

the opinion that engaging community members in the entire process was going to be a key factor for success since they will eventually become stewards of the initiative.

While in the area, Greenspace Urban Farms conducted a survey using a questionnaire that they developed as part of their customer discovery program. This confidential survey was useful in gauging information such as which foods residents typically bought in their local stores, how far they travelled to buy food, and which foods would they be interested in growing locally. Greenspace Urban Farms later shared the aggregated data with the Project, which helped in the process of designing the Project's own customer discovery efforts. Details of these efforts are described later in this report. Appendix B shows the slides presented to the community of Baie Verte during the *Second Thriving Regions Workshop* on June 7<sup>th</sup>, 2018. Appendix C shows the notes that were taken by members of the community of Baie Verte during the *Second Thriving Regions Workshop* on June 7<sup>th</sup>, 2018.

## Project Scope and Objectives

As mentioned above, the Project proposed to address one of the priority themes identified in the summary report *Baie Verte Peninsula Thriving Regions Workshop*: food [and nutrition] security (The Harris Centre, 2018). For this purpose, the Project defined *food and nutrition security* as the adequate and reliable access to satisfactory amounts of quality and healthy food. Food and nutrition security (or lack thereof) has many implications for the physical and mental health of people who live in remote communities and harsh environments where access to sufficient nutritious food is inadequate. Food and nutrition security is a complex and multi-faceted issue. Thus, designing sustainable solutions to improve food and nutrition security must be holistic, be enabled by traditional knowledge, respond to local needs, and combined with economic development strategies (Council of Canadian Academies, 2014). An all-inclusive approach to food and nutrition security and its compounding effects should comprise assessing country food, store-bought food, local food production, life skills and nutrition literacy, programs and community initiatives, and policy and legislation (The Public Policy Forum, 2015). The Project focused primarily on local food production (produce) by designing and proposing a business model for a commercially viable social enterprise that could help provide a scalable and transferable solution to food and nutrition security in the Baie Verte Peninsula. A *social enterprise* is a revenue-generating organization that applies commercial strategies to maximize its overall impact in the community. The Project relied on the expertise of Memorial University's Centre for Social Enterprise and the community to determine the final legal form and organizational structure of the social enterprise.

To make the solution scalable and transferable, the Project proposed the use of an ecosystem approach (Adner, 2012). The *ecosystem approach* to the commercialization of an innovation provides a vantage point that helps reveal the dependencies that lie beneath the surface, avoid most of the predictable mistakes, and choose and manage initiatives in a smarter and more effective way. The first step in the process of designing a commercialization strategy based on the ecosystem approach is mapping the ecosystem. The *ecosystem map* identifies the network of parties involved

in the delivery of the value proposition. The second step is drawing a surplus map. The *surplus map* helps the creation of winners across the ecosystem, i.e., it does not suffice just to generate large net surplus. The third step is drawing the probability of success map. The *probability of success map* helps to increase the overall odds of success by increasing the odds of success across the ecosystem. To the best of the Project Team’s knowledge, the Project was the first to use an ecosystem approach to design the commercialization strategy of a social enterprise. To map the ecosystem and draw the surplus and probability of success maps mentioned above, the Project used a technique called value blueprint. The *value blueprint* is a tool that makes the ecosystem and its dependencies explicit. It lays out the arrangement of the elements that will be required to deliver the value proposition. It explains the positions and linkages of the different activities and who will be responsible for them.

Notwithstanding the primary goal of the Project was to provide food and nutrition security in the Baie Verte Peninsula; the possible benefits from the outcomes of the Project are more numerous and far reaching. That is, the Project could help address (indirectly) at least one additional priority theme in the Summary Report, namely “community and regional development” (The Harris Centre, 2018). For example, the proposed solution to food and nutrition security can provide the opportunity for the lowest-cost, scalable infrastructure development in order to promote health and wellness initiatives and social wellbeing of the region, along with the potential for educational curricula and intergenerational activities around fresh produce. The implementation of the proposed solution could also remove barriers related to food transportation, allowing for the development of a more sustainable, self-sufficient, and local food supply. Furthermore, the Project also encourages the connection between the social enterprise and education institutions, with the potential to operate within the scope of the *Provincial and Federal Farm to School* programming or as a year-round community garden (Food Security Network of Newfoundland and Labrador, 2011; Food First NL, 2018).

## **Methodological Approach**

The Project employed two different but interrelated methodologies to complete its deliverables. To design the business model for the social enterprise, the Project used the lean start-up methodology (Ries, 2011). The *lean start-up methodology* prescribes an iterative process by which the Project formulated and validated the different problem, product, and customer hypotheses throughout the Project’s lifecycle. To help develop the value proposition within the business model, the Project used the translational research & development methodology (Bazan, 2019). The *translational research & development methodology* is a structured framework based on best practices that greatly improves the likelihood of delivering a product in time, within budget, and to specification. It explains how to initiate, plan, execute, and close a translational research & development project conducted within an academic institution with the intent of bringing a product to market. Both the lean-start up methodology and the translational research & development methodology are described in more detailed in what follows.

## Lean Start-Up Methodology

With the publication of the book *The Four Steps to the Epiphany: Successful Strategies for Start-ups that Win*, Steve Blank launched the “lean start-up movement” by introducing the *customer discovery* process as a step-by-step approach for managing the generation of a business model for a new venture (Blank, 2006). A *business model* describes the rationale of how an organization creates, delivers, and captures value (Osterwalder and Pigneur, 2010). A few years later, Eric Ries refined and developed the approach further and popularized it in the book *The Lean Start-up: How Today’s Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses* (Ries, 2011). Their novel approach to business model generation, namely the lean start-up methodology (LSM),<sup>1</sup> focuses on the importance of learning from the customer (market) to create the products (and services) that customers need and want. The *lean start-up methodology* prescribes an iterative process where problem, product, and customer hypotheses are formulated and validated in order to minimize waste, time, and money during the new product development (NPD) process while building a viable business (Herbsleb et al., 2010). Start-up companies<sup>2</sup> and corporations of all sizes are applying the LSM in diverse industries from healthcare to defense, and in far apart places such as Silicon Valley and Bangalore.

The Project used the LSM to generate the business model for the social enterprise and designed a value proposition for customers in the most efficient way possible in order to decrease risk of failure by continuously testing and modifying assumptions about the market—an approach usually referred to as “build-measure-learn.” The LSM is becoming a pervasive part of entrepreneurial communities but it has not yet been applied extensively for social innovations (Gelobter, 2015; VentureWell, 2018). The vast majority of the entrepreneurship literature focuses on the creation of new ventures to generate profits. However, by definition, *entrepreneurship* is about discovering the best fit between certain needs and resources, establishing an innovative venture to satisfy those needs, and working on the venture’s growth to produce sensible outcomes (Ebrashi, 2013). Therefore, the Project argues that almost the entire entrepreneurship body of knowledge is applicable to generating business models independent of the desired outcomes and metrics to measure them. The Project was among the first to test the applicability of the LSM to create a social enterprise.

In fact, a search through the SCOPUS electronic database platform—the largest citation database of peer-reviewed literature—from inception until May 2019 with the key terms: (ALL (“social enterprise” OR “not for profit” OR “nonprofit”) AND ALL (“lean startup” OR “lean start-up”)), produced 45 articles of which only three articles were relevant to the Project as follows. Ellarby (2013) discussed the creation of *Alive and Kicking*—a social enterprise that manufactures balls in Kenya, Ghana, and Zambia—and how they have been using the LSM since 2003, even before the

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<sup>1</sup> The origins of the LSM can be traced back to the lean manufacturing principles implemented in the automobile industry in Japan after World War II (Ohno, 1978).

<sup>2</sup> A start-up is an human institution designed to create new products and services under conditions of extreme uncertainty (Moogk, 2012).

start of the lean start-up movement. Semcow & Morrison (2018) explored an adaptation of the *National Science Foundation Innovation Corps* (I-Corps<sup>TM</sup>) program (which uses the LSM to help science, technology, engineering, and mathematics scientists commercialize their research), to include mixed revenue and not-for-profit business models to help researchers generate social impact, i.e., the *I-Corps for Social Impact* (I-Corps SI). Their results revealed limitations of the I-Corps model and modifications required to enhance social impact. Katre (2016) proposed specific activities that nascent social entrepreneurs should undertake for the development of the venture by using design thinking approaches to work iteratively on both the problem and solution spaces and collaboratively with multiple diverse stakeholders. Similar to the LSM, *design thinking* is an iterative process through which, e.g., social entrepreneurs seek to understand the user, challenge assumptions, and redefine problems in an attempt to identify alternative strategies and solutions that might not be readily apparent with their initial level of understanding (Rikke Dam and Teo Siang, 2019).

Although not all peer-reviewed articles, the same search conducted through Google Scholar produced 872 results of which only a few were relevant. For example, the query identified a thesis by Kear & Thiergartner (2017) that described the use of the LSM to establish a social enterprise that aimed at developing *Beacon*—a disaster relief mobile application—to efficiently distribute relief resources to disaster survivors and mitigate waste. In a critical evaluation report, Vitvitskaya (2015) analysed the possibility of using the LSM along with design thinking to integrate “lean design thinking” into social entrepreneurship. In his book, Gelobter (2015) described the use of the LSM to produce social change by drawing from multiple examples of successful and unsuccessful new social ventures while walking the reader through the process of starting a social enterprise. Ertemel (2019) argued that for-profit and non-for-profit entrepreneurship are in essence indifferent, and presented the latest trends in the commercial entrepreneurship world together with implications for social entrepreneurship. Among these, he explored the implications of the lean start-up phenomenon and closely related concepts such as customer development philosophy, business model innovation, value proposition design, and jobs-to-be-done theory. Based on the work by Osterwalder & Pigneur (2010), Aure (2014) developed a framework to visualize the interplay between the management of a social enterprise’s commercial and social value propositions. He argued that the visual framework could help practitioners to better understand, frame, and devise strategies for their social enterprises. Dung & Oanh (2013) used the Business Model Canvas to clarify all the important factors such as the market, customers, competitors, and value proposition for a social enterprise in agriculture. They concluded that besides the business model, there are many other elements that influence the successful development of a social enterprise. Becker, Franco-Garcia & Groen (2013) described the use of the LSM to develop a business model for a social enterprise—a product co-creation centre as a means to investigate the development of economically sustainable models.

## Translational Research & Development Methodology

A *value proposition* is the collection of products and/or services (offerings) an organization provides to a customer segment to resolve a particular problem (need). The technology at the heart of the value proposition that was designed for the social enterprise has been developed by Greenspace Urban Farms—an award-winning student-operated social enterprise offering lowest-cost alternatives to urban farming initiatives. Indeed, Greenspace Urban Farms has won the First Prize of the Social Innovation Challenge held in St. John's on May 11-12, 2018. Prior to that, in November of 2017, they won the Feeding 9 Billion Challenge organized by Memorial University's Centre for Social Enterprise. More recently, in May of 2019, Greenspace won the Third Place in the "Pitch n' Pick" competition organized by Genesis—an innovation hub for technology start-ups. These awards provide an informal validation of their technology as a means to solve the problem of local food production through the urban farming concept. *Urban farming* is the practice of cultivating, processing, and distributing food in or around urban areas (Miccoli, Finucci and Murro, 2016). Greenspace Urban Farms builds its urban farming systems from upcycled industrial materials and houses them in used shipping containers. By using these materials, they reduce the overall solution costs and its lifetime environmental impact. Their systems are highly customizable, allowing for the design of units that can produce yields at commercial scales whilst reducing recurring costs. The systems can be combined in arrays for higher efficiency and can utilize hydroponic or soil-based alternatives to provide a limitless variety of crops, thus expanding beyond the *Newfoundland and Labrador Local Food Seasonality Chart* that other agricultural programs provide (Food First NL, 2018).

The NPD component of the Project incorporated the Greenspace Urban Farms technology and followed the translational research & development methodology "From Lab Bench to Store Shelves" (TR&D) developed at Memorial University (Bazan, 2019). The TR&D was proposed to better link science and engineering research to commercial outcomes, i.e., to create a more seamless transition from research to business. It is a structured framework based on best practices in new product development, project management, new venture creation, science of team science, and intellectual property management that greatly improve the likelihood of delivering a product in time, within budget, and to specification; hence increasing the odds of a successful product launch. The TR&D explains how to initiate, plan, execute, and close a translational R&D project conducted within an academic institution with the intent of bringing a product to market.

The TR&D was a critical component in the design of the Project given the grim statistics of NPDs in general. In fact, the majority of new products never make it to market and those that do, face a failure rate anywhere between 25% to 45% (Bhuiyan, 2011; Cooper, 2011, 2013; Crawford and Di Benedetto, 2014). The Project tried to beat these odds by following a framework that identifies the critical success factors at the Project level and for each stage of the NPD process, along with metrics to assess these factors and techniques to evaluate each metric (Bhuiyan, 2011). NPD processes differ from industry to industry but most of them are based on the well-known Booz, Allen & Hamilton model (Booz and Hamilton, 1982; Montoya-Weiss and Calantone, 1994). The



TR&D is a variant of the one proposed in the *PDMA Handbook of New Product Development* (Kahn et al., 2013). This choice allowed for a NPD process that is time-tested and well understood in the research & development community.

The TR&D incorporates a customized Stage-Gate® model to try to overcome the challenges that plague most NPD efforts (Cooper, 2013). In its entirety, State-Gate® includes upfront pre-development, development, and commercialization activities into one complete, robust business process. In essence, Stage-Gate® is a value-creating business process and risk model designed to transform good ideas into winning new products. Leading companies have adopted some version of Stage-Gate® to accelerate NPD projects from idea to product launch (Griffin, 1997; Menke, 1997; Lynn, Skov and Abel, 1999; Cooper, 2011; Edgett, 2011). For instance, the 2010 *American Productivity & Quality Center* benchmarking study revealed that 88% of U.S. businesses employ Stage-Gate® as roadmaps for efficiently driving NPD (Edgett, 2011). Stage-Gate® breaks down the often complex process of taking an idea from conception to launch into smaller *stages* (where project activities are conducted) and *gates* (where business evaluations and “Go/Kill” decisions are made) (Cooper, 2011). Critical success factors such as front-end loading, sharp product definition, spiral development, and voice of the customer approach are intrinsically built into Stage-Gate® (Cooper, 2013). Figure 2 depicts the customized NPD framework used by the Project.

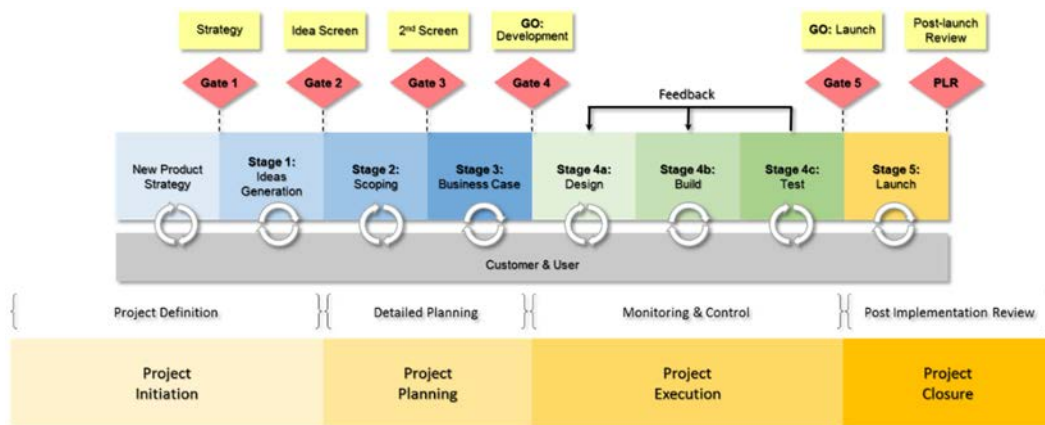


Figure 2. Project lifecycle diagram depicting the four project phases and the five-stage Stage-Gate® system.

Table 1 lists the Project activities conducive to completing the Project deliverables. The schedule was divided into the different phases of the Project at three levels: project (the Project’s lifecycle), business model development, and value proposition development (new product development).

Table 1. Overall Project Schedule

Month	Project Lifecycle (I)	Business Model Development (II)	Value Proposition Development (III)
1	Project Initiation	Hypothesis Formulation Experimental Design	New Product Strategy Stage 1: Ideas Generation
2	Project Planning	Problem Validation Customer Segments Validation	Stage 2: Scoping Stage 3: Build Business Case
3	Project Execution	Value Propositions Validation*	Stage 4: Design-Build-Test
4		Channels Validation** Customer Relations Validation** Revenue Streams Validation** Key Resources Validation** Key Activities Validation** Key Partners Validation** Cost Structure Validation**	
5			
6			
7			
8			
9			
10			
11			
12	Project Closure	Business Model Design	Stage 5: Launch

\* Value Propositions Validation continued until the end of Stage 4: Design-Build-Test.

\*\* Stages occurred simultaneously.

## Research Activities

The generation of the business model for the social enterprise using the lean start-up methodology, included the elements and concepts described below.

*Hypothesis Formulation.* The Project formulated the business model hypotheses that customers (stakeholders) in the community validated or invalidated through customer discovery experiments. The hypothesis validation process helped to eliminate most of the uncertainties common in any new venture. The Project formalised these hypotheses by using the Value Proposition Canvas and Business Model Canvas (Osterwalder and Pigneur, 2010).

*Minimum Viable Product (MVP).* This is the version of the product (solution) that enabled the Project to conduct the build-measure-learn approach with the minimum amount of effort and development time. In other words, it is the solution with just enough features to satisfy the initial customers and provide feedback for future development.

*Validated Learning.* In this context, validated learning is a unit of progress and describes learnings generated by hypothesis testing. Each test of a hypothesis (or assumption) was a single iteration in a larger process of many iterations whereby the Project sought validation based on the voice of the customer approach.

*Pivot.* A pivot is a structured correction designed to test a new hypothesis about the product. It results from a better understanding of the customer’s problem after sufficient customer feedback that invalidated a hypothesis. The Project undertook several pivots after some assumptions about the business model were invalidated.

*Rapid Iteration.* The cycle build-measure-learn occurred as fast (and lean) as possible. This cycle provided the necessary learning required to generate a more adequate business model for the social enterprise.

The research activities conducted throughout the Project’s lifecycle are described below. The Project’s lifecycle consisted of four phases, as depicted in Figure 2. Within the four lifecycle phases lies the customized five-stage Stage-Gate® model (Cooper, 2013; Palmetto, 2016).

### Project Lifecycle (Level I): Project Initiation

The project initiation phase comprised two frontend NPD processes, namely New Product Strategy and Ideas Generation, along with several supporting project management activities (project definition). The New Product Strategy step led to Gate 1: Strategy, which led to Stage 1: Ideas Generation; while Stage 1: Ideas Generation led to Gate 2: Idea Screen; which led to Stage 2: Scoping (see Figure 3).

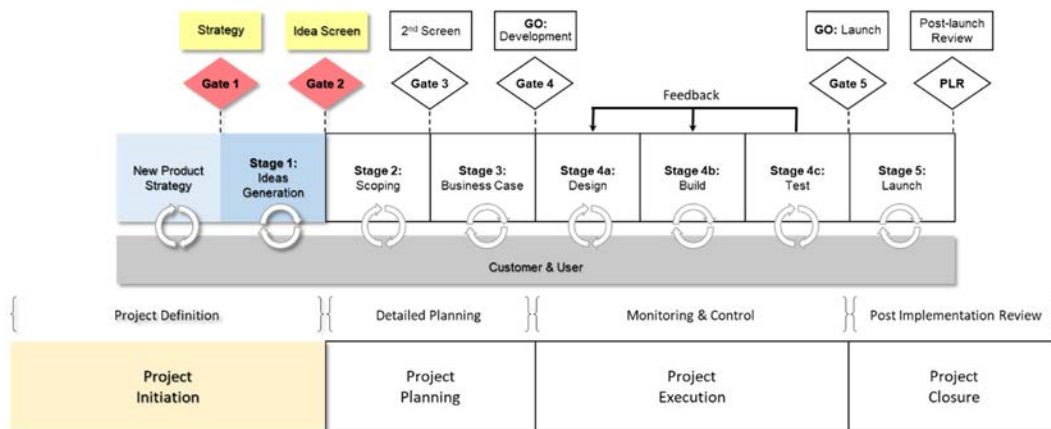


Figure 3. Project initiation phase of the Project’s lifecycle.

### Business Model Development (Level II)

#### Hypothesis Formulation

Research was conducted to determine crucial factors of the Project such as the existing needs of the community and the potential locations for a Greenspace system. The Project formulated the business model hypotheses that customers (stakeholders) in the community either validated or invalidated through customer discovery experiments. There were 10 categories of hypotheses encompassing the problem statement and the nine building blocks of the Business Model Canvas: Customer Segments, Value Propositions, Channels, Customer Relations, Revenue Streams, Cost Structure, Key Resources, Key Activities, and Key Partners. The hypothesis validation process was meant to minimize uncertainties common in any new venture. This process was especially important given the novelty of the approach for social innovation. The Project formalised these hypotheses by using the Value Proposition Canvas and the Business Model Canvas. (Appendix F provides the latest iteration of the Value Proposition Canvas and the Business Model Canvas.)

### ***Experimental Design***

The Project designed the experiments used for data acquisition based on preliminary interactions with and interest demonstrated by community members. Some of the important factors considered during this process were the types of data acquisition methods (interviews, surveys, town hall meetings, etc.) that were available to efficiently acquire the variables to validate or invalidate and reformulate the assumptions of the business model. The Project opted for semi-structured interviews conducted either in person or by phone along with more informal interactions with community members.

To conduct research involving human subjects, all members of the Project Team completed the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Course on Research Ethics (TCPS 2: CORE). Before conducting the interviews, the *Interdisciplinary Committee on Ethics in Human Research* reviewed the study proposal and found that it complied with Memorial University's ethics policy. Appendix D shows the documents submitted for the ethics application review: Recruitment Letter, Informed Consent Form, and Semi-Structured Interview Script. A typical interview was designed to take about 20 minutes of the community member's time and they were asked questions regarding how food security affects them and their community. Note: these experimental designs are different from the ones corresponding to the value proposition development (new product development) Stage 4: Design-Build-Test explained further below.

### **Value Proposition Development (Level III)**

#### ***New Product Strategy***

The first step in the NPD process was to devise a clear New Product Strategy (Wind, 1982). This identified the strategic business requirements with which the product must comply, and these were derived from the identified goals of the community (market) (Booz and Hamilton, 1982). Part of developing the New Product Strategy was the design of the gates. These gates turned into the built-in quality control checkpoints in the system and served as natural milestones of the Project. Appendix E describes the New Product Strategy.

The customer discovery process began very early in the process, even before the project initiation, and continued throughout the entire lifecycle of the Project. During this process, the Project investigated the community's needs through customer interview strategies. Among other things, the Project used the data collected to determine a custom crop selection that fits the community's needs, wants, and budget. This process was also used to investigate location alternatives for the MVP and future Greenspace systems where the Project and the social enterprise can avail of existing infrastructure to minimize costs.

#### ***Stage 1—Ideas Generation***

The aim of Stage 1 was to uncover opportunities and generate a number of different product ideas from which to select. The Project's New Product Strategy guided the search for product ideas. This stage in the NPD process was very customer-focused (Souder, 1987; Johnson, 2002), although a

strong customer involvement was sought throughout the entire NPD process (Souder, 1987; Cooper, 2011; Crawford and Di Benedetto, 2014).

### Project Lifecycle (Level I): Project Planning

The project planning phase comprised two frontend NPD processes, Stage 2: Scoping and Stage 3: Business Case, along with several supporting project management activities (detailed planning). Stage 2: Scoping led to Gate 3: Second Screening, which led to Stage 3: Business Case; Stage 3: Business Case led to Gate 4: GO: Development; which led to Stage 4: Design-Build-Test (iterative process) (see Figure 4).

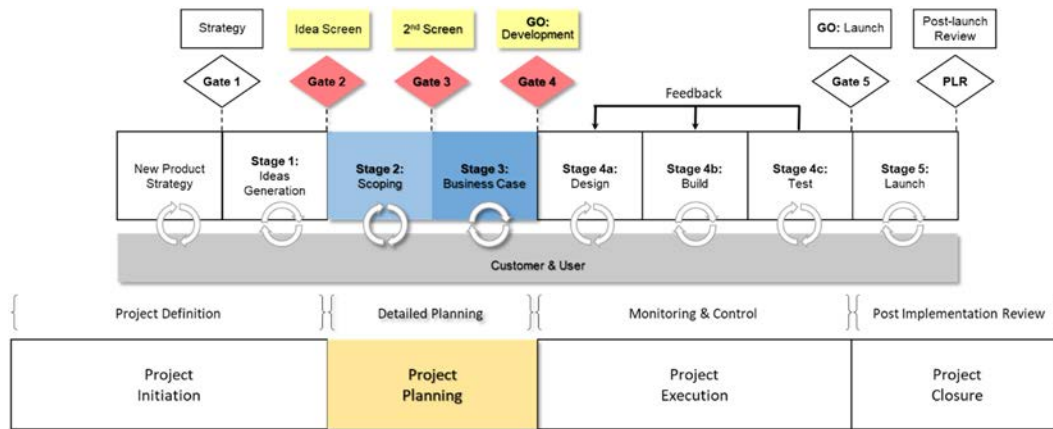


Figure 4. Project planning phase of the Project’s lifecycle.

### Business Model Development (Level II)

Utilizing the methods decided in the experimental design, experiments were conducted to validate and iterate the hypotheses. The determination of the Customer Segments for the business model was done through the analysis of prior research and testing of the Customer Segments assumptions.

#### Problem Validation

The Project used the Value Proposition Canvas to help formulate the hypotheses related to the problem statement. Within the Value Proposition Canvas, the Project used the Customer Profile to clarify the understanding of the customer’s experience when trying to solve the problem. The Customer Profile has three components that helped formulate the problem statement. 1) Customer Jobs: describes the tasks customers are trying to perform and complete, the problems they are trying to solve, or the needs they are trying to satisfy. 2) Customer Pains: describes anything that annoys customers before, during, and after trying to get a job done or simply prevents them from getting a job done. 3) Customer Gains: describes the outcomes and benefits that customers want including functional utility, positive emotions, and cost savings. The Project used a problem recognition scale for each type of customer. That is, customers who expressed: 1) a latent problem, they have a problem but they do not know it; 2) a passive problem, they are aware of the problem but are not motivated or do not know of the opportunities to solve it; 3) an active (urgent) problem, they recognize the problem and are searching for a solution although not very actively; and 4) a

vision, they have tried to solve the problem but are willing to adopt another solution when available. Appendix F provides the latest iteration of the Value Proposition Canvas.

### ***Customer Segments Validation***

After validating the problem statement, the Project needed to validate the Customer Segments assumptions. Customer Segments defines the different groups of people the social enterprise aims to reach and serve. Customers comprise the heart of any business model. To better satisfy customers, the Project needed to group them into distinct segments with common needs, common behaviors, and other attributes. The proposed business model defined two related Customer Segments based on the results of the Problem Validation experiments. Since serving all people simultaneously is not feasible, the Project needed to make a conscious decision about which segments to serve and which segments to ignore. That allowed for the design of a business model around a strong understanding of specific customer needs. Some of the questions the Project tried to answer during the Customer Segments Validation were as follows: For whom is the social enterprise creating value? Who are the social enterprise's most important customers?

## **Value Proposition Development (Level III)**

### ***Stage 2–Scoping***

During Stage 2, the Project performed a quick investigation and outlined the remaining of the Project with new information uncovered during the previous phase, i.e., for the development of the value proposition. The intent during this stage was to determine the entire Project's technical and marketplace merits. This stage prescribes desk research for preliminary market, technical, and business assessments (Cooper, 2013).

### ***Stage 3–Build Business Case***

Stage 3 had a front-end gate involving screening of ideas. During the screening process, the ideas generated during the Ideas Generation stage were evaluated against the New Product Strategy, and based on elements such as the Project's resources and estimated development time. Product ideas that passed the screening process were the subject of the appropriate business analysis and evaluated against quantitative performance criteria. The final results of this stage was a defined product, a business justification for the product, and a detailed plan of action for next stages (Cooper, 2013). The proposed product design went before several stakeholders to make further revisions and ensure that it will meet the needs. With the final product designs, the social enterprise will be able to seek corporate sponsorships to acquire the needed materials. The entire community will play an important role in acquiring the materials for the construction of the Greenspace system.

## **Project Lifecycle (Level I): Project Execution**

The project execution phase comprised three iterative NPD processes, Stage 4a: Design, Stage 4b: Build and Stage 4c: Test, along with several supporting project management activities (monitoring and control). Stage 4: Design-Build-Test leads to Gate 5: GO: Launch; which leads to Stage 5: Launch; while Stage 5: Launch leads to Post-Launch Review (PLR) (see Figure 5).

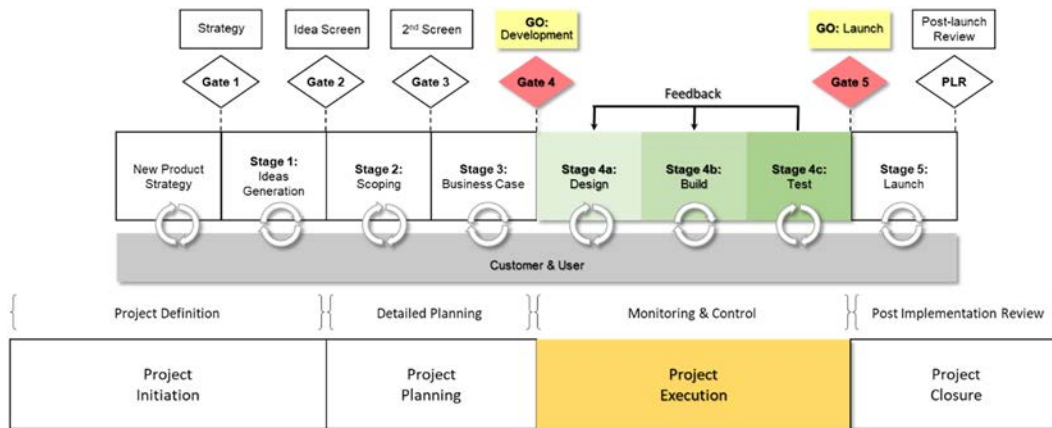


Figure 5. Project execution phase of the Project's lifecycle.

## Business Model Development (Level II)

### Value Propositions Validation

This step involved the validation of the offerings that the community members want. Some of the questions that the Project tried to answer were the channels that customers use (e.g., grocery store, home delivery) and how will an urban farming system alleviate the pain points that the community is experiencing?

The Value Propositions validation goes hand-in-hand with Stage 4: Design-Build-Test of the value proposition development. Thus, it continued until the end of the Project. The Value Propositions in the business model describes the bundle of products and services that create value for specific Customer Segments. Therefore, the Project designed as many Value Propositions as validated Customer Segments. For each Customer Segment the Project used the Value Proposition Canvas to identify the value proposition requirements. Within the Value Proposition Canvas, the Project used the Value Map to help describe the features of a specific value proposition for the business model in a more structured and detailed way. The Value Map breaks the Value Propositions down into three components that helped to design each value proposition. 1) Products and Services: the list of elements around which the Project built the value proposition. 2) Pain Relievers: describes how the products and services will alleviate specific customer pains identified during Problem Validation. These explicitly outline how the social enterprise intends to eliminate or reduce some of the things that annoy customers before, during, or after they are trying to complete a job or that prevent them from doing so. 3) Gain Creators: describes how the products and services will create customer gains. They explicitly outline how the social enterprise intend to produce outcomes and benefits that the Customer Segments expect and desire. Some of the questions that the Project tried to answer during the Value Propositions validation were as follows: What value will the social enterprise deliver to the customer? Which one of our customer's problems will the social enterprise help to solve? Which customer needs will the social enterprise satisfy? What bundles of products and services will the social enterprise offer to each customer segment? Appendix F provides the latest iteration of the Value Proposition Canvas.

### ***Channels Validation***

This process involved the determination of the means through which the final product of the business model will be delivered. Channels describes how the social enterprise will communicate with and reach its Customer Segments to deliver its value proposition. Communication, distribution, and sales channels comprise the organization's interface with customers. Since Channels are customer touch points that play an important role in the customer experience, the Project tested the Channels hypotheses by conducting field and desk experiments. Some of the questions that the Project tried to answer during Channels Validation were: Through which Channels do the different Customer Segments want to be reached? How are they being reached now by the competition? How are the Channels integrated? Which ones work best? Which ones are most cost-efficient? How will the social enterprise integrate the Channels with customer routines?

### ***Customer Relations Validation***

Several assumptions were made regarding how the social enterprise will interact with their customer base. In general, this involves the area of staffing, communications, commerce systems, educational programming of the social enterprise, customer service policies, and much more.

Customer Relations describes the types of relationships the social enterprise will need to establish with specific Customer Segments. The goal here was to clarify the type of relationship the organization will need to establish with each customer segment. Some of the questions the Project tried to answer during the Customer Relations Validation were as follows: What type of relationship does each of our Customer Segments expect the social enterprise to establish and maintain with them? Which ones can be established? How costly are they? How are they integrated with the rest of the business model?

### ***Revenue Streams Validation***

The determination of possible revenue sources for the social enterprise is very much related to the potential output of the Greenspace systems. Other potential avenues for revenues were also examined in collaboration with Copper Ridge Academy and the Municipality of Baie Verte.

Revenue Streams represents the cash that the social enterprise will generate from each Customer Segment (note: costs must be subtracted from revenues to create earnings). The main goal here was to figure out the value for which each customer segment will be willing to pay. Some of the questions the Project tried to answer during the Revenue Streams Validation were as follows: For what value are the customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each revenue stream contribute to overall revenues?

### ***Key Resources Validation***

This validation comprised the determination of the key resources required to implement an initial urban farming system, as well as those that are required to create a scalable business where more



units can be added. Some of the considerations included existing infrastructure, land availability, permitting requirements, and materials for system construction.

Key Resources describes the most important assets that the social enterprise will need to make the business model work. These resources will allow the organization to create and offer the Value Propositions, reach its Customer Segments, maintain relationships with the Customer Segments, and earn revenues. The Project worked with some community members not only to identify the key resources needed but also to design the strategy to acquire them through, e.g., corporate sponsorships, funding agencies, fundraisers, etc. Some of the questions the Project tried to answer during the Key Resources Validation were as follows: What Key Resources do the different Value Propositions require? What Key Resources do the different Distribution Channels require? What Key Resources do the different Customer Relationships require? What Key Resources do the different Revenue Streams require?

#### ***Key Activities Validation***

Key Activities of the social enterprise are those required to be able to acquire raw materials for construction, construct the unit, grow crops, educate the community, maintain the space and sell the crop, along with every step in between. If part of the business model is to scale the units every so often, then that will also be a key activity.

Key Activities describes the most important things the social enterprise must do to make the business model work. Key Activities defines the most important actions the organization must take to launch and operate successfully. Similarly to Key Resources, Key Activities are required to create and offer the Value Propositions, reach different Customer Segments, maintain Customer Relationships and earn revenues. Some of the questions the Project tried to answer during the Key Activities Validation were as follows: What Key Activities do the different Value Propositions require? What Key Activities do the different Distribution Channels require? What Key Activities do the different Customer Relationships require? What Key Activities do the different Revenue Streams require?

#### ***Key Partners Validation***

Key Partners describes the social enterprise's network of suppliers and partners that will make the business model work. Organizations forge partnerships for many reasons, and partnerships will be a cornerstone of the social enterprise's business model. The organization will create alliances to optimize the business model, reduce risk, and acquire resources. Some of the questions the Project tried to answer during the Key Partners Validation were as follows: Who are the Key Partners? Who are the key suppliers? Which Key Resources is the social enterprise acquiring from partners? Which Key Activities do partners perform?

#### ***Cost Structure Validation***

Cost Structure describes all costs that the social enterprise will incur to operate the business model. The goal was to determine the most important costs incurred while operating under the particular business model. Creating and delivering value, maintaining Customer Relationships, and

generating revenue all incur costs. The Project calculated such costs after defining Key Resources, Key Activities, and Key Partnerships. Some of the question the Project tried to answer during the Cost Structure Validation were as follows: What are the most important costs inherent in the business model? Which Key Resources are most expensive? Which Key Activities are most expensive?

### **Value Proposition Development (Level III)**

#### ***Stage 4–Design-Build-Test***

During Stage 4, the product was iteratively designed, developed, and tested. The most critical success factor in this stage was to move through the iterative process as quickly as possible, and to seek customer input and feedback throughout the entire stage. As the product moved along the NPD pipeline, the Project reassessed the product for alignment with customer’s needs and wants, market trends, competition, available third-party technology, etc. (Urban and Hauser, 1993; Cooper, 1999, 2011).

One of the advantages of the Greenspace systems is the choice of building them either on-site or in a nearby location. The preferred choice—of course—is to build the systems on-site to minimize costs although the system is designed to be movable (shipping container), in which case it can be easily transported to the final location. To maximize impact, the Project explored the possibility of employing individuals on the autism spectrum to assemble the system. Greenspace Urban Farms has a standing relationship with the Autism Society that utilizes the Greenspace concept within their construction programming. The implementation of the urban farming will begin short after the construction of the first system. This includes connecting to water and electricity sources as required, as well as site inspection and possible certification. During this time, Greenspace Urban Farms will undertake the training of the designated personnel and the social enterprise will provide a platform to implement the community programming. Appendix H provides a detailed description of the Greenspace system designed by Greenspace Urban Farms.

### **Project Lifecycle (Level I): Project Closure**

The project closure phase comprised the final NPD process, Stage 5: Launch, along with several supporting project management activities (post implementation review) and writing of the report, user manual, and manuscript with case study. Stage 5: Launch led to the Post-Launch Review (PLR) gate, while the Project closure phase led to the end of the Project (see Figure 6).

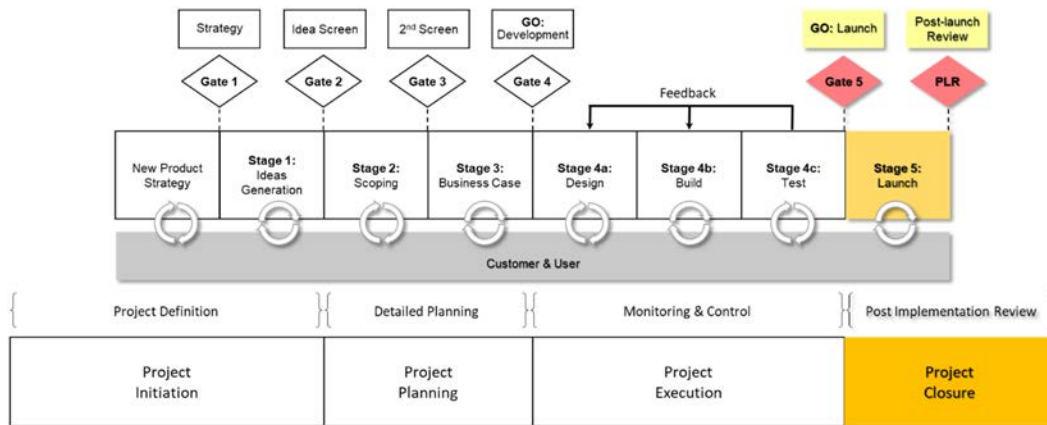


Figure 6. Project closure phase of the Project’s lifecycle.

## Business Model Development (Level II)

### *Launch of Social Enterprise*

Transfer of ownership of the social enterprise to the community.

## Value Proposition Development (Level III)

### *Stage 5–Launch*

The social enterprise will implement this stage. However, during the project closure phase, the Project designed the launch and post-launch plans, including the early elements of the post-launch lifecycle of the product.

## Commercialization Strategy

To help scale and transfer the proposed solution to the entire Baie Verte peninsula (and beyond), the Project designed the path to commercialization by following an ecosystem approach (Adner, 2012). Sequencing a commercialization strategy following an ecosystem approach involves three components. 1) *Minimum viable footprint* (MVF): this is the smallest configuration of elements that when brought together, can still create unique commercial value. One Greenspace system operated by the social enterprise represents the MVF. 2) *Staged expansion*: this is the order in which additional elements can be added to the MVF so that each new element benefits from the system already in place, and increases the value creation potential for the subsequent elements to be added (e.g., expanding the number of production units). 3) *Ecosystem carryover*: this is the process of leveraging elements developed during the construction of the ecosystem to enable the construction of a second ecosystem. Ecosystem carryover in this case entails the expansion throughout the Baie Verte peninsula. The Project designed but did not implement the staged expansion and ecosystem carryover stages. After the successful implementation of the MVF, the social enterprise will collaborate with the different stakeholders to seek funding for the said expansion.

The first step in the process of developing the commercialization strategy based on the aforementioned framework involved mapping the ecosystem. That is, the network of parties

(suppliers, distributors, customers, competitors, government agencies, etc.) involved—in one way or another—in the delivery of the value proposition. The second step was the drawing of a surplus map. The key here was to create winners across the ecosystem (it did not suffice just to generate large net surplus). The third step was to draw the probability of success map. The key here was to increase the overall odds of success, by increasing the odds of success across the ecosystem.

To map the ecosystem and draw the surplus and probability maps, the Project used a technique called value blueprint. The *value blueprint* is a tool that makes the ecosystem and its dependencies explicit. It lays out the arrangement of the elements that are required to deliver the value proposition. It lays out how the different activities are positioned and linked, and which actor will be responsible for what. The Project began by identifying the full set of partners and specifying their positions; the suppliers the social enterprise will rely on, the intermediaries that lie between the social enterprise and the consumer, and the “complementors” whose offers are bundled with that of the social enterprise. The Project then identified the changes in activities and links that are expected from each participant. Finally, the Project assessed how these changes and links affect the likelihood that the entire system will come together to deliver the value proposition. Please see Appendix G for a more detailed description of the commercialization strategy.

## Knowledge Mobilization

Evidence shows that for an initiative to achieve real and measurable impacts it requires a thoughtful and deliberate knowledge mobilization (KM) plan (Fixsen et al., 2005). The Project recommends that the social enterprise develop its KM plan in collaboration with The Harris Centre personnel. They have the expertise to help organizations develop and implement a clear plan that will increase the effectiveness and reach of the KM efforts. Meanwhile, the Project designed an outline of the KM plan by following the recommendations in the Ontario Centre of Excellence’s Knowledge Mobilization Toolkit (Ontario Centre of Excellence for Child and Youth Mental Health, 2014).

**Key Message:** The main message the social enterprise would like to convey is the applicability of social entrepreneurship to address food and nutrition security issues in rural communities where access to sufficient supply of quality and healthy food is limited by infrastructure and extreme weather.

**Purpose:** The purpose of the key message is twofold, to engage the community in supporting the social enterprise that they own, and to inspire other communities to pursue similar solutions for their food and nutrition security needs.

**Collaboration:** The social enterprise would engage several stakeholders (e.g., The Harris Centre, municipalities, community leaders, and champions) for sharing the information with the right people to ensure meaningful engagement and impact. These stakeholders will be able to share the vision, build understanding, recognize other perspectives, establish personal meaning, and build commitment from the community (Lavis et al., 2003). KM requires actively meeting people where

they are and making it possible for them to act on the information. To accomplish this, the social enterprise would engage with knowledge users from each target audience during the planning stage—during the development of the message(s)—so that information and tools are designed and delivered the way the different audiences prefer (Ontario Centre of Excellence for Child and Youth Mental Health, 2014).

**Implementation:** The Project recognizes that no single strategy will be effective in all situations. Different target audiences have preferred means of communication. Thus, the social enterprise would design a series of communication strategies to deliver the knowledge that they want to mobilize. A few of the communication strategies are as follows. 1) *Yaffle Networks* will provide a web home for the clusters of connections between the social enterprise and the knowledge they want to share (The Harris Centre, 2019). It will bring exposure for social entrepreneurship as a viable approach to helping solve food and nutrition security in rural areas and connect with other stakeholders with similar interests. 2) The social enterprise would use the Project website that features the Project design, lessons learned, and outcomes. The Project website can keep the community informed and involved and it can provide inspiration for others (e.g., local governments, non-governmental organizations) to use similar strategies for their own food and nutrition security efforts. 3) The social enterprise would create its own website (e.g., with ecommerce capabilities) that can provide valuable information for the community and people from other communities interested in urban farming. The Project recommends the design of the website by using the WordPress® platform. WordPress® is a free and open-source content management system that will allow different content providers to communicate with the community. 4) The social enterprise would also use other means of communication as appropriate such as social media, town hall meetings, workshops on urban farming, educational material, fact sheets, local and national media outlets, etc.

**Measure:** The social enterprise would use a host of indicators to measure the KM efforts such as reach indicators, usefulness indicators, use indicators, partnership/collaboration indicators, program or service indicators, etc. Data collection for the indicators can include surveys, feedbacks, interviews, number of downloads/hits, number of read/browsed, etc.

## Appendix A

### Demographics

Note: This section was extracted almost verbatim from (Newfoundland and Labrador Statistics Agency, 2016). The 2016 Census population for Economic Zone 11 was 13,250. This represents a decline of 3.6% since 2011 (13,250 in 2016, down from 13,745). Over the same period, the entire province experienced a population increase of 1.0% since 2011 (519,715 in 2016, up from 514,535). The median age in Economic Zone 11 was 52 in 2016. The 2016 median age in Newfoundland and Labrador was 46. Figure 7 shows the decline of the population in Economic Zone from 1986 to 2016 and the gender distribution according to the 2016 Census.

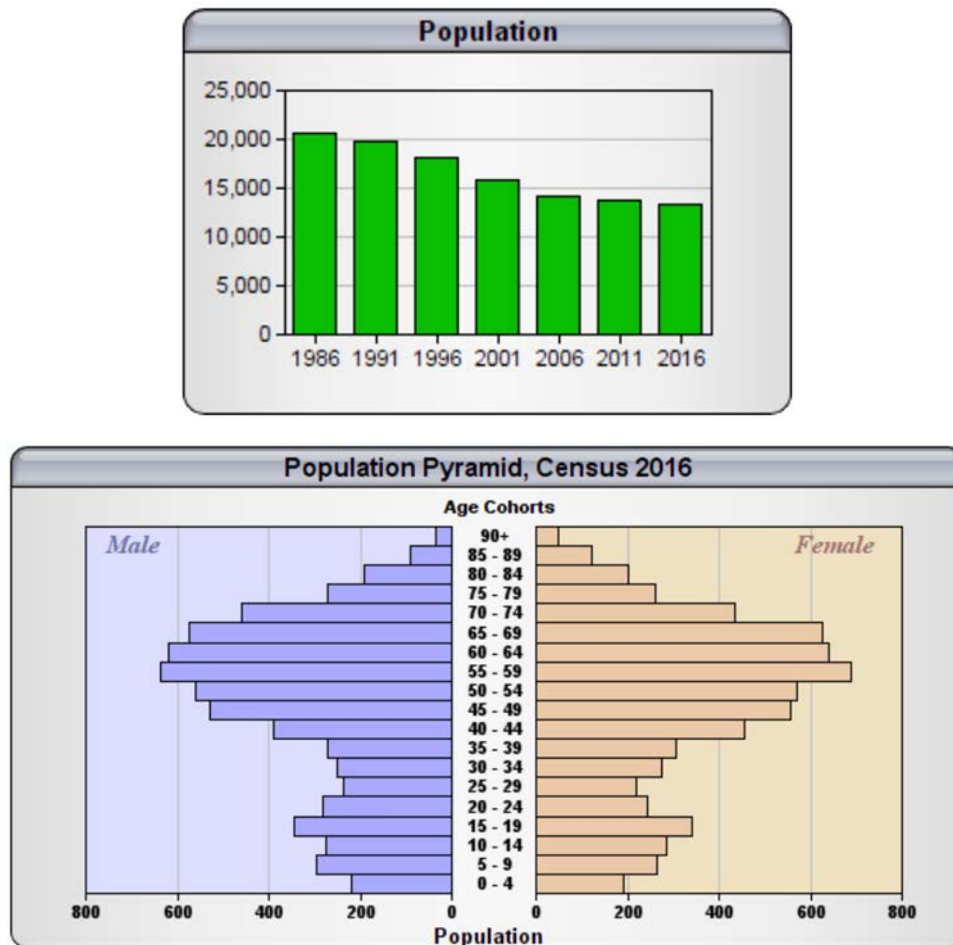


Figure 7. Population statistics for Economic Zone 11.

### Income, Consumption, and Leisure

**Gross and After Tax Personal Income Per Capita.** The 2016 gross income for every man, woman, and child (gross personal income per capita) in Economic Zone 11 was \$30,500. For the province, gross personal income per capita was \$36,600. After tax personal income per capita, adjusted for inflation, was \$19,600 for Economic Zone 11 in 2016. For the province, after tax personal income per capita was \$22,600. Figure 8 shows that income per capita has been rising in the Baie Verte Peninsula from 1998 to 2016.

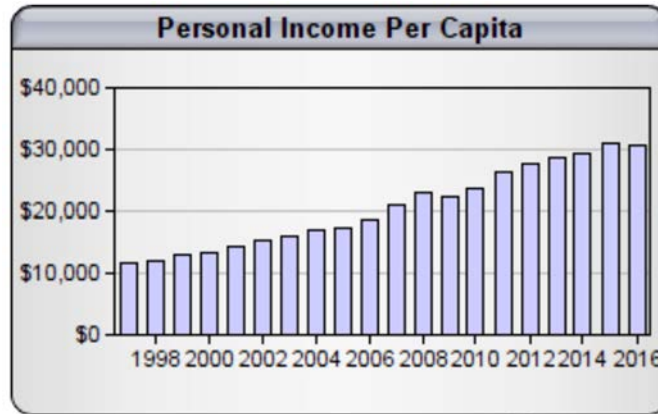


Figure 8. Personal income per capita in Economic Zone 11.

**Individual and Family Income.** Half of the males in Economic Zone 11 received more than \$35,200 in income during 2016, while half of females received more than \$20,300. Half of the males in Newfoundland and Labrador received more than \$40,200 in income during 2016, while half of females received more than \$26,100. The national values were \$41,000 for males and \$29,200 for females. Half of the couple families in Economic Zone 11 had incomes of more than \$67,400 in 2016. Half of the couple families in the province had incomes of more than \$88,400. The national value was \$89,600. Half of the lone parent families in Economic Zone 11 had incomes of more than \$36,500 in 2016. Half of the lone parent families in the province had incomes of more than \$40,900. The national value was \$45,200. The average couple family income in Economic Zone 11 was \$81,800 in 2016. The average couple family income in the province was \$107,000. The national value was \$111,100. Figure 9 shows that income per capita for males, females, and total in the Baie Verte Peninsula have been rising from 2002 to 2016.

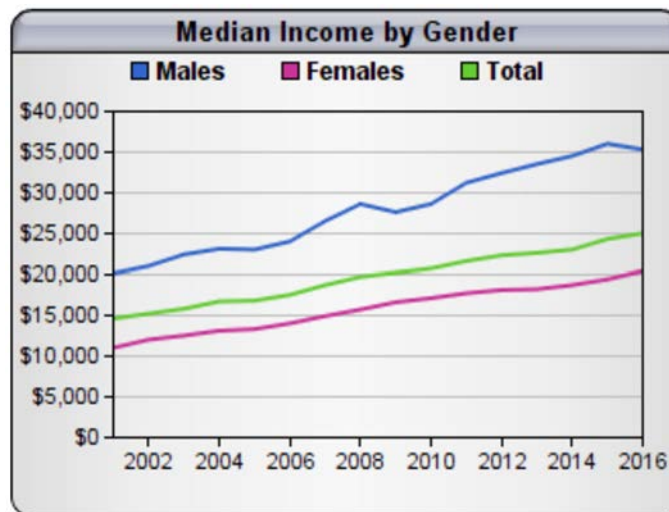


Figure 9. Median income by gender in Economic Zone 11.

**Self-Reliance Ratio.** The 2016 self-reliance ratio for Economic Zone 11 was 69.1%. This is a measure of the community’s dependency on government transfers such as Canada Pension, Old Age Security, Employment Insurance, and Income Support Assistance. A higher self-reliance ratio

indicates a lower dependency. The self-reliance ratio in the province was 80.6%. Figure 10 shows the sources of income in the Baie Verte Peninsula in 2016.

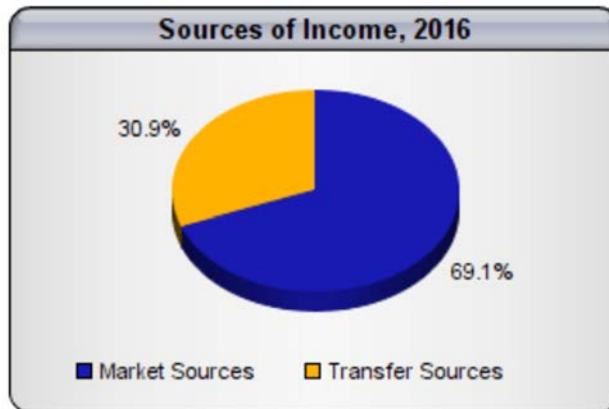


Figure 10. Sources of income in Economic Zone 11.

**Market Income and Sources.** In 2016, the sources of market income for persons in Economic Zone 11 were:

- Employment Income (6,870 persons reporting \$35,600 average income)
- Investment Income (1,580 persons reporting \$3,800 average income)
- RRSP Income (65 and older) (140 persons reporting \$4,400 average income)
- Private Pension (1,410 persons reporting \$15,500 average income)
- Other Income (1,190 persons reporting \$7,300 average income)

## Health

A major indicator of well-being is how people rate their own health status. In 2015-2016, 68.2% ( $\pm 10.9\%$ ) of individuals age 12 and over in Economic Zone 11 rated their health status as excellent or very good. For the province, 62.0% ( $\pm 1.7\%$ ) of individuals age 12 and over rated their health status as excellent or very good. Figure 11 shows the self-assessment of health status for people in the Baie Verte Peninsula in the 2015-2016 period.

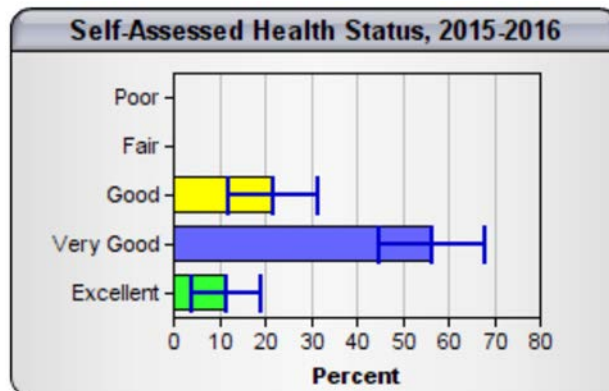


Figure 11. Self-assessed health status in Economic Zone 11.



## Education, Literacy, Skills and Training

**Highest Level of Education.** In Economic Zone 11, about 61.3% of people aged 15 and over had at least a High School diploma in 2016 compared to 76.6% in the province as a whole. In Economic Zone 11, about 5.6% of those people aged 15 and over had a Bachelor's Degree or higher in 2016 compared to 14.8% in the province as a whole. In Economic Zone 11, about 70.9% of people aged 25 to 64 had at least a High School diploma in 2016 compared to 84.3% in the province as a whole. In Economic Zone 11, about 6.9% of people aged 25 to 64 had a Bachelor's Degree or higher in 2016 compared to 18.3% in the province as a whole. Figure 12 shows the highest level of education for people in the Baie Verte Peninsula in 2016.

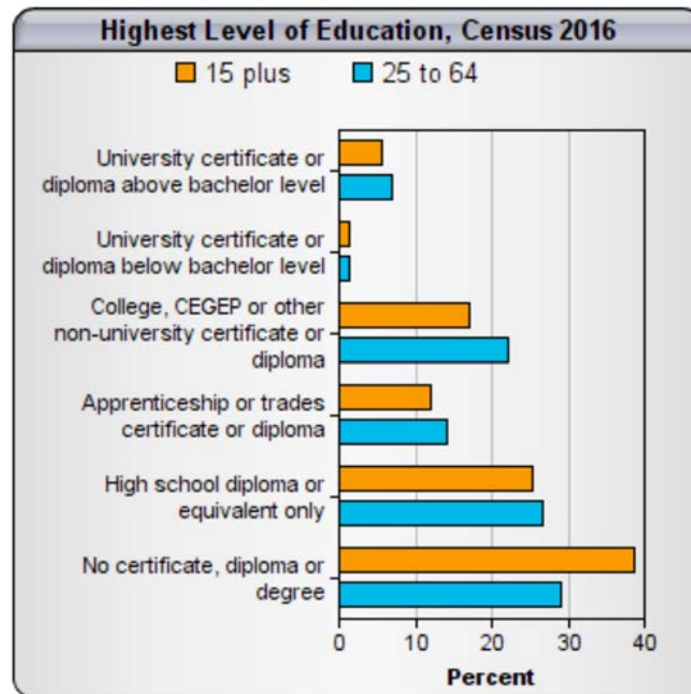


Figure 12. Highest level of education in Economic Zone 11.

## Schools contained in Economic Zone 11

The list below shows the names of the schools in the Baie Verte Peninsula. Of the 42 schools in the region, only 14 schools were open in 2016.

- Bayview Primary - Nipper's Harbour
- Brian Peckford Primary - Triton
- Cape John Collegiate - La Scie
- Copper Ridge Academy - Baie Verte
- Dorset Collegiate - Pilley's Island
- Green Bay South Academy - Robert's Arm
- H.L. Strong Academy - Little Bay Islands
- Hillside Elementary - La Scie
- Indian River Academy - Springdale
- Indian River High School - Springdale
- Long Island Academy - Beaumont

- MSB Regional Academy - Middle Arm
- St. Peter's Academy - Westport
- Valmont Academy - King's Point
- Baie Verte Academy - Baie Verte (Closed)
- Baie Verte Collegiate - Baie Verte (Closed)
- Baie Verte Middle School - Baie Verte (Closed)
- Beachside Academy - Beachside (Closed)
- Blackmore Elementary - Pilley's Island (Closed)
- Brighton Elementary - Brighton (Closed)
- Charisma Collegiate - Springdale (Closed)
- Crescent Elementary - Robert's Arm (Closed)
- Deckwood Primary - Woodstock (Closed)
- Elias Goudie Academy - Port Anson (Closed)
- Hall's Bay Elementary - South Brook (Closed)
- Harbour View Academy - Triton (Closed)
- Harbour View Elementary - Harry's Harbour (Closed)
- Indian River Primary - Springdale (Closed)
- La Rochelle Academy - Brent's Cove (Closed)
- La Rochelle Central High - Brent's Cove (Closed)
- Little Bay Elementary - Little Bay (Closed)
- M.W. Jeans Academy - Burlington (Closed)
- Ocean View Elementary - Ming's Bight (Closed)
- R.W. Parsons Academy - Robert's Arm (Closed)
- Rickett's Elementary - Seal Cove, White Bay (Closed)
- Sacred Heart Elementary - Brent's Cove (Closed)
- Seaside Elementary - Ming's Bight (Closed)
- South Brook Academy - South Brook (Closed)
- St. George's Elementary - Purbeck's Cove (Closed)
- St. Pius X Elementary - Baie Verte (Closed)
- St. Pius X High School - Baie Verte (Closed)
- St. Theresa's Elementary - Fleur de Lys (Closed)

## Appendix B

Thriving Regions Session Presentation. Baie Verte, June 7<sup>th</sup>, 2018

# Development of a Business Model to Help Address Food and Nutrition Security in the Baie Verte Peninsula

Bennett Newhook, Hannah Gaultois, Carlos Bazan



## Collaboration

**Bennett Newhook (Mechanical Engineering)**  
**Sonya Killam (Commerce)**  
**Justin Elliott (Civil Engineering)**



# Collaboration (Cont'd)

**Hannah Gaultois (Centre for Social Enterprise)**  
**Carlos Bazan (Faculty of Engineering)**

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# Collaboration (Cont'd)

**Allan Cramm (Anaconda Mining)**  
**Brian Peach (Town of Baie Verte)**  
**Kristie Jameson (Food First NL)**

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# Goal

## FOOD AND NUTRITION SECURITY

Summary Report: Baie Verte Peninsula Thriving Regions Workshop  
Lesley Harris Centre (Memorial University)



# Complex

## FOOD AND NUTRITION SECURITY

- Country food
- Store-bought food
- Local food production
- Life skills and nutrition literacy
- Programs and community initiatives
- Policy and legislation



# Focus

## LOCAL FOOD PRODUCTION

Business model for a social enterprise

Scalable, transferable solution



“A business model describes the rationale of how an organization **creates, delivers and captures** value.”

LEAN START-UP METHODOLOGY

## TRANSLATIONAL R&D

“From Lab Bench to Store Shelves”



# Translational R&D

## BEST PRACTICES

- Product development
- Project management
- New venture creation
- Science of team science
- Intellectual property management



CHANGE-MAKER  
INCLUSION  
SOCIAL ENTREPRENEURSHIP  
TRIPLE BOTTOM LINE SOCIAL PROCUREMENT  
SOCIAL ENTERPRISE INCUBATOR  
CORPORATE SOCIAL RESPONSIBILITY  
IMPACT ENGAGEMENT SOCIAL  
INVESTING BUSINESS  
INNOVATION SOCIAL RETURN  
RESEARCH ON INVESTMENT  
COLLABORATION COMMUNITY  
REVENUE SOCIAL  
STREAM IMPACT  
SOCIAL JUSTICE TEACHING  
SUSTAINABILITY AND BLENDED  
SOCIAL LEARNING VALUE  
VENTURE NOT-JUST-FOR-PROFIT  
SOCIAL FINANCE



# Social Enterprise

- Earns revenue through the sale of goods or services to further a social, community economic, cultural, or environmental purpose
- Reinvests its profits into the organization
- Blended return on investment both social and financial



# Social Enterprise Baie Verte

- Addresses a social, cultural, environmental need
- Model is sustainable
- Creates community and university engagement in many ways
- Can be used in other communities



## Technology

GREENSPACE URBAN FARMS

First Prize of the Social Innovation Challenge

First Prize of the Feeding 9 Billion Challenge

Overcast Overachiever Award



GREENSPACE URBAN FARMS 



Justin Elliott

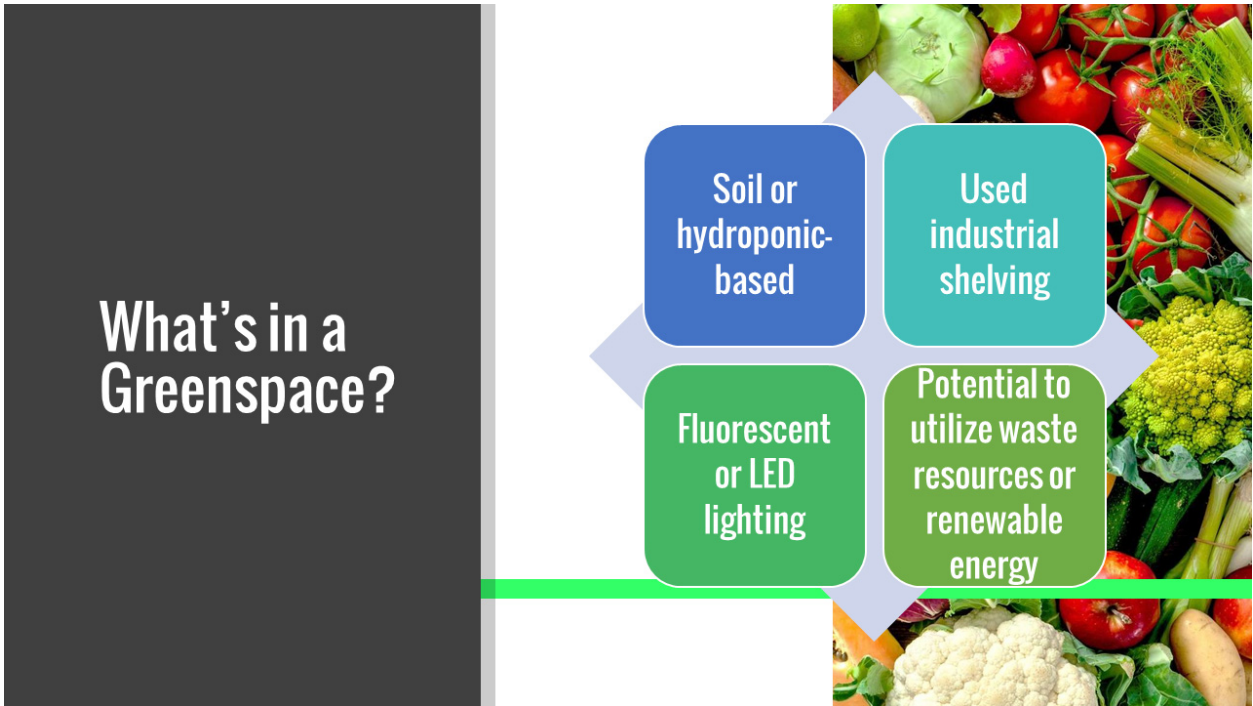


Sonya Killam



Bennett Newhook





# Greenspace

## BUSINESS MODEL

Maximizing impact to the community



Social  
Enterprise  
Model

Sustainable  
Project  
Development

Agriculture  
Sector Work  
Plan

# Social Enterprise

## QUADRUPLEBOTTOM-LINE

- Cultural programming & opportunities
- Educational curriculum & community programming
- Employment opportunities
- Using almost entirely post-consumer materials



# Sustainability

## CANADIAN FOOD SUSTAINABILITY GOALS

- Holistic
- Enabled by traditional knowledge
- Responds to local needs
- Combines with economic development strategies



# The Way Forward

## AGRICULTURE SECTOR WORK PLAN

- 6 key challenges and opportunities
- 43 actions to accelerate growth in agriculture industry
- Greenspace can provide value, directly answer 19 actions



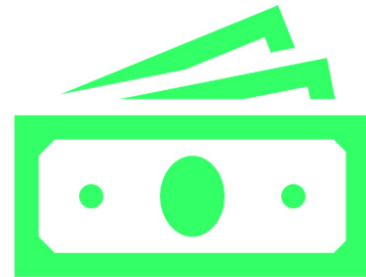
# Partnerships with Communities

- Partnerships that utilize existing infrastructure
- Opportunity for customized cultural programming
- Answering food security while addressing cultural and community values



# Post-Consumer Materials

- Waste minimization
- Corporate sponsorship methods
- Higher-value donations at a lower cost
- Potential to lower carbon taxation for corporate entities



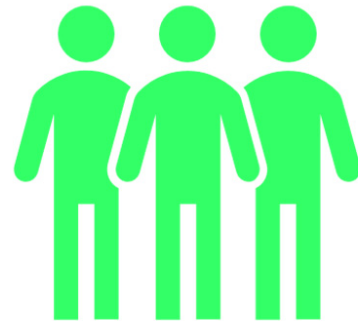
# Employing Individuals on the Autism Spectrum

- Programming through The Autism Society
- Construction of units
- Employment post-implementation
- Educational programming



# Community Programming

- Educational curriculum
- Cultural programming
- Nutritional Literacy
- Intergenerational programming



# Possibilities for Greenspaces

- Provincial and federal Farm to School programming
- Seniors facility food supply
- Year-round community gardens
- Anything that fits community values and needs



## Community Input







## Appendix C

### Thriving Regions session notes Baie Verte - June 7th, 2018

*(Notes recorded by Brennan Lowry and Marilyn Forward)*

#### **Project 3: Food and Nutrition Security on the Baie Verte Peninsula - Bennett Newhook, Hannah Gaultois, Carlos Bazan**

*Presentation:*

- Goal is to develop a business model for food security on the Baie Verte Peninsula
- Part of the project team are the co-founders of Greenspace (a company in St. John's)
- Other project partners: Anaconda, town of Baie Verte, Food First NL
- Food security in NL: should address country food, community food, etc.
- This project will develop a business model for a social enterprise to help provide a scalable and transferrable model for food security on the Baie Verte Peninsula - describe how a non-profit can create, deliver, and capture value and improve food security
- Use of the Lean Startup methodology
- Translational R & D model/methodology (developed at Memorial) - “from lab bench to store shelves” - designed to help improve seamless transition from research to business development/market readiness
  - Product development
  - Project management
  - New venture creation
  - Science of team science
  - IP management
- MUN Centre for Social Enterprise started in 2017 - mandate to catalyze social enterprise in NL - partnership between schools of Business, Music, and Social Work to create a multidisciplinary team to help stimulate social enterprise in rural areas of NL and across the province
- Social enterprise
  - The social enterprise action plan recently launched by the provincial gov't as part of the Way Forward plan
  - Working definition of SE as a revenue-generating organization that furthers a social, cultural, environmental, or otherwise community-oriented purpose that re-invests its profit into the organization (not to shareholders), as well as blended ROI into both financial and social returns
  - In the Baie Verte region, it's a good fit due to regional challenges/priorities - declining population, food security, etc., as well as being amenable to community-owned ventures, and allowing for greater support from MUN and other institutions

- Social enterprise is very scalable and transferrable - what is developed here could be adapted in new SE models in other rural regions of the province
- Greenspace Urban Farms
  - 84% of our communities in NL don't have a full service grocery stores/rely on local corner stores
  - NL only grows 10% of its fruits and vegetables
  - Only hundreds of farms in NL, where there used to be farming
  - 3 day food supply across the island
  - Some urban farming solutions exist, but they're usually expensive
  - Greenspace aims to solve these challenges by using affordable self-contained urban farming systems housed in post-consumer shipping containers
    - Highly customizable to fit the needs and available infrastructure of communities
    - Systems can be soil or hydroponic-based, custom-built hydroponic or pre-fabricated
    - LED or fluorescent lighting
    - Can use waste resources (e.g. heat from industrial facilities), as well as solar panels, rain water
    - Each unit can grow about 66 kg of food every 9 days - \$1500 of potential revenue
  - Greenspace has a quadruple bottom line
  - All projects must be sustainable - holistic
  - Provincial Ag. sector work plan (Way Forward) - Greenspace can help address 19 out of 43 of the action items in the work plan
  - Will grow based on community partnerships that draw on existing infrastructure, customized cultural programming, etc.
  - Use of post-consumer materials minimizes waste, provides corporate sponsorship benefits, carbon emissions reduction possibilities
  - Will employ clients of the Autism Society who are already being trained on agriculture
  - Wide variety of community programming: educational curriculum, cultural programming, nutritional literacy, intergenerational programming
  - Possibilities: farm to school systems, seniors' systems, year-round community gardens

*Discussion:*

- Idea of having fresh fruit and vegetables for mine workers - could be a good fit, but what are the power requirements and other factors that are required/costs? - the biggest input is

usually the material cost, which can often be 100% donated by corporate sponsors; power requirements depend on the lighting, crop, soil vs. hydroponic, etc.

- Any units already in operation? - not yet, there has been experimental work at the MUN Botanical Gardens testing crops in similar conditions, and one of the founders has 10 years of agriculture experience, but this project would be the pilot project
- There are similar companies doing similar units, but they cost \$70,000 a unit, which would mean you'd have to grow herbs to get the greatest revenue, or do vertical farming
- Are you looking for non-cash sponsorships as well? - yes, they're very valuable because of the materials they can give
- What would be the social enterprise model? - that's up to the community/region, and that's what the business model in this project is hoping to develop
- The business model does have to retain a non-profit status to get the corporate sponsorships
- \$1500 per 9 days estimate is based on microgreens, which is applicable to St. John's and not to the region, so the crop portfolio would have to be tailored to the food security needs of the region
- fodder/forage for livestock could be an opportunity
- How could the interior setup of the systems be optimized to be efficient and cost-effective? - we have lots of skills within the team of Greenspace that can be drawn on
- Potential partners: Anaconda, schools, seniors groups - great opportunities for social enterprise, and could be integrated into curriculum - food banks could also be a potential partner
- The units could be integrated into a commercial kitchen at a school or another public institution
- There's a new seniors' residence going up in Baie Verte - there could be use of the waste heat from that facility
- The mines in the area give off a lot of waste heat from their ventilation systems that could be captured by greenhouse units, enable year-round agriculture
- Greenspace is developing a hands-on gardening curriculum based on one developed in New Brunswick
- Geothermal energy for greenhouse production - there could be a greenhouse/root cellar combination that uses underground piping, Greenspace has been talking with an engineer about this idea
- This project suggests it would get \$1500 of produce in 9 days
- Corporate sponsors ... monetary and non-monetary. Non-monetary often seeks to get rid of used valuables and we can use this while promoting their business
- Funding available? This hits the "Way Forward" government mandate in many capacities so check out the directions and see if it is a good fit. TCII funding; ACOA - we must solidify core details before we seek out funding. MMSB may potentially have funding available. Greenspace would appreciate having their name on it so they can ensure that

they are pushing the concept and getting recognition but we want to make sure that corporate sponsorship is determined to ensure that they are recognized.

- What inspections would have to be done for food safety? - Service NL has to do a food safety inspection, the facility has to be certified and people have to be trained
- There are retraining opportunities for workers who have been laid off, workers with disabilities (e.g. partnership with Autism society, etc.)
- The solution has to be plug and play, it could be digital, but high tech solutions also make the whole system dependent on computers (low-cost Arduino systems could be setup)
- Does the logo have to be displayed on the side of the units? - Greenspace is flexible
- The \$1500 in 9 day figure depends entirely on the crops grown and the method - a lot of it depends on microgreens, which have been used for a long time in high-end restaurants, but could be used for all kinds of things

## Appendix D

### Ethics Application Review

#### Recruitment Letter

Subject Line: Baie Verte Food Study

Hello,

My name is Carlos Bazan and I am Assistant Professor & Engineering Chair in Entrepreneurship at Memorial University. My research team is conducting a research project titled “Generation of a Business Model to Help Address Food and Nutrition Security in the Baie Verte Peninsula.” The other members of the team are Bennett Newhook, senior Mechanical Engineering student and Ms. Hannah Gaultois, Partner Relations Officer with the Centre for Social Enterprise.

The purpose of the research project is to design a business model for a community-owned social enterprise that will help address food and nutrition security in the Baie Verte Peninsula. The residents of the Baie Verte Peninsula have identified “food security” as one of the priority themes in the Summary Report Baie Verte Peninsula Thriving Regions Workshop sponsored by the Harris Centre in March 2018.

The research team would like to invite you to participate in an interview in which we will ask questions regarding how food security affects you and your community. Participation will require around 15 to 20 minutes of your time and can be conducted in person or over the phone. The in person interview will be held in the offices of the Town of Baie Verte (32 Highway 410, Baie Verte) or another location that may be more convenient to you. If you are interested in participating in this research project, please fill out your contact information in the form provided below and return it by fax (709 864 3490) or email ([carlos.bazan@mun.ca](mailto:carlos.bazan@mun.ca)). Please note that this project is not associated with the organization that circulated the study information on our behalf, and that the decision whether or not to participate will not be reported to members or officials of any organization.

If you have any questions about the research project, please contact any of the team members: Carlos Bazan ([carlos.bazan@mun.ca](mailto:carlos.bazan@mun.ca)), Hannah Gaultois ([hgaultois@mun.ca](mailto:hgaultois@mun.ca)) or Bennett Newhook ([bennett.newhook@mun.ca](mailto:bennett.newhook@mun.ca)). Also, if you know anyone who may be interested in participating in this research project, please feel free to give them a copy of this information. Thank you in advance for your help,

Carlos Bazan

The proposal for this research has been reviewed by the Interdisciplinary Committee on Ethics in Human Research and found to be in compliance with Memorial University’s ethics policy. If you have ethical concerns about the research, such as your rights as a participant, you may contact the Chairperson of the ICEHR at [icehr.chair@mun.ca](mailto:icehr.chair@mun.ca) or by telephone at 709-864-2861.

**Contact Form:**

First Name: \_\_\_\_\_

Best way to contact you to arrange an interview:

Email: \_\_\_\_\_

Phone: \_\_\_\_\_

**Informed Consent Form**

**Title:** Generation of a Business Model to Help Address Food and Nutrition Security in the Baie Verte Peninsula

**Researchers:** Dr. Carlos Bazan  
Assistant Professor & Engineering Chair in Entrepreneurship  
Faculty of Engineering & Applied Science  
Memorial University of Newfoundland  
240 Prince Phillips Drive  
St. John's, Newfoundland & Labrador, Canada A1B 3X5  
S.J. Carey Building | Room EN3032  
Email: carlos.bazan@mun.ca, T 709 864 8943 | F 709 864 3490

Ms. Hannah Gaultois  
Partner Relations Officer  
Centre for Social Enterprise  
c/o Faculty of Business Administration  
Memorial University of Newfoundland  
St. John's, Newfoundland & Labrador, Canada A1B 3X5  
Email: hgaultois@mun.ca, T 709 864 8556 | F 709 864 7999

Mr. Bennett Newhook  
Senior Mechanical Engineering Student  
Memorial University of Newfoundland  
14 Powell Place  
St. John's, Newfoundland & Labrador, Canada A1A 3W4  
Email: bennettnewhook@gmail.com, T 709 351 1379

You are invited to take part in the research project titled “Generation of a Business Model to Help Address Food and Nutrition Security in the Baie Verte Peninsula.”

This form is part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. It also describes your right to withdraw from the study. In order to decide whether you wish to participate in this research study, you should understand enough about its risks and benefits to be able to make an informed decision. This is the

informed consent process. Take time to read this carefully and to understand the information given to you. Please contact the Principal Investigator, Carlos Bazan, if you have any questions about the study or would like more information before you consent.

It is entirely up to you to decide whether to take part in this research. If you choose not to take part in this research or if you decide to withdraw from the research once it has started, there will be no negative consequences for you, now or in the future. Should you decide to withdraw from the study, any data collected up to that point will be deleted. You are free to skip any questions during the interview and can decide to quit participating in the interview at any time.

**Introduction:**

My name is Carlos Bazan, Assistant Professor and Engineering Chair in Entrepreneurship at Memorial University, and I am conducting studies to help transfer research outcomes generated at Memorial University to the community.

**Purpose of Study:**

The purpose of the research project is to design a business model for a community-owned social enterprise that will help address food and nutrition security in the Baie Verte Peninsula. The residents of the Baie Verte Peninsula have identified “food security” as one of their priority themes in the Summary Report Baie Verte Peninsula Thriving Regions Workshop sponsored by the Harris Centre in March 2018.

**What You Will Do in this Study:**

The research team would like to invite you to participate in an interview in which we will ask questions regarding how food security affects you and your community.

**Length of Time:**

The interview will require approximately 15 to 20 minutes of your time.

**Withdrawal from the Study:**

If you do not wish to participate in the research project you can say so at any point and the interview will stop immediately. Should you decide that you do not wish to participate in the study, any data collected up to that point will be deleted. Please note that we do not collect any personal identifiers and anything that you may say cannot be associated with you in any way.

**Possible Benefits:**

Your participation in this research project may lead to the following potential benefits:

- a) The research project will design a business model for a community-owned social enterprise that will help address food and nutrition security in the Baie Verte Peninsula.
- b) The findings of this research project will be published in a report by the Harris Centre.



**Possible Risks:**

There are no foreseeable risks associated with the interview.

**Confidentiality:**

Although the data from this research project will be published by the Harris Centre, the data will be reported in aggregate form, so that it will not be possible to identify individuals. Since no personal identifiers are requested, it is not possible to associate a name with any given set of responses.

**Anonymity:**

No personal data will be collected during the interviews.

**Use, Access, Ownership, and Storage of Data:**

- Only the researchers will have access to the data.
- Data from the research project will be kept secure using password protected files and when not in use for analysis, they will be stored in USB keys in a locked drawer in the office of the Principal Investigator.
- Data will be kept for a minimum of five years, as required by Memorial University's policy on Integrity in Scholarly Research.

**Reporting of Results:**

The findings of this research project will be published by the Harris Centre.

**Sharing of Results with Participants:**

A summary of the results of this research project will be posted online at <http://www.ittakesavillage.mun.ca>.

**Questions:**

You are welcome to ask questions before, during, or after your participation in this research project. If you would like more information about this study, please contact:

Carlos Bazan, BSc(Eng), MBA, MSc(AM), MSc(BA), PhD  
Assistant Professor, Engineering Chair in Entrepreneurship  
Faculty of Engineering & Applied Science  
Memorial University of Newfoundland  
240 Prince Phillips Drive  
St. John's, Newfoundland & Labrador, Canada A1B 3X5  
S.J. Carey Building, Room EN3032  
Email: [carlos.bazan@mun.ca](mailto:carlos.bazan@mun.ca)  
T 709 864 8943  
F 709 864 3490

The proposal for this research has been reviewed by the Interdisciplinary Committee on Ethics in Human Research and found to be in compliance with Memorial University's ethics policy. If you have ethical concerns about the research, such as the way you have been treated or your rights as a participant, you may contact the Chairperson of the ICEHR at [icehr@mun.ca](mailto:icehr@mun.ca) or by telephone at 709-864-2861.

### **Consent:**

By participating in this interview you agree that:

- You have read the information about the research.
- You have been advised that you may ask questions about this study and receive answers prior to continuing.
- You are satisfied that any questions you had have been addressed.
- You understand what the study is about and what you will be doing.
- You understand that you are free to withdraw participation from the study at any time by saying so without having to give a reason and that doing so will not affect you now or in the future.
- You understand that, if you decide to withdraw from the study, any data collected up to that point will be deleted.

By consenting to this interview, you do not give up your legal rights and do not release the researchers from their professional responsibilities.

Please retain a copy of this consent information for your records.

### **Customer Interview Script**

- Thank you for taking the time to speak with us today, we really appreciate it. Would you mind if I recorded this interview so that I can refer to the information later?
- So you live on the Baie Verte Peninsula?
- What vegetables did you buy last time you went grocery shopping?
- Where do you buy your groceries?
- Do you have trouble getting the food you want locally?
- Can you tell me about the last time this happened to you?
- Has this problem gotten better or worse in recent years?
- Have you ever tried to solve this problem?
- What isn't ideal about your current solution, if you have one?
- How is the quality of the food that you purchase locally as opposed to the food that you purchase out of town?
- Can you tell me about the last time this happened to you?
- Has this problem gotten better or worse in recent years?
- Have you ever tried to solve this problem?

- What isn't ideal about your current solution, if you have one?
- Do you have any other issues with the food in your community?
- Can you tell me about the last time this happened to you?
- Has this problem gotten better or worse in recent years?
- Have you ever tried to solve this problem?
- What isn't ideal about your current solution, if you have one?
- Thank you very much for taking the time to speak with us. This has been incredibly helpful and I'm really excited to incorporate what we talked about into our plans.

## Appendix E

### New Product Strategy

#### Vision, Goals and Scope

The project's New Product Strategy takes into account the vision, goals, strategy, climate, leadership, and overall management issues that drive the activities of new product development. Some elements of the New Product Strategy have already been articulated in the Project Proposal. However, the Project revisited them as a team for them to further embrace the project's vision and share the project's goals. The overarching vision of the Harris Centre Thriving Regions project: *Generation of a Business Model to Help Address Food and Nutrition Security in the Baie Verte Peninsula* is: "To provide a framework for self-sustaining efforts to bring food and nutrition security to remote communities in Newfoundland and Labrador."

The main goal of the Project is to design and propose a business model for a commercially viable social enterprise that the community in the Baie Verte Peninsula will own and operate. A social enterprise is a revenue-generating organization that applies commercial strategies to maximize its overall impact in the community. The Project will rely on the expertise of Memorial University's Centre for Social Enterprise and the community to determine the final legal form and organizational structure of this organization. A business model is an evolution from the more familiar and traditional business plan in that the proposed business model will describe the rationale of how the social enterprise will create, deliver, and capture value for the community. At the heart of the business model will be the value proposition, which are the benefits that the community can expect from the social enterprise, i.e., products or services that will help address the need for adequate and reliable access to quality and healthy produce. To help deliver the value proposition to the community, the project will design and propose an offering based on the urban farming solution developed by Greenspace Urban Farms.

The project will use two different but interrelated methodologies to complete the project deliverables. To design the business model for the social enterprise, the project will use the lean start-up methodology. The lean start-up methodology prescribes an iterative process by which the project will formulate and validate the different problem, product, and customer hypotheses throughout the project lifecycle. To develop the value proposition within the business model, the project will use the translational research & development methodology. The translational research & development methodology is a structured framework based on best practices that greatly improves the likelihood of delivering a product in time, within budget, and to specification. It explains how to initiate, plan, execute, and close a translational research & development project conducted within an academic institution with the intent of bringing a product to market.

#### Target Markets

The Project's New Product Strategy identifies the strategic business requirements with which the new product must comply based on more up to date information about market needs, feedback

from the project's sponsors and collaborators, and the participation of the entire Project's team. The feedback received from participants of the *Second Thriving Regions Workshop* on June 7<sup>th</sup>, 2018 in Baie Verte and the preliminary survey conducted by Greenspace Urban Farms among the same participants suggest that people from various communities within the Baie Verte Peninsula, are interested in participating in the Project's efforts. The Project has identified two main customer segments (potential customers and users) for the social enterprise's products: 1) Consumers that buy produce locally, and 2) the Co-op Baie Verte and local grocery stores.

### **Product Requirements**

Some of the product requirements were articulated in the Vision, Goals, and Scope above. To align with this vision, the product that the Project will develop must be economically feasible, scalable, customizable, use hydroponic or solid-based alternatives, and provide a rich variety of crops. The aforementioned product requirements: economically feasible, scalable and customizable are all "must have" characteristics. There are additional product requirements that do not rise to the "must have" level but that will be part of the desirable characteristics of the products. These additional product requirements are: small space requirements, low maintenance and recyclable nutrients.

### **Product Development Gates**

The gates are the built-in quality control checkpoints in the system and serve as natural milestones of the Project. At each gate, the Project Team will meet with some of the Project's collaborators and sponsors and seek consensus to proceed to the next stage. Each Go/Kill gate specifies deliverables (what the Project must deliver to the gate review); criteria for Go upon which the Go/Kill and prioritization decisions will be based; and stage outputs (action plan for the next stage and resources needed). The design of gates is part of the Project's New Product Strategy and they are described below. They consist of simple criteria in the form of questions with Yes/No answers.

#### ***Gate 1: Idea screen***

**Deliverable:** The New Product Strategy specifications with clear understanding of objectives for new product development. This milestone will coalesce in a list of new product ideas consistent with the New Product Strategy.

#### **Criteria:**

- Is the product strategically aligned with the Project's vision and goals?
- Is the product strategically important?
- Does the product have a reasonable likelihood of technical feasibility?
- Does the Project have the freedom to operate with the background intellectual property embedded into the product?

#### ***Gate 2: Second idea screen***

**Deliverable:** Preliminary assessment determining entire Project's technical and marketplace merits including preliminary market, technical, and business assessments.

**Criteria:**

- Does the product have a good market size?
- Will the product compete in a growing market?
- Does the product have an overall competitive advantage?

**Gate 3: Go to product development**

**Deliverable:** List with ranking of attractive new product development proposals vetted through scoring models including financial and strategic considerations. Detailed documentation of selected product.

**Criteria:**

- Does the product have a positive return vs. risk?
- Does the product provides unique benefits?
- Does the product meet customer needs better than competition?
- Is the product a good value for the money?
- Can the product be manufactured within a reasonable timeframe?
- Does the Project have the freedom to operate with the foreground intellectual property embedded into the product?

**Gate 4: Alpha-tested product**

**Deliverable:** In-house-tested (alpha-tested) prototype of the product and partially (as much as possible) tested with the customer. Prototype tested under simulated field conditions.

**Criteria:**

- Does the product have a technical gap?
- Does the product present reasonable complexity?
- Does the product have technical uncertainty?
- Does the product present a marketing synergy?
- Does the product present a technical synergy?
- Does the product present manufacturing/processing synergies?
- Does the product have a good supply chain and distribution channels?

**Gate 5: Tested and validated final product**

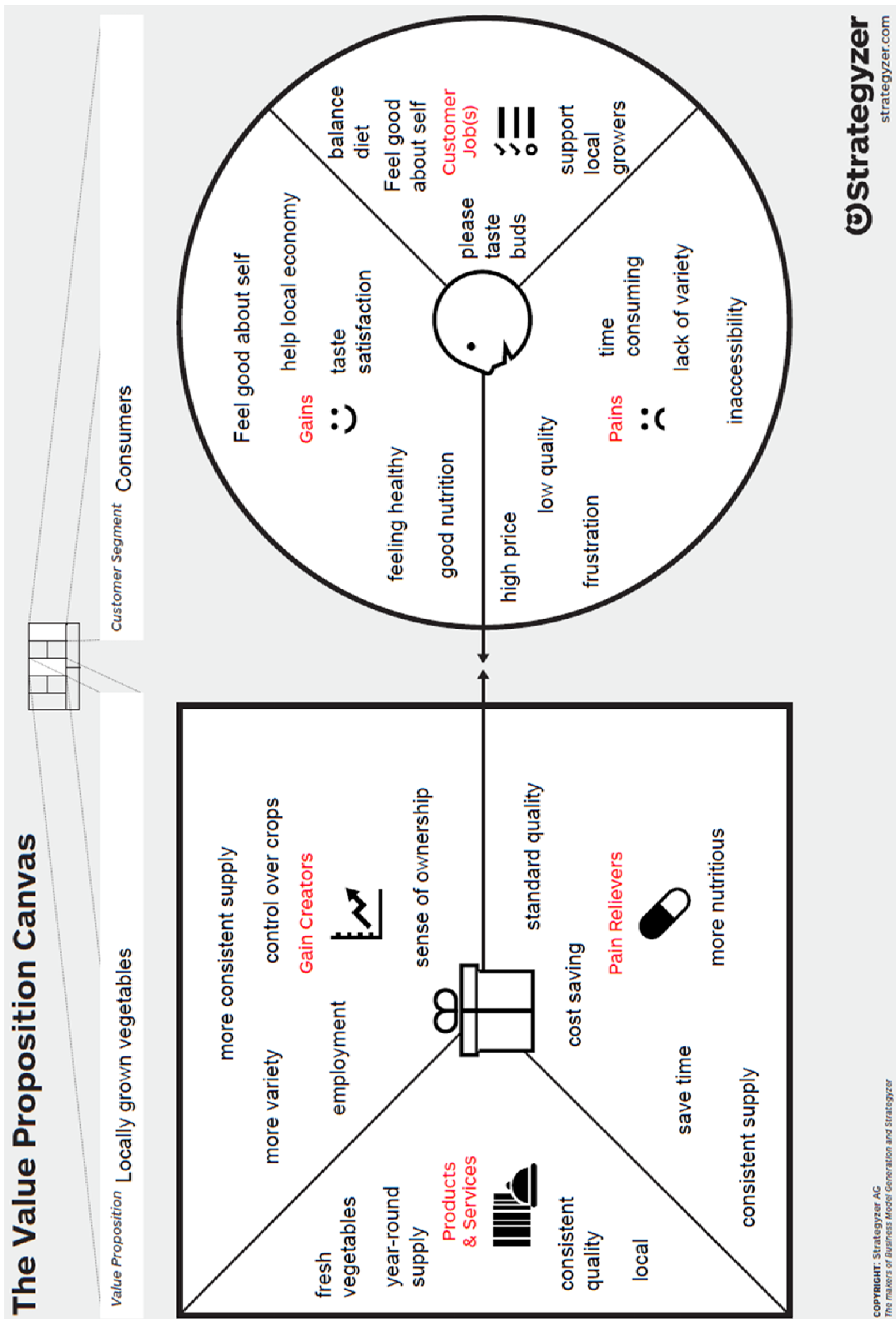
**Deliverable:** Final report with complete customer-oriented validation of the product's commercial viability, production, and marketability. Detailed documentation of ready-for-market product tested under field conditions (if appropriate). Refined new product development framework and non-standalone product commercialization strategy.

**Criteria:**

- Is the product ready for market?
- Is there at least one customer ready to buy the product?

# Appendix F

## Value Proposition Canvas



# Business Model Canvas

Designed for:		Designed by:		Date:		Version:	
<h2>The Business Model Canvas</h2>							
<b>Key Partners</b> <ul style="list-style-type: none"> <li>- Copper Ridge Academy</li> <li>- Regional grocery stores</li> <li>- Companies with local stake</li> <li>- Municipal and provincial governments</li> <li>- Municipal groups with accessible existing infrastructure</li> <li>- Food first NL</li> <li>- Anaconda Mining</li> <li>- Memorial University of Newfoundland</li> <li>- MUN Centre for Social Enterprise</li> <li>- Regional Autism Society</li> </ul>		<b>Key Activities</b> <ul style="list-style-type: none"> <li>- Acquisition of materials for system</li> <li>- System construction</li> <li>- Growing and selling crops</li> <li>- Helping with educational programming</li> </ul>		<b>Value Propositions</b> <ul style="list-style-type: none"> <li>- Cost-effective accessibility to fresh food</li> <li>- Meaningful and continuous employment (potentially for individuals on the Autism spectrum)</li> <li>- Cultural and educational programming opportunities</li> </ul>		<b>Customer Relationships</b> <ul style="list-style-type: none"> <li>- Direct and personal relationship with intermediaries</li> <li>- Website, newsletter, and social media for "get, keep, grow" customer base</li> </ul>	
<b>Key Resources</b> <ul style="list-style-type: none"> <li>- Physical space and adjacent infrastructure</li> <li>- Materials and funding for construction of the system</li> <li>- Specialized and non-specialized labour</li> <li>- Expertise from Greenspace Urban Farms</li> <li>- Personnel and volunteers</li> <li>- Mentors</li> <li>- Advisory board</li> </ul>		<b>Channels</b> <ul style="list-style-type: none"> <li>- Grocery stores</li> <li>- Co-op Bale Verte</li> <li>- Direct pickup</li> <li>- Drop-off to facilities</li> <li>- Farmers markets</li> <li>- Website</li> <li>- Social media</li> </ul>		<b>Customer Segments</b> <ul style="list-style-type: none"> <li>Consumers:           <ul style="list-style-type: none"> <li>- Single households</li> <li>- Hospitals and seniors centres</li> <li>- Regional schools</li> </ul> </li> </ul>			
<b>Cost Structure</b> <ul style="list-style-type: none"> <li>- Personnel</li> <li>- Utilities</li> <li>- Maintenance (including supplies)</li> <li>- Sales and marketing</li> <li>- Construction of the Greenspace systems</li> </ul>		<b>Revenue Streams</b> <ul style="list-style-type: none"> <li>- Sale of produce through grocery stores (earned income)</li> <li>- Corporate donations</li> <li>- Government grants</li> </ul>					



## **Business Model Rationale**

### **Value Proposition Canvas**

#### ***Customer Profile***

The Customer Profile has three components that helped validate the problem statement.

1) Customer Jobs: describes the tasks customers are trying to perform and complete, the problems they are trying to solve, or the needs they are trying to satisfy. The primary jobs that customers are trying to solve are: acquire a balanced diet through fresh and nutritious food, please they taste buds through tasty food, support local growers, and feel good about themselves.

2) Customer Pains: describes anything that annoys customers before, during, and after trying to get a job done or simply prevents them from getting a job done. The primary pains that customers are experiencing are: high prices for quality food, inaccessibility to certain foods due to seasonality, lack of variety and low quantity and quality of food, frustration for time wasted in seeking fresh produce.

3) Customer Gains: describes the outcomes and benefits that customers want including functional utility, positive emotions, and cost savings. The primary benefits that customers are seeking are: feeling healthy due to good nutrition, taste satisfaction, feeling good about themselves, and helping the local economy by purchasing locally produced food.

#### ***Value Map***

The Value Map breaks the Value Proposition down into three components that helped to design the value proposition.

1) Products and Services: is the list of elements around which the Project built the value proposition. The value proposition integrates a custom designed urban farming system by Greenspace Urban Farms. Greenspace Urban Farms offers comprehensive services including the construction of the design, project management and implementation of the system, and maintenance contracts and packages of materials required to operate the system. With the Greenspace system, the social enterprise can provide their customer segment with year-round, locally grown, fresh produce with consistent quality.

2) Pain Relievers: describes how the products and services will alleviate specific customer pains identified during Problem Validation. These explicitly outline how the social enterprise intends to eliminate or reduce some of the things that annoy customers before, during, or after they are trying to complete a job or that prevent them from doing so. The social enterprise will alleviate certain pains that costumers are experiencing by providing: a more consistent supply of fresh produce, more standard quality produce, cost and timesaving, and a potentially wider variety of produce.

3) Gain Creators: describes how the products and services will create customer gains. They explicitly outline how the social enterprise intends to produce outcomes and benefits that the Customer Segments expect and desire. The social enterprise will provide the following gains to their customers: more consistent supply of fresh produce, potential employment opportunity for

members of the community, more variety and control over the crops, a sense of ownership, and opportunities for educational and cultural programming.

### **Market Size Hypothesis**

Please see Appendix H.

### **Business Model Canvas**

#### ***Customer Segments***

Customer Segments describes who the customers are (customer types) and what their problems, needs, and wants are. Understanding the customers' problems, needs, and wants involved understanding their sources, i.e., how the customers experience the problems and why it matters to them (Blank and Dorf, 2012). The most important customer segment that the social enterprise will target are community members who struggle with numerous facets of food access in general and with access to nutritious fresh produce in particular. Depending on the scale of the social enterprise's operation over time, customer segments could range from Copper Ridge Academy's cafeteria for its school lunch program to hospitals and senior centres through the intermediation of the local grocery stores (e.g., Co-op Vaie Verte). Initially, the target customer segment is the consumers who purchase their groceries in the local and neighboring stores. The grocery stores then are intermediaries that become a secondary customer segment.

#### ***Value Propositions***

The value proposition of the social enterprise includes (cost-effective) accessibility to local, fresh produce grown with the use of the urban farming system developed by Greenspace Urban Farms. There are several reasons for recommending the implementation of the solutions proposed by Greenspace Urban Farms. Greenspace Urban Farms is a student-run social enterprise that designs and builds urban farms made from shipping containers. They are cheaper than any other solution on the market and use almost entirely recycled materials. The systems are highly customizable and designed to be accessible for people with physical and mental disabilities to visit or work in. Through the implementation of corporate sponsorship methods and utilizing post-consumer materials, Greenspace Urban Farms can offer circular economy systems at a much lower cost than any comparable systems.

Although there are other urban farming systems on the market made from shipping containers, Greenspace Urban Farms is able to remain competitive through a "quadruple bottom line." Greenspace Urban Farms incorporates a quadruple bottom line by saving money for users and creating jobs, using almost all recycled materials, and developing and integrating cultural programming catered to the community's needs. Greenspace Urban Farms is also allowing employment opportunities for individuals with disabilities through programming with the Autism Society.

Through partnerships with communities and community groups, Greenspace Urban Farms can avail of existing infrastructure to ensure that the systems they design have the highest yield possible. Greenspace Urban Farms works with community stakeholders to develop systems that

can answer a community's specific needs, from year-round community gardens to on-site fresh food supplies for public health facilities. Through the implementation of educational and cultural programming, Greenspace Urban Farms can help answer food security issues of entire communities while addressing their values.

By seeking the support of corporate entities for monetary and non-monetary donations, Greenspace Urban Farms provides a method to lower project costs while creating benefit for the donors. Donations of physical assets (which for Greenspace Urban Farms projects primarily involve low-value post-consumer industrial materials) provide significant corporate sponsorship benefits at a far lower cost for the donors. Greenspace Urban Farms also seeks methods to benefit from waste resources of corporate entities (such as waste heat) to lower the cost of unit operation while also providing an avenue through which corporate sponsors can lower the burden of carbon taxation.

### ***Channels***

Channels describes how the social enterprise will deliver the value proposition to the customers. The social enterprise will use one main channel and several secondary channels to reach its costumers. The primary channel will be the intermediation through the local grocery stores (indirect channel). This channel will allow the social enterprise to focus on the production processes while helping to create and deliver educational opportunities around urban farming. To create awareness, promote collaborations and partnerships and attract volunteers, the social enterprise will use the organization's website, newsletter, and other forms of social media communication such as Facebook and Twitter.

### ***Customer Relationships***

Customer Relationships describes how the social enterprise will get customers into its sales channels, keep them as customers, and grow additional revenues from them over time. The social enterprise will need to maintain two levels of customer relationships, the consumer and the intermediary. The relationship with the intermediary, i.e., grocery stores, will need to be direct and personal. To establish and maintain this relationship, the social enterprise will need to adhere to the usual commercial terms that the intermediary has with other suppliers. The relationship with the consumer will comprise three stages. 1) To get customers, i.e., creating demand; the social enterprise will need to create awareness, interest, consideration, and purchase. 2) To keep existing customers, the social enterprise will need to reach out to customers proactively to strengthen and bolster retention by keeping them informed and educated. 3) To grow customers, the social enterprise will need to establish programs for new revenue, e.g., diversify crops, referral programs. The social enterprise will conduct most of its customer interactions through the organization's website, newsletter, and social media.

### ***Revenue Streams***

In general, the revenue (and pricing) model is the most difficult element of the business model but it is critically important since it ensures that the business model makes long-term financial sustainability. The revenue model is strongly intertwined with the other elements of the business model such as the Value Propositions, Channels, Customer Relationships, and others. The primary

revenue model for the social enterprise will consist of (one-time) payments received from the intermediaries (grocery stores and Co-op Vaie Verte) for the sale of the different crops (earned income). There will also be opportunities for ad-based revenue through advertising on the larger faces of the urban farming units. All the educational programs will be offered for either free or through sponsorships from existing and potential partners. The social enterprise will set the prices of its products with the help of the Co-op Baie Verte using product-based pricing or competitive pricing. Corporate donations and government grants will be a secondary source of revenue for the social enterprise.

### ***Cost Structure***

The primary cost elements of a Greenspace Urban Farms project include personnel, utilities, maintenance, and sales and marketing. The cost of personnel will be contingent to the availability of volunteered labour that the social enterprise might be able to coordinate. Utilities and maintenance costs are described in the technical portion of this report. In addition, since one of the possible sources of funding for the social enterprise is government grants and corporate sponsors, it is important that a strong and positive image is maintained at all times. To ensure that, marketing efforts should be factored into the cost structure.

### ***Key Activities***

The main activities of the social enterprise will consist of production and sale of the different crops. These activities would be conducted throughout the year while activities such as maintenance will be conducted periodically. Another key activity will include seeking new funding for expansion projects, seeking corporate sponsors for marketing projects, and providing a platform for educational programming on food and nutrition security.

### ***Key Resources***

Key Resources identifies the external resources that are critical to the organization's success and how the social enterprise will find them. The physical space and adjacent infrastructure are the most important resources for any urban farm. The Copper Ridge Academy will be instrumental in facilitating access to these resources. The required materials for any given Greenspace Urban Farms project include those required for system construction and those required regularly post-implementation. The materials required for the construction of a Greenspace system primarily include used post-consumer industrial materials and the materials required regularly could include electricity, water, fertilizer, and seeds. Specialized and non-specialized labour will be required during the construction, operation, and maintenance phases of Greenspace Urban Farms projects. Much of the labour can be outsourced to organizations such as The Autism Society through their employment programming and technical labour can be almost entirely completed by Greenspace Urban Farms personnel. Some of the technical work such as electrical connections would require labour from certified professionals. Safety is paramount in all Greenspace Urban Farms projects and should not be sacrificed under any circumstances. Dedicated personnel, community volunteers, and mentors will play an important role in the operation of the social enterprise. The social enterprise should also create an advisory board to help with the organization's strategies.

**Key Partners**

Key Partners will provide the capabilities, products, and services that the social enterprise cannot do by itself. The primary partners of the social enterprise include Greenspace Urban Farms, Copper Ridge Academy, Co-op Baie Verte, Food First NL, Memorial University's Center for Social Enterprise, and the Harris Centre. Corporate partners will be strategic to provide support for the initiative, primarily through the donation of used industrial materials in exchange for advertising privileges. Other partners may include Newfoundland and Labrador's Department of Tourism, Culture, Industry and Innovation (TCII), The Boys and Girls Club, The Autism Society, and many more on an individual project basis.

## Appendix G

### Risks of the Innovation

The project took into account the three sources of risk for the innovation (Adner, 2012) depicted in Figure 13.

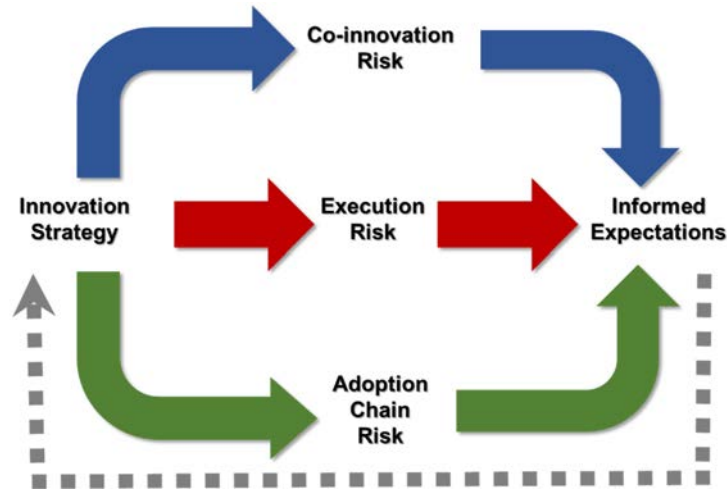


Figure 13. Three risks of most innovations.

**Execution Risk:** These are the challenges that the Project and the social enterprise had during the design of the innovation and will have in the final implementing the innovation, i.e., urban farming systems, to the required specification and within the available time (see Figure 14). Greenspace Urban Farms has designed the proposed system based on the findings of the Project. They implemented small-scale prototypes to test most of the variables in the system. Furthermore, they have been working with stakeholders in the community to acquire some of the information necessary for a swift delivery. Details of the system design are given in Appendix H.

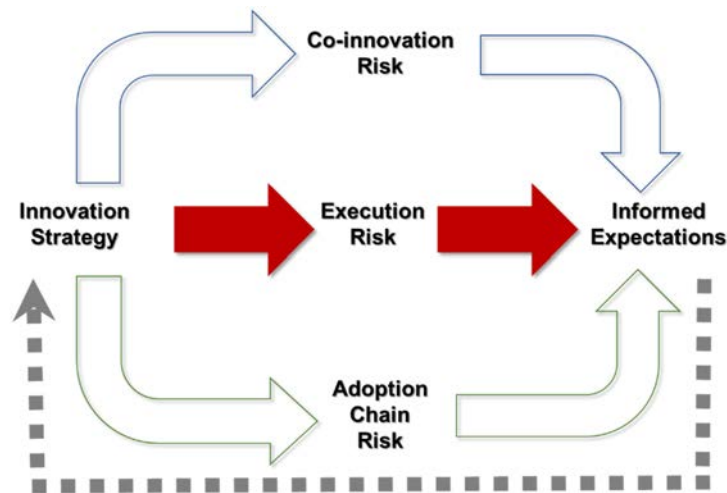


Figure 14. Execution risk.

**Co-Innovation Risk:** These are the challenges that the Project and the social enterprise will have in securing the partnerships that the social enterprise will need to complement its value proposition.

The Project and Greenspace Urban Farm have established collaborations with several community organizations that will prove instrumental in the delivery of the innovation, i.e., urban farming systems (see Figure 15). Among the most valuable partnerships are the ones with the Copper Ridge Academy and the Co-op Baie Verte. Personnel from the Copper Ridge Academy have been in frequent interaction with the Project and Greenspace Urban Farm for numerous details related to the installation of the first Greenspace system in the school property.

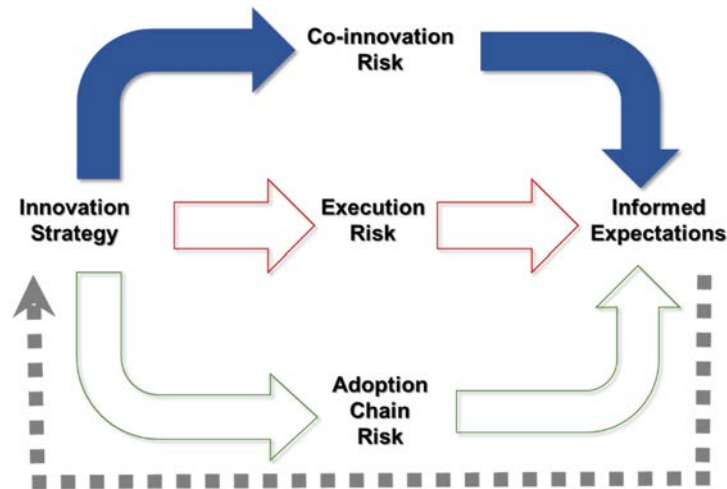


Figure 15. Co-innovation risk.

**Adoption Chain Risk:** These are the challenges that the Project and the social enterprise will have in consolidating the partnerships that will allow for the adoption of the innovation, i.e., urban farming systems (see Figure 16). The Project tried to mitigate this risk by establishing early conversations with key community stakeholders, e.g., Copper Ridge Academy, grocery stores, and the Co-op Baie Verte. It will be crucial that the social enterprise continue these relationships (including the ones with Greenspace Urban Farm and Memorial University) given that the adoption of urban farming as a viable solution to food and nutrition security in the Baie Verte Peninsula relies on leveraging the efforts and capabilities of everyone in the adoption chain.

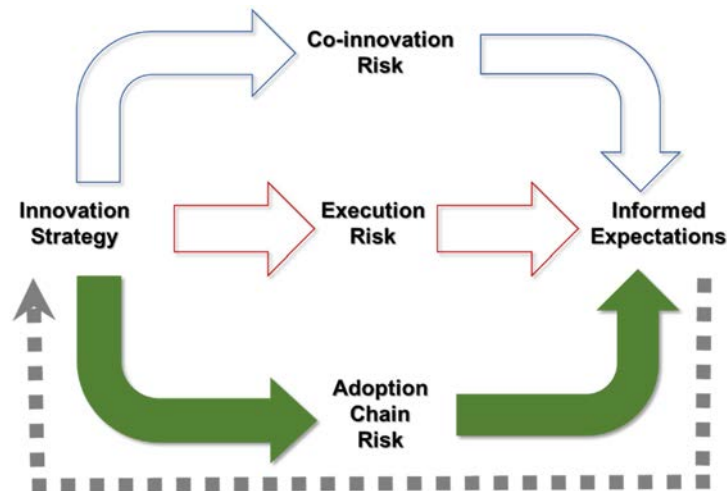


Figure 16. Adoption chain risk.

## Value Blueprint

The Project used the value blueprint in Figure 17 to identify the actors and links that make up the ecosystem (Adner, 2012). The steps to construct the value blueprint are listed below.

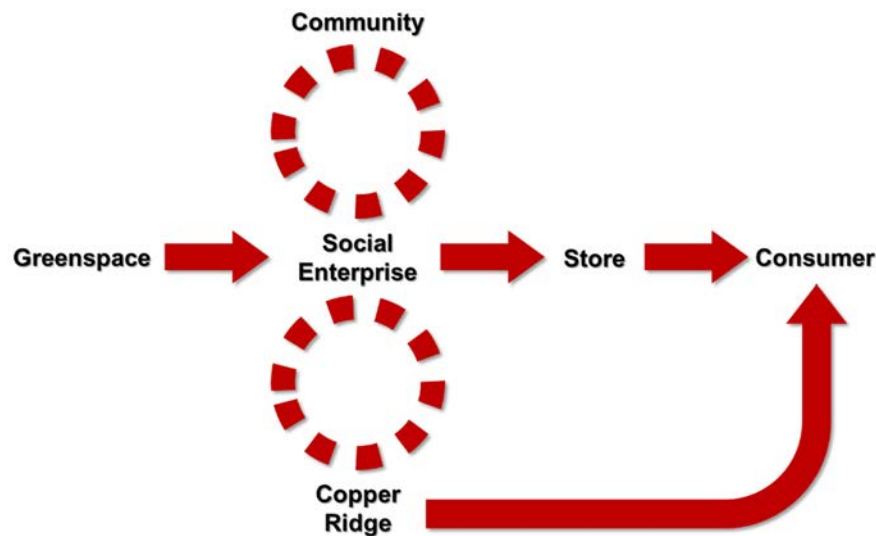


Figure 17. Value blueprint.

### 1. Identify the customer:

- Who is the final target of the value proposition?

The final target of the value proposition is the consumer of fresh vegetables in the Baia Verte Peninsula.

- Who ultimately has to adopt the innovation for the social enterprise to claim success?

Several organizations have to adopt the innovation, e.g., Copper Ridge Academy, Co-op Baie Verte, and local grocery stores.

### 2. Identify the project:

- What is it that social enterprise needs to deliver?

The social enterprise needs to deliver fresh vegetables through the implementation of urban farming systems.

- When does the social enterprise need to deliver it?

The social enterprise needs to deliver fresh vegetables after the first Greenspace system has been installed and the first crop is ready to harvest.

### 3. Identify the suppliers:

- What inputs will the social enterprise need to build its offer?



The social enterprise will need at least one Greenspace system, supplies, and labour.

- Are the inputs off-the-shelf or ad-hoc?

Part of the inputs are off-the-shelf (e.g., supplies) and some are ad-hoc (e.g., Greenspace system).

4. Identify the intermediaries:

- Who stands between the social enterprise and the final customers?

Intermediaries (grocery stores, Co-op Baie Verte) who sell the fresh vegetables to the final consumer stand between the social enterprise and the final customers.

- Who touches the innovation after the social enterprise?

The innovation, i.e., urban farming systems, will be operated by the social enterprise and its partners exclusively.

5. Identify the “complementors”

- For every intermediary: Does anything else need to happen before the intermediaries can adopt the offer and move it forward towards the end customer?

The fresh vegetable will need to be harvested and packaged according to the intermediaries’ demands.

6. Identify risks in ecosystem:

- What is the level of co-innovation risk every element presents? How able are they to undertake the required activity?

The level on co-innovation risk is low for every element in the ecosystem. The different complementors will not need to alter any of their current activities.

- What is the level of adoption risk every element presents? How willing are they to undertake the required activity?

The level of adoption chain risk is low to moderate. The successful adoption of the innovation by the community will depend on how well the social enterprise builds partnerships and collaborations. Providing a sense of ownership by the community will increase the odds of a successful adoption chain.

- Identify incentives.

The consumers are eager to find a solution to food and nutrition security in the community. The possible extra earnings that additional sales might provide and the ability to supply their customers year round motivate the intermediaries.

## 7. To launch or not to launch?

The overall risk of launching the innovation is within manageable range.

### Surplus Map

The surplus map represent winners and losers in the adoption chain process. Adoption chains follow a logic of minimum, not net surplus, i.e., failure is most likely if a link is negative. Figure 18 depicts the surplus map for the implementation of the innovation.

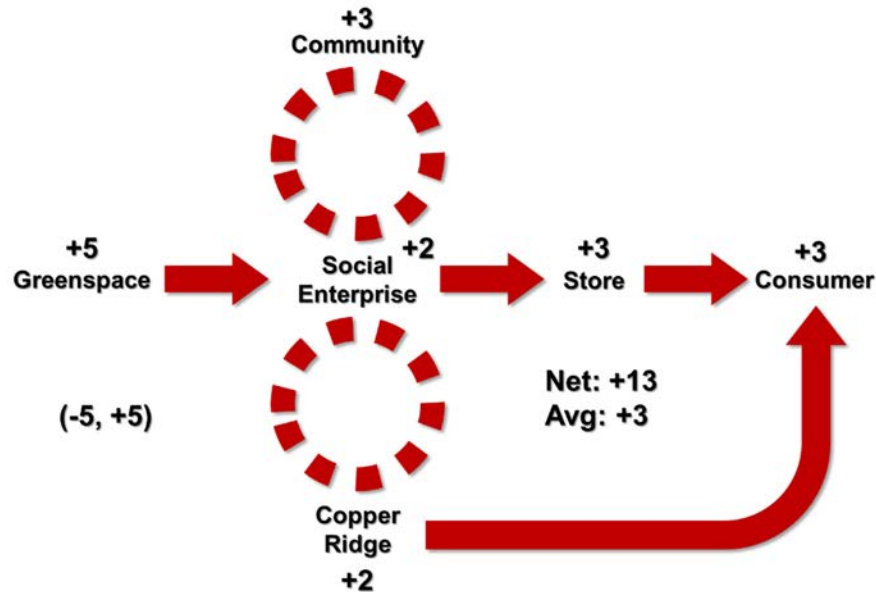


Figure 18. Surplus map.

### Probability of Success Map

The ability for the social enterprise to commercialize its offering successfully will depend on the partners' ability to successfully commercialize (or adopt in the case of consumers) their own offerings. The key here is to increase the overall odds for success, by increasing the odds of success across the ecosystem. It is important to be aware that the logic of co-innovation is a logic of multiplication, not averages. Figure 19 shows the probability of success map for the innovation to be implemented by the social enterprise.

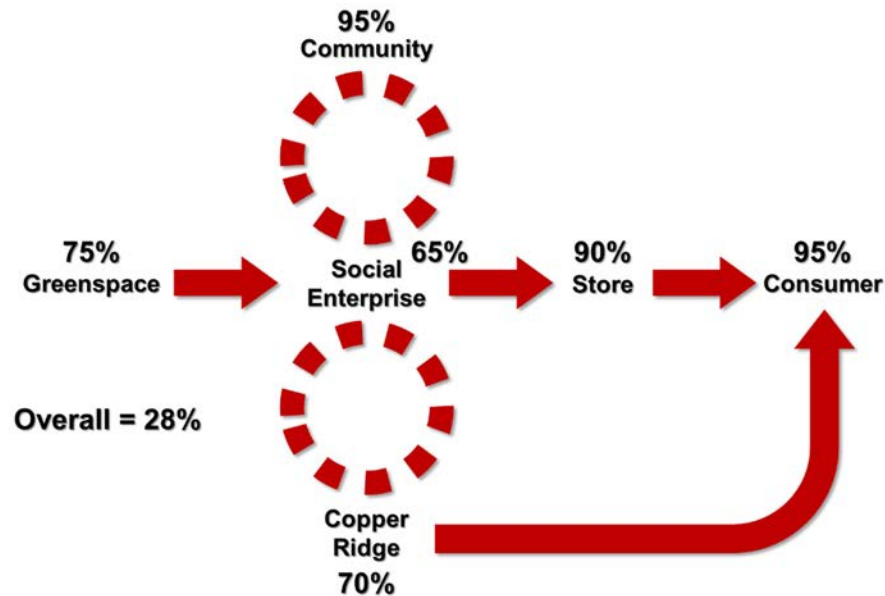


Figure 19. Probability of success map.

### Sequencing the Construction of the Ecosystem

Constructing the ecosystem will require the coherent alignment among the network of partners who will need to succeed in their own executions. The construction of the ecosystem will take time and be gradual. Sequencing the ecosystem will require the following steps below.

**Minimum Viable Footprint (MVF).** The smallest configuration of elements that can be brought together and still create unique commercial value will require the installation of one Greenspace system, staffing the operation based on the requirements of the crops, and establishing the sale arrangements through the intermediaries.

**Staged Expansion.** This represents the order in which additional Greenspace systems will be added to the MVF so that each new element benefits from the system already in place and increases the value creation potential for the subsequent element to be added. This will allow for the expansion not only of quantity but also of variety of the crops.

**Ecosystem Carryover.** Once the first ecosystem is up and running and the lessons learned have been documented, ecosystem carryover will constitute the process of leveraging elements what were developed in the construction of the first ecosystem to enable the construction of a second and subsequent ecosystems.

## Appendix H

### Greenspace System

#### Agriculture Market Overview

##### ***Global and Canadian Vegetable Markets***

Much of the Canada's agricultural production and food processing is relatively efficient and operates with lower production costs than most nations. However, approximately 7% of the land in Canada is suitable for farming. Of that farmable area, only a fraction of 1% is in Newfoundland and Labrador (The Canadian Encyclopedia, 2015). This means that most of the industry development has occurred within those regions, leaving relatively little development into modern agricultural techniques to the most vulnerable regions of the nation.

Food insecurity can be defined as inadequate or insecure access to food due to financial or available constraints. In Canada, one in eight households is food insecure, totalling over 4 million Canadians and 1.15 million children living in households that struggle to put adequate food on the table (McIntyre *et al.*, 2016). The global market for vegetables is rapidly increasing to match the growing global population growth. This has resulted in a Compound Annual Growth Rate (CAGR) of 8% between 2019 to 2023.

##### ***St. John's (CMA) Vegetable Market***

As the St. John's Metro Region represents the largest aggregate purchaser of produce in Newfoundland and Labrador, they are a crucial market to analyze in the determination of purchasing potential. The expenditure on fresh vegetables in St. John's for 2018 was \$60,803,979 for a total of \$676 annually per household. Fresh vegetables were 6% of the annual food spend for the average household in St. John's.

##### ***Grand Falls Windsor Vegetable Market***

Grand Falls Windsor represents the nearest city and distribution location for food imported to or exported from Baie Verte. The expenditure on fresh vegetables in Grand Falls Windsor for 2018 was \$4,379,716 for a total of \$541 per household. Comparably, to St. John's, fresh vegetables were 6% of the annual food spend for the average household in Grand Falls Windsor.

##### ***Baie Verte Peninsula Vegetable Market***

The 2017 census stated that expenditure on fresh vegetables in Baie Verte for 2018 was \$391,827 for a total of \$582 per household. Comparably to both St. John's and Grand Falls Windsor, fresh vegetables were 6% of the annual food spend for the average household on the Baie Verte Peninsula. Recently acquired sales data for the Baie Verte Peninsula shows the yearly expenditure on fresh vegetables to be higher, closer to \$500,000. This suggests a total yearly expenditure per household on fresh vegetable to be approximately \$742, or approximately 9% of the annual food spend. The discrepancy in these figures is likely due to the misclassification of items during the census.

## **Discussion**

The Coast of Bays has the lowest rate of fruit and vegetable consumption in Newfoundland and Labrador. Only 13% of residents over 12 eat five or more servings of fruit and vegetables a day, whereas the provincial average is 29.7%. The population of the Baie Verte Peninsula is also decreasing, which causes issues along the supply chain. The result of this decrease is further reduction in quality and increases in cost. Due to a lack in regional agriculture, the region is reliant on export from nearby regions. However, there are opportunities within the issues. Since the Coast of Bays region is reliant on importation and then the back-freighting of empty refrigerated trucks, the development of agricultural transportation routes out of the Baie Verte Peninsula is more streamlined. Furthermore, the abundance of underused public infrastructure provides a unique base for the development of commercial agricultural systems.

## **Greenspace Urban Farms**

Greenspace Urban Farms is a social enterprise that seeks to increase the accessibility and lower the cost of fresh food in Newfoundland and Labrador. They work with communities and community groups to provide customized urban farms that are operable year-round and can be integrated with their existing infrastructure, at the lowest price possible. Their systems offer the opportunity for full-time employment while providing local produce at a fraction of the price. Plus, they fit inside a parking space.

Greenspace Urban Farms develops compact hydroponic farms of various sizes. These include commercial systems that fit inside of shipping containers to systems the size of a bookshelf. They are operable year-round in any climate, can hold several acres of food, and are priced at a fraction of the cost of other hydroponic systems on the market.

They can price their systems below those of their competitors because they are able to hook their systems up to existing infrastructure. By accessing heating systems, water mains and industrial kitchens that are already established, you can maximize the use of their customer's assets while using all possible growing space. This means that the purchasing price is lower, the electricity costs are up to 60% lower, and you can grow more food than any other container farming system on the market.

There are several other companies that sell container farms, but they exclusively sell turn-key systems built for modest climates. Through the connection of Greenspace systems to existing infrastructure, they can construct systems that grow more and cost less.

By partnering on our projects with communities and community groups, they can avail of existing infrastructure to ensure that the systems they design have the highest yield possible. They work with community stakeholders to develop systems that can answer a community's needs; from year-round community gardens to on-site fresh food supplies for public health facilities. Through the implementation of educational and cultural programming, they can answer the food security issues of entire communities while addressing their values.

Their vision is to have a province where all people can get the fresh food that they need at a price that they can afford. They seek to develop this change through collaborative projects with community initiatives, healthcare facilities and corporate entities. This allows them to provide not only systems that produce affordable and nutritious food, but also employment opportunities and community-oriented programming. Through these partnerships, they can stimulate community growth to develop low-cost urban farms that function as economic and cultural staples. Greenspace is committed to making our vision a reality.

### ***Hydroponic Farming***

Hydroponics is the growth of crops in a soil-less medium, typically consisting of a water-based nutrient solution. Hydroponic systems have been found dating back to the era of Ancient Egypt, as they often provide better growing conditions for difficult climates.

Modern hydroponic technology allows for a higher yield in a smaller space and year-round operation, even in the harshest environments. The typical restriction for the implementation of hydroponic systems is the high cost of equipment, indoor space required to grow the crops, and maintenance. However, recent developments in the hydroponic field allow for the mitigation of these issues and provide opportunities for lower-cost systems that provide comparable yields.

Some of the benefits of hydroponic farming are as follows:

- No need for soil contaminated with diseases.
- Labor for field management is reduced or eliminated.
- Economically feasible system with higher yield.
- Better control of nutrients and lower concentration of nutrients and lower concentration of nutrients from leaching.
- Use of disease-treated seeds.
- Water conservation
- Constant statistics.
- Eliminates environmental problems.
- Increases yields, size, quality, colour, shelf-life and taste.
- Boosted insect and disease resistance of plants.
- Eliminates water quality and soil contamination.
- Less space required.
- Less growing time required.
- Labour and garden maintenance is reduced.
- Nutrients are recyclable.
- Transplanting shock is reduced for seedlings.
- No crop rotation is necessary.
- Less environmental impact.
- Shelf-life of the produce is much longer.

For all the advantages that hydroponics hold, there are several issues if trained professionals are not consulted.

- Rapid spread of disease when it enters the system.
- Loss of crops upon pump failure.
- Clogging of system.

Hydroponics is practiced around the globe on a commercial level, as it can be adapted to required scale. It has become increasingly popular in the United States, Canada, Western Europe and Japan.

### ***Greenspace Commercial Hydroponic Systems***

#### **System Overview:**

Greenspace Urban Farms utilize Nutrient Film Technology (NFT) in their hydroponic systems. NFT hydroponic systems suspend the roots of plants in a thin film of nutrient solution. The nutrient solution is controlled in a reservoir that pumps the solution to the crops. NFT is widely used in hydroponics and is ideal for a wide variety of crops including lettuce, leafy crops and herbal vegetables. Greenspace Urban Farms specializes in the development of farms that integrate within existing infrastructure. Their farms are customized to ensure that every crop has the highest yield and the best quality.

#### **Cost Structure:**

The cost structure for a commercial Greenspace Urban Farms range greatly based on the needs of the customer, the needs of the market, and the facilities that it is attached to. Commercial systems can range in cost anywhere from \$100,000 per unit to \$300,000, depending on the needs of the customer and the yield they hope to achieve.

- Overhead cost
  - Commercial units
  - Greenspace Home Farm Systems
  - The average Greenspace project is for two units, can employ up to three people year-round and costs \$210,000.
- Operating costs
- Cost of alteration
- Processing and packaging: <http://cecolusa.ucanr.edu/files/277960.pdf>

### ***Greenspace Home Farm Systems***

#### **System Overview:**

To put extra veggies on your plate or extra money in your wallet, the Greenspace Home Farm System is there. Made from food-safe materials and easy to assemble, it can make you over \$200 a month, just by sitting in the corner of the room. The system pumps water mixed with liquid nutrients to the top of the system, which trickle back down and feed the plants. LED strip-lights hang over the plants to give them the light that they need, without eating into your electricity bill. The water is fed through the system using a small pump, so it is no noisier than having a fish-tank.

#### **Cost Structure:**

The systems cost between \$400 and \$600 and can make over \$200 a month in revenue. The

materials required to operate the system can either be shipped straight to your door or to the grocery store to be picked up when you make a delivery. Multiple growers operating individual small operations provides complicated logistics for the grocery stores. For that reason, Greenspace Urban Farms will provide the logistics for the system; so that the right people have the right information and the right materials at the right time. The materials required to operate the system vary for each variety of crop, which can create complications for the growers. To simplify the task for the people who will be growing with the Greenspace Home Farm systems, the materials will automatically be delivered based on the needs of the grocery store, with instructions on how to grow that particular crop and variety.

**System Output:**

The Greenspace Home Hydroponics System can produce over 144 crops a month.

**Projects**

Greenspace Urban Farms is collaborating with multiple agencies on the development of several hydroponic farming projects that are catered to the market, culture, and needs of the Baie Verte Peninsula.

***Baie Verte Commercial Farming Project***

Greenspace Urban Farms is collaboratively working with several agencies on the development of a commercial hydroponic farm to be attached to Copper Ridge Academy, on the Baie Verte Peninsula. This system will provide a consistent revenue stream for Copper Ridge Academy, supplementing their existing programming both inside and outside the classroom. The sustainable development project will incorporate the needs of the community to promote a social and monetary output that has been specially developed to cater to the needs of the community at large.

The system will be able to employ multiple people and is being explored for the possibility of an employment focus of individuals with Autism Spectrum Disorder. This programming is being explored in collaboration with the Autism Society of Newfoundland and Labrador. For this reason, universal design principles are used in the design of Greenspace Urban Farms systems; to ensure that they are useable for individuals with both mental and physical disabilities.

The generalized process for the implementation of a Greenspace Urban Farm is as follows:

Step	Description
Training	A small-scale hydroponic system will be implemented during the engineering design process and a representative of Greenspace Urban Farms will provide the training for use of the commercial system to the facility managers. This also includes data management training.
Determination of location	Greenspace Urban Farms can be implemented in existing infrastructure or in free-standing structures; such as shipping containers. However, a location has to be chosen



	<p>that will support the requirements for growth of the crops year-round.</p> <p>In the case of a free-standing structure, you must have an area allocated. The location can be either soil or soilless. If the location is soil, it should be covered in a sufficient layer of gravel to give the ground structure and accommodate natural drainage.</p>
Preparation of location	In the case of a free-standing structure, the land must be prepared. The ground should have no plants growing to destroy environment for insects and other pests. Proper drainage will need to be ensured so that the site is not prone to flooding or corrosion. Stagnant water also provides a breeding ground for insects and algae.
Finalize design of the hydroponic system	Based on the results of the preparation of location, engineering change management procedures must be followed for any final alterations to the system.
Manufacture structure of the system	The manufacture of the free-standing structure occurs. The manufacture of the free-standing structure will be completed either on site or off-site and then transported, determined by design specifications of the particular project.
Placement of structure on location	Free-standing structure is implemented and any required alterations to existing infrastructure can now occur.
Testing of controlled environment	Tests are conducted to ensure that the controlled environment of the system is stable under a variety of conditions.
Placement of hydroponic system.	The hydroponic system will be assembled and placed in the structure.
Implementation of reservoir	The reservoir will be put in place and filled.
Set up pump system	The pump system will be put in place and the system will be tested.
System purge	A combination of food-safe cleaning agents will be pushed through the system to clean it in preparation for commencement of growth.

Implementation of control system	The hardware of the environmental control system will be implemented.
Nutrient solution circulation and adjustment of concentration	The system will be started and the nutrient solution will be adjusted to realistic concentrations.
Implementation of germination station	The germination station will be constructed
Production tests	A full crop will be grown in commercial conditions to ensure system functionality and required adjustments will be made.

***Baie Verte Home Farms Pilot Project***

Greenspace Urban Farms has partnered with the Baie Verte Foodland Co-Op to develop a home hydroponic pilot program. The program will put Greenspace Home Farm systems in the homes of people across the Baie Verte Peninsula. The produce that is grown will be sold to the Baie Verte Foodland Co-Op at market price to produce income for the operators. Greenspace Urban Farms will work with the Baie Verte Foodland Co-Op during the production of the systems, distribution of the materials, training of the operators, and logistics of the project.

Please see the **Home-Scale System Information Package** below.

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