

# **Can Foresight Processes Operationalize the Notion of Sustainability?**

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## Abstract

# CAN FORESIGHT PROCESSES OPERATIONALIZE THE NOTION OF SUSTAINABILITY?

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In an increasingly complex world, many business leaders, politicians, citizens, and NGOs desire sustainability, but the academic literature is insufficient with insights on how to operationalize sustainability. The commonly mentioned Brundtland definition of sustainability refers to making decisions that benefit today but are also beneficial to future generations. Implicit in the definition of sustainability is consideration of the future. Given this temporal dimension inherent in the definition of sustainability, the research question is: how does thinking about the future impact decision making and enhance sustainability? Linking the future to the definition of sustainability, foresight or future studies may be essential to operationalize sustainability.

After a review of the literature on sustainability, the researcher proposes a theoretical construct known as the Sustainability Heuristic Model where thinking about the future fosters social learning, adaptability and sustainability. In this model, foresight methodologies promote the development of adaptive capacity through the development of options, technologies, and solutions that support sustainability. The consideration and practice of these options opens thinking, consciousness of changes, and the generation of ideas and options for action. The combination of these factors increase the likelihood that decisions move the achievements toward sustainability. Therefore, the Sustainability Heuristic Model argues a process that can help prepare for uncertainty and take action that will benefit future generations.

To explore the application of the Sustainability Heuristic Model, the researcher examines the impact of two case studies, which use foresight methodologies, to think about the future and explore options of action leading to decision making that is supportive of sustainability. The research obtained participant views, understanding, and reflections on how foresight processes impact the elements of the Sustainability Heuristics Model.

The first case study focused on foresight exercises led by Agriculture and Agri-Food Canada on how agriculture could adapt to climate change. The second case study focused on foresight exercises led by Health Canada on how to develop a sustainable health system. A case study was constructed for each foresight series from the analysis of the documents produced from each foresight exercise and an analysis of the participant's interviews. Then the two cases were compared through a cross-case analysis examining using the same framework as was used in the case study construction.

The outcomes of the case study analysis and the cross-case analysis indicate similarities in findings suggesting the possibility of broader system understanding and model development to inform the operationalization of sustainability. Key analytical findings indicate that the Sustainability Heuristic Model, which argues that foresight leads to social learning and increased adaptive capacity is a valuable and relevant construct.

Therefore, the researcher proposes the Sustainability Heuristic Model with the use of foresight as a way to draw the future into present day decision making and thus, operationalize a practice where new options are developed leading to sustainability.

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*“The future starts today, not tomorrow”....Pope John Paul II.*

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## I. Introduction

### 1. Introduction

The purpose of this paper is to explore and address how one can operationalize the notion of sustainability. In essence, most organizations, leaders, communities, and businesses desire sustainability; however, there is very little information in the literature to provide insight or guidance on how one can achieve sustainability.

The most commonly used definition of sustainability is the 1987 Brundtland definition which explains sustainability as an outcome or actions that result in betterment for today as well as for future generations. Within this definition of sustainability is a temporal dimension--that a decision made today should improve conditions for society now as well as for future generations. Though the issues of today are evident, the future is uncertain, creating ambiguity of knowing the needs of future time periods. Therefore, insight as to how one might think about decision-making under uncertainty is warranted.

Future studies or foresight explores how one may think about future plausibilities. Foresight is the practice of being reflective on what those future requirements may mean to decisions taken today. This science or practice has been used historically by the military; not necessarily to predict future events, but to prepare for the possibility of future events. Thinking about the future is intuitive in each of us. Individuals think about what they would like to achieve and can work backwards to imagine the steps they would need to complete to reach that destination (backcasting). People can use scenarios to imagine future events to practice how they might respond or evaluate if their capacities or capabilities are sufficient for those possible events (scenario and causal layered analysis). And there are many more practices and tools that people, organizations, governments, and businesses have used to think about the future.

## 2. Problem

Though thinking about the future is necessary within the definition of sustainability, many researchers argue that practicing foresight alone is an insufficient condition to derive

sustainability. To make use of the ‘anticipatory intelligence’ gained by thinking about the future, certain types of detailed and subtle processes occur at the level of the individual and group. There are individual and group learning processes that internalize the information. By comparing the learning about the future with what is already known, individuals can rationalize or change their assumptions or mental models that frame their thought processes and decision-making in the context of sustainability. Questions such as ‘what does this mean to who we are?’ and ‘what does the learning mean to what we do (social learning)?’ stimulate a reflection to align individual and collective desires with actions. When people (individuals or groups) learn something, particularly if people can learn how they might respond or the implications of not responding, this can build society’s ability to adapt (adaptive capacity). Integrating these key elements of sustainability; such as foresight (thinking about the future), social learning (what does this mean to the community?), adaptive capacity (how does this understanding prepare society to survive and thrive over time?), and sustainability (raising our consciousness on how to fulfil the desire to exist in the future) is key to manifest sustainability.

Therefore, the researcher has developed a Sustainability Heuristic Model (SHM) that illustrates how these steps build upon each other and collectively can lead to sustainability because it involves thinking about the future, learning of possible future change, thus increasing society’s capacity to anticipate or adapt, that all together is likely to increase our consciousness of sustainability. Though each decision taken today may not necessarily be sustainable (and society will not know until long after) perhaps thinking or ‘being’ in this fashion can overall increase the likelihood of being sustainable.

This research explores the trends in the literature and the processes involved in each of the elements of the Sustainability Heuristic Model. In addition, this research explores how the processes within each element of the Sustainability Heuristic Model relate to each other to enhance the likelihood of increased sustainability. Other related questions are addressed, such as:

Does an in depth review of these processes inform the focal doctoral question whether foresight (and/or other tools) can help operationalize the notion of sustainability?

Do insights from this research help better frame future research to inform how to achieve sustainability, including areas such as ‘what is the relationship with the processes within the Sustainability Heuristic Model?

This paper, focusing on the exploration of the processes inherent in the Sustainability Heuristic Model (sustainability, adaptive capacity, social learning, and foresight), is organized in the following manner. First there is a summary of the literature review observations on the Sustainability Heuristic Model with the intention of bringing the reader up-to-date on the research presented in the literature. Second, the literature in each element will be reviewed to define or describe the processes in each of the process elements of the Sustainability Heuristic Model. This section will also include a comparative analysis to describe similarities and differences of the processes in the literature. Third is a discussion of the analysis and findings and their relevancy to informing sustainability. Finally the dissertation will conclude with an elaboration of results, discussion, conclusions, and areas requiring further research in the quest to operationalize the notion of sustainability.

### 3. Mini-Literature Review on Sustainability

#### a. Introduction to Sustainability

The concept of sustainability has been around for years. In its various meanings and interpretations it has been defined as the ability to hold up or support, to endure or to maintain (Kulhman & Farrington, 2010). Sutton described the concept of sustainability used in the micro or personal context as long as a few hundred years ago in reference to the longevity of the production of forests in Germany and Switzerland (Sutton, 2004). The term sustainability was used in the literature in the 1960s onward in the context of the environment to sustain society. In 1972, the United Nations (UN) established its use in a UN Conference on the Human Environment in the context of sustainable development. In 1987 the Brundtland Report refined the meaning of sustainable development to mean “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. The 1992 UN Conference on Environment and Development (UNCED) further evolved the meaning of

sustainability to refer to “the integration or balancing of environmental, social, and economic issues or simultaneous progress in the environmental, social, and economic domains, often in the context of strong programs of consultation and participation” (Sutton, 2004, p. 2). In an agricultural context, Conway defines sustainability as the “ability of an agro ecosystem to maintain productivity when subject to a major disturbing force” (Conway, 1987, p. 101). Over time, there has been refinement to the definition of sustainability as the concept became more broadly utilized.

Even within the concept of sustainability, there are differences in the precision of definition. For example, the words of sustainability and sustainable development are often interchanged. Sustainability is typically referred to as the ability or process of being sustainable (a way of being); whereas, sustainable development often is referred to as an end outcome. Businesses and governments began to use the term, particularly due to popular demand and expectations of consumers and citizens, and it seems that the meaning has now reverted back, at least in colloquial use, to the ability to endure or maintain. There is a body of literature that has begun to wrestle with this moving definitional challenge suggesting that sustainability is really more of a journey rather than destination. In the context of this research, the concept of sustainability versus the concept of sustainable development, will be used.

### *Three Key Constructs in the Domain of Sustainability*

In the literature there are three unique constructs on sustainability:

1. Balancing of social, economic, and environmental elements (based on the 1992 Rio definition of sustainability) (United Nations General Assembly, 1992) with the intention of balancing the provision of social means or support, economic or wealth generation, and support to the environment to maintain the carrying capacity of the earth;
2. The concept of Integral Sustainability which requires the balancing of individual values and perspectives within the collective or societal view of sustainability (Wilber, 2006). Integral sustainability encourages the internalization of global world view of sustainability with individual belief systems and actions; and

3. Concepts of strong and weak sustainability presented by Robert Solow (Figge, 2005) as:
  - a. Weak Sustainability - That the next generation should inherit a stock of wealth, comprising man-made assets; and environmental assets, no less than the stock inherited by the previous generation;
  - b. Strong Sustainability - That the next generation should inherit a stock of environmental assets no less than the stock inherited by the previous generation (Daly, 1997).

In this concept of sustainability, the idea of asset provision for future generations needs to be in balance enabling future generations are able to provide for themselves in a meaningful way.

Each of these constructs or frameworks of sustainability is similar in the need for balance as a principle within the concept of sustainability. Where they differ, is the nature of ‘what’ is in balance. For example, the Rio definition emphasizes the balance and consideration of social, economic and environmental needs; whereas Integral Sustainability balances the individual world view with the global view of sustainability. Solow’s definition compares the asset inheritance of one generation with the next in the achievement of sustainability. These theoretical constructs differ in their assumptions of what areas require balance in the present and future to become sustainable. The aspect that is similar in all three constructs is that they all reference the temporal dimension of the future, but none of these frameworks provide insight to operationalize the future within sustainability processes. For this reason, there are many researchers who question if the concept of sustainability is sustainable (Bonevac, 2010) (Scheirer, 2005).

In this research, the researcher is adding the fourth balance, that of integrating the present and the future. This research will focus on adding the temporal dimension inherent in the definition of sustainability: to provide for today’s generations while enabling for future generations. Therefore, the researcher is exploring the relationship to thinking about the future to inform present day decision making in the context of sustainability.

## b. Literature Overview

These evolving terms and various interpretations of sustainability are compounded by the futurity implied in the definitions. Researchers allude to the management of the temporal dimension of the future, but without guidance on how to practically incorporate the long term time dimension of sustainability. The concepts, 'to ensure, to sustain, to maintain, or development to meet the needs of the present without compromising the future', all embody elements of uncertainty in the future. Though conceptually the term of sustainability is desirable, the operationalization of the term is abstract and uninformed in the literature. In fact, more is known about sustainability when it is not achieved (i.e. something becomes extinct) than is known what really is sustainable.

A literature review highlights that a relatively new discipline of futures studies or foresight that considers the future in various ways in order to reflect back and embed that thinking in the decisions made today. Foresight can happen with individuals or collective groups. This research is focusing on the definition of foresight in collectives or groups in a participatory action research approach. Foresight in this context has examples of participation yielding social change or action because it rationalizes the temporal scales of action to be taken now that would be useful or beneficial in the future. This idea of balancing or aligning the relevancy of a decision or action between the present and the future is a key feature within the definition of sustainability (i.e. Brundtland's definition that sustainable activity benefits the present without reducing the capacity of future generations to care for themselves). Therefore, this research explores if the inclusion of foresight methodologies and practices within the context of sustainability helps operationalize the concept of sustainability.

### *Operationalizing Sustainability: Building Adaptive Capacity through the Consideration of Plausible Futures*

What are the action components of sustainability? What is the nature of the concept of being sustainable? In the literature one of the ways of being sustainable is to enhance adaptive capacity, the ability to change with the desire to endure. Adaptive capacity, in social systems, is the ability to respond to change, being maintained through the

existence of institutions and networks that learn and store knowledge and experience, create flexibility in problem solving and balance power among interest groups (The Resilience Alliance, 2012, p. [http://www.resalliance.org/index.php/adaptive\\_capacity](http://www.resalliance.org/index.php/adaptive_capacity)). Adaptive capacity is a social learning concept that through participatory processes, builds the ability and agility of groups to deal with future uncertainties.

Why is adaptive capacity important? Adaptive capacity is a management skill that enables the capacity to adapt to changing conditions and circumstances, anticipate and take action with the mission to endure. Adaptive capacity increases sustainability because it is a skill that is repeated as necessary to survive and prosper. Developing an individual's or community's capacity to adapt is essential for sustainability because it helps the individual or community with decisions relating to the elements of balance. Wikipedia defines sustainability as to maintain the capacity to endure (Wikipedia, 2012, p. <http://en.wikipedia.org/wiki/Sustainability>) or as Brundtland described sustainability as "the ability to meet their own needs without compromising the abilities of generations in the future"<sup>1</sup>. With respect to methods that facilitate the manifestation of adaptive capacity and social change (Celino & Concilio, 2011) (Ellis, 2000) (Funtowicz & Ravetz, 1993) (Jones, et al., 2009) the domain of futures studies or foresight, is a process that may be able to inform the question of operationalizing the notion of sustainability in that the process is focused on embedding the future in present day decision making. Perhaps there are findings from foresight that can inform the operationalization of an uncertain futurity expressed in Brundtland's definition of sustainable development?

Folke, Colding, and Berkes (2003) identified four key factors to maintain adaptive capacity: learning to live with change and uncertainty, the ability to combine different types of learning, creating opportunities for self-organization for resilience, and nurturing resilience for renewal. The first factor is learning to live with change and uncertainty. Uncertainty is a futures based concept. To have the ability to deal with change and uncertainty requires that decisions or solutions derived today be useful in the future. Historically, the military has been a practitioner of future studies. The military would use

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<sup>1</sup> Many researchers use the Brundtland definition of sustainability being "*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*" There have been debates in the literature on this definition of sustainability primarily in the domain of adaptive capacity because many times compromising in a particular path is a form of adaptation.

future or foresight studies to determine strategic positioning and solutions development through a process that would firstly, anticipate what might happen and then practice how the action might play out, which would develop the capacity of the military to respond to various events. Therefore, foresight studies developed the military's capacity to anticipate and deal with uncertainty. Developing this skill provided the military with the best chances of survival or winning. It is reasonable to assume that individuals and communities could increase their sustainability by fostering their adaptive capacity through the practice of dealing with uncertainty (nurturing their ability to anticipate and respond to various future scenarios).

The application of foresight also enables the other three key factors to maintain and develop adaptive capacity. When groups engage in foresight they in effect create social learning opportunities through the anticipation of consequences of various scenarios, choices, actions, and relationships. By simulating possibilities, individual and collective members are more likely to adapt because they have had some mental exercise to deliberate the action, investment, consequences, and replay these until they explore the series or set of actions that meet their future expectations. It is not so much the predictive capacity of the foresight exercises (that there is one correct action) but the practice of engaging in multiple possibilities that create opportunities for self-organization for resilience. The cumulative impact of these foresight exercises (anticipating change, what it means to me, what it means to others, investment requirements, behaviour changes, and impacts) foster considerations of awareness/consciousness, options, impacts, and changing behaviours that nurture conditions for the possibility of resilience and adaptation.

The science of anticipatory intelligence in the military and political sciences domain is now creeping into the social domain. Foresight researchers defined futures studies as the capacity to enable people to think ahead, consider, create and model future eventualities (Slaughter, 1995) enabling people to take responsibility and action for their own future (Hideg, 2007) through present day decision making and mobilizing joint action (Miles & Keenan, 2002). Participation is a key dimension in developing better anticipation and better anticipatory behaviour (van der Helm, 2007). Therefore, it would be interesting to explore and understand the foresight process and how (and if) the methodology contributes to social learning which can nurture adaptive capacity.

The assumption here is that foresight participatory processes are robust enough to iterate consideration of the future to present day decision making to increase the likelihood that ideas and innovations are sustainable in the future. To manifest social change, there was the realization that adaptive capacity increased the likelihood of solutions/ideas/investments/choices to be relevant in a future context. Thus, the inclusion of the future seems to be an important part of converting participation to action to manifest sustainability.

#### 4. Summary

In summary, foresight is a participatory process that adds the temporal dimension of the consideration of the future or possible plausible futures in the decision making of today. Foresight is a participatory process and adds the dimension of how to co-create for the future, which pre-supposes the actions of engagement, deliberation, and consultation. Within this context, foresight can be articulated as a participatory social learning process that integrates consideration of the future in present day decision making. In effect, this process increases the adaptive capacity of considering various plausible futures and practicing the anticipation of consequences evolving from present day decision making.

Therefore, this study aims to understand the foresight process, map how foresight events manifest social learning, with the intention of understanding if foresight methods could inform the operationalization of sustainability.

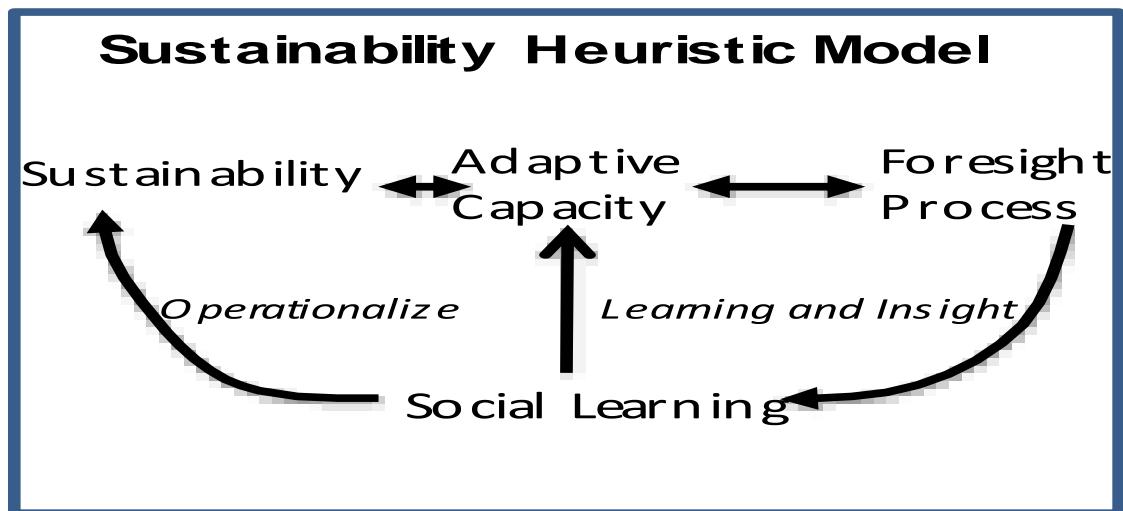
## II. The Theoretical Construct: The Sustainability Heuristic Model - Literature Review

### 1. The Theoretical Construct: The Sustainability Heuristic Model

The challenge within the theoretical constructs of sustainability is how to rationalize the temporal dimension of the needs of today with the requirements of an uncertain future. Futures studies or foresight is a field of study in the domain of anticipatory intelligence, which through a participatory process embeds plausible futures into present-day decision-making. Foresight, which originated in the military sciences to build the military's adaptive capacity to endure through social learning, is now creeping into the social domain to address complex problems such as adaptation to climate change and natural resource management, to name a few.

From a review of the literature on sustainability, the researcher has constructed a model or map on the key elements and processes which may influence or impact sustainability. The model is illustrated below in Figure 2.1.

Figure 2.1. Sustainability Heuristic Model



The description of the model is as follows:

1. The foresight process is a participatory set of exercises that helps people and organizations experience possible future options. The intention of the foresight

process is to foster learning and insight at multiple levels, such as revealing one's assumptions and mental models, then exploring alternative thinking, solutions, and ways of being. The idea is to be open to a new future and this experience can inform present-day decision-making. Insight in the future enhances understanding of the future consequences of current decisions.

2. Foresight participants experience a social learning process. They learn about themselves, how they think as a group (manifested by policies, governance bodies, and other institutions). At this point they may realize how the collective reinforces old paradigms and realize what changes in governance and collective behaviour may have to materialize to support decisions that are relevant in the present and the uncertain future.
3. Recognizing the behavioural and governance/policy changes may be required, the participants develop adaptive capacity or the consciousness to recognize the changes and ideas on how and when to make changes.
4. As a result of the processes described above, participants and stakeholders are more likely to take action in a direction that enhances sustainability; thus, there is an increase in the likelihood of sustainability. In this case, sustainability is also viewed as a process versus an end destination that is continuing to sense and adapt to an ever-changing context.

This research will build on the existing bodies of research summarized in the following literature review and explore the dynamic processes involved in each of the elements of the Sustainability Heuristic Model in order to see how the processes affect each other and overall contribute to the attainment of sustainability. The literature review will summarize the bodies of literature in the model elements of foresight, social learning, adaptive capacity, and sustainability. Emphasis will be placed on the literature surrounding the linkages or processes in each of these elements as it is anticipated that there is a paradigmatic shift moving from an analysis of the elements to the transformational capacity of these processes to generate change or action.

## 2. Sustainability - A Review of the Sustainability Literature

A review of the literature on sustainability has revealed common groupings of challenges in the expectations of sustainable development, including changes in the context interpreting sustainable development, paradigmatic evolution of the theoretical constructs, and evolution in the methodological approaches to sustainable development. A summary of the key observations of evolution or evolved thinking in each of these categories include:

### a. Evolution in the Challenges and Contexts to Sustainable Development

The most common discussion in the literature on sustainability or sustainable development was the desire to achieve sustainability, but there was a frustration with respect to the means to operationalize sustainability (Kuhlman & Farrington, 2010) (Sutton, 2004). Some articles suggested that sustainability was a type of 'hype' or jargon (Estes, 1993) (Fergus & Rowney, 2005). Discussions by other researchers ranged from illustrating achieving sustainability in the present, but questioning how one maintains sustainability into the future, implying the need for constant reassessment and change (Estes, 1993) (Giddings, Hopwood, & O'Brien, 2002).

The focus of discussions on sustainability changed over time. Initially, sustainability was applied to the nature of finite resources under the 'limits to growth' forum (Lele, 1991) (Leisinger, 1998) (Redclift, 2005). Later the discussion on sustainability evolved to the tradeoffs that existed between nature and economy (Giddings, Hopwood, & O'Brien, 2002). Currently, the literature resides in a more symbiotic relationship between nature and growth, approaching the development of nature and economy in an integrated manner. One could describe this evolution from a state of exploitation of natural resources moving to a focus on conservation, then natural resource management, and residing at the moment in the discussion representing a symbiotic relationship within the 'Green Economy' (Colby, 1991).

Figure 2.2. Changing Foci of Sustainability



As illustrated above, the context at various time intervals defined the nature or focus of sustainability. For example, initially commencing with frontier economics, supporting the view that there was an infinite supply of natural resources, the notion of sustainability was developed with a focus on conservation of natural resources for the future (Lele, 1991) (Leisinger, 1998). Later the concept expanded to conserve natural resources under a neo-liberal agenda focused on the economy and capitalism (Macnaghten & Jacobs, 1997) (Mebratu, 1998). Today, the concept focuses on the economy with a biological integration of the Green Economy, generating wealth while engaged in low resource usage (Backstrand, 2003) (Celino & Concilio, 2011) (Fergus & Rowney, 2005). Many researchers argue that this is a weak sustainability model (key lens being capitalism) still operating in the neo-liberal agenda and that the next evolution in theoretical constructs or paradigm alternatives focuses in an integral sustainability framework where human dignity and quality of life are center (illustrating the strong sustainability model) requiring a value shift away from a capitalistic focus (Clark, 2007) (Lauzon, 2012) (Morgan, 2011).

b. Evolution in Scientific Philosophy and Theoretical Constructs

At the same time there was an evolution of thinking in the philosophy of science, moving from a reductionist understanding of problems (breaking problems down into their component parts and studying these pieces independently). Academic disciplines and institutional entities emerged to support the common reductionist focuses, thus

disciplinary approaches or disciplines emerged in the construct of normal science or modernity to address a situation or a problem in a reduced standard manner.

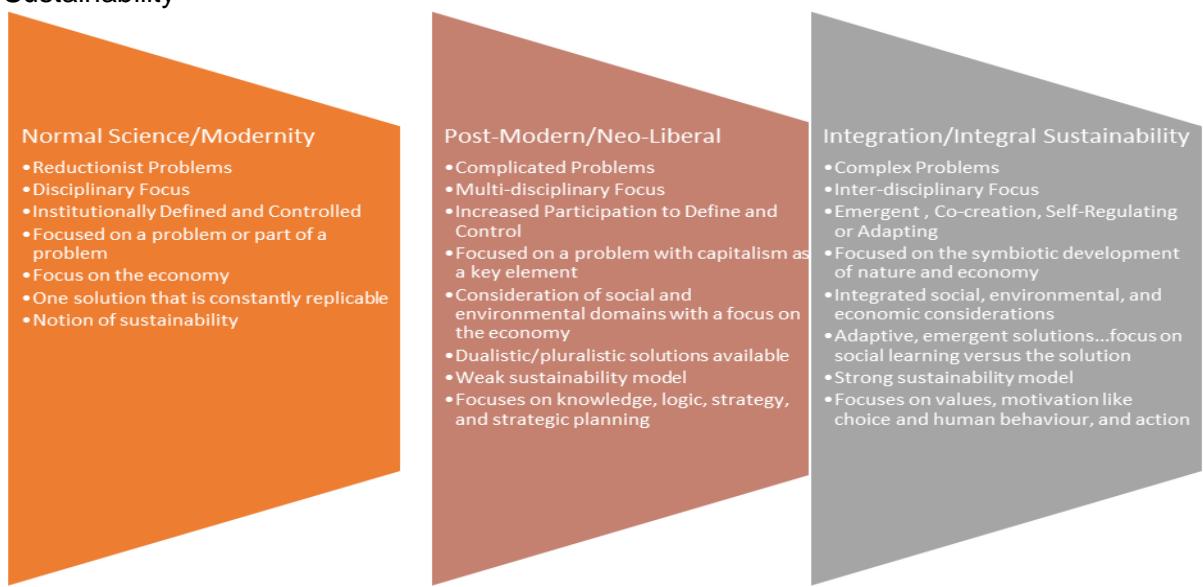
As the knowledge base increased, researchers began to focus on more complicated problems (Batie, 2008). As each discipline developed and maximized its knowledge function or potential to address reductionist issues, problem solving evolved to a more multi-disciplinary approach, bringing the knowledge of many disciplines to bear on a particular issue (Colby, 1991) (Estes, 1993). Post-modernism and neo-liberalism emphasized a consideration and interpretation of other knowledge within the context of the economy (quantitative and qualitative or natural sciences and social sciences) (Backstrand, 2003) (Castro, 2004) (Lehtonen, 2004) (van Kerkhoff & Lebel, 2006). In this context there was increased participation of institutions, populations, and new organizations with a vested interest in the outcomes (Funtowicz, Ravetz, & O'Connor, 1998) (Macnaghten & Jacobs, 1997).

Again, an evolution of thinking no longer just brought multiple knowledge sets together, but now these new foci and disciplines created an opportunity to innovate, and create new knowledge stemming from multiple disciplines. This interdisciplinary domain, which embraced innovation as an emergent property of the system, created new fields, disciplines, and knowledge sets to inform problem solving in more complex situations (Mebratu, 1998) (Redclift, 2005). The current space of discourse focuses on continual change requiring a complex adaptive management approach with principles that are self-regulating within the system (Celino & Concilio, 2011) (Diamond, 2005) (Gunderson, Peterson, & Holling, 2008). The evolved theoretical construct in this time period is the Integral Sustainability Theory which considers and integrates all perspectives to foster a sustainable solution to the context and which is ever changing or self-regulating to its environment or context (Backstrand, 2003) (Wilber, 1997) (Wilber, 2006) (van Egmond & de Vries, 2011). Examples of such open and emergent systems are the internet evolution, open source spaces, and changes in the nature of privacy and validation of information open to the public (Vallaster & Koll, 2002).

By bringing all perspectives to bear in a holistic way, the Integral Sustainability Theory incorporates values which motivate stakeholders to action (Banerjee, 2003) (Brown, 2005) (Castro, 2004). Thus the emphasis is not really in the solution at all, but the

capacity of the society to learn to adapt to come what may (social learning emphasis) (Backstrand, 2003) (Brown, 2005) (Lehtonen, 2004). In addition, there is a change as to the nature of the objective function or intended end outcome of sustainability. This idea is illustrated by a movement from the weak sustainability model (interested in sustainability but focused on the economy) to the strong sustainability model (involving a value shift that explores sustainability but with a focus on human dignity and quality of life) (Castro, 2004) (Kallio, Nordberg, & Ahonen, 2007) (Lauzon, Chapter 1-3, 2012). Researchers argue that without this value shift, one cannot fully transition from the neo-liberal framework to the integral sustainability framework (Scharmer, 2009) (Scharmer & Kaufer, 2013) (Senge, Scharmer, Jaworski, & Flowers, 2004) and in effect to 'real' sustainability.

Figure 2.3. Transition of Philosophical Spaces which Provide New Lenses to Sustainability



Within the theoretical constructs there is movement from a reductionist approach (reducing the problem to parts that are manageable within the confines of normal science), to a multidisciplinary approach which recognizes society, environment, and the economy, to finally an interdisciplinary or integrated approach which integrates all perspectives simultaneously nurturing an emergent co-constructed solution from a wide set of participants (Mebratu, 1998) (Vallaster & Koll, 2002). The alternative changes are not radical substitutes for the existing paradigms but focus on integrating theories and ideas of the past with a wider range of perspectives, objectives, solutions, and

participants to achieve a greater range of benefits. This context is important because it is the environment that defines ‘what is the outcome of sustainability’ and how society believes they may achieve sustainability at that time. The movement to Integral Sustainability is therefore a more holistic system of perspectives that integrates broader world-views (Macnaghten & Jacobs, 1997) (Redclift, 2005) (van Egmond & de Vries, 2011). Solutions within this context are more likely to inspire and motivate action because they represent the integrated reality of stakeholders and agents (Schmuck & Vleck, 2003). Therefore, in theory, actions taken in this way are thought to be more sustainable in the Integral Sustainability framework. However, a criticism of the Integral Sustainability Framework may be the complexity or difficulty to deal with ‘everything’ but impacting the operationalization of sustainability.

#### c. Evolution in the Methodologies Operationalizing Sustainability

The desire to be sustainable has evolved from the concepts of conservation in natural resource management to more complex problems that not only embed the environment but social, ethical, and value dimensions. The convergence of multiple objectives such as social, economic, and environmental aspects of issues illustrate the growing awareness and concern of more complex problems. There is a growing consciousness and desire to understand and find solutions for complex problems as these types of problems can be found virtually everywhere, ranging from mitigation and adaptation to climate change, environmental management, organizing a sustainable Olympics, health systems, poverty, AIDS reduction, civil conflicts, colonialism, and tradeoffs between environmentalism and poverty, to name a few (Backstrand, 2003) (Banerjee, 2003) (Cohen, Demeritt, Robinson, & Rothman, 1998) (Dietz, Ostrom, & Stern, 2003) (Funtowicz, Ravetz, & O'Connor, 1998) (Giddings, Hopwood, & O'Brien, 2002).

How have operational approaches or methodologies evolved to inform or achieve sustainability within this more complex context? The literature depicts a movement from the organizational-led strategic planning approaches to an increase in the participation of various stakeholders in some form of consultation (Backstrand, 2003) (Bentley, 1994). Many of the strategic planning decisions were supported by the information derived from quantitative models. These models embedded decision-maker’s assumptions and then incorporated time series data or historical data to predict what would be the outcomes in

the future. The models were generally viewed to be continuing, fostering an extrapolative approach to anticipate or predict the future. At this time, many financial and policy decisions were based on quantitative estimates. For this time period, quantitative extrapolation seemed to be the preferred approach in the context of sustainable development or the arrival to a sustainable destination (Australian Public Service Commission, 2007) (Batie, 2008).

As the control of such processes dispersed, moving to more open forums for discussion and debate with an expanded range of participants, there was the evolution of co-creation fostered by collaborative agreements to guiding principles. Often pluralistic solutions were proposed and implemented. This approach was preferred in the context of sustainability, that change was a journey and not a destination (Backstrand, 2003) (Batie, 2008) (Celino & Concilio, 2011). For example, within the context of agriculture, Conway argued that in addition to a focus on productivity, stability and resilience, a goal is to increase social value to promote a ‘type of fitness for the future’ (Conway, 1987, p. 100) (Pretty, 2008). In addition, there was the realization that change was occurring quickly and that decision-making models were no longer accurate to predict what was going to occur. Policy-makers opened dialogue to include discussions on these assumption discontinuities with other stakeholders and participants in the system (Armitage, et al., 2009) (Australian Public Service Commission, 2007) (Rittel & Webber, 1973). There was the realization that the models were only useful if the assumptions remained the same. This period of discussion contributed to the understanding that more of today’s problems were wicked problems rather than tame problems. Wicked problems were unique complex problems that often did not have a solution and the solution was not optimal nor replicable to other situations (Australian Public Service Commission, 2007) (Rittel & Webber, 1973).

The discussion in the literature evolved from one replicable solution led by an institution to many solutions for many agents to a focus on social learning in order to foster a resilience or adaptability to constant change (Berkes, Colding, & Folke, 2003) (Clark, 2007) (Folke, Hahn, Olsson, & Norberg, 2005). The current context is one that the world is ever changing and some sort of self-regulating and constantly adaptive capacity is required to become resilient through time. Therefore, social learning is the methodological approach to cultivate this naturally adapting and regulating capacity

(Armitage, et al., 2009) (Lehtonen, 2004) (Slaughter, 2008). This point also applies to organizations or institutions. As Elinor Ostrom argues, transformation and diversity is required for institutions to tackle sustainability. She suggests principles or guidelines to follow to increase the likelihood of sustainability which focus on setting clarity, accountability, nested governance and transparent enforcement to keep actions in line with intentions (Ostrom, 2005).

The notion of sustainability and/or sustainable development in the Brundtland definition refers to sustainable solutions in the present and for future generations. The future implies uncertainty. The paragraph above describes the evolution to a self-regulating, constantly calibrating society. If we know that the next time period is the future, can we be anticipatory and integrate the future in present decision-making and social learning contexts (Da Costa, Warnke, Scapola, & Cagnin, 2008) (Gunderson, Peterson, & Holling, 2008) (Hideg, 2007) (Floyd & Zubevich, 2010)?

Future studies, a science which stemmed from the security and military domains, is used to anticipate scenarios to develop the capacity to survive (Hideg, 2007). Future studies, often referred to as foresight, operates with the use of expanded narratives, to explore expanded possibilities, solutions, and implications. Foresight is a type of anticipatory social learning to anticipate scenarios and practice potential solutions in various contexts (Miles, 2010). In foresight, the intention is not to be predictive of tomorrow, but rather to develop alternative thinking and intuition to become more adaptive to uncertain future contexts (Floyd & Zubevich, 2010). Often the value in foresight is the ability to surface assumptions and values through shared perspectives (narratives) which are useful in exploring the motivators that are essential to change human behaviour (Miles & Keenan, 2002). Future methodologies have a large similarity with the Integral Sustainability framework in that expanded possibilities are encouraged which also expands the space for the co-creation of collaborative solutions sets (Floyd & Zubevich, 2010) (Morgan, 2011). Perhaps the application of foresight methodologies as a social learning process is a way to increase societal resilience by fostering an anticipatory adaptive capacity? Himmelman argues that participation is a key element of sustainability because it fosters collaborative learning, decision-making, and buying in or committing to action (Himmelman, 1996). Therefore, the integration of future studies in social learning may be a way to operationalize Brundtland's definition of sustainable development

(development that meets the needs of the present without compromising the ability of future generations to meet their own needs) in a more robust way. The integration of future studies is also consistent with the current theoretical construct of Integral Sustainability which promotes the integration of broader world-views to consider the whole system of perspectives, fostering a change in the values or belief system, thus motivating individual and collective choices, changing human behaviour that would result in action (van Egmond & de Vries, 2011). Future studies has methodological approaches to surface and challenge assumptions and has the tools to explore how alternative solutions could manifest with changes in value systems and human behaviour (Ozdemir, Faraj, & Knoppers, 2011).

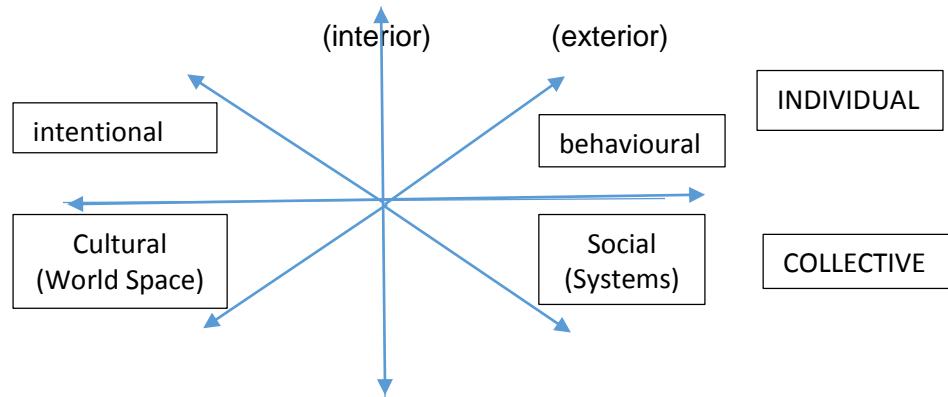
Researchers such as Scharmer (2009) argue that sustainability is a continual process that should be managed by a notion called transitional management. He states that to be sustainable one needs to transition from a neoliberal perspective focused on an economic endpoint, to a continual process of embedding other social and environmental requirements on a continual basis (Kemp, Rotmans, & Loorbach, 2007) (Roe, 1998) (Voss & Kemp, 2006). Kemp et al. (2007) and other researchers (Funtowicz, Ravetz, & O'Connor, 1998) suggest that governance of sustainability is an issue because of uncertainty of the future, ambivalent goals, and a lack of clarity with respect as to who has power, control, resources, and the responsibility to take action. In addition, policy or governance processes focus on the short term ('what are the results in the quarter?', 'if you can't measure it you can't do it' attitudes) which may focus within an election cycle, but do not address needs in the long term. Kemp et al. (Kemp, Rotmans, & Loorbach, 2007, p. 316) argue that there is a bias for incremental politics and that if traditional institutions dominate (even if you do the reflexive governance, which is governing by reflecting knowledge and choices with society) understanding might be better, but that we are destined for more or less the same path. Therefore, Kemp et al. suggest transition management as a way to adapt to change while taking the role to shape change itself (Kemp, Rotmans, & Loorbach, 2007, p. 317). To do so, the group has to understand these driving assumptions; rationalize any contradictions with society's values or goals, clarify goals or a type of end state that is truly desired. In addition, they must deal with uncertainty or uncertain impacts---how do they do that? They must anticipate (make scenarios), see what could be the implications, see what they need to have to take advantage of or mitigate against these circumstances, and reflect if they

can potentially live with these consequences or should they do something about them (Kemp, Rotmans, & Loorbach, 2007, p. 318) (Lee, 1993) (Walker, Holling, Carpenter, & Kinzig, 2004). Therefore, reflexive governance (reflecting/critiquing your own choices) is required to move to sustainability in that this governance approach fosters the participation of society and the recalibration of societal values and adaptive policies for systems change (Kemp, Rotmans, & Loorbach, 2007, p. 327).

#### d. A Review of the Processes used to Achieve Sustainability

The most recent theory on sustainability is the Integral Sustainability Theory which stems from Wilber's Integral Theory (Wilber, 1995). In applying the integral theory, the premise is that one has to examine the whole concept. Sustainability, as whole concept, must be treated in a whole way (Varey, 2004). Varey's interpretation of Wilber's theory suggests that the whole must encompass the intentional, the cultural, the social, and the physical (Varey, 2004). Varey suggests that in general we intend to have sustainability. Typically sustainability is measured in the physical quadrant (quality of air, availability of water, amount of biodiversity). Recently there has been more collective attention to the cultural (increasing concern for others, marginalized), but overall there is a lack in understanding of the social quadrant. The Integral Sustainability Theory argues for the inclusion of multiple perspectives, particularly the alignment of individual and collective world-views, corresponding behaviours (individual and collective), and the inclusion of cultural and social needs.

Figure 2.4. Wilber's Integral Sustainability Components (Wilber, 1995)



"Sustainability assessment is where we prospectively assess and design for sustainability impacts. It differs from the assessment of environmental impacts of a prescribed solution only to have to mitigate those impacts retroactively" (Varey, 2004, p. 2). Varey suggests that the barrier to develop proficiency of sustainability practices is in our social and political systems. "With no clear 'integral instruction manual' the emergent processes are meshed into conflict with existing structures and can only hope to be partial" (Varey, 2004, p. 2). Often sustainable ideas are in conflict with things that need to be completed in the present time frame and thus take precedence over sustainability (future oriented) thinking.

A group of Australian researchers came together and through a comparative analysis developed principles that could be applied to processes that nurture sustainability.

These processes are defined as (Ostrom, 2005) (Varey, 2004, pp. 3-4):

- Clearly defining the terms of sustainability – what is to be sustained? For whom?
- Define sustainability core principles – weak or strong sustainability, what is the tradeoff between social, environmental, and economic?
- Define sustainability guiding principles – i.e. approach to biodiversity, indigenous populations.
- Definition of sustainability assessment design principles – basically a rubric of the above inclusive of the results anticipated, how and when they will be measured.
- Define sustainability assessment process principles – how many consultations, when will decisions be made and reviewed.
- Define sustainability assessment policy principles – for decision-making bodies (parliament, cabinet, departments, etc.).
- Define sustainability "hierarchy" (management by the whole) principle coordination – how will different levels of stakeholders and decision-makers coordinate?

The Australian researchers point out that there is much documentation of intentions, processes, consultations, and expectations which are useful to articulate the manner and precision of decisions. A point of concern is that the determination of sustainable is conducted or detailed in the present without the flexibility for the future and the need for empirical measurement (a positivistic and end outcome focus) versus a way of being (emphasized by later literature on a focus from an end destination to a journey or to a way of being). However, consistent with the commentary from Varey, there is a

tendency for organizations to use current practices (dominance of the present) as they foster credibility, acceptance, and familiarity for advancement and action of an initiative.

Varey states that if you maintain all seven principles then you increase the integrity of sustainability of the whole. If any one of these categories is missing then you compromise sustainability because you are missing some element of the whole (Varey, 2004). Thus Varey's premise is that failure to practice all principles of sustainability reduces the likelihood of being sustainable. By abiding by these principles, Varey argues that you increase the emergence of sustainability. Other researchers follow relatively similar processes (Scheirer, 2005) emphasizing the recording of the process, stakeholders, goals intended, and measurement process. The difficulty with all of these processes is that they emphasize the destination and not the process. A goal is set out in the present, but there is not a process to change, anticipate, and formally to account for uncertainty. In many ways the process is more reflective of strategic planning than strategic thinking. The literature notes a consciousness of sustainability being a journey, however the common tendency to anchor to artifacts of acceptance from the past to maintain a connection to the 'known'.

Throughout the theoretical literature discussions there has been a movement from sustainability being a destination to sustainability being a journey to sustainability being a way of being; the actual practical applications of sustainability seem to focus on the first; sustainability being a destination. Researchers such as Scheirer (2005) argue that these processes discussed above - the tendency to set a goal and measure it - stems from our tendency to legitimize behaviour in the older paradigm. That is, we have many conventions that are accepted without reflecting their relevancy or usefulness in the current period. 'You can't achieve what you can't measure', etc. are types of processes so entrenched in organizations, that even if you can get the strategy right, your credibility or acceptance is often guided and influenced by path dependent or historically accepted practices, thus there is a disconnect from understanding and knowing -- to the required future action. These concepts have led to a thread of thought that sustainability is achieved when the new behaviour is institutionalized or becomes routinized in an organization or system (Scheirer, 2005). Once it is institutionalized, this is apparently proof that they understand and know, but then there is the mechanism in place to facilitate the 'doing'.

Scheirer summarizes that there are many variables contributing to sustainability such as (Scheirer, 2005, pp. 340-342):

1. The people inside and outside the organization interested in the issue;
2. Leadership and staff to ensure that the program is properly administered; and
3. The visualization of benefits and results (using a series of quick wins to illustrate success).

These summary points allude more so to a process; however, the identification of quick wins and successes refers to the ‘destination’ discussion. Maybe one needs a bit of both to maintain momentum and transition from one paradigm to another? Perhaps this overlap of paradigms is important in the nature of transitions -- the ability to step into the new world because you have a foot anchored in the old world?

Other researchers state that it is impossible to know the future therefore, one should adopt the pre-cautionary principle to preserve all forms of capital (and not substitute one type of capital for another) (Daly, 2001) (Rees, 1990). The idea here is to maximize the reserves of resources, human capital, social capital, and financial capital for an unknown future (Conway, 1987) (Pretty, 2008). “Herman E. Daly points out that we cannot bequeath utility to the future; we can only bequeath opportunities” (Bonevac, 2010, p. 100). Therefore, the objective function should constrain the use of assets where possible for potential future usage. These concepts would be emphasized in the ‘strong sustainability’ model. Whereas in the ‘weak sustainability’ model, the focus would be to permit the substitution of one form of capital for another (i.e. substitute economic growth for ecological capital and/or social capital). This point is also emphasized by Kuhlman and Farrington (2010) but more so from a theoretical perspective versus an operational perspective. Other researchers have expanded the theoretical framework to include general processes that they argue are essential to sustainability, such as integration, diversity, multiple and interconnected perspectives, deal with uncertainty, have rules/processes for tradeoffs, the end is open, and must embody transparency and good communications (Kemp, Pareto, & Gibson, 2005); however, the description is at the level of principles or general processes to keep in mind versus a more operational type of approach.

Some researchers have explored processes that organizations need to consider or maintain to increase the likelihood of sustainability. Kemp et al (2005) includes the important movement from ‘government to governance’. With the rise of civic participation and a change in the nature of organizations to move to embody the principles described above (diversity, communications, integration, transparency processes and rules, etc.) (Himmelman, 1996) (Ostrom, 2005); to ensure integrated diverse participation and in effect action. “Because a major proportion of sustainable development is about radical changes in the systems of production and consumption, governance for sustainability is, by implication, about working through formal and informal institutions to bring about societal change” (Kemp, Pareto, & Gibson, 2005, p. 19). Ways for organizations to do this is through a common narrative that focus to employees and others clarifying what they stand for, policy integration, and information and innovation programs (to incentivize new behaviours). These system innovations are linked to institutional changes to replace old ways of dialoguing, policy-making, communicating, and acting (Kemp, Pareto, & Gibson, 2005). Change at these many levels require making transitions. “Transitions involving system innovation cannot be managed in a controlling sense but they can be aimed and guided in an iterative, forward looking, adaptive manner, using markets, institutions and hierarchy (the three basic forms of coordination)” (Kemp, Pareto, & Gibson, 2005, p. 23). “Transition management does not aim to realize a path at all costs. It engages in the exploration of promising paths, in an adaptive manner with exit strategies” (Kemp, Pareto, & Gibson, 2005, p. 24). Therefore an important element to maintain or strive for sustainability is the management of those transitions. Thus, processes such as these, and the people which focus on managing transitions (leaders), seem to be key to taking action.

Backstrand (2003) states that participation is a key element in sustainability science, particularly through the notion of civic science. Civic science refers to a balance of scientific experts, policy-makers, coupled with public participation in science, as essential to make sustainable decisions (Backstrand, 2003). In this manner, the public is not just involved in decision-making, but learn and contribute in order to become better ‘actors’ in the system (Himmelman, 1996). Using processes that involve the public is becoming more important as there is a rise in what is called ‘negotiated science’ (Backstrand, 2003). Negotiated science refers to issues such as global warming or climate change or health issues or epidemics such as obesity and chronic disease. There is evidence of

these issues but not certainty, but action taken by policy-makers on these more complex and less certain issues requires understanding, support, and action from the public to make investments in less clear or concrete issues. In addition, with a shortage of research funds, decision-makers or policy-makers need ways of prioritizing investments. Having the citizenry involved can help prioritize competing priorities in ways that the public can support and act upon as well (Himmelman, 1996). To deal with a decrease in research funds or an increase in areas to be researched, action is leveraged by unique policy instruments such as tripartite or cost-sharing agreements. If the public or citizenry feel an issue is important then they can raise the funds and research institutions and/or government can match those funds. Backstrand highlights that these mechanisms make it a bit unclear if the goal is participation, representation, management of risk, social learning, or the democratization of science (Backstrand, 2003).

At the same time, there is a growing public understanding that science is not as precise as previously believed. It is better understood that science exists but may be incomplete in its understanding, yet decisions have to be made (Backstrand, 2003). Therefore, through participation processes, sustainability is increased by the public becoming more informed, being involved in the choices and the findings, and taking on some of the risks in science in areas of particular uncertainty. “Problems such as climate change, GMOs, or biodiversity which are fraught with uncertainties, cannot be adequately resolved by resorting to the puzzle-solving exercises of Kuhnian normal science” (Backstrand, 2003, p. 30). In effect, “the transition from industrial society (with its calculable risks) to a risk society (with its incalculable mega-hazards) requires a redefinition of the rules, principles and institutions of decision-making” (Backstrand, 2003, p. 32). In theories of risk societies and reflexive governance, participation becomes an essential component as it opens up the discourse for the social rationalization of science leading to awareness creation and learning. This inclusive science approach ensures questioning and self-reflexivity. As one can see, there is a big social learning component with the processes of critique and reflection, but the participation with the role of creating the process of self-reflection to the individual or individual entity is necessary for progress or growth. There exists formal processes of participation and social learning in groups, but the literature only alludes to the ideas of individual transformation due to learning, reflection, and thus action.

Brundtland's definition of sustainability emphasizes the ability to make decisions for the betterment of today that enables the capacity to provide for future generations.

Sustainability must deal with the dimension of time. This temporal dimension is not addressed in neo-classical economics. If neo-classical economics were to integrate the need for sustainability it would have its objective function stated (usually in a neo-liberal capitalist form) with a constraint of sustainability. Currently neo-classical economics uses a discount model of the future, thus making the future irrelevant (Chichilnisky, 2010). Posner argues that the present discounted value does not capture the possibility of catastrophic events in the future, thus rationality does not work to truly account for future events outside of the norm of today (Posner, 2004). Chichilnisky states that expected value is a good tool to assess risks that are likely to happen today or tomorrow but is insufficient to evaluate highly impacting but lower probability events that may occur (visualize examples such as Hurricane Katrina) (Chichilnisky, 2010) and thus, we need another way to fully account for plausibilities in the future by giving weight to the future. She argues that Koopman's axioms (proofs that demonstrate that a discounted future puts most of the emphasis on the present) illustrate a bias for the present (Chichilnisky, 2010) and that sustainability involves giving equal weight to the present and the future (Chichilnisky, 2009). She postulates that weight given to a long-term future will account for potential extinction of the resource considered. Chichilnisky suggests that consumerism indicates a dictatorship of the present, whereas romanticism illustrates a dictatorship of the future. She supposes that sustainable decision-making that involves some tradeoffs between the present and future (Chichilnisky, 2009) yields the most sustainable decision-making. Therefore, processes that give ample consideration of the future are important.

The literature describing the processes involved in the domain of sustainability are varied and interesting. Most of the research is primarily focused on the theoretical level, emphasizing the Integral Sustainability Theory, which advocates for an inclusion of broadened world-views to increase our consciousness of perspectives and potential impacts, thus evolving to more sustainable decision-making. Other literature noted similar trends (the need to broaden world-views) particularly in the domain of science (more citizen involvement) and the domain of economics (business models are not emphasizing or attributing adequate weight to the future); thus, current decision-making

is short term or present focused versus long term or sustainability focused. Therefore, consideration of the future is likely to increase the emergence of sustainability.

e. Controversies and Trends in the Sustainability Domain

Regarding controversy in the sustainability literature, there were no significant deviations, but more of a rolling elaboration and thinking of the previous theory. Small dissention amongst researchers existed temporarily in the following two key areas:

- Sustainability versus sustainable development – however, as explained in the text above, this definitional difference has moved from sustainable development (arrival at a sustainable destination) to the focus on sustainability (focus on a journey that is constantly self-regulating to a changing context); and
- Sustainability in the neo-liberal postmodern paradigm with capitalism as the focus and social and environmental elements are considered in relation to the economy. Many researchers call this thinking the weak sustainability model, in that sustainability exists but placing the economy as the primordial driver of the decision-making process. The strong sustainability model is the alternative paradigm proposed which inextricably links the economy and the environment, with the primordial focus on a value shift represented as human dignity or quality of life. This discussion led to ideas on how one achieved sustainability in the weak sustainability model (neo-liberal capital oriented, man in control of nature) and how one achieved sustainability in the strong sustainability model (integrated values based on human dignity, quality of life where man and nature are symbiotic).

In these areas, the discussion in the literature has been evolutionary, introducing an expanded argument versus proposing a radically alternative paradigm. The literature very gently or gradually changes to represent the new integrated or expanded version as the stepping point to foster further discussion.

Regarding the most robust theory ‘de jour’, the Integrated Sustainability is the main theoretical construct in the sustainability literature at the moment. Its major premise is to be inclusive of diverse world-views representing a holistic perspective. Consideration of the whole perspective with full players and agents is perceived to derive the most sustainable solution at any time.

In addition, the literature highlights the transition to sustainability in terms of knowledge waves from the weak sustainability model to the strong sustainability model, stating that

society is at the cusp of a fundamental value change moving from a focus on the economy to one of human dignity and quality of life. As articulated above, many researchers are stating this change requirement and simultaneously arguing that decision-making frameworks are embedded in institutions and participants that support the neo-liberal weak sustainability perspective. Consciousness exists and that a radical shift in values is required to move from the weak model to the strong model. Concrete examples of how this shift should be supported are unclear. The recent thinking of Senge and Scharmer (Scharmer & Kaufer, 2013) in the area of transformational leadership (motivating or encouraging individual leaders and innovators to forge ahead with change to explore the alternative paradigm) might be headed in that direction.

Within the methodological discussions, there is an acknowledgement that sustainability has to rationalize the temporal scale of present-day decision-making with an uncertain future. The literature from futures studies or anticipatory sciences has crept into the sustainability literature as a way to enhance social learning in the future. Though anticipating various scenarios would increase adaptive capacity to potential future conditions, this approach is not predictive. This point is important as it reflects a deviation from traditional strategic planning models that identify a preferred end point as opposed to more of the literature in decision-making under uncertainty.

### 3. Foresight - A Review of the Foresight Literature: Sustainability in an Uncertain Future

These evolving terms and various interpretations of sustainability are compounded by the futurity implied in the definitions of sustainability. Researchers allude to the management of the temporal dimension of the future within the definitions of sustainability, but without guidance on how to practically incorporate the long term time dimension of sustainability (Bonevac, 2010) (Castro, 2004) (Kates, 2000). The concepts, 'to ensure, to sustain, to maintain, or develop to meet the needs of the present without compromising the future', all embody elements of uncertainty in the future (UNDP, 2005). Sustainability, though conceptually desirable, the operationalization of the term is abstract and uninformed in the literature. In fact, more is known about sustainability when it is not achieved (i.e. something becomes extinct) than is known what is sustainable.

### a. Foresight Overview

Future studies or foresight, which is a participatory action research approach, has examples of participation yielding social change or action because it rationalizes the temporal scales of action to be taken now that would be useful or beneficial in the future (Floyd & Zubevich, 2010) (Webber, 2006) (van Egmond & de Vries, 2011). This idea of balancing or aligning the relevancy of a decision or action between the present and the future is a key feature within the definition of sustainability (i.e. Brundtland's definition that sustainable activity benefits the present without reducing the capacity of future generations to care for themselves). Therefore, an interesting question is if the inclusion of foresight methodologies and practices within the context of sustainability helps operationalize the concept of sustainability into action.

The science of anticipatory intelligence in the military and political sciences domain is creeping into the social domain. Foresight researchers defined futures studies as the capacity to enable people to think ahead, consider, create, and model future eventualities (Slaughter, 1995) enabling people to take responsibility and action for their own future (Hideg, 2007) through present-day decision-making and mobilizing joint action (Miles & Keenan, 2002). Participation is a key dimension in developing better anticipation and better anticipatory behaviour (van der Helm, 2007). Therefore, it would be interesting to explore and understand the foresight process and how (and if) the methodology contributes to social learning which can nurture adaptive capacity to be sensitive and responsive to change as required.

The assumption here is that foresight participatory processes are robust enough to iterate consideration of the future to present-day decision-making to increase the likelihood that ideas and innovations are sustainable in the future. In addition to social learning processes generated through the participatory foresight methodologies to manifest social change, there was the realization that adaptive capacity increased the likelihood of solutions/ideas/investments/choices to be relevant in a future context. Thus, the inclusion of the future seems to be an important part of converting participation to action to manifest sustainability.

Foresight is characterized as a ‘community of practice’ more so than an academic discipline, formed by a group of individuals of diverse academic backgrounds, from

different types of occupations, coming together to understand the futurity of present-day decision-making (Voros, 2003). Foresight or future studies is the study of possible, plausible, and preferable scenarios to study the underlying beliefs, models, and values that underpin them. It is the study of ‘what if?’ to test if you are prepared for such eventualities, or to see if there are discontinuities to present decision-making models or ways of thinking. Sometimes foresight is referred to as ‘anticipatory intelligence’ as the future is uncertain, but there is a certain type of learning or awareness can occur when you study future plausible situations (Slaughter, 2002). This learning can generate insight to deficiencies and new opportunities by building in flexibility to ‘see other things’ and ‘think in other ways’ which encourages people to recognize, embrace, and foster change.

There is also a term called forecasting. Forecasting is the study of historical data and extrapolating how this data may unfold into the future. Forecasting is linear thinking in that one assumes that the conditions in the past will be the same as in the future. Given this assumption, forecasting is commonly used to predict or anticipate how a situation may role out in the future (Voros, 2003).

How is foresight different than forecasting? Mintzberg has characterized the differences between strategic planning and strategic thinking stating that strategic planning “has always been about analysis - breaking down a goal or set of intentions into steps, formalizing those steps so that they can be implemented . . . , and articulating the anticipated consequences or results of each step” (Mintzberg, 1994). Strategic planning is a project management type of activity requiring analytical, logical, deductive, and pragmatic thinking to keep initiatives ‘on track’. Mintzberg then describes strategic thinking which in his words is focused on ‘syntheses’. Utilizing more fluid and creative skills (‘what if?’ or ‘blue-skying’, experimentation, and intuition) to formulate an integrated perspective or vision of where an entity could be heading. Other researchers describe foresight as a more disruptive approach (Liedtka, 1998) which attempts to go beyond what purely logical thinking can inform. The future is uncertain; therefore, the activity needs to be ‘synthetical’ and inductive, rather than analytical and deductive.

Voros thus describes foresight as an aspect of strategic thinking which is meant to open up an expanded range of perceptions of the strategic options available so that strategy-

making is potentially wiser (Voros, 2003). Strategic thinking utilizing foresight is exploring options and strategy for today and tomorrow. Strategic planning is the means to operationalize that strategy into action. Thus foresight is not a replacement for strategic planning, but that recalibration of the entity's vision to consider if the strategy requires a reality check, refinement, or adjustment now and into the future.

The notion of foresight has existed in human history for millennia. The idea of anticipating what might happen and preventing an incident has long been practiced, primarily in the military. One of the commonly used tools in foresight studies is the use of scenarios. Herman Kahn developed the first formal scenarios in the 1960s at the Hudson Institute to study potential offensive and defensive strategies in the context of the Cold War, specifically on thermonuclear war. This thinking led to development of 'war games' to simulate capacity and capability requirements for military investments and preparations (Riedy, 2008) (Voros, 2003).

The success of anticipatory military exercises supported the development of foresight and scenario professionals to support the corporate, educational, and non-governmental organizational sectors--to apply foresight to other fields--to develop more competitive frameworks and strategies (Slaughter, 2002). Perhaps one of the most notorious examples in this period was the Royal Dutch Shell scenario planning used to anticipate responses or behaviour change in the oil industry to Shell's advantage. Later, in the 1990s, foresight was used to generate insights and new directions to support national systems of innovation or how to advance competitiveness through innovative approaches (Martin & Johnston, 1999).

So what is the future for future studies? Researchers (Australian Public Service Commission, 2007) (Batie, 2008) suggest that consideration of the future, versus a reflection or extrapolation of the past, will be more necessary over time. The reason is that due to an increase in connectivity, there are more agents, more actions, and a confluence of these items makes the future more complex and less predictive. In fact the Australian Government has described an increase in 'wicked' problems (Australian Public Service Commission, 2007, pp. 10-12) (Rittel & Webber, 1973). There are specific characteristics of wicked problems including the:

- difficulty to define the problem;
- multiple interdependencies and multi-causal relationships within the context;
- a lack of stability among the agents and elements;
- often responses to wicked problems result in some unintended or unanticipated consequences;
- frequently there is no clear solution to the problem;
- problems are socially complex and rarely can be handled by only one institution or player; and
- approaches to these problems often require a change of behaviour and often current or status quo policy frameworks are inadequate to address the issue.

Typically these problems are very interdependent on multiple systems and a solution to one situation may not be applicable to other similar situations.

The Australian Government (Australian Public Service Commission, 2007) recommends approaches, methodologies, and strategies that can address the characteristics above to provide insight to future directions. Typically these strategies and methodologies must be holistic, not linear, and have innovative thinking that can span across the boundary of organizations. The processes should be effective in facilitating the engagement of citizens and stakeholders to understand the problems and co-create solutions towards those problems, require a comprehensive focus and behaviour change among policy-makers, and deal with uncertainty and perspectives/implications in the long term. Often solutions to wicked problems are referred to as adaptive management approaches in that the solution depends on the actors and context, it is possible to have more than one solution, and often solutions are not replicable in other contexts or transferable.

Given the nature of wicked problems, complexity, and the recommended responses it is understood how the study of the future and its processes will become more important. Thus foresight or future studies has often been discussed to better understand complexity, uncertainty, and change within multiple systems at the same time.

#### b. Changes in Methodologies in Future Studies

Over time there has been the expansion, addition, experimentation of new methodologies. Initially, the most common foresight methodologies included the use of scenarios (Voros, 2003). Sometimes these scenarios were role played or simulated, either in real-life situations or table top exercises (actors sitting around the table and

talking out their actions and responses). These scenarios were analyzed and findings were reported to policy and decision makers to influence their strategy and activity development.

As scenario work gained respect, positivists began to model the scenarios to gather quantifiable outcomes. Though these extrapolations were not predictive, quantifiable models were the respected ‘mode de jour’ and often helped neo-classical-based policy-makers understand the implications through quantifiable estimates (Slaughter, 2005). However, when various future scenarios were developed, modelers came to the realization that the value of the exercise was not in the numbers predicted but in the insights derived on discontinuities to the decision-makers’ thinking (Slaughter, 2002). Through the study of various scenarios participants began to understand their assumptions and mental models that clouded their ability to see new trends (which could be opportunities or challenges) or to look at challenging issues but with new eyes or new approaches. By realizing their assumption base (inclusive of values and beliefs) and understanding the mental frameworks that they used to assess problems and solutions, participants could now see how certain decisions were biased, changes not observed, and innovation opportunities missed (Slaughter, 2002) (Floyd & Zubevich, 2010). These scenario tools were primarily designed in social settings, providing learning for individuals and groups to see new trends, and offered a forum to examine how their organization or policies were an impediment to change. In these type of participatory exercises ‘deep or profound learning of change’ was observed.

As information management tools and internet connectivity increased, more automated and distributed tools emerged. The ability to scout the news and information sources around the world led to advancements in environmental scanning (looking for changes in various domains and reporting those) to the Delphi methodologies that through broad based surveys and rapid analysis could see the ‘wisdom of crowds’ to provide new insights (Riedy, 2008). These tools were designed to reach many individuals, however, these tools did provide learning to groups when the results of the overall findings were distributed back to participants. In these types of exercises, there was the ability to inform many people. (Refer to Table 2.1 for a description of the most common methodologies used in each time period).

There have been many methodologies used in the foresight domain. Popper covers the various methodological approaches in a comprehensive graphic inserted below.

Popper's (2008) illustration articulates a couple of key themes resonating from foresight methodologies. The first theme is that the methodologies range in some combination of four categories, ranging from creativity, interaction, evidence, and expertise (Popper, 2008). Scenarios and rigorous imagining are in the most extreme corners of creativity; social forums in the form of conferences and citizen panels emphasize interaction; modeling and bibliometric reviews illustrate a strong evidence emphasis; and expert panels are examples of engaging credible expertise. Often foresight analysis will use more than one methodology with the intention of triangulating findings. The future is uncertain and has not yet occurred therefore some way to validate changing trends, discontinuities, and innovative responses are required. Popper's analysis observed that an average of five methods are used per foresight exercise (Popper, 2008). Why so many participatory exercises?

Popper's second illustration on the foresight process demonstrates a mix of participatory exercises over time to step a group through an understanding of what is, understanding possible futures, and developing a shared vision and understanding in order to engage in action. Within these processes are awareness building (understanding individual and collective assumptions), visioning (what futures are possible?), reflection (are we prepared?, what happens if we do nothing?, what could we do?), this reflection often leads to social learning (so what do we need to do?), with the intention of action (now we have to do it) (van Kerkhoff & Lebel, 2006). The foresight exercises correlate with various stages of generating understanding. The first exercise focuses on scoping the issue and surfacing aspirations. The second foresight exercise mobilizes and engages of key players. The third exercise emphasizes the creation of new knowledge and a shared vision. The fourth exercise leans towards shaping the future through commitment and transformation. The final foresight experience is reflective, reviewing the learnings in the form of intelligence and wisdom (Popper, 2008). It is possible to conduct fewer foresight exercises, but in general, these are the learning and transformative steps that occur in the process. (Refer to Figure 2.8 for the correlation of foresight methods and transformative learning steps).

Intuitively, foresight, in its ability to explore possible futures creates a backdrop with which to assess the assumptions of policy-makers, decision-makers, and population awareness in their assumptions and to explore if those assumptions create opportunities or weaknesses in the future. The uptake of foresight directly into policy making or decision-making cycles seems to be relatively poor (Voros, 2003) (Macklin, 2010). Some researchers have argued that the issue here is that there is a bottleneck between the processes, language usage, and timelines used between the two groups. For example, the policy making process wants answers to very specific questions in very specific time intervals. Policy-makers are presented with an issue and they want to hear the evidence that is directly relevant in order to make a responsive decision. The foresight process, by its participatory nature that encourages social learning, takes time. Time is needed to clarify the questions, engage the right stakeholders, and develop trust and a mutual language to understand each other's point of view. In addition, there may be a study of various scenarios and then later a reflection of a series of possible options for consideration on larger and more holistic issues. This process, these results, this timeline, seem not to be modular as to integrate directly into the policy decision-making process (Da Costa, Warnke, Scapola, & Cagnin, 2008).

Da Costa et al presented that the main value of foresight was to inform the thinking around policy, create platforms for learning, as it can improve the legitimacy of policy making due to its participatory processes and can raise awareness where long term and short term policy tradeoffs may exist. Many foresight events have increased awareness that linear and short term policy processes are frustrating and changes in paradigms, governance, decision-making and policy making may need to occur (Da Costa, Warnke, Scapola, & Cagnin, 2008). Though it may seem intuitive that change in institutions would be necessary, it has been very hard to change the policy making process that has been very well entrenched in governance institutions (Ostrom, 2005).

Table 2.1. Chronological Representation of Foresight Applications and Frequently Used Methodologies

Focus	Objective	Favored Methodologies	Research Interests
Military strategy (historically, more so in the 1940s+)	Defensive/offensive maneuvers; War games – responses/ roll out consequences of thermonuclear war; Cold War applications	Scenarios War Games	Herman Kahn Hudson Institute Rand Corporation
Business Advancement (1970s+)	Competitive Advantage	Scenarios Expert Panels	Global Business Network (GBN) Royal Dutch Shell
Competitiveness and Innovation Systems (1990s+)	National systems of innovation	Technology foresight; Scenarios; Delphi Expert Panels Technology Road – mapping; Scanning	New Zealand; Taiwan; Singapore Australia; Canada (more governmental focus)
Wicked Problems Framework (Australian Public Service Commission, 2007) (climate change, obesity, natural resource scarcity) 2000+	Complex problems Challenges to traditional public policy frameworks	Scenarios Modelling Delphi Citizen/Societal Engagement Scanning	Governments (Australia, Canada, UK, USA, EU, South Africa+) (Riedy, 2008) & other organizations & stakeholders Universities involved in foresight (Oxford, Harvard, Houston)
Value Shift Framework-wicked problems but focused on the initial conditions; change the behaviour that caused the problem vs responding to the problem	Look for a behavioural change to not create/mitigate the problem in the first place; looking for a value shift; Integral Sustainability/Integral Theory (Wilber, 2006) Integral Futures (Slaughter, Integral futures methodologies, 2008) (Morgan, 2011)	Integral futures Causal layered analysis (Riedy, 2008) Scenarios Co-created consciousness, solutions or actually individual responses to a shared primordial objective Inclusions of 'others'/ expanded world-view	Don Beck Spiral Dynamics on Israel-Palestinian conflict Some climate change work and realization of changing values with the 2009 financial crisis

Figure 2.5. Popper's Representation of Foresight Methodologies Referencing Key Emphatic Qualities (Popper, 2008, p. 60)

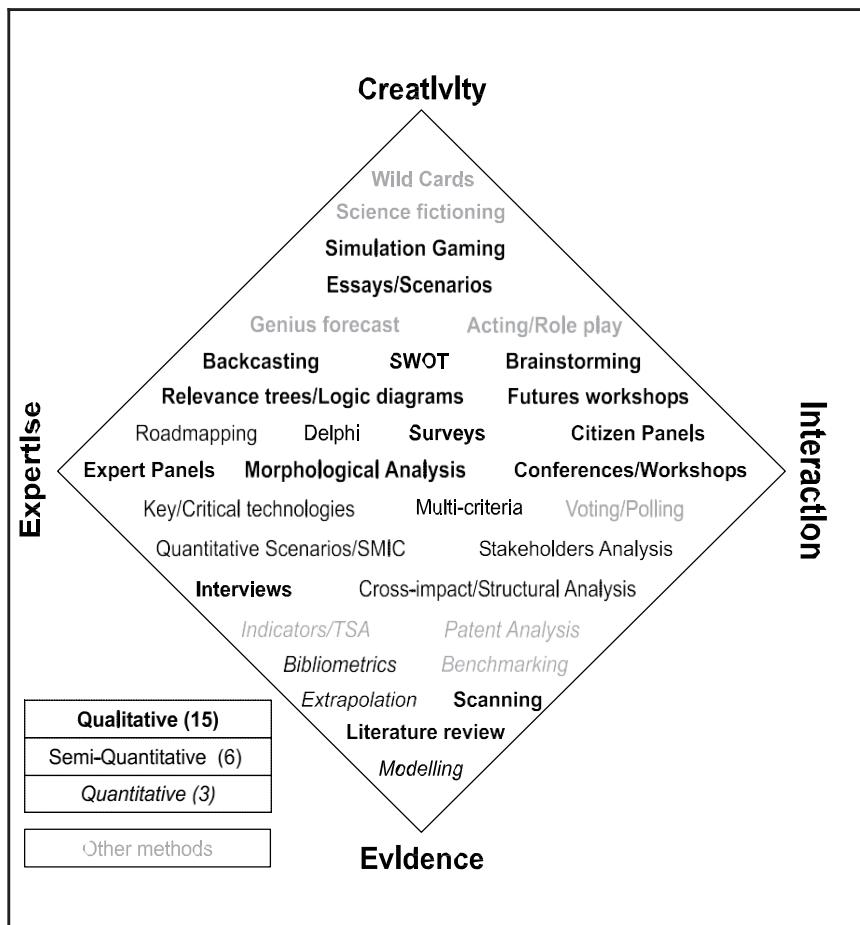
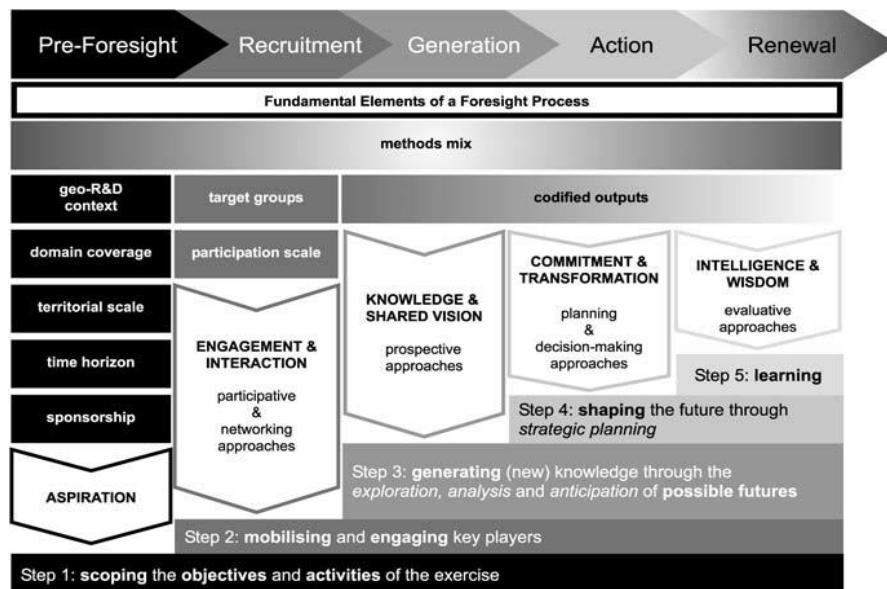


Figure 2.6. The Foresight Process  
(Popper, 2008, p. 62)



### c. Processes within the Element of Foresight

Foresight experts state that foresight is not a technique; it is a process in itself (Martin, 2001). Thinking about the future in terms of one's existing capacities to respond to opportunities or challenges or explore new ways of being can open leaders to options, ideas, and change. This learning can give general insight to deficiencies and new opportunities by building in flexibility to 'see other things' and 'think in other ways', which encourages people to recognize, embrace, and foster change.

Martin also states that foresight is an essential process to renegotiate the social contract between society and science in the direction of continuous learning and organizational learning, in order to gain a better understanding of uncertainty and facilitate the construction of the future in uncertain terrain (Martin, 2001). Typically there is a paradigm that is being questioned by society and the scientific community. In a way, these stakeholders know that things are not working (the existing paradigm), but need some way to determine the alternative paradigm. In the thoughts of Thomas Kuhn, foresight is that process that enables that discussion, exploration, and charting a path forward for that alternative paradigm (Kuhn, 1962). Foresight practices tend to emerge when there is a change in condition, with the observation that something is new, thereby initiating a quest to address the question 'what are we going to do about it?'

Researchers recommend that foresight should not happen as a punctuated event with a few people, but be embedded in an organization to support the sense of being a learning organization (Voros, 2003). Though foresight can be useful to inform a change in the way of being after a crisis, most researchers recommend the organizational learning approach to broaden the value of foresight (recalibration of direction, search for new opportunities or innovation, or averting or mitigating difficult or catastrophic events).

A common mistake in the use of foresight is the mixing up of strategic thinking and strategic planning, and as Mintzberg states, these are not the same thing (Mintzberg, 1994). Foresight is more useful when applied to the goal of strategic thinking in order to explore the areas of uncertainty and high impact (Voros, 2003). Whereas strategic planning is a methodology used when the end destination is known, but a plan with the detailed steps is needed to get to that destination. Strategic planning explores known unknowns (the end destination is known, but just need to determine the best way to get there). Foresight is used to anticipate the unknown unknowns. So what does foresight

do in the learning process? Voros illustrates what happens generally and what he believes happens specifically within the foresight process (refer to Figure 2.6) which is primarily to understand change and ponder options on how to deal with change.

Figure 2.7 illustrates that foresight processes occur to explore uncertainty. Through these processes, participants leave the session with an expanded set of perceptions. These new perceptions and options can now inform decision-making both embedding the future in strategic thinking (are we going in the right direction?) and in strategic planning (are we going where we planned to go?). Figure 2.7 also illustrates how these expanded perceptions and options come to be. The processes generate an understanding of what is happening, what is changing, what is not well understood, what might happen, what actions might be needed, and a discussion on how these actions could be implemented. In this case, foresight explores the unknown but also embeds consideration of the future in current planning and operations. Voros recommends some discipline to explore positive and negative and slightly bizarre scenarios because there is a bias to aspirational scenarios, yet good learning may also involve learning what happens if consequences are understood as a result of inaction or how might one overcome an adverse scenario (Voros, 2003).

Figure 2.7. A Description of what happens in the Foresight Process as Illustrated by Questions  
(Voros, 2003, p. 14)

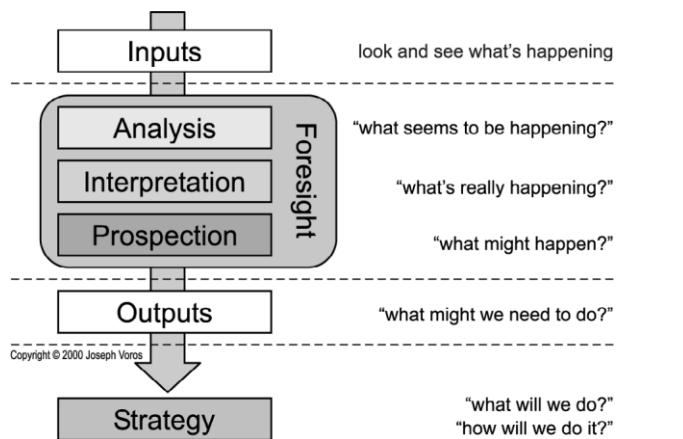
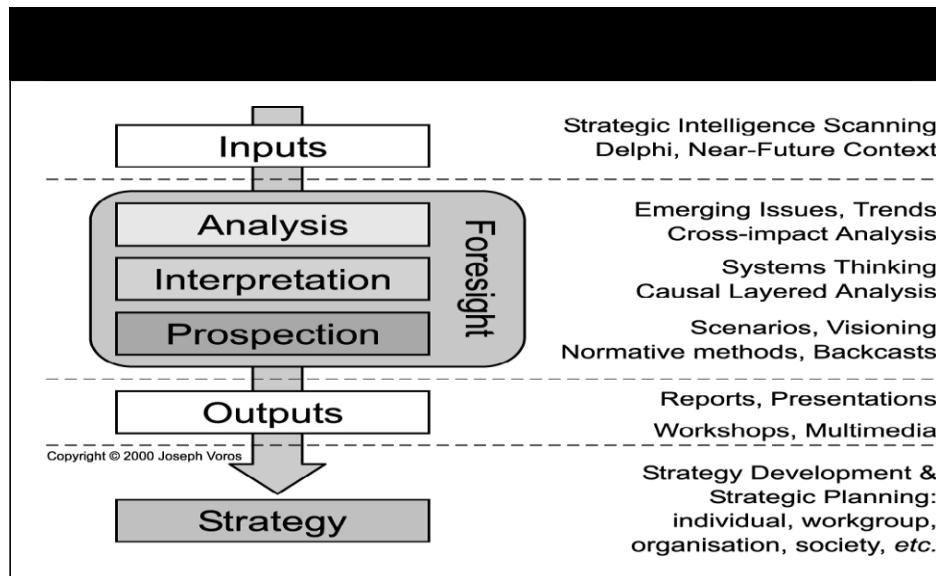


Figure 2.8. Methodologies Used to Help Participants go through all the Learning Steps (Voros, 2003, p. 15)



It is important to understand the interface between strategic thinking and strategic planning. This aspect, and the role foresight plays in both, will be linked in the overlay of all processes. Some researchers explain the relationship between strategic thinking and strategic planning as a type of continuum. Bleicher (1991) describes a concept of integrated management consisting of three parts (Alsan & Oner, 2003, p. 37):

1. Normative Management – is the constitution of the organization, the identity it creates, how it sees itself (8-30 year horizon);
2. Strategic Management – the strategic part is how the organization organizes itself to achieve its goals or realize its image (4-7 years); and
3. Operational Management – the operational aspect is represented by the rules and processes it places on itself to take action (1-3 years).

Bleicher's three parts describe the continuum requiring both the use of strategic thinking (foresight) and strategic planning. Though these processes are not the same, they are often used by organizations, but at different times and different purposes. It is even likely that strategic planning will follow strategic thinking, as an organization is always interested to execute its clarified vision or direction.

Alsan and Oner (2003) explain that foresight helps inform the normative (is this the image desired, has there been a recalibration that this is the idea or the vision desired). The image or the normative of the organization is usually the easiest way for the organization to articulate its strategic direction. Inherent in this strategic vision are its values and beliefs, the manner the organization wishes to conduct itself. It is often categorized as the spirit of the organization. However, strategic management can also be informed by foresight in that the foresight process can expand perceptions and the range of options for consideration (for example, in medium term planning, it can use foresight to come up with innovative ideas or solutions for consideration). For operational management, once the other two aspects are determined, this aspect typically falls in the range of strategic planning.

Godet (Godet, 2001) suggests that there is a critical triangle that can strengthen all the management types. Alsan et al. represents this triangle as illustrated below.

Figure 2.9. Knowledge Triangle  
(Alsan & Oner, 2003, p. 41)

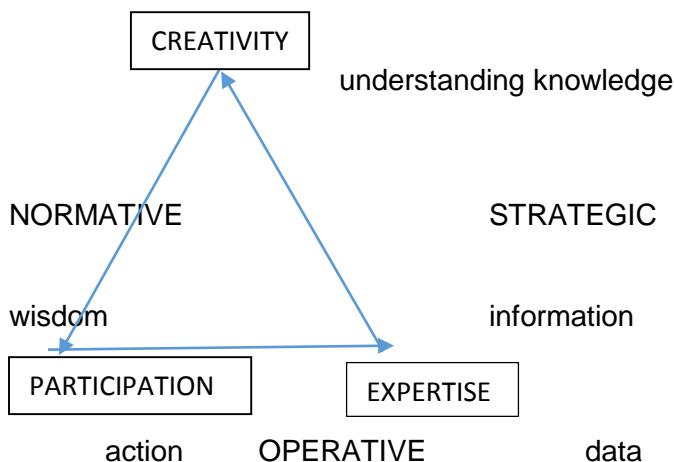


Figure 2.9 illustrates how expertise mobilizes collective action; creativity is only possible with prospective thought (foresight); and participation leads to action by strategic will (Alsan & Oner, 2003). This concept means if you want to develop creative ideas and take them to action, then foresight may be essential to draw in consideration of the future (prospection). Note that this thinking may be applicable to those working in innovation research. Since the process integrates the future; creativity; and the

ownership of stakeholders/players which leads to action, Alsan et al argue that leaders need to think strategically to have these activities embedded in their organization (aligning regularly with the long term vision, through strategic and finally operational planning). However, as Voros also stated in his article (2003), these are very different activities and not all people enjoy playing in the same space. People will gravitate to where they are comfortable, but the organization as a whole is better off if it can embrace all aspects. This observation alludes to the previously mentioned thread that strategic thinking and planning are not the same, nor are foresight and policy making. There are similarities, but with different players and purposes. It is important to note that an organization may be better off having both processes, but that these processes are not the same, may not use the same language, and are likely organized for substantially different processes. Path dependencies, like groups created for strategic planning, tend to get both tasks of foresighting and planning and with enough experience to be dangerous or limited budgets, have tendencies to meld the two or integrate the two in often inappropriate ways. Maintaining organizational diversity can be key to balance strategic thinking and strategic planning as these tasks are often not best done by the same people.

Ken Wilber (2007) describes another angle to learning or as he puts it to “knowing and being”. He describes three learning/ways of knowing/ways of seeing the world that impacts what is seen, what becomes important, and what is acted upon. These three ways of knowing and being are:

1. Body (eye of flesh) – operates on nature, empirical, perceives an external world of space, time, and objects – measurable and utilizes strategic planning;
2. Mind (eye of reason) – images, concepts, visions, knowledge of philosophy – future oriented consciousness; and
3. Spirit (eye of contemplation) – knowledge of transcendence realities (how to view from one reality to another) – what do I have to do to make the leap between the two worlds described above?

Wilber’s Integral Theory or Integral Sustainability Theory thus incorporates the empirical (what is), future oriented thinking (awareness of the future, sustainability, and plausible outcomes), and the ability to transcend these realities (move from the present to a future vision) through the eye of contemplation. By knowing where one is and the future

oriented consciousness, one can transcend from one paradigm to another. Perhaps in the theory of expanded perspectives is the future space (in addition to the present) and the wisdom and motivation to move from one to the other? The study of the future fosters social learning which can increase the capacity of agents to embrace change, options, and innovation to move to another reality.

The following table illustrates the common foresight processes by various researchers. There are similarities to processes in social learning and adaptive capacity (shown later), however, with different jargon. Foresight processes include sense making (Lane & Maxfield, 1995) (what is going on); sense making generativeness (Lane & Maxfield, 1995) (coming up with options); creating an audience of permission; and finally taking action. There are similarities between all of the processes used in the Sustainability Heuristic Model (some sense of concern, searching out a group to explore the question of discontinuity with the current way of thinking, some exploration of what might happen, what could be done, what might be the impacts, opportunities for action, and finally some reflection on actions taken). The nuance unique to these processes was alluded to tangentially in most of the literature, which was that often these processes were insufficient to generate change on a regular basis -- something was missing. Some researchers alluded to processes that reflected back on the individual (a further step in the social learning continuum) as necessary. Others suggested that changes in strategic thinking (what we should be doing) required the development of social learning (societally-accepted thinking or conventions) thus the role of strong individuals was required to create social learning in the initial phases of consciousness for a paradigm change.

Table 2.2. Processes Embedded in Various Foresight Exercises

<b>Formal Action Process</b>	<b>Benefits / Outcomes</b>	<b>Individual Process</b>	<b>Benefits / Outcomes</b>	<b>Social Process</b>	<b>Benefits / Outcomes</b>
SENSEMAKING	Awareness building, reason for action, sense of urgency	Understanding what it means to me	Individual awareness, learning, action, responsibility, clarity of choice	Awareness in complex problems; could change choices and behaviour at the societal level; Recognition that the future is uncertain, thus the future is based on creativity and opinion (Popper, 2008).	Social awareness, opportunity to make a relationship between individual and society Beginning of creation of a new identity (Lane & Maxfield, 1995)
Discussion: Perspectives inform a foresight process to inform the question SENSEMAKING GENERATIVENESS	Mutual language, inclusion, participation, perspectives, learning, options	Learn about issues, perspectives, options	Ideas and options I refine my opinion I have better understanding	We learn more, have more ideas and options, better understanding of systems; I understand where my choices are not in line with collective, group, social choices or directions	"Agents must engage in an interrogation of themselves, other agents, and the artifacts" (Lane & Maxfield, 1995) generativeness makes new relationships
Communications – promotion, understanding, awareness PERMISSION/ACTION	Increasing awareness, understanding, perspectives	Increasing individual learning, reflection, change, action	What is in it for me? How do I affect others?	What do WE need? How do I help or hinder us? Awareness by others if I take action or not...more accountability; system of collaboration/participation;	Open harmonization or realization of actions with intentions. Broader understanding of all types of implications
Changes in leadership, policies, institutions mainstream PERMISSION ACTION	Awareness of perspectives, implications, minimize unintended consequences	Changes in ME, my family, my choices	Reduce negatives, maximize positives	Awareness, respect, for other perspectives; understanding of broader implications, actions, inactions; see who is doing the right thing or not (accountability); co-created solutions	Foresight brings people to a problem/solution that does not have advocacy, creates mutual directedness, permission, action through generativeness (Lane & Maxfield, 1995)

Foresight is not a panacea. Don Beck, co-founder of ‘Spiral Dynamics’ states that foresight, if it just talks about the potential new opportunities and the assumptions (perhaps emphasis in a neo-liberal world) and does not address the internal issues (like values, feelings, beliefs, biases) will truly not prepare people to embrace the changes or actions that are required (Slaughter, 2002). In the researcher’s personal use of foresight, she has often noted how during the foresight process there are often moments where participants ‘hit the wall’. What is meant is the emotional or visceral reaction that participants feel what they have been doing is profoundly wrong or not aligned with what they believed. This moment is perhaps like a realization of truth where participants seem ‘to have confronted the reality that their actions were not in line with their beliefs’ or that they realized there was a profoundly different way to view the problem. In consultation with other foresight practitioners some practitioners stated that they tried to avoid this moment of conflict or contradiction as they did not want the sponsors of the event (often government) to create uncomfortable feelings for a stakeholder. However, when speaking with these participants in private, they would often state that they learned something that was inconsistent with the beliefs of their constituents and became fearful of how they could address this (i.e. under profound climate change the situation for beef production could change radically). The challenged participant developed a sense of consciousness that they realized immediately did not align with the collective beliefs of their organization. The individual immediately skipped to the challenge of how to rationalize this discontinuity with her individual reflection and the goals of her organization. Though uncomfortable, it is often through these moments of intense realization of a discontinuity that one is truly motivated to act.

Miller (2007) describes foresight literacy as having three key steps or processes. The first one is creating temporal awareness which make explicit the values and beliefs held and that may be in contradiction. The second process is described as one of discovery where ‘rigorous imagining’ can expand the options for consideration. The third phase emphasizes choice, that the potential alignment of values can impact behaviour to make choices with new assumptions or an awareness of assumptions. He states that without making these transitions, the participant cannot progress effectively to action.

From the psychology discipline, Baumeister and Masicampo (2010) argue that social learning must go through a reflective act back to the individual in order to take action and that this reflectivity or realization is in effect the notion of consciousness. Consciousness is the ability to define and mentally simulate events to create learning (called conscious thought) and the application of conscious thought is conscious experience (applying the learning from a simulation) to a particular behaviour or action (Baumeister & Masicampo, 2010). The authors do not use the language of foresight, but refer to mental simulations of possible future behaviour in group settings as the ability to articulate one's thoughts and share them with others, then to learn from the wisdom of others and update or improve your thoughts (Baumeister & Masicampo, 2010). This point is very important because consciousness can strengthen one's or a group's behaviour or their intention to act. The authors suggest that there are three sub-activities that occur that advance this learning in the individual and group (Baumeister & Masicampo, 2010):

1. Mental cross talk – sharing new insights with other parts of the brain for other applications;
2. Social communication – the ability to tell your thoughts to others and learn from others; and
3. Sequential simulation – logical reasoning of the implications of thinking through a new idea, action, or desire.

The benefit of consciousness is to play out, get used to, and perhaps accept another way of thinking and acting. This aspect is in effect the development of intrinsic motivation of the individual and social learning of change for groups. Combined with social cognitive learning or the support by the group to reinforce the individual's activity (maintenance effect), the change in behaviour is more likely to be sustained. This is relevant for the individual and can be particularly motivating if others think the same thing.

The convergence of these findings leads the researcher to think that perhaps learning has to be both individual and social with various iterations between them. Perhaps this convergent realization is what is necessary to increase success at social learning, foresight, and adaptive capacity all at the same time? The processes are iterative between the individual and the collective, in that the individual needs to think about things themselves; they need to share, learn, and improve (social learning); the

individual needs to take action; and it is more likely to lead to something if others take action too.

Wangel (2011), alludes to the importance of activities such as foresight to raise consciousness explicitly. Wangel argues that “by not addressing how to change and change by whom in an explicit and explorative way, social structures and agency become represented only implicitly and/or are maintained according to the status quo” (Wangel, 2011, p. 872). To do so, foresight, inclusive of all its methodologies, must include social structures and agents, reflect on their actions, their values and beliefs, how specific aspects may need to change to address challenging and complex issues. Perhaps the part that is missing is support for the individual reflection and rationalization of their own individual change in consciousness that can increase the amount of sustained action for change?

d. Controversies in the Foresight Literature

Though foresight participants often see a change in their own thought processes and personal learning, the learning has been dispersed and difficult to attribute exactly where there is influence to the policy process per se (Barre & Salo, 2002). Webber (2002) has observed that it may be too difficult to transcribe foresight to fit directly into the policy making process. Some interesting historical cases have emerged. Either the democratic processes that are highly inclusive of broad-based participation are not always considered or integrated in policy processes (though they may have some consultative function, the policy-makers may not be ready to accept or practice the suggestions recommended by foresight) or foresight has become a ground of private exploration without large-scale democratic inclusion of stakeholders. Sometimes these limitations are placed because of a lack of desire to relinquish control (the tension between if you ask others for their opinions then perhaps you should consider and use those opinions versus maintaining control in governmental decision-making) or a lack of finances (social participative processes are expensive due to hospitality provisions and travel expenditures). These reasons tend to keep many of the foresight findings out of the more direct path of policy and decision-making (Barre, 2001).

Researchers suggest that there is a misunderstanding of what foresight can provide. Many suggest that foresight can inform policy and stakeholders on what has to be done to implement policy (Barre, 2001); however, foresight processes have to be adjusted or materials considered in a different manner and forum to fit in the policy development process (Barre, 2001), or perhaps to take the people who participated in foresight and have them now consider or advise on the policy formulation process (Webber, 2006).

Another criticism of foresight is that, in order to be accepted by the current policy-makers, it must maintain the neoliberal view that the economy is the key focus. There are other researchers (COST ACTION 22, 2007) (Inayatullah, 2004) (Nelson, 2010) (Slaughter, 2005) (Wilber, 1997) who suggest that a new type of foresight called Foresight 2.0, as opposed to Foresight 1.0, has to be used because Foresight 2.0 is aimed at creating a change in consciousness and culture which is essential to tackle the complex problems of the 21<sup>st</sup> century. Just studying what might happen in the future is insufficient (Foresight 1.0); however, as process is required that forces or nurtures sensing, thinking, and doing--that without this emotive level being affected, Foresight 1.0 is just an exercise and not a commitment (Nelson, 2010). In Foresight 2.0, the focus is on leadership that can sense a contextual change and has the courage and commitment to identify a vision of forward consciousness that is able to transcend the technical improvement of today with a value shift of tomorrow. Nelson (2010) states that foresight methodologies need to mature to draw to the forefront our values and beliefs.

Researchers suggest that this values driven approach will inspire a type of transformational leadership "...that entails consciousness work and that this must be taught and practiced as such" (Nelson, 2010, p. 292) as the approaches to these complex issues will require a profound change in the way we look at the problem and a profound way to conceptualize the solution as a change from within ourselves versus a change of technology or approach.

Thus the authors suggest that foresight has value, but may have to be re-thought on how to activate change. In addition, the authors suggest the following considerations or actions (Da Costa, Warnke, Scapola, & Cagnin, 2008, p. 382):

1. Policy-makers need to understand the broader context; that is, they need to understand how foresight can inform and advance policy making, not necessarily feed directly into it. This is where a new kind of leadership, perhaps a

- transformational leadership, needs to recognize a broader system or set of cycles; and
2. A ‘joint construction of demand’ is observed—a demand to foster understanding amongst stakeholders and meet the needs of policy-makers for the end result of sustainable decision-making. Both sets of players need to see how democratic cycles and policy making cycles are part of a larger system of transformation and change.

Da Costa et al (2008) allude to a very important nuance. They suggest that policy-makers are looking for ‘strategic consulting’, what should we do? Whereas stakeholders are looking for ‘strategic counselling’, what is changing in our context? What do I need to be aware of that I wasn’t thinking? How do I have to change? (Da Costa, Warnke, Scapola, & Cagnin, 2008). These thought processes are both needed but do not directly feed into each other, thus the difficulty of fitting foresight directly into the policy making process.

#### 4. Social Learning - Definition of Social Learning and Trends in the Literature

Bandura (1977) introduced the more formalized notion of social learning when he articulated that learning occurs in a social environment, where people can learn from each other (skills, behaviours, and responses to action). Though Bandura was the first to formally articulate the notion of social learning, over time there is no common or universal concept of social learning (Reed, et al., 2010) (Wals & van der Leij, 2007), though there are descriptions in the literature describing social learning as a movement from expert-based teaching toward community-based learning (Capra, 2007). Some researchers allude to social learning being individual learning in a social context; other researchers refer to social learning as learning at the level of the group or society (Parson & Clark, 1995); and yet others refer to social learning as learning amongst individuals and groups that improve the relationships between social and ecological elements (Keen, Bruck, & Dyball, 2005). As mentioned earlier, it is widely assumed that social learning enables the innovation of social structures and institutions, yet there is little in the literature that crystallizes this notion.

### a. Social Learning Overview

Many researchers have illustrated that there are changes in behaviours, perceptions, and world-views as a result of participatory and collaborative processes (Connick & Innes, 2001) (Sims & Sinclair, 2008). Evident in these social learning processes are reflexive moments where participants question their values, beliefs, and mental models in order to reflect if these are truly their perceptions and if their desires correspond with their mental frameworks (Keen, Bruck, & Dyball, 2005) (O'Donaghue, 2007). Such active and reflexive learning often occurs in communities of practice (groups of interested participants learning to apply and improve processes) (Wenger, 1998). Argyris (1999) further elaborates on specific types of learning such as single, double, and triple loop learning. Single loop learning focuses on improvements to strategies (good conventional learning), double loop learning refers to questioning assumptions that underpin decision-making, and triple loop learning refers to a reflection on values and beliefs which is more likely to result in transformational or paradigmatic change.

Underpinning social learning are some primary system conditions that are needed to foster social learning. These conditions include trust and reciprocity (willingness to hear and understand other perspectives without necessarily the need to agree) (Armitage, et al., 2009) (Kumlar & Lemos, 2008) (Olsson, Folke, & Berkes, 2004) (Pretty, 1995) usually maintained by an 'honest' broker to maintain the levels of trust and sharing during periods of conflict that are required for such deep learning. Some of the challenges alluded to in the many articles published include the need for a definition of social learning (Argyris, 1999) (Reed, et al., 2010); however, it is likely that social learning is an outcome due to some combination of processes that require further study, understanding, and elaboration.

Other researchers mention concepts related to social learning, the first being the attitude or opinion of a group, known as 'groupthink' (Janis, 1989); secondly that collective learning can be more than the sum of individual knowledge (Senge, 1990); and thirdly that there is strength in the 'wisdom of crowds' (Surowieck, 2004). These concepts have articulated many of the same points, agreeing that that there is more than individual learning and we really do not understand the intricacies of social learning (definitional, processes, prescriptive elements, and emergence). Many researchers also link social

learning to social network literature stemming from Habermas (1981) stating that concepts require the expansion in social space, such as through social networks. A series of social interactions fosters all types of learning at different levels. In addition to social networks, power and scale are important dimensions taking the learning to bigger and broader groups to generate the creation of a new world-view or a critical mass of people adopting a new world-view (Keen, Bruck, & Dyball, 2005). As a result, Reed et al proposed that social learning must express the following outcomes; changed perceptions, go beyond individuals and small groups, and occur through social interactions (Reed, et al., 2010).

Social learning can facilitate adaptive co-management, which is the ability of various stakeholders not hierarchically bound to work together to sense and respond to change. Some researchers suggest that social learning can facilitate adaptive co-management (Cundill, 2010) as long as there is a balance in maintaining key individuals in the system, encouraging communities of practice, preventing rigidity, facilitating with a true 'honest' broker, and minimizing vulnerabilities (Armitage, et al., 2009). Adaptive co-management has been introduced in the literature as a response to complexity and uncertainty by engaging multiple levels of actors doing what they can under a vision of common understanding (Armitage, et al., 2009) (Olsson, Folke, Galaz, Hahn, & Schultz, 2007) (Ruitenbeek & Cartier, 2001) and under transformational leadership (Olsson, Folke, & Berkes, 2004) (Olsson, Folke, Galaz, Hahn, & Schultz, 2007). These processes share and combine different types of knowledge that foster social learning (Armitage, et al., 2009) (Folke, Colding, & Berkes, 2003) and social learning has been shown to contribute to institutional innovation (Kumlar & Lemos, 2008). Therefore, it is essential to understand 'what is social learning' and nurture its occurrence to foster innovation and adaptive capacity in people, companies, organizations, and society (Cundill, 2010). The goal of social learning is to understand the given context and to learn how to transcend social norms, values, and traditional thinking to cope with change, complexity, and uncertainty (Wals & van der Leij, 2007).

#### b. Processes within the Element of Social Learning

As mentioned earlier, Bandura (1977) introduced the more formalized notion of social learning when he articulated that learning occurs in a social environment, where people

can learn from each other (skills, behaviours, and responses to action). Though Bandura was the first to formally articulate the notion of social learning, over time there is no common or universal concept of social learning (Reed, et al., 2010) (Wals & van der Leij, 2007), though there are descriptions in the literature describing social learning as a movement from expert based teaching toward community-based learning (Capra, 2007).

Reed et al (2010) state that social learning occurs when the following three conditions are true. First there must be a change in understanding of the individuals involved; a demonstration that the change goes beyond the individual to wider social groups; and that the change occurs amongst social actors in networks. These three conditions are very important because they highlight a relationship between the individual and a group of individuals that undergo change. Though individual learning is defined differently than social learning, learning and change has to occur within individuals to manifest social learning and change.

Bandura and others talk about social learning leading to self-efficacy (2001). This aspect is important because it means that as the group learns something, this learning can motivate the individual. There is a reflectivity that is required of the individual to actually realize the change, take the action, and make a difference to conform to the socially learned behaviour or action. Social learning can maintain or encourage an individual to take action, if the individual is trying to change behaviour to what the collective has already accepted. Thus learning in groups can create learning at the individual level, enabling self-efficacy.

Self-efficacy is the ability to derive consciousness on the impacts of doing something or not doing something. By this act of heightened consciousness the person is motivated to take action (for example, sticking to a diet or quitting smoking). The concept of self-efficacy is central to Bandura's theory on social cognitive theory (Bandura, 2001). Bandura's social cognitive theory states that an individual's successful behaviour change is more than just adopting the behaviour themselves, but reinforced by learning or modelling that behaviour from others.

The concept of self-efficacy is generated by consciousness developed through one of four means (McAlister, Perry, & Parcel, 2008) such as:

1. Learning from other people's actions and behaviours;
2. Mastery experience which is a process in which the interventionist facilitates the success of an individual by achieving simple incremental goals;
3. Improving physical and emotional states refers to ensuring a person is rested and relaxed prior to attempting a new behaviour; or
4. Through simulation and verbal persuasion thus providing encouragement for a person to complete a task or achieve a certain behaviour.

These four elements represent learning that must happen at both the individual level as well as at the social level. However, these four means of learning can also highlight reasons for slow change. If successful behavioural changes involves some sort of moral support or emulation from a group that is well accepted and understood then the change can be relatively quick. However, if there is a paradigm change, or one wants to introduce something new which is contradictory to the status quo, then the individual must find a critical mass that agrees there is an issue and that something requires changing; go through a social learning process to explore it; reflect individually on what it means to them and others; take action; and only over time and a build-up of critical mass, the change becomes accepted by the group and facilitates quick reinforcement. Therefore, there has to be a process to highlight some type of discontinuity, collectively explore it through discussions, and increased perspectives and options analysis if there is any hope or chance of making the change. Yet, there is an individual element of learning and changing behaviour, such as being open to the possibilities, perspectives, and potential challenges to one's way of thinking. We see that the foresight processes are similar to study what doesn't yet exist, or scenarios of 'what if'. The foresight exercise by its nature is a practice to raise consciousness of the explicit behaviour change by groups or agents, simulations of what may occur, and networking or a community buy in or support for the new behaviour as it studies and explores conditions that do not yet exist.

Yet, even with those steps or processes, individuals and groups can take action, not sustain action, and have to start again. Just because one or the group goes through

these steps, one can observe a type of oscillation before the change is thoroughly maintained. Ajzen developed the “theory of planned behaviour”, (1991) which is an extension of the “theory of reasoned action” (Fishbein & Ajzen, 1975). These theories suggest that if individuals view the proposed behaviour as positive (develop a positive attitude towards the behaviour) and think that people important to them expect or would like them to perform that behaviour (subjective norm), then the individual is more likely to do the behaviour (motivated intrinsically by self and extrinsically by others). However, it has been also observed that even though these conditions may exist, it may not be sufficient to sustain or start the behaviour change at all. The “theory of reasoned action” (Fishbein & Ajzen, 1975) was developed to deal with this issue by thinking what could motivate the individual to maintain the change and at the same time think about what could derail the behaviour change. By adding these additional thought processes, it was intended to increase the likelihood of making and sustaining the desired behaviour change (Ajzen, 2012).

Another model called the Transtheoretical or the Stages of Change Model (Prochaska & DiClemente, 2005), proposed a five step process of manifesting change including the stages of:

1. Pre-contemplation – thinking about the issue but not necessarily in reference to themselves;
2. Contemplation – thinking what the individual would have to do to make these changes;
3. Preparing for action – thinking of when to start, how to do it, how to keep on track;
4. Action – starting the behaviour; and
5. Maintenance – managing, maintaining or improving the behaviour.

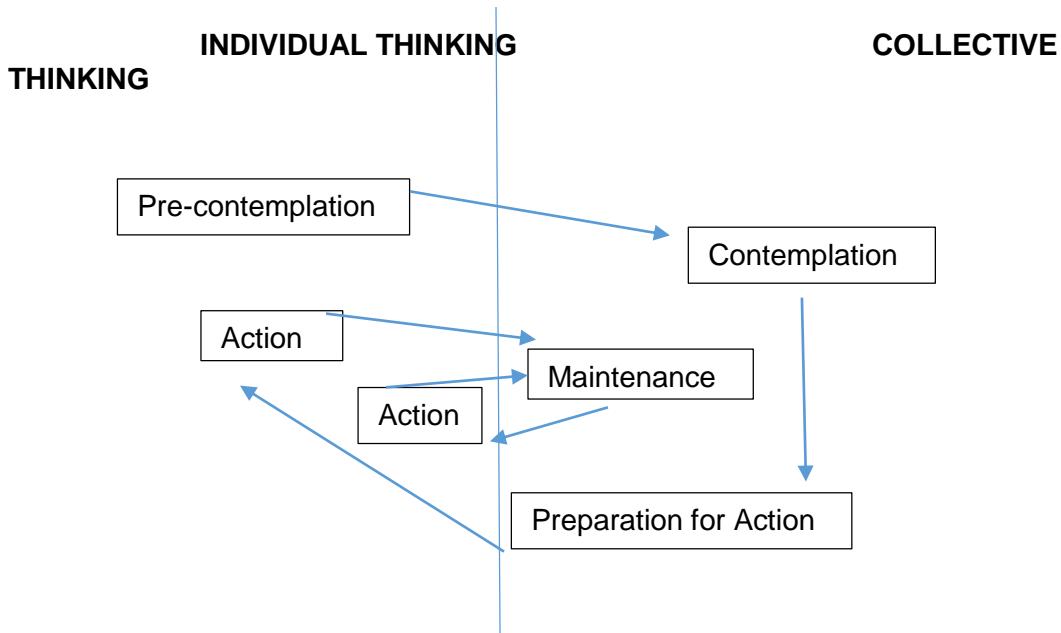
A quick comparison with the processes involved in developing social learning show strong similarities with the processes involved in foresight. There is some individual recognition of a discontinuity, there is group discussion and learning, there is a choice to act, and there is a continuation of action. In social learning we see that sustained behaviour change involves an individual learning process as well as an acceptance and

support from others, simulating the unknowns or uncertainties can reduce derailing from the intended outcome, and there are many little steps along the way (in fact the action could stop but start again) so the process may be iterative. The following table summarizes the processes articulated in the social learning literature and illustrate their individual and group learning impacts.

Table 2.3. Processes Highlighted in the Social Learning Literature  
 (Ajzen, 1991) (Bandura, 2001) (Fishbein & Ajzen, 1975) (McAlister, Perry, & Parcel, 2008) (Prochaska & DiClemente, 2005)

<b>Formal Action Process</b>	<b>Benefits / Outcomes</b>	<b>Individual Process</b>	<b>Benefits / Outcomes</b>	<b>Social Process</b>	<b>Benefits / Outcomes</b>
AWARENESS PRECONTEMPLATION – an individual awareness looking for a group	Awareness building, reason for action, sense of urgency	Interest, curious, an understanding what it means to me	Individual awareness; learning	I recalibrate in social groups....do others feel this way? Can their perspectives inform me?	Calibration of individual thinking with other groups, identity creation
CONTEMPLATION – social activity to clarify, gain perspectives, create an identify, figure out the issue	Mutual language, inclusion, participation, perspectives, learning, options	Learn to make better choices for me and for others	I have more ideas and options; I refine my opinion	We learn more, have more ideas and options; We have a better understanding of broader world-views	We understand the system better
PREPARATION FOR ACTION – what can we do about it? -Social option sharing about possibilities	Increasing awareness, understanding, and action at all levels;	Increasing individual learning, reflection, change and action	What is in it for me? How do I affect others, the end goal?	How do I help or hinder us? Awareness by others if I take action or not; system of collaboration	Open harmonization or realization of actions with intentions.
ACTION – given the group reflection; Change me? Change my relations with others	Awareness of perspectives, minimizes unintended consequences	Changes in ME, my family, my choices	Reduce negatives, maximize positives for ME	Awareness, respect, for other perspectives; understanding of broader implications	Understand the system, platform for group change; individuals/ society are aligned
MAINTENANCE – implications of the actions to me, my group	Individual choice prevails but sees the group impact	How did it work for me? The group?	individually and collective comparison	How did it work for me? How did it work for the group?	Calibration process increases accountability

Figure 2.10. Illustration of the Reciprocity in Social Learning Processes between the Individual and the Collective



The figure above describes the Transtheoretical Model which includes the steps of pre-contemplation (creating an awareness of an anomaly or something new), contemplation (finding people interested to discuss the topic, share information, and refine the identification of the issue); preparation of action (preparing for what can be done perhaps through group brainstorming); action (the individual decides to take an action whether it be in a group or individual context); and finally maintenance (involves some reflection on if things are working at both the individual and collection level. It is interesting that decisions or processes reside in different spheres (either individual reflection or group learning and reflection) but success entails the consideration of the other side as well. Though social learning literature uses different vocabulary than the adaptive capacity literature, one can see a similarity in the processes between the two domains of collective and individual self-efficacy.

In conclusion, with respect to the social learning processes, we can see a similarity in the process with foresight process. Initially there is an issue or a deviation to the status quo, individuals gather to share and explore, the group thinks about action (these are the things that occur in a social learning context), then there is action (which is carried by the individual but nurtured by the group's reinforcement of behaviour). It is observed that if

the strategic thinking is accepted, the group is efficacious to support individual changed behaviour and action (i.e. not smoking is very accepted, thus society can be fairly effective to support the behaviour of people who want to quit smoking). The area that is of concern is that in a paradigm change (moving from one mental model to an alternative, may be so different that the social learning is not yet there to support action or behavioural change). In the case of a paradigm change, society requires individuals to be strong or courageous enough to lead the change, which informs social learning (perhaps these are the early adopters) to create a critical mass of social learning which then supports the change of broader groups of people. Thus, there is a nuance here where in a paradigm change, the examples or leadership of strong individuals, is very important to contribute or enable broader based social learning.

c. Controversies and Future Research in the Social Learning Literature

In the review of social learning literature, the key points are articulated at a high level but do not elaborate on the specific processes of learning or which activities can generate or guarantee social learning. The articles allude that there is learning but articulate that the specific sense of what occurs is a bit of a mystery. Some researchers look for the conditions that are necessary for social learning to occur, yet others comment how social learning does not always happen if these conditions exist, and at times social learning occurs without all the elements present. This is a frustrating aspect of the literature, yet intriguing in that most researchers agree it occurs but have not been able to fully describe required elements or specific details in the process.

However, there is a bit of an ‘add-on’ to social learning in the literature on ‘presencing’. Presencing is a word that represents being in the present, but sensing an emerging future (Scharmer, 2009) (Scharmer & Kaufer, 2013). Scharmer and his colleagues describe ‘presencing’ occurring with the application of Theory U, which refers to an individual reflection technique to having an open mind to new ideas (not be biased by one’s assumptions); an open heart (not being biased by one’s feelings of attachment to organizations, groups, or oneself); and having an open will (willing to do the right or courageous action). Scharmer does not depict a controversy per se to social learning, however, highlights that there is social learning on change, but at the end of the day, individual leaders, inventors, and participants must change their values and beliefs and

thus their actions. Scharmer argues that this individual reflection post social learning is essential to take action in a paradigm change.

## 5. Adaptive Capacity - Literature Review of Adaptive Capacity

What are the action components of sustainability? What is the nature of the concept of being sustainable? In the literature one of the ways of being sustainable is to enhance adaptive capacity, the ability to change with the desire to endure. Adaptive capacity in social systems is the ability to respond to change, being maintained through the existence of institutions and networks that learn and store knowledge and experience, and create flexibility in problem solving and balance power among interest groups (The Resilience Alliance, p. [http://www.resalliance.org/index.php/adaptive\\_capacity](http://www.resalliance.org/index.php/adaptive_capacity)).

Adaptive capacity is a social learning concept that through participatory processes, builds the ability and agility of groups to deal with future uncertainties.

### a. Adaptive Capacity Overview

Why is adaptive capacity important? Adaptive capacity is a management skill that enables the capacity to anticipate, then adapt to changing conditions and circumstances, and take action with the mission to endure. Adaptive capacity increases sustainability because it is a skill that is repeated as necessary to survive and prosper. Developing an individual's or a community's capacity to adapt is essential for sustainability. Wikipedia defines sustainability as the ability to maintain the capacity to endure (Wikipedia, p. <http://en.wikipedia.org/wiki/Sustainability>) or as Brundtland described sustainability as "the ability to meet their own needs without compromising the abilities of generations in the future"<sup>2</sup>. Future studies or foresight can facilitate the manifestation of adaptive capacity and social change (Celino & Concilio, 2011) (Ellis, 2000) (Funtowicz & Ravetz, 1993) (Jones, et al., 2009) as it is a process that may be able to inform the question of operationalizing the notion of sustainability by embedding the future in present-day decision-making.

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<sup>2</sup> There have been debates in the literature on this definition of sustainability primarily in the domain of adaptive capacity because many times compromising in a particular path is a form of adaptation.

The literature on complex adaptive management and adaptive capacity emerged from a response to the realization of complexity and uncertainty which were notions introduced by Holling (1973). Later the responses to uncertainty emerged in the literature in that adaptive capacity or adaptive management embodied such traits as experimentation, widening world-views, participation, and learning by doing (Gunderson, Peterson, & Holling, 2008) (Lee, 1993) (Walters, 1986) (Walters & Holling, 1990). Though adaptive co-management is not a panacea to achieve sustainability, it does indicate that having adaptive capacity can increase the likelihood of sustainability (Plummer, 2009).

Folke, Colding, and Berkes (2003) identified that the ability to learn to live with change and uncertainty would increase adaptive capacity. Uncertainty is a futures based concept. To have the ability to deal with change and uncertainty requires that decisions or solutions derived today be useful in the future. Historically, the military has been a practitioner of future studies. The military would use future or foresight studies to determine strategic positioning and solutions development through a process that would first anticipate what might happen and then practice how the action might play out, thus developing the capacity of the military to respond to various events. Foresight studies developed the military's capacity to anticipate and deal with uncertainty. Developing this skill provided the military with the best chances of survival or winning. It is reasonable to assume that individuals and communities could increase their sustainability by fostering their adaptive capacity through the practice of dealing with uncertainty (nurturing their ability to anticipate and respond to various future scenarios).

Over time researchers such as Folke et al (2005) realized that change in ecosystems and society can be slow and incremental, but it can also be drastic and punctuated. In addition, particularly in the context of ecosystems researchers saw that the capacity of the earth to adapt is potentially lessening (Folke, Hahn, Olsson, & Norberg, 2005). In turbulent times, the nature of interactions are unclear and the future is more uncertain (Gunderson & Holling, 2002). If the shifts are extreme or radical, adaptive capacity of the system (both biological and social) may collapse or have catastrophic impacts due to exceeding the system's ability to adapt in the immediate context. Thus, studies have emerged to examine a system's capacity to adjust to change or to be resilient, and these

studies focus on studying a system's adaptive capacity to perceive, respond, and adapt with the intention to endure (Folke, et al., 2004).

Researchers defined resilience in this way, to mean the capacity of the system to absorb shocks and undergo change but yet in general, have the same function, structure, and identity (Folke, et al., 2004) (Walker, Holling, Carpenter, & Kinzig, 2004). Adaptive capacity can foster resilience (make changes to provide the same function, structure, and identity) or it can also adapt more so, enduring but perhaps with different functions, structures, or identity. Adaptive capacity is the ability of the system to address uncertainty and surprise (Carpenter & Gunderson, 2001) (Costanza, Waigner, Folke, & Maler, 1993) (Folke, Hahn, Olsson, & Norberg, 2005). This fact brings to light the critical nature of diversity to enhance the complex adaptive management capability of the system to be resilient (Elmqvist, et al., 2003) (Folke, Hahn, Olsson, & Norberg, 2005). However, adaptive capacity can nurture greater transformations if required. Holling expressed this notion as being able to exist through multiple paradigms (Holling, 2001) meaning that sustainability could be expressed as resilience—the ability to return to the same identity and function; or transform—ability to adapt to change the function, structure, or identity in changing circumstances.

Within the literature on adaptive capacity and resilience is an interesting discourse. Initially many researchers separated social and ecological systems or perhaps just studied one aspect (Holmes, 2001) (Waltner-Toews, Kays, Neudoereffer, & Gitau, 2003); however, the discussion evolved that the separate interplay between social and ecological was artificial and not useful when discussing adaptive capacity (Berkes, Folke, & eds, 1998). Complex adaptive management was a term used to describe the resilient and adaptive properties concerning the interaction of diverse systems and impacting their ability to retain or in fact morph their capabilities into what was required in the ambiance of a complex dynamic context (Dietz, Ostrom, & Stern, 2003) (Folke, Hahn, Olsson, & Norberg, 2005). The more robust discussion of the application of complex adaptive management or adaptive capacity to social systems began in earnest with a focus on the capacities of governance institutions to perceive and adapt to changing contexts to reduce catastrophic impacts to society as well as the environment (Lebel, et al., 2005); thereby impacting the discussions or notions of sustainability and the ability of a system or syndicate of systems to sustain over time (Boyle, Kaye, &

Pond, 2001). Boyle et al (2001) suggested to create a vision for sustainability with management as the key element to operationalize the notion of sustainability utilizing a narrative on how the operationalization of sustainability may unfold into the future. Folke et al (2005) suggested that the success of sustainability is dependent on the adaptive co-management of sub-systems which is dependent on leadership that motivates trust, action, knowledge, learning, and practice of individual and governance entities. These elements are key as they connect to the other key foci in this paper (such as foresight, social learning, and allude to the value shifts that are proposed as essential to transform our world into a strong world-view). The future is important (this is not just historical, evidence based learning), but learning to anticipate and practice what may happen is important as well (Ostrom, 2005).

In the literature on adaptive capacity or adaptive co-management there has been a change in the notion of participation. Initially many programs, learning, understanding, policy making and action taking was done on part of the government or top down institutions. Over time the notion of participation of stakeholders and how they participate has been expanding. At the beginning the concept of participation commenced with more vetting or consultation (Pinkerton, 1989); later with deliberative input (What do you think is going on? What are ideas we might consider?); then later to co-creation (What do you think is going on? How can we work on this together?); and now to the discussion on co-management (We all know the end state desired, what can we all do within our powers to move the system there?) (Plummer, 2006) (Plummer & Armitage, 2007) (How can we work together? What has worked or didn't work? How do we adapt or change?). The nature of the participants have expanded from government to non-governmental institutions, to local participants and stakeholders, to those of regional, national, transnational and international fora. Within this spectrum of expansion also includes a change in the notion of the problem. Initially the objective function was 'How do we solve this problem?' (Plummer, 2009), to a more continual process of change towards complex adaptive management where the game is constantly being played---managing for the journey versus the destination by diverse and multiple agents in the system.

Thus, the concept of adaptive capacity is pivotal to the resilience approach in that the adaptive capacities help strengthen leadership, participation, and system dynamics that

lead to transformation (Plummer, 2009). This concept demonstrates a movement from hierarchy, rigid policy approaches, and replicable solutions to more fluid, emergent, and adaptive responses (Walker, et al., 2002) (Walker, Holling, Carpenter, & Kinzig, 2004). Resilience comes from nested feedback loops, multiple levels of governance, and diversity in stakeholders which recreates a type of redundancy in the system. In addition, by the fact that there is more than one decision-maker or leader, interested and active agents in the system are more likely to do something (Holling, 2001).

Next the adaptive capacity or adaptive management literature draws in network theory. Network theory refers to the study on the structure and relationship amongst entities. The ideas of multiple levels of governance, diversity in stakeholders, and unique feedback loops illustrate the various types of networks that may emerge (Berkes, Colding, & Folke, 2003) (Plummer & Armitage, 2007). These networks, and how they relate to other networks, may motivate a critical mass for transformation. Some researchers, such as Bodin et al (2009) have used the term social networks to denote the complex interactions amongst people, organizations, and governance bodies. Though not all social networks are created equal; structural patterns, characteristics of individuals, and critical mass can impact the behaviour and action of the social network to be effective (Bodin & Crona, 2009) (Bodin, Crona, & Ernston, 2006) (Dietz, Ostrom, & Stern, 2003).

Researchers such as Gladwell have postulated that the activities in these groups or networks may amount to individual personality traits (people who are mavens, connectors, or salesmen). Gladwell (2000) suggests that mavens are instrumental for coming up with a vision, connectors can reach to different groups and levels of interaction, and salesmen can persuade people to listen and take action (Folke, Colding, & Berkes, 2003) (Gladwell, 2000) (Plummer, 2009). Thus, effective adaptation can occur at different spatial and social scales with social consent and action (Adger, Arnell, & Tompkins, 2005) (Berkes, 2002). This is where you need Gladwell's mavens, connectors, and salesmen, but in clusters or networks who can generate action. Thus, adaptive capacity is a scale dependent concept and a characteristic of an adapting system. In addition, the concept of adaptive capacity is a part of the nature of vulnerability in that there is more vulnerability if there is less adaptive capacity (Adger & Vincent, 2005). This idea leads to the thought that adaptive capacity requirements in the

future are uncertain because the future is uncertain. Therefore, some researchers recommend that adaptive capacity should take a 'no regrets' approach (Adger & Vincent, 2005) to give one maximum potential to work in future uncertainty.

Complex systems often have self-organizing properties. This notion leads to the concept of emergence. The unique dynamics regarding the interaction of various systems increases the level of uncertainty (Folke, Hahn, Olsson, & Norberg, 2005). Learning that facilitates the understanding of the future and how one may respond is a unique type of learning that is often not spoken about in the literature. This type of learning helps leaders prepare for things that have not yet happened (uncertainty and surprise). This type of learning usually occurs in a social process and stimulates an understanding of uncertainty and potential responses or behaviour changes that may be required (Clark, Jager, van Eijndhoven, & Dixon, 2001) (Olsson, Folke, & Berkes, 2004). Though there is individual learning and organizational learning, learning and anticipation must occur throughout the whole system (embracing those in social and ecological circles) (Whiteman, Forbes, Niemela, & Chapin, 2004). Therefore, the ability to self-organize, the property of emergence, seems to be another important attribute within the idea of adaptive capacity.

Why is the characteristic of self-organization so important? The self-organizing attributes of adaptive co-management has the potential to make the social-ecological system more robust to change (Gunderson, 2003). Resilience is heightened due to the inclusion, participation, learning, ownership, and action that all stakeholders are better equipped to understand and mobilize. The result is a buffer that reduces the likelihood of failure from one party not having information or understanding. Therefore, resilience often requires a type of redundancy built into the system (Gunderson & Holling, 2002) (Holling, 1973). The concept of redundancy is provocative as streamlining in neo-liberal and neo-classical literature has emphasized reducing notions of waste or redundancy in the short term, however, redundancy can increase a system's ability to adapt in the long term.

So how does one build and utilize adaptive capacity effectively? The research indicates that the answer is good strategic leadership. Strong leaders are needed to foster discussions amongst stakeholders, motivate a vision, encourage people to the table to

co-create and implement action (Folke, Hahn, Olsson, & Norberg, 2005) (Olsson, Folke, & Berkes, 2004). What makes a strong leader? Someone who can develop trust. Trust fosters a sense of community, makes it easier for stakeholders to have difficult discussions, and it is easier to persuade and motivate action in a trusting environment (Cook, 2003) (Misztal, 1996). Trust and its benefits builds social capital, which is an investment in the people and community as a resource that has the means to generate action (Castle, 2002) (Pretty & Ward, 2001) (Sobel, 2002). Providing good system conditions for discussing, learning, and experimenting encourages social learning and confidence to discuss change and take the actions required.

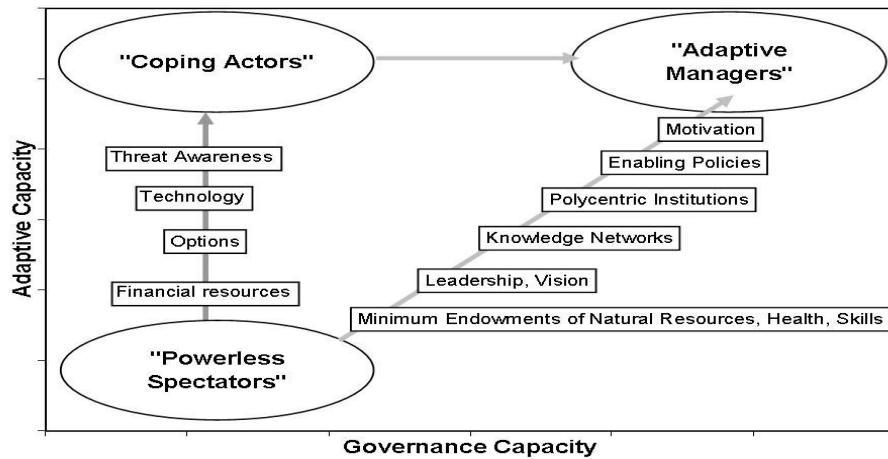
So how does social capital manifest? With leadership, networks, ability to host discourse, trust, social memory (how things worked or did not work in the past), and actor groups (people willing to do something) (Senge, Scharmer, Jaworski, & Flowers, 2004). These elements hold collective memory while promoting innovation, experimentation, and future visioning. As mentioned earlier, Gladwell (2000) identified three types of people who are instrumental to foster social change or tipping points to do things a different way. Gladwell describes these three groups as Mavens – altruistic individuals that share information; Connectors – people with large diverse networks and acquaintances; and Salesmen – people who are persuasive. When these three groups come together, they can make large, long term, meaningful change.

Researchers such as Hahn et al (2006) and McKay (2002) talk about transformational leadership in motivating or fostering social learning. A change of social learning, transformative leadership, and interest to generate a new forward looking vision has impacted the nature of governance institutions which are more fluid, inclusive, and action oriented (Kettl, 2000). Transformational leadership that can move society from the weak sustainability model (based on the neo-liberal ‘capitalism is king’ philosophy) to the strong sustainability model (based on balanced needs in the economy and environment, focused on human dignity) will require these skills to transcend path dependent frameworks, decision and policy making lens, and hidden value systems (Scharmer & Kaufer, 2013).

Organizations and researchers at UNDP (2005) developed frameworks for processes to foster adaptation. They developed the adaptive policy framework to provide guidance in

processes, discussions, and methods to adjust policy making to suit a complex adaptive systems context. The key principles in guiding an adaptation framework include: adaptation works at different levels of society so a multi-participatory and governance approach should be considered; adaptation policy and measures should be assessed in a developmental context; and the adaptation strategy and the stakeholder processes of engagement are equally important (UNDP, 2005) as policy making and decisions occur by those stakeholders. Foresight tools are often used to help stakeholders understand what might happen. The UNDP articulates methods such as participatory scenario building, simulation, role play, visioning, and backcasting tools that can be used to understand what could happen, assess if the community would be prepared, and determine what they would have to do to be prepared. Future oriented tools can be helpful to create awareness, offer a platform to experiment with the ability to cope, induce innovation by fostering a discussion on what tools, policies, behaviours, and other things would be required to generate resiliency in various scenarios (UNDP, 2005). The following graphic depicts some of the requirements that are included in adaptive capacity. The illustration also identifies the leadership requirements.

Figure 2.11. Factors to Enhance Adaptive Capacity and Adaptive Management (Fabricius, Folke, Cundill, & Schultz, 2007, p. 7)



In this graphic, the authors suggest that there is a learning or growing requirement in leadership skills and capabilities (see the arrow going up and to the right) with managers, but there is also a learning function that has to occur to participants or stakeholders in the system. The 'powerless spectators' also need to increase their

awareness, knowledge, explore their assumptions biases, understand their options and potential consequences to perhaps become the engaged ‘receptor capacity’ to deliver on the action requirements. The leaders create the enabling environment, but in this graphic (Fabricius, Folke, Cundill, & Schultz, 2007) the action is dependent on engaged participants and stakeholders. This is a very changed model from the leadership and action from government or ‘someone else’ in the system back to the individual or the citizenry. Glasbergen proposes a similar model in that by building trust, creating collaborations, agreeing to a common rules system, changing a market, and finally changing the political order (co-governance for example) can advance the role of partnerships to achieve sustainable development (Glasbergen, 2011).

Some of the adaptive capacities identified by researchers include active learning (Ashley, Newman, Molyneux-Hodgson, & Blanksby, 2008). Active learning is defined here as the need of all stakeholders to continuously monitor, re-evaluate, and respond to infrastructure in light of new and potential risks (Ashley, Newman, Molyneux-Hodgson, & Blanksby, 2008). The idea is that reliance on the government to see problems and respond is too slow to avoid catastrophic effects. The authors argue that community vigilance, taking their own precautions such as cleaning the public drain in front of their house or reporting cracks/breaks/leaks would improve the system overall and reduce the likelihood of extreme events. “Active learning can develop the capacity by different stakeholder groups to both accept a different view on risk and performance and also be able to utilize different types of response and at different times of implementation” (Ashley, Newman, Molyneux-Hodgson, & Blanksby, 2008, p. 2). It is also anticipated that this approach will reduce response times, facilitate decision-making, and save costs in the future.

In addition to active learning, the authors (Ashley, Newman, Molyneux-Hodgson, & Blanksby, 2008) suggest that adaptive management is an important adaptive capacity. Adaptive management encourages visioning, can persuade and motivate people to ‘step up to the plate’, build trust, address conflict, and foster understanding and decision-making in dilemmas. In the same article, Ashley et al suggested that ecological adaptive capacity is also important. This is likely why many authors suggest that a ‘do no harm’ or precautionary approach is often warranted in order to maximize the adaptive capacity of the ecosystem in the future. The future is uncertain so maximizing future potential

motivates players to consider this precautionary principle when possible. Though active learning and other similar concepts like social learning, increased participation, and action learning exist; the biggest difficulty with these methods is the time, resources, and leadership it takes to bring these groups together and generate learning (Ashley, Newman, Molyneux-Hodgson, & Blanksby, 2008). Researchers suggest that motivation is easiest to foster learning after a major incident that has heightened awareness (Gunderson & Holling, 2002). Though the attention of a serious incident may not be necessary; the community requires some resources, forums, and time commitments to sustain interest and build this capacity continuously in the community. Often a crisis or catastrophe is the impetus to pool the essential resources for such strategic thinking.

Another aspect of adaptive capacity introduced by researchers includes that of anticipatory governance. Anticipatory governance is the approach to understand future uncertainties through participatory foresight to enable a group to understand the challenges and the types of actions that may be necessary (Ozdemir, Faraj, & Knoppers, 2011). In much of the literature the focus is on science and technology requirements, researchers remarked that often non-science and technology policy advice would surface as well. Ozdemir et al (2011) suggest that anticipatory governance brings in the social constructivist technology usage and design points which expands thinking from a science and technology (S&T) downstream impact assessment to include an upstream consumer use and participation. This type of approach (anticipatory governance with participatory foresight) may actually help decision-makers and the public consider the broader implications and consequences of new science and technology and foster changes in behaviour so the S&T is less needed. The result may be a type of responsible innovation (Ozdemir, Faraj, & Knoppers, 2011). This thinking stemmed from the realization of rigidity in social systems to understand, reflect, and incorporate societal values or value changes in S&T policy (Godin, 2006) (Marmot, 2004) (Marris & Rose, 2010) (i.e. a vaccine for all even though there has been the realization that some vaccines work for some, not for all, can have adverse consequences, and at times can be avoided all together with behaviour change – think hand washing during H1N1). Uncertainty, unknown unknowns, and a series of plausible scenarios increased the need for anticipatory intelligence (Selin, 2008) to enable a more innovative set of solutions. Researchers identified the need to prepare for the transformative impacts of future events (Ozdemir, Faraj, & Knoppers, 2011). Once again the future is uncertain and

anticipatory governance is required to understand that S&T may have impacts that we are uncertain of and that may require monitoring and adjustment over time.

Foresight is a human cognitive capacity to anticipate and imagine however, this type of thinking has not until recently been applied to science and technology (S&T) and innovation (Miles, 2010) (Ozdemir, Faraj, & Knoppers, 2011). Adaptive governance and participatory foresight may not be for everyone and in all conditions. There are some challenges with this approach being that it is hard to let go of the idea of proposing a ‘sure thing’. There is a tendency to say this is how a technology will roll out versus to say here is a plan, there is uncertainty how it will go, but through observation and looking for the unknown unknowns, one can adjust as the plan progresses. Challenges include; that people and organizations are familiar with another paradigm with the appearance of certainty (Miles, 2010), social sciences have not spent a lot of time dealing with the future (Ozdemir, Faraj, & Knoppers, 2011), and the need to continually practice in this way (some ongoing entity or approach with resources to continually reflect on this type of engagement) are all required. Overall this approach represents a shift from government to governance.

#### b. Processes within the Element of Adaptive Capacity

Adaptive capacity is the ability to sense and respond to, or sense and anticipate to changing contexts. Often changing with the intention or result of returning to the same identity, function, and form is called resilience. In some literature, the ability to adapt but not necessarily to return to the same identity, function, or form is often called adaptation.

Within the adaptive capacity literature, there are two types of general processes. The first is a type of ‘superficial’ or normally understood processes. These processes are very similar amongst all the elements of the Sustainability Heuristic Model. These are the processes that groups use to identify discontent, explore options, make choices, communicate to others, and take some action. In the research, summarized from three groups of researchers (Grothman & Patt, 2005) (McGrath, 2001) (Pelling, High, Dearning, & Smith, 2008), one could conclude that there were five general action activities or processes that occurred. The processes can be articulated as the following:

1. Individual recognition that the current solution is not working;
2. Exploratory discussion with others that sense a discontinuity – to clarify the issue, expand perspectives, identify options, and analyze options;
3. Options analysis and choice with others – so what will we do?
4. Communications with others – some promotion to explain the issue, reason for action, the choice, and intended outcomes or consequences; and
5. Specific changes both at the group and individual level – in leadership, policies, and institutions to catalyze the change.

What was interesting is that the other elements utilize much of the same ‘normally understood’ processes or actions. These processes are relatively well codified and institutionalized. In the literature on participatory action research or the increasing desire for participation, identifying an issue, expanding perspectives, making choices, communicating decision-making, and taking action are generally accepted steps of participation or consultation processes. They are referred to as ‘superficial’ processes, in that on the surface these processes are expected and well tolerated. However, it is noted in the literature that having these types of events do not always bring the desired results, particularly in the form of sustained action. Therefore, one has to look at the second order level of processes that is discussed in the literature, but not really discussed in the public. Refer to the following table for a summary of these processes and the impacts these processes have on learning.

This second tier or order of processes is referred to by the researcher as ‘deep understanding’ processes. In the literature these processes are referred to as tacit learning. Some of these processes have been more so articulated in the social learning literature. Social learning processes are embedded in the concept of adaptive capacity. Pahl-Wostl (2009) talks about multi-level learning processes in the area of natural resource management, particularly in issues surrounding climate change. Pahl-Wostl refers to Argyis’ reference to maneuvering from single loop learning (incremental improvements without questioning assumptions); to double learning (revisiting assumptions) and triple loop learning (reconsider values, beliefs, and world-views). These stages are essential when delving into uncertainty and surprise as these processes help to negotiate between transitions of learning. Learning can occur on many levels such as at the level of consciousness, emotive commitment, knowledge,

and movement to action. These learnings help to deal with real actor transitions such as moving regulatory processes (opening up what is allowed and what is not); challenging the normative (what is now viewed as right or wrong by society); and the cultural-cognitive (what is thinkable or unthinkable by society). Once again, robust foresight exercises can aid in the preparation of plausible scenarios, have a backdrop with which to conduct a comparative analysis on actions and outcomes, provide a forum to foster interpretation, and the prospection (new future outlooks) on these subjects which collectively can lead to strategy preparation and action taking.

Though these second order processes are discussed in the literature, they are not publically or formally articulated to participants in explicit ways. It is not common practice to discuss surfacing your assumptions, challenging your mental models, clarifying your belief and value systems, and fostering moments for the participant to rationalize their own personal discontinuity with their desired outcomes and a reflection of their actions. Often these processes are embedded or perhaps anticipated to occur – however, they do not always happen. It is unclear if it is the lack of consciousness of this type of profound shift, or the lack of social acceptance of such discussions (in the literature there has been some reference to participant felt manipulation), or enough clarity for practitioners to realize these profound shifts. In addition, the realization for these profound changes often results in individual or group conflict. In many organizations there is the paradigm of a consensus driven approach where disruption to the consensus is perhaps what is truly required but this process or practice creates discomfort amongst facilitators or policy-makers who require agreement to go forward, versus the potentially negative political implications of challenging assumptions, beliefs, value systems, and actions. The very act of this challenge can create discomfort and derail a consensus driven approach, and in fact, one would argue is one of the reasons many processes reach a certain level of strategic interest, but do not generate the momentum for the ‘action’ interest. This nuance is important. If many political or policy-making processes use participation to generate consensus to take an action, often the discovery of a new strategy or recalibration of what is being done is not well tolerated. This consensus driven approach works well if the destination is clear and correct and the desire is strategic planning, however, this process generates discontent when participation discovers a discontinuity which identifies a change in direction. This means that there must be some self-reflection on the mental model, a challenge to

assumptions, and a rationalization of values and beliefs with actions (robust strategic thinking) so that proper strategic planning can ensue.

In the adaptive capacity literature there is the addition of sub-processes suggested by various researchers. The first sub-process is an expansion of perspectives to not only include the perspectives of stakeholders representing human-kind, but also to represent the non-human elements or perspectives of ecology into the domain of expanded world-views. Folke et al (2002) state that in the realization of a holistic approach to advance both social and ecological systems it is important to use scenarios and active adaptive management. Active adaptive management learning still happens in a social context in order to be open, and flexible, without foreclosing future options. The second sub-process suggested, also in the domain of expanded world-views, are scenarios or consideration of the plausible future events. The idea is to build capacity to learn and adapt in a dynamic approach; change all aspects to encouraging self-organization. One can make a plan, but also be flexible and adaptable to change the plan or leave the plan if required. Scharmer talks about the importance to envision many alternative futures to stimulate active adaptive management (Scharmer, 2009). Scharmer suggests to use policy sets as experiments, as multi-level policy platforms with many types of policies to examine what is happening and make the best choice for the context. These two additional sub-processes fit in the five generally accepted processes mentioned earlier, but they introduce an expansion to the consideration of things outside of human-kind, as well as an expansion of options or considerations of the future and those potential implications in today's decision-making. These two elements are important because they reduce the anthropogenic tendencies to consider a more holistic perspective.

Table 2.4. Summarized “Superficial or Normally Understood/Codified” Activities to Develop Adaptive Capacity (Grothman & Patt, 2005) (McGrath, 2001) (Pelling, High, Dearning, & Smith, 2008)

<b>Formal Action Process</b>	<b>Benefits / Outcomes</b>	<b>Individual Process</b>	<b>Benefits / Outcomes</b>	<b>Social Process</b>	<b>Benefits / Outcomes</b>
1. Recognition that current way of thinking is not working (i.e. sustainability of Canada's health system)	Awareness building, reason for action, sense of urgency	Interest, learning, an understanding what it means to me, acquiring a new skill, potential individual advantage, develops ME	Individual awareness, learning, action, responsibility,	Interest and awareness in complex problems; reduce fear; change in accountability; increases opportunity for more solutions;	Social awareness, learning, action
2. Discussion: -What are the complex issues? Why is the situation not working? -Discussion of perspectives (develop a common language, mutual understanding), who should be involved	Mutual language, development of inclusion, increased participation and perspectives	Learn about issues, perspectives, options; Increase an understanding of the implications of MY actions; I hear other worldviews; I use the learning to make better choices for me and others	I have more ideas and options; I refine my opinion;	We have a better understanding of broader world-views so I can use info to make better choices for me that can also help the system; individual and collective views	We understand the system better and can change ourselves and our groups, organizations, identities
3.Choice and Communications – promotion, understanding, awareness	Increasing awareness, understanding, and action at all levels	Increasing individual learning, reflection, change and action	What is in it for me? How do I affect others?	What do we need? Awareness by others if I take action or not...more accountability and collaboration	Broader understanding of all types of implications
4.Changes – in leadership, policies, institutions, new types of organizations, becoming mainstream	Awareness of perspectives, implications, minimize unintended consequences	Changes in me, my family, my choices	Take action to increase positives and decrease negatives	Awareness, respect, for other perspectives; understanding of broader implications, actions, inactions; co-created solutions	Fuller system understanding, platform for group change; align society and individuals

c. Controversies and Further Research in the Adaptive Capacity Literature

There were not any controversial elements in the adaptive capacity literature. It was observed that there was an expanding world-view on the literature evolving from having the capacity to adapt to change, the ability to anticipate change, the ability to lead change, and concepts of co-creation and emergence. Most of the challenges highlighted in the literature centered on the lack of awareness on consciousness of profound change, challenges to lead and motivate profound change for the strong sustainability world-view, and the strength of neo-liberal institutions and decision-making frameworks inhibiting this awareness of profound change.

One of the aspects of adaptive capacity literature that is not well researched and may be an area for future research is how societies respond to change and how societies organize after significant change (Gunderson & Holling, 2002). Folke et al (2003) has identified four dimensions of adaptive capacity including: learning to live with change and uncertainty, ability to combine different types of knowledge for learning, creating opportunities for self-organization toward social-ecological resilience, and nurturing resilience for renewal. These are characteristics that Folke et al suggest should exist. However, the nuance in the dynamics of change during or after an event have not been explored in depth.

6. Summary of the Model

a. Observations in each of the Key Elements

The literature review surfaced key points of reflection. First of all, in all of the research domains of the Sustainability Heuristic Model (sustainability, foresight, social learning, and adaptive capacity), overall there were no radical paradigmatic shifts. In general, each domain had an expanding body of knowledge to contribute insights or additional perspectives of application.

In addition, each domain of literature also started from a more positivist perspective with precise definitions with a search for characteristics of replicability in the future. What is very striking is that a chronological view of the evolution of the literature led to more pluralistic perspectives being considered in each domain. Consequently the researcher

observed patterns of evolution in the literature which follows the epistemological transitions in the background, underpinning the transition on the view of knowledge. These patterns mirrored the rise of complexity, increase in societal consciousness of the problems, and the possibilities of new ways of thinking or innovating for solutions. For example, a movement from positivism/modernism, to structuralism to social constructivism, and to post-constructivism (which the researcher would articulate as emergence). The researcher observed the patterns illustrated in the following table. Key observations from the literature review included:

1. Movement to increase consciousness and awareness of others – reduction in anthropocentricity;
2. Movement to increase perspectives, world-views, stakeholders, and other ‘beings’ into the initial picture and problem etc.;
3. Realization of an inconsistency between time, value shifts, and behaviours;
4. Realization of the increasing complexity and partnerships required to address future issues;
5. Realization of the lack of control people truly do have;
6. Realization that action is inspired from within; thus a change in learning, management, leadership is required; and
7. Though one would like to envision and achieve it all, there may be things out there that are more beautiful and amazing than one could imagine; so how do individuals and society stay open and able for those opportunities?

With respect to the learning on the processes involved in the Sustainability Heuristic Model, one can observe the following:

- The major accepted or codified processes in each of the Sustainability Heuristic Model use a similar set of processes (recognition of a discontinuity, social exploration of the options, discussion on the potential solutions, some agreement on action, and finally some communications and follow-up);
- Thinking about the future or foresight is mentioned or alluded to in all of the Sustainability Heuristic Model literature, but not listed as a formalized process. Foresight is often referred to as tacit knowledge or occurring, but not always. This point highlights that it is beneficial to consider the future in this type of thinking and decision-making, but the practice is not yet codified as a ‘regular’ practice;

- The Sustainability Heuristic Model elements all mention the notions of dealing with the future, that there is social learning, and that these actions can increase adaptive capacity. However, there is not a body of literature that formally links all of these elements together. In this respect, the Sustainability Heuristic Model is a novel construction in the literature;
- Much of the research relating to the Sustainability Heuristic Model has been focused within the disciplines or elements of the Sustainability Heuristic Model (sustainability, foresight, social learning, and adaptive capacity). Though there are references to the other competencies, there is not a formalized model that links these elements together. The most ‘holistic’ model on sustainability seems to be Wilber’s Integral Theory or Integral Sustainability Model which is inclusive of expanded perspectives and the theoretical notion of the whole (mostly referenced by expanded stakeholders and their world-views). This Sustainability Heuristic Model is consistent with that theory, however, it expands world-views to include expanded temporal dimensions implicit in the definition of sustainable development or sustainability. This paper is one of the very few papers in the literature that wrestles with the temporal dimension highlighted in the original definition in an in-depth and tactile manner; and
- Not only is the temporal dimension more thoroughly explained, the nuances in the temporal dimension are broken down into types of social learning (social learning on the nature of change) plus social learning on the impacts and needs in the future impacting the capacity to adapt amongst multiple agents (adaptive capacity). The convergence of these disciplines increases the likelihood of sustainable decision-making by creating consciousness over time, space, and players leading to the heightened emergence of sustainability.

Through a literature review, the researcher was able to construct the Sustainability Heuristic Model and propose this model as a novel contribution to explain how foresight facilitates social learning and heightened adaptive capacity. This chain reaction of events and learning contributes to sustainability in that foresight creates social learning of other perspectives and options, creating a platform to visualize action and change. Having options, thinking about impacts and consequences of action contributes to sustainability by fostering choice and change.

#### b. Comments on the Controversies and Areas for Further Research

As mentioned earlier, no significant controversies were observed in the literature, just expanded theoretical views and added methodologies. However, noted was the following challenges emphasized by various researchers. These challenges were quite similar among the Sustainability Heuristic Model elements.

The research alluded to an issue of awareness of a major shift or disruption. There was awareness that a profound shift was soon to occur, however, many researchers commented that there was and for some time would continue to be difficulty to transcend the neo-liberal lens of sustainability (i.e. difficulty to move from the weak sustainability model to the strong sustainability model). This challenge was described as:

- Heavy dependencies on well-established/entrenched models;
- Not enough discourse overall in society on values, goals, vision, and recalibration with behaviour;
- Institutions knowing their business but not addressing the change...they are living entities and in many cases are perpetuating their existence without the same reflection and recalibration;
- Intuitively knowing that something is up, but not yet manifesting the critical mass to gel awareness, consciousness, and action; and
- Advanced thinkers have articulated ideas on what needs to happen, but it seems that it is hard to stop the old machine and recalibrate. Do we require a crisis to stop and respond? Or is there a transformational leadership or consciousness that will emerge to move us there? Or will the crisis be that pivotal point?

Most of the processes referred to within the Sustainability Heuristic Model (referring to the elements of sustainability, foresight, social learning, and adaptive capacity) emphasized the codified or accepted participatory processes. In each of the bodies of literature, there was the mention of strong leaders and strong or courageous individual actors who were willing to challenge the status quo, yet there were no formalized processes to actually build the sustainability thinking and achieving capacity of these individuals. There may be a nuance here that warrants future attention in the research as it seems that most processes still require the strength or agreement of groups (social learning aspect), yet motivation of new behaviours in alternative paradigms are often not understood by groups. Likely this area will require further research.

A notion that resonates for further research also includes the notion of thinking about the future to enhance creativity and innovation. Researchers alluded to the idea that the ability to be creative requires prospection (thinking about the future) in that one must think of ideas, inventions, and innovations that do not yet exist and be desired by others.

Given the growing area of innovation, there may be further research required to explore this aspect.

Further research in this area may include a further elaboration of the shift (manifestation of change), ideas on how to raise awareness or consciousness of the shift, co-management of institutions to discuss the shift and facilitate it together, as well as work on an internal reflection of these processes. There were many gaps in the literature on how ideas transform individuals, groups, and networks. In addition, further work needs to occur on understanding the leadership requirements and how to manifest or nurture those characteristics perhaps as an additional element in the proposed Sustainability Heuristic Model.

The other relatively large challenge in the literature with respect to rigorous theories and operational guidance in the social learning domain. Frequently researchers articulated that there was learning, however, they had difficulty understanding and articulating the process. In addition, there were attempts to discuss what elements had to be there (trust, reciprocity, etc.) however, researchers did comment that sometimes learning resulted but not all of the elements were there. This area seemed to be in a bit of a mystery and likely further research and perhaps a new paradigm is required in this domain.

## 7. Summary

Until now, the literature does not propose an interdisciplinary model, such as the Sustainability Heuristic Model, to explain the processes involved in foresight and how these processes may contribute to sustainability. Most of the literature is focused in each of the disciplines involved in this research: foresight, social learning, adaptive capacity, and sustainability. Each discipline alludes to similar factors such as thinking about the future is a type of intelligence or information that can be useful to understand uncertainty, participation in a foresight event can contribute to social learning and increasing adaptive capacity, and that these elements can contribute to actions taken that may increase the likelihood of being sustainable. This interdisciplinary model is thus novel in the literature, though substantiated by references in each independent discipline. In addition, the Sustainability Heuristic Model addresses the temporal dimension inherent in the Brundtland definition of sustainability by drawing in the future

to inform present day decision making for the betterment of individuals and society in both time periods. This new knowledge can contribute to social learning and adaptive capacity in both time periods increasing the activity of being sustainable.

Other interesting notations stemming from the literature review include the fact that leadership is essential to foster an enabling environment to address the present, the future, and the transition between the two paradigms. In addition, the literature in most of the elements of the Sustainability Heuristic model discusses that there is a ‘double loop’ in learning. This is not Argyris’ (Argyris, 1999) model on single, double, and triple loop learning, but two loops of social learning. The first loop is similar to Bandura’s social cognitive theory where within a paradigm the group can help an individual make a change. In this example the group has learned something (for example that smoking is not a positive health act) and can reinforce the individual to take corrective action (to quit smoking) with policies, peer pressure, and other signals. The second loop is in a paradigm change. In this loop, individuals register discontent for the current paradigm and explores learning (may be future oriented, a meeting on what is wrong, understanding potential alternative paradigms). In this loop the individual leads. When some critical mass of individuals take action, social learning occurs. When social learning occurs to a large extent, it creates the rules or understanding in the new paradigm. Evident in this comparison is that social learning is essential however, operates in a different way depending on the emergence or reinforcement of a paradigm.

The next stage of the research is to explore insights from participants involved in foresight focused on sustainability to describe and identify their experiences of how foresight may operationalize sustainability. In the research described below participants from two foresight programs where sustainability is intended are interviewed to describe their experiences and insight as to how the foresight process could or did contribute to sustainability.

### **III. The Research Methodology**

#### **1. The Problem**

Given that the notion of sustainability is desirable in many disciplines, determining how to operationalize sustainability, particularly the aspect of balancing needs of today with those in an uncertain future, would be very impactful. One of the major challenges in this type of research is that the idea of sustainability is socially constructed and that this construction may change over time depending on changes in actors, changes in endogenous and exogenous conditions, and other factors. Therefore, this research will not evaluate if decisions are more sustainable or not, but will focus on the primary issue on how the use of foresight can address the temporal dimension inherent in the definition of sustainability.

#### **2. Research Goal and Objectives**

The research goal is to understand how the foresight process embeds the consideration of the temporal dimension in the context of sustainability. Here foresight processes refer to the participatory practices to think about changing trends, surfacing assumptions, imaging various scenarios, and assessing how changes in technology, policies, behaviours, and structures could better adapt over time.

The research objectives include:

- To increase comprehension on how foresight embeds the future to social learning;
- To increase understanding on how foresight embeds the future in adaptive capacity development;
- To illustrate how foresight influences decisions and actions in the two theme areas of study; and
- To gather insights on how foresight influences other areas of the participants' lives.

#### **3. Research Questions**

To address the research goal and objectives, the following types of questions will guide the research process:

1. What were the perspectives of participants in their respective thematic area before attending the foresight events?
2. What did participants experience in the foresight process?
3. What did participants learn as a result of the foresight process?
4. What did participants do differently as a result of the foresight process?
5. What were participants' comments of collective and individual learning?
6. What were participants' comments of collective and individual action?

These probing questions will inform the research objectives to identify what participants experience during the foresight process and how this experience impacts elements of the Sustainability Heuristic Model, namely social learning and adaptive capacity.

#### 4. Research Sub-Questions

The following sub-questions will also be addressed to gain richness, detail, nuances expressed by participants throughout the foresight process. These questions will explore participant's assessment of impact of the foresight process to their learning and actions contemplated or taken:

1. What are the participants' perspectives on the foresight process?
2. What are the participants' perspectives of change as a result of foresight?
3. What were the outcomes of foresight?
4. What were 'other outcomes' of foresight? For example, changes in the way participants viewed the world? Actions they took? Barriers to action?

Though not proof that the impressions of participants are true, their impressions will give the researcher a first glimmer to crystallize processes within foresight that impact social learning, adaptive capacity, and sustainability. It is anticipated that in further research, the replicability of the findings could be attempted once this exploratory research on model structure is completed.

#### 5. The Research Context

This research will examine participant thoughts, experiences, and insights in two foresight programs conducted within the Government of Canada that have the goal or objective of sustainability as a key part of the exercise. These foresight programs were multi-series events using a different foresight methodology in each event to clarify a focal question, identify trends and drivers impacting the world today and into the future,

create scenarios of the future plausibilities, and test learning, options, strategies, and actions in each of those scenarios. The intention of both foresight series was to garner insight on change and options to consider in order to operationalize sustainability in their particular sector or domain.

The first foresight series was conducted by Agriculture and Agri-Food Canada with the key question on how agriculture needs to adapt to climate change considering a time period to 2030. The second foresight series was conducted by Health Canada to explore how science and technology could support a sustainable health system using the time period to 2030. Foresight participants who attended more than one event were invited to participate in the research.

## 6. The Research Methodologies and Analysis

### a. Common Methodologies in this Type of Analysis

To identify the impacts of participatory foresight, inductive research methods, such as case study preparation and analysis, is often used to identify the phenomenology evolving from the various events. The case studies include a description of the foresight program's intention, the foresight activities, and analysis of findings from the 'end of event' reports to record statements of social learning, adaptive capacity enhancement, and sustainability intentions. In effect, the case study is a description of the processes and findings that occurred approximately five years ago.

To add richness to the case study, participants who have attended the foresight events were interviewed to determine their understanding of foresight and their reflection on their personal experiences, changes in awareness, their own learning, their perspectives of group learning, enhancement to adaptive capacity, and movement to action. The interviews focused on areas of learning, capacity building actions, and sustainability actions that resulted after the foresight project. The interviews obtained participant feedback regarding their thoughts and behaviours with respect to taking action or not taking action, extracted other factors that the researcher may not have considered in the model, and determined the application and relevance of the foresight exercise to other areas of life. The purpose of this approach is to surface nuances that were not anticipated by the researcher which could be explored in more depth through a more

open-ended exploratory approach. The disadvantage of this process is that it is possible that the findings will be relevant solely or mostly to the case study as less objectivity may be used to perhaps imply broad models or inferences.

Other methods that are considered in circumstances such as these are more deductive research methods such as case study preparation and analysis to explore the impact of foresight by distributing a survey of participants to determine their various courses of action or inaction. The advantage of this methodology is that objectivity of the survey provides a potential framework for replicability to a broader range of cases. The disadvantage of this methodology is that at this preliminary stage for work, nuances that are essential for the robust interpretation of the cases may be missed, thus, reducing the likelihood of extracting the appropriate detail to make insightful conclusions.

Therefore, the researcher chose the inductive research approach to create case studies constructed from a combination of document reviews and participant interviews to determine learnings, actions, and results post foresight, to determine if there were other elements that were not considered in the Sustainability Heuristic Model proposed, and see if foresight has impacted areas of life since the foresight exercises. With this information the researcher:

1. analyzed if the intentions in each case study resulted in the intended actions;
2. conducted cross-case analysis to see if there are similarities or differences across cases (potential replicability to other issues and sectors); and
3. identified missing elements in the model.

Through this approach, the researcher garnered insights to the following:

1. an explanation of further processes that influence learning and action;
2. a correlation of particular foresight exercises and the type of learning/action; and
3. surfaced insights into the time lag in learning, decision making, and action.

Each of the participant interview responses was typed verbatim as the interviewer asked the questions. The researcher analyzed the participant responses for insights and examples that address the research goal and objectives. These observations were

included in the relevant case study. The researcher studied the multiple participant responses in each case study to determine how foresight addresses the temporal dimension in the context of sustainability.

b. Detailed Preliminary Research Design and Analysis

To inform the primary research questions and sub-questions, the researcher conducted an embedded two-case study approach. Thus, two case studies were created by conducting a document review of two past foresight exercises focused on sustainability to explore and map the foresight events along with stated points of awareness, individual and social learning, identifying improvements to adaptive capacity, and highlighting planned actions stated in the reports where specific tasks included:

- i. Obtaining the intention, process summary, and foresight event reports in each thematic area;
- ii. Creating an overview of the intention, processes used, end results, and use of the information generated in the foresight events;
- iii. Reviewing each document created in each thematic event in terms of the research goal and objectives and the following analytical framework. It is important to define the term action. In this research the analytical framework to explore different types of action included:
  - Cognitive action – I have now become aware of some knowledge or idea
  - Sharing action/social learning – The group has become aware of some knowledge or idea
  - Cognitive adaptive capacity action – I and/or the group states that it is important to have a behavioural change (this action may be in the form of changing an actor's form, function, structure, investment)
  - Tactile or operational action – The participant and/or the group do something stated above.

In effect, the researcher reviewed statements in the reports and grouped findings or trends in areas of likeness or similarity in order to highlight a finding. Key findings were structured as those most often referenced to those least often referenced. Thus, the findings were compiled by assessing the text and grouping elements of commonality.

- iv. Conducted interviews with each group of foresight participants (selecting participants that were involved in approximately two or more of the events in each series) to explore their learning with respect to the primary research question to understand how foresight enables consideration of the future in decisions focused on sustainability, plus ask ‘end of the interview’ questions to potentially expand the model based on their overall impressions of the foresight exercises, what new issues were surfaced, recording new ideas, innovations, and options of actions. The interviews provided an opportunity for participants to delve deeper into the nuances of how findings were derived, their own choices in action or inaction, the conditionality required to take action, and extract observations and findings not proposed in the Sustainability Heuristic Model.

In order to assess participant comments, the researcher reviewed each participant's interview notes and grouped findings or trends in areas of likeness or similarity in order to highlight a finding. Key findings were structured as those most often referenced to those least often referenced. Thus, the findings were compiled by assessing the text and grouping elements of commonality.

Specific tasks included:

1. Making a list of participants involved in each series of workshops (Note: A pilot or test case of the interviews described below was conducted to inform errors or weaknesses in the questions. Results were reviewed and updates were made to the questions and data capture framework).
2. Sending participants an introductory/informatory email on the nature and purpose of the research, a request for them to volunteer to participate in the interview, provide contact information to enable them access to further information, informing them of their ability to withdraw from the process at any time, estimate of the time commitment to participate, and an opportunity to receive a copy of final findings. Identities were kept confidential.
3. Reminder emails were sent out to remind people to participate and schedule an interview.
4. Interviews were conducted.
5. Interview results were entered in a data base. A file was created from the data of each interview. Each file plus the findings stemming across

participant responses were analyzed for similarities and differences to determine if there were broader applications to the findings or if the findings were case specific. Preliminary and final findings were reviewed to highlight initial findings and gaps. The researcher was searching for common concepts or phrases articulated by the participants. These common groupings were assembled in an order of frequency. These insights were then included into the case studies.

- v. Reflecting on the findings from the interviews. Findings were circulated to interview participants and foresight managers/organizers to obtain their perspectives on the findings.
- vi. Final comments were received and incorporated as appropriate. Final results are articulated in the thesis.

Therefore, the researcher clearly laid out a step wise process to evaluate the text of the reports to extract common findings and understanding based on the grouping of common causes and phases. In addition, the researcher studied participant's comments to group thoughts, findings, and experiences that were similar and then ordering these concepts by the frequency the concept or phrase was used by participants. It should be noted, that the researcher did not anticipate groupings in advance of the research, but by reviewing the interview notes 3 times, was able to extract common comments, concepts, and experience by frequency. The intention of this approach was to explore the elements of the model that resonated with the participants themselves versus the researcher's own notion of what would be the appropriate groupings.

### c. Secondary Research Design and Analysis

The researcher conducted a cross-case comparative analysis to determine common or differing elements in a heuristics based approach which is an experience based technique to interpret learning or discovery (were the learnings solely thematic or case study specific or was there the possibility for broader scale generalizations) by:

- i) Reflecting the findings to the model: Identify individual and social learning stemming from foresight; identify adaptive capacity requirements stemming from foresight; identify operational actions taken stemming from foresight; conduct analysis on why operational actions were not taken. These findings were correlated with the findings in the analysis of documents.

- ii) Identifying specific findings such as ideas of increased awareness, identifications of options, and identification of learnings (individual and social), identify capacity for action, and identify conditions for future action, identify reasons for inaction (from personal interviews).

In steps i) and ii) the cross case comparison examined if the concept groupings in each case study were similar or different. The comparison also examined if there were commonalities in the frequency or popularity of each concept. The greater the similarities between the two case studies, then the greater chance that the generalized observations could be applied to other initiatives focused on sustainability.

- iii) Reporting findings on the model specifically how foresight impacts social learning, adaptive capacity, and sustainability. Findings were examined from a comparative analysis results between the two cases to determine if there was the possibility of broader case replicability.
- iv) Returning the findings to participants to obtain their reflection and learning from the foresight process and research process to validate the relevance of the findings to their experience.
- v) Reviewing the findings with foresight practitioners to obtain their reflections and learnings from the foresight process and research process to validate the relevance of the findings to their experience and determine if they would change or adjust their processes based on the findings.
- vi) Reviewing suggestions and making changes. Findings from the case study and multi-case comparisons were used to complete the research project/dissertation.

This information and analysis was used to inform the research goal as to how foresight enables the consideration of the temporal dimension in decisions focused on sustainability; and objectives as to how foresight contributed to social learning and adaptive capacity enhancement; were there other elements to consider to better explain the model; and were their second order benefits and applications of foresight to

participants. Anticipated interviewees included participants from each series of workshops, foresight practitioners, and experts involved in the design and delivery of the foresight events.

d. Constructing the Case Studies

An inductive research framework facilitated the exploration of two past participatory foresight projects through a constructivist approach using the case study methodology and comparative analysis to identify the level of consciousness of individual and collective values and temporal scales of the present and future. These case studies were used to assist the researcher in the definition of indicators that emerged from preliminary exploration. The two case studies chosen were sponsored by the Government of Canada to address sustainability questions. The first case study was led by Agriculture and Agri-Food Canada, which focused on the agricultural adaptation requirements to climate change. The second case study was led by Health Canada, which focused on improving the sustainability of Canada's health system. These case studies are further elaborated as:

1. ***Agricultural Adaptation to Climate Change*** – Agriculture and Agri-Food Canada led exercise with sector stakeholders focused on how agriculture stakeholders may have to adapt to climate change in Canada. The researcher reviewed materials to create a case study of the participatory foresight process. The researcher interviewed participants to identify p to explore the understanding and terminology that participants use to articulate their understanding of social learning and adaptive capacity during the course of five workshops exploring how to best adapt to climate change.
2. ***Developing a Sustainable Health Care System*** – Health Canada led exercise with sector stakeholders to identify how to increase the sustainability of Canada's health system. The researcher reviewed materials prepared after each event to create a case study of the foresight process. The researcher interviewed participants to identify phenomenology to explore the understanding and terminology that participants use to articulate their understanding of social learning during the course of two workshops exploring how to improve the sustainability of Canada's health system.

The construction of the two case studies explained the context, intentions, and corresponding outputs from each event. The cross case analysis enabled a comparison to obtain a first look if there was the possibility of broader generalizations and findings that indicated the potential relevance and possible application of the Sustainability Heuristic Model. The cross case analysis would also highlight potential differences to bring to the researcher's attention aspects of the model that were not considered or other attributes that would better explain participant's impressions on how foresight impacted themselves, social learning, adaptive capacity, and sustainability.

## 7. Research Limitations, Assumptions, and Risk Mitigation

The scope of this research was limited to the understanding of the impact of foresight on addressing the temporal dimension of sustainability. It was anticipated that findings in this research area will inform the broader question on how one might operationalize the concept of sustainability.

Though this research was done in the context of sustainability, the researcher did not address the question if the decisions made were more sustainable. In the literature review and the model proposition, it has been defined that sustainability is evident with four balances:

1. The inclusion of social, economic and environmental considerations;
2. An expanded range of perspectives (local, global, cultural, institutional, marginalized);
3. Broader asset considerations (social capital, human capital, financial capital, environmental services); and
4. Present and future considerations.

As stated in the previous paragraph, this research focused on the last point, that foresight could embed the future in present day decision making, thus making the likelihood of decisions made today are more sustainable (considering the needs of future generations because the process considers the future). The researcher assumes that decisions made embodied the first three balances of sustainability. Thus, this research

focused on the fourth balance that thinking about the future could influence thinking, learning, adapting, and action towards sustainability.

The researcher designed interview questions and conducted a pilot test of the interview questions in January, 2015. Once preliminary results were analyzed and the survey improved, the full range of interviews were conducted from February to May, 2015. The researcher analyzed the data and constructed the case studies from June to July, 2015. The cross case analysis was conducted from August to September, with the first draft of writing commencing in the early fall 2015.

## 8. Expected Outcomes

### a. The Significance of the Issue

The concept of sustainability is a grand aspiration with virtually all stakeholders referencing sustainability or sustainable development as a desired state or process in complex issues of the day such as natural resource management, rural studies, and climate change, to name a few. However, lacking in the literature is research on how to operationalize the notion of sustainability. Within the sustainability literature, a common element is the implied futurity of sustainability – the need to rationalize the needs of the present with an uncertain future. Following a robust literature review on the science of anticipatory intelligence, we see the domain of futures studies or foresight, which is a participatory process to embed the study of the future into present day decision making. Therefore, this research is focused and limited to the temporal dimension inherent within the definition of sustainability, specifically:

- How foresight enables the consideration of the future in sub processes of social learning and adaptive capacity that are inextricably linked to sustainable decisions made today;
- Exploration of other elements that can enhance understanding on how to operationalize sustainability; and
- Preliminary understanding of the definition of action and aspects that increase action or inhibit action.

By answering these questions, the researcher may gather insights on how foresight stimulates social learning and adaptive capacity, thereby leading to a greater likelihood of moving towards sustainability because participants are able to anticipate change, develop more options, and reflect on changed behaviour and actions to operationalize the notion of sustainability, a key focus in rural studies.

b. Anticipated Findings

The researcher proposed that analyzing the two sustainability oriented case studies will help the understanding on how foresight impacts sustainability by addressing the temporal dimension of considering the future in decision making in the present. In addition, the participant interviews assisted to surface the participants' understanding or reflection of social learning. These social learning thresholds were mapped against the foresight process to identify possible processes that contribute to social learning or heightened adaptive capacity. The cross-case analysis between the two foresight events focused on sustainability and participant interviews illustrated similarities and differences between sectors. General analytics were used to reflect on the validity of the Sustainable Heuristic Model. Finally, the insights obtained from the findings in this research were reflected with participants and foresight organizers to reflect on the observations and learning of the research process and to advance reflection and further social learning by embedding the participants and foresight organizers into the research process itself. This process of exploration and discovery provided the ground work to continue the journey on how to operationalize the notion of sustainability.

## IV. The Results

### 1. Introduction and Problem Restatement

Given the notion of sustainability is desirable in many disciplines, determining how to operationalize sustainability, particularly the aspect of balancing needs of today with those in an uncertain future, would be very impactful. The research goal is to understand how the foresight process embeds the consideration of the temporal dimension in the context of sustainability. To gather insights on the research goal, participants in each foresight series were asked questions to explore:

- how foresight contributes to the elements of the Sustainability Heuristic Model (social learning, adaptive capacity, and sustainability);
- identify any other nuances or elements that link foresight to sustainability; and
- garner insights as to the experiences and processes involved in the foresight process.

Refer to Appendix I for questions given to interviewees to address the research questions. Refer to Appendix II for the detailed responses given by interviewees in each of the foresight programs. Appendix III summarize the analysis of the documents or reports produced in each one of the foresight exercises.

These reports were analyzed for statements or references that addressed the research questions. The analysis from reports from each foresight event, plus the analysis of the cohort of responses, were used to construct a case study of each foresight series designed to provide insight on being or becoming sustainable in agriculture in response to climate change, and in developing a sustainable health system for Canada. The case studies provide a comprehensive review of how the foresight series intended to address sustainability, the findings immediately reported after the event, and the analysis of participant responses regarding the foresight events. Together, this information contributed to a reflective piece on how the foresight process manifested in social learning, adaptive capacity development, sustainability, and other findings.

2. Case Study 1 – AAFC-Agriculture Adaptation to Climate Change  
Foresight Series

a. Objective and Scope of this Foresight Series

In 2009, climate change discussions were increasing in frequency in the Government of Canada and the public domain. There was preparation of the “Growing Forward” Agriculture Policy Framework in Canada. This framework was to be designed by AAFC in consultation with agricultural stakeholders with the intent to increase productivity, competitiveness, and innovation in Canada’s agriculture sector. In order to build the capacity of the agriculture sector to work in collaboration with government and in a way that would enable the sector to anticipate their future needs, AAFC created a futures study program called the Agri-Foresight Initiative. Cabinet approved \$6.5 million dollars to enable the agriculture sector to think about future issues in order to develop policies and programs that would create a framework to advance the competitiveness of Canada’s agriculture sector today and well into the future. It was anticipated that the engagement of agents and actors in the agriculture would increase learning by all stakeholders and enable the co-creation of a policy framework that would help the sector understand the trade-offs of which activities would be supported and which would not be supported (there was not enough money to fund all desired initiatives). With all agents and actors knowing more, each other’s position, and the limitation of resources stated, it was anticipated that co-creation of a strategic approach would be likely as each participant would have a better capacity to individually and collectively respond to future conditions with limited resources.

It was intended that by conducting foresight exercises to study future scenarios of climate change, that the insights from studying the future, particularly in the first foresight series to explore the potential changes to climate and those changes on agriculture, would contribute to designing the policy framework and strategic investments to support the agriculture sector. Findings from the foresight events could be used to design policy, guide investments in research, and identify changing behaviours/agents/activities that would be necessary to prepare for the opportunities and challenges of dealing with climate change from 2010-2030.

A foresight team was created consisting of a foresight manager, three analysts, an event planner, and access to administrative support. This team reported to two directors

(Policy Branch and Research Branch). The intention of the exercise was to have two reporting lines in order to create a shared initiative across the Department (instead of the traditional silos). Policy and Research branch collaboration was illustrated by the Policy Branch providing human resources and Research branch providing financial resources from the Agri-Foresight Initiative.

The foresight process was designed to use six exercises using different foresight techniques (analyzing changing trends/drivers, constructing 4 scenarios, analyzing the policy and science implications, mapping the system and inherent influences/relationships, and exploring innovation through contradiction) would give a robust set of insights of the adaptations required to adapt to climate change and some specificity to the types of investments and actions that would be required to better adapt to climate change. Many events were planned not just to address agriculture's adaptation requirements to climate change, but to test various foresight methodologies for use in the Agri-Foresight Initiative. At this point in the Government of Canada, foresight was beginning as a practice with limited knowledge on the various foresight methodologies. Prior to this event, the Research Branch funded smaller foresight events to gain experience and pilot the foresight project. This project, to determine how agriculture would have to adapt to climate change, was the first 'deep' multi-series foresight event exploring the same issue.

Approximately 120 different people participated in the climate change foresight program, with approximately 50% of participants involved in more than one event. The management team aimed for participants to represent government, industry, and civil society. In addition, the group aimed to have approximately 50% of the participants being 'new' to the process. With a balance of new people combined with people attending previous events, the management team sought to increase exposure to the foresight process and outcomes. However, the drawback of selecting so many new people in each event was that the 'repeat performers' learned about the process and could more easily participate in the foresight activities whereas new people often would ask many questions of the process, had difficulty suspending disbelief of the scenarios in order to explore new relationships and options, and at times this clash of 'old and new' would frustrate each camp as well as the facilitators and organizers of the foresight series.

At this time, there were many research initiatives with respect to climate change, both on the policy and research side. From the Strategic Policy side, there was a question on how might climate change consciousness increase the likelihood of carbon pricing, taxation, credits; the creation of environmental goods and services (EG&S); the potential of using agriculture for fuel and fibre, and value chain marketing (such as Tesco gaining market share by advertising the carbon and water footprint on food products). From the Research side, there was a greater movement towards investing in sciences that would promote climate smart agriculture, the ability to trace and track carbon for those markets just mentioned, carbon sequestration research, and research that sought sustainable production systems that may use less carbon or sequester more carbon. Both branches of AAFC were interested to have an understanding on how climate change would impact agriculture and where strategic investments may have to be made to increase productivity and competitiveness in the Canadian agriculture sector under climate change.

From a political perspective, Prime Minister Stephen Harper had transitioned from a minority to a majority government. The Conservative position on climate change was not yet defined. From an AAFC perspective, it was anticipated that insights could inform the strategic policy and research agendas, particularly in terms of the new “Growing Forward” Policy Framework that was being discussed with agricultural stakeholders. The policy framework was a tool with an integrated and strategic direction to advance the competitiveness of the agriculture sector in a comprehensive systems approach.

#### b. Summary of Each Event Report

At the end of each of the six foresight events, a report on the foresight process and findings was produced and distributed to participants and the management at AAFC. Each event was facilitated by a foresight specialist. The agreement between the foresight management team and the participants was that participants share their wisdom, ideas, and learning; and all who attend the foresight events can fully own the report. This meant that each participant could use the research and findings for their own use or purposes. The foresight team determined that if the questions for the sole

purpose of AAFC, that there may not be the same level of commitment and interest in long term participation.

The following table summarizes the findings from each foresight event in reference to the key research questions. A detailed summary of the reports is presented in Appendix III. A summary of the key findings extracted from the reports is validation of the following premises:

- The world is increasingly complex, requiring a new way to think about sustainability and planning.
- Foresight exercises created an atmosphere to see changing trends and drivers, facilitate awareness that current decision making frameworks were flawed to deal with uncertainty.
- Sustainability requires constant reflection and recalibration as the nature of sustainability is dynamic; thus complex adaptive management systems warrant consideration.
- The various foresight exercises fostered social learning and some practice of adaptive capacity that was anticipated to lead to action.
- There was a change in consciousness that thinking of the future was useful when moving to the goal of sustainability.
- There was an underlying assumption that foresight could be done once every few years and this would be sufficient to drive planning towards sustainability.
- The reports highly emphasized that foresight contributed to social learning and that social learning through the rehearsal of scenarios increased adaptive capacity.

The key summary findings suggest that foresight events create conditions for social learning and enhancing adaptive capacity. Through the learning from diverse participants and challenges to current decision making assumptions, participants expressed the sense that they were able to determine more options and changes required that would enhance their capacity to adapt to change in the future.

Table 4.1: Summary of Outcomes from Each Foresight Event Case Study 1 – AAFC: Requirements for Agriculture to Adapt to Climate Change

<b>Events</b>	<b>Outcomes</b>	<b>Key Findings Related to the Research Questions</b>	
<b>Scenario Event</b> March, 2009 70 people	-understand the trends/drivers that impact ag/climate - developed 4 scenarios to study capacity requirements	<ul style="list-style-type: none"> <li>-Having ‘one policy fits all’ ineffective in the future.</li> <li>-More variability/volatility means redundancy in the system enhances resilience.</li> <li>-Access to information, technology, and social media changes power structures (individuals can be as powerful as traditional institutions)</li> <li>-Integrated approaches is necessary to understand and address future issues.</li> <li>-Society is blinded by its assumptions.</li> </ul>	
<b>Policy Event</b> June, 2009 30 people	-see implications that worked in all scenarios -what type of policy instruments will be required	<ul style="list-style-type: none"> <li>-Increase in complexity, uncertainty means more options/players/variations-new policy frameworks are required.</li> <li>-Need flexible and adaptive policies.</li> <li>-Increase our view who is an expert; solutions are coming from everywhere.</li> <li>-Adaptation requires innovation and this fosters resilience.</li> </ul>	
<b>Science Event</b> June, 2009 30 people	-see implications across scenarios -understand research needed in the future	<ul style="list-style-type: none"> <li>-Need physical/natural sciences + social sciences to know what motivates change.</li> <li>-Science in agriculture production, but also market factors (carbon, water footprints).</li> <li>-Integration of agriculture and environment, health, and economy.</li> <li>-Move from optimum science/best solution to sub-optimal solutions (2<sup>nd</sup> best) in systems.</li> </ul>	
<b>Systems Mapping Event</b> October, 2009 30 people	-understanding the Canadian agriculture system/players/influence -understand future system and what must change	<ul style="list-style-type: none"> <li>-Realization that the system is more complex with more players.</li> <li>-Traditional command and control power structures don’t work in fragmented complexity.</li> <li>-‘Influence’ will be of increasing importance in the future in a pluralistic system.</li> <li>-The ‘relationship’ is of growing importance (trust and reciprocity has weight).</li> <li>-Access/diffusion of information in a system creates influence and relationships.</li> <li>-Role of innovation to influence could be very powerful.</li> </ul>	
<b>Innovative Solutions</b> Nov/2009	-address scenario contradictions fosters innovations to adapt	<ul style="list-style-type: none"> <li>-addressing the scenario contradiction was innovative and creative (TRIZ method).</li> <li>Innovation in approach and options can lead to sustainability.</li> <li>-An ‘innovation environment’ means having it exist everywhere and in different ways.</li> </ul>	
<b>Synthesis Event</b> January, 2010 25 people	-given the previous events, what are the key points to enable agriculture to adapt to climate change?	<u>Old Paradigm</u> Reductionist WV in control hierarchy Short term economic dominant approach Subsystem optimization for suboptimal systems Replicate the efficient model Experts driven	<u>New Paradigm</u> Complexity has multiple world views Long term integrated approach Multiple suboptimal solutions for system optimization Adaptive policy Diverse and resilient adaptive actions

c. Analysis of Participant Interviews

i. *Research Participant Selection Process*

In the AAFC foresight series to determine how agriculture may need to adapt to climate change, there were approximately 120 diverse participants representing government, industry, and civil society. The foresight program organizers were conscious to maintain the diversity of participants from these groups in order to refrain from a particular perspective to dominant or over-power discussions. In each event, organizers aimed for approximately 33% of participants to come from those three main interest groups. Other types of diversity were encouraged such as diversity in ages, representing various minorities, and gender.

This research focuses on the perspective of these participants on how thinking of the future impacts learning and capacity development in order to result in sustainability. An initial research list was selected with the criteria that the participant had to attend two or more events in the foresight series. With two or more foresight events, the researcher assumed that the participant would be familiar to identify with foresight and its implications versus someone who only attended a foresight event one time. The initial research invitee list consisted of 40 people. This group of people were invited by email to participate in the research. Of these 40 people invited to participate in the research, two responded that they could not participate as they were posted out of country. Another five participants agreed to be interviewed, but then could not/did not commit to a time to be interviewed (upon multiple attempts to reach them). Six of the introductory emails “bounced back” or were no longer valid and the researcher could not locate alternative email addresses via a general internet search and professional internet services such as Linked In. Eleven participants did not respond at all to the two email requests (introductory and a “gentle reminder” email). In the agriculture and climate change case study, sixteen participants (approximately 13.5% of participants involved) were interviewed and asked to provide their opinions, perceptions, perspectives, and actions taken as a result of the foresight exercise. Of these 16 interviewees, 9 were male and 7 were female. Two people were interviewed who only attended one event. They were erroneously invited to be interviewed because they appeared on the invitation lists of two or more events. Apparently they confirmed attendance but did not show up for all of the events (in these cases they attended only one event). The researcher

interviewed them as they agreed to participate and the researcher was curious if the responses would be significantly different for people who attended one event as opposed to multiple events.

*ii. Communications with Participants*

The initially screened list of 40 participants were sent an introductory email, indicating the nature and purpose of the research, informed on the types of questions that would be asked, informed of the time commitment to be involved in the research, the parameters of the research on their ability to withdraw and not answer questions, and information on how to follow up with the research supervisor and/or ethics review board. Respondents who did not reply within two weeks were sent another email as a reminder. The confirmed participants resulted in 16 interviews in this case study.

Once the participant agreed to participate, an email was sent to confirm the date and time of the interview, with an attachment of a summary of the foresight events to aid memory. When the interview call occurred, the researcher reminded the participant of the nature and purpose of the research, ability to withdraw and/or not answer particular questions, and key contacts to follow-up. Once these parameters were reviewed with the participant, the researcher asked if it was 'ok' to commence the interviews. The interviews were conducted by telephone with the shortest interview taking 40 minutes and the longest interview being 2.5 hours. The researcher conducted the interview by speaker phone and typed the responses of the participant verbatim. If the speech was too fast for the researcher to capture, the researcher asked the participant to repeat the answer or parts of the answer.

*iii. Summary of Participant Responsiveness*

All participants who were interviewed answered all of the questions, were very cooperative and forthcoming, and asked for a summary of the research findings when available. All of the participants were informed that the researcher would keep to the time limit of 45 minutes. Two participants needed to keep to the time limit due to following appointments, the rest talked as long as they wished to share information. The researcher was surprised as to how willing and open participants were to share their

perspectives. All participants answered all questions presented to them. No one withdrew from the research at the time of writing. All participants requested a summary of the research once completed.

d. Summary of Themes Highlighted in the Participant Responses

The following table illustrates the various themes highlighted through the participant interviews related to the research questions. Refer to the participant responses in Appendix II for detailed comments. The main themes identified by participants on the foresight process are summarized (Refer to Table 4.2 for a detailed description of key themes identified by participants) as:

1. Foresight was useful to study the intersection of agriculture and climate change; providing clarity in the convergence of two disciplines.
2. Foresight provided a holistic approach to study the agriculture system and their interactions, identifying areas of conflict (shedding light on how to resolve conflict) and creating a platform to see how areas of policy, science, and investments could be developed within the same overlying framework.
3. Foresight fosters social learning by examining the various intersections of the system and enables the exploration of options and innovations in the long run.
4. Foresight enables the consideration and simulation of changes in potential action which may encourage future action, but does not guarantee action in the short term. Participants felt that this information would be useful to leaders who may have a better understanding of changes required to be more sustainable.
5. Participants felt that foresight fostered social learning and the exploration of action which was likely to improve decisions making towards sustainability.
6. Foresight brought consideration of the future into present day decision making.
7. The scenarios provided a platform to see many changes at the same time...a more holistic mechanism to visualize or comprehend complexity.

Table 4.2. Summary of Themes Highlighted in the Participant Responses

Theme	Details
<b>Foresight provided understanding on intersection of ag/climate change.</b>	<ul style="list-style-type: none"> <li>-Agricultural assets should be preserved from foreigners.</li> <li>-Science integration is needed but also social sciences to get people to do the right things.</li> <li>-Climate change impacts make the food system vulnerable.</li> </ul>
<b>Foresight can help address conflicts.</b>	<ul style="list-style-type: none"> <li>-Foresight creates a space to deal with difficult scenarios.</li> <li>-By surfacing conflict, participants can plan reconciliation.</li> </ul>
<b>Foresight provides some clarity in uncertainty.</b>	<ul style="list-style-type: none"> <li>-The diversity of participants expands world views broadening knowledge, implications, and points of view.</li> <li>-The foresight process can put some scope on uncertainty.</li> </ul>
<b>Systems approach increases redundancy, resilience; sustainability.</b>	<ul style="list-style-type: none"> <li>-Foresight increased consciousness of system vulnerabilities.</li> <li>-Stakeholders tend to take a reductionist approach.</li> <li>-Solutions/approaches often lie outside of the direct sector; holistic systems approach is required.</li> <li>-Investments in resiliency science are needed.</li> </ul>
<b>Foresight highlights interconnectivity with other systems.</b>	<ul style="list-style-type: none"> <li>-Events increased consciousness how actions impact others.</li> <li>-Learning on the interaction of agriculture and climate change.</li> <li>-Foresight increased awareness of the interconnectivity of agriculture with wildlife, economy, health, and environment.</li> </ul>
<b>Foresight exercises foster social learning at multiple levels.</b>	<ul style="list-style-type: none"> <li>-Learning from diverse stakeholders develop a common language, mutual understanding, increased perspectives, sharing knowledge, and understanding consequences for different stakeholders.</li> </ul>
<b>Foresight exercises enable participants to see the value of multiple options.</b>	<ul style="list-style-type: none"> <li>-No longer one size fits all (narrow policies won't apply across Canada). Concepts like resiliency/redundancy are needed.</li> <li>-Participants need to be open to more broad perspectives.</li> <li>-Disruptive action can motivate change.</li> </ul>
<b>Foresight exercises generate creativity and innovation that can help sustainability.</b>	<ul style="list-style-type: none"> <li>-The foresight process leads to innovative thinking.</li> <li>-Foresight enabled thinking of the long term for sustainability.</li> <li>-Connectivity allows deviants, innovators, experimenters to connect/create paradigm change.</li> </ul>
<b>Foresight generates thinking /innovation which eventually leads to action.</b>	<ul style="list-style-type: none"> <li>-Foresight changes participants to see assumptions, is a precursor to action, but action takes time.</li> <li>-More is needed on how to transcend the present paradigm.</li> <li>-Foresight is necessary for action but is insufficient on its own.</li> </ul>
<b>Foresight indicates the western world tends to take the short term view.</b>	<ul style="list-style-type: none"> <li>-Government cannot take bold action due to 4 yr elections.</li> <li>-Short term vision is killing the world (environment, economy, society); however it is really the future problems that you can do something about. The future is compared to the present.</li> </ul>
<b>Creating conditions for change require transformational leadership.</b>	<ul style="list-style-type: none"> <li>-Action takes courage, to go against the status quo.</li> <li>-New leaders focus on influence balancing the future/ present.</li> <li>-Leaders need to help organizations think about the future, present, &amp; the path dependencies working against the future.</li> </ul>
<b>Foresight helps participants make sense of complexity.</b>	<ul style="list-style-type: none"> <li>-Visuals and narratives help to understand complexity.</li> <li>-Foresight events help develop innovative ideas.</li> <li>-Different methodologies reach different stakeholders.</li> </ul>

In addition, participant interviews highlighted the following findings with respect to each event:

Table 4.3. Summary of Participant Observations per Event/Foresight Methodology

<b>Event</b>	<b>Positive Statements about the Event</b>	<b>Negative Statements about the Event</b>
Scenario Event	<p>Increased learning and cohesion of the group.</p> <p>Increased appreciation of diverse perspectives.</p> <p>Increased thinking and number of options for consideration.</p> <p>Major learning on the problem, stakeholders, issues, and options occurs here.</p>	<p>Takes time and resources to host and facilitate.</p> <p>Need decision makers to attend and commit.</p> <p>Not everyone experiences the same thing at the same time. People can be uncomfortable exploring negative scenarios.</p>
Policy Event	<p>Realization that an outcome based flexible policy framework will be more popular in the future.</p> <p>This requires less prescription and more options measuring success in the outcomes. Our metrics are not set up this way.</p> <p>Integration of governance, sciences, departments, and overall more collaboration is needed.</p>	<p>In general these ideas are new to organizations and more training and thinking is needed in this domain.</p> <p>We are bound by old metrics and need to innovate.</p> <p>Relinquishing control and integrating is very hard to do.</p> <p>Need to change funding, influence, and create a vision.</p> <p>Hard to change our habits and dominance of the short term...we could learn from other cultures.</p>
Science Event	<p>We need not just agronomic science, but sociology, psychology, business science to create new markets (carbon and water foot printing) including social sciences of psychology and change management).</p>	<p>Expertise is very siloed and arrogant. More sharing and discourse is required.</p> <p>Science and society need to be more connected.</p>
Systems Mapping Event	<p>Powerful to visualize power, relationships, and consequences.</p> <p>Helps define complexity.</p> <p>Increased awareness that relationships and influence will be stronger tools.</p>	<p>Very complex for those not relationship minded.</p> <p>Hard to decipher.</p>
Innovative Solution Sets	<p>This foresight methodology was the most loved or satisfying for all participants. Participants liked its ability to develop innovative and practical ideas.</p>	<p>Not well known approach.</p> <p>Needs to be better studied and practiced.</p>
Synthesis Event	<p>Helps create a long term vision.</p> <p>Good for policy framework but less so for solutions to specific regions or problems.</p>	<p>A lot of repeat. It was more of packaging information for people who were not there.</p> <p>Information was hard to understand if one did not attend many events.</p>

With respect to sustainability, participants felt that sustainability is something one works towards but with sustainability one is never sure that one will arrive at the destination as the circumstances are always changing. Through the participant responses, it became clearer that innovation is the way that one can count outputs that help one track their road to sustainability. The participant interviews highlighted that foresight is an instrumental process to draw in diverse perspectives, and diverse futures which overall increases the likelihood of sustainability. By taking actions in the present, it is impossible to know if you are sustainable; you cannot evaluate sustainability immediately as it might take three to five years to see if the series of innovations or actions are working. In addition, it is possible that a particular innovation may fail, but the portfolio of innovative investments are sufficient in ‘being sustainable’ or moving to sustainability.

The interviews highlighted that thinking about the future, anticipating challenges and opportunities, then innovating and taking action is perceived to more likely lead to sustainability. Participants stated that all of these steps are essential to become sustainable. So why doesn’t everyone take action?

The researcher examined the narratives to identify what participants stated that inhibited action. Key points are summarized to include (referenced in the two previous tables):

- There is a tendency to weight the short term or the present much more than the future (economic gain over long term environmental health);
- Current path dependencies (habits, behaviours, and policies) of the old paradigm unknowingly thwart movements towards the future direction;
- Peer pressure and former knowledge bases dominate decision making and action in times of crisis. When people are under pressure they revert to their ‘evidence’ base and training which is often not in line with an unproven future direction;
- Disabled conversations (the government determined they would not participate in the climate change discussion and would end most projects on climate change);
- Though change management is discussed, there is very little support or information or structure to assist transitioning to an uncertain future; and
- ‘Change’ action requires innovative individuals to start/gain momentum and a critical mass before everyone else joins in (think the S curve in that early

innovators often suffer failure, losses, or setbacks before the innovation takes hold).

Therefore, the researcher noted that there are organizational and individual inhibits to change and action. This fact suggests that adaptive organizations need to address how to increase awareness, adaptiveness, and learning in their organization. Leaders need to be aware that organizations tend to exist for consensual arrangements of the past and may not be so inclined to change for the future. Leaders need to be aware of the role they can plan to create an environment and system conditions to increase learning and adaptive capacity. This observation on the barriers to action may also be essential to acting sustainably.

#### e. Document and Participant Interview Analysis

The following section analyzes the findings from each event report in terms of the research questions. For a detailed report on the documents being analyzed, please refer to Appendix III.

##### 1. *Foresight Findings*

With respect to foresight findings referred to in the various reports, the common observations center around understanding the broader agriculture system, gaining understanding of uncertainty and exploring change. Specific observations emergent from the event reports include:

- **Foresight helps frame uncertainty.** Foresight does not predict, but by exploring various plausibilities and possibilities, participants can visualize the impact of changing trends on their area of interest. In the case of climate change, foresight identified that participants felt that the severity and timing of climate change was very uncertain. By highlighting that different regions and in fact the same region but in different years could experience drought or flooding, participants became acutely aware of the variability issue that could plague decision making in only one direction (for example investing in only drought resistant technologies). Studying this uncertainty revealed that redundant science (having all types of science) could be useful to help different regions of Canada adapt to climate change.

- **Foresight reveals old paradigm assumptions and new paradigm requirements.** The foresight process also enables participants to see their assumptions in the current model, examine changes in agents/players, relationships, behaviours, and/or actions that may have to be taken to survive or thrive in the future. In the climate change foresight event, one of the most revealing old paradigm assumptions was “what is government going to do about climate change?” Through the foresight exercises, participants stated that they had an increased sense of urgency that they as individuals had to step up and take action if they wanted to be prepared to adapt to climate change.
- **Foresight can stimulate innovation.** By analyzing various futures, participants can start to put some scope around innovation. Innovation are the actions, technologies, and other changes that may need to occur in the future. With respect to the climate change foresight exercises, participants stated that depending on the net worth of the farmer, both high and low technology solutions would be essential in the adaptation process across the country. In addition, the ability to share and build on other people’s solutions would increase the ability of the whole sector to adapt to climate change. This observation relates to the previous point; that by sharing innovations, each individual has an increased likelihood to take action.
- **Foresight can build the competencies to become sustainable.** By thinking about the future, understanding changing trends, and potential actions; participants can begin the reflective road to put action in place. By studying the changes required in the future scenarios, understanding the nature of change and action, sharing ideas on various ways these actions could be taken, is an essential step for people to prepare to act.
- **Foresight does highlight action, but is not a commitment to action.** In the foresight documents there are many recommended actions; however, there is no direct assignment of action, promises to complete action, and details on how to start/continue the action. As mentioned in the previous point, foresight is necessary to plan for action, but it is insufficient to ensure action is taken. There are other factors such as support of others, permission to innovate or deviate from the status quo, and innovation funds for the future oriented type of activity that can encourage people to take action. The foresight events on climate

change highlighted that forums for innovation were essential to motivate future action.

- **Foresight increases consciousness of change.** The documents revealed key trends. With this information participants created sign posts or markers with which they could track trends and reflect on what these trend changes would mean to their business. In the climate change foresight exercises some examples included that people may actually eat less meat, that there would be a concern for cheap food and very safe food, and that an increase in climate related disasters could deplete business risk management programs (crop insurances and disaster relief provisions) if they occurred with increasing frequency and variability.

Therefore, the foresight findings suggest that reductionist decision making models are becoming less effective and suggest the advantage in entertaining more options and policy making and decision making models that enable plurality, the consideration of more than one solution set to increase the ability to adapt to climate change.

## *2. Social Learning Findings*

With respect to social learning findings referred to in the various reports, the common observations focused on understanding the issues of others and learning from their experiences. Specific observations emergent from the event reports include:

- **Participants appreciated diverse perspectives.** Many participants valued the inclusion of stakeholders typically outside their system. For example, many people stated that they learned a lot from having people from Public Safety, Health, Immigration, and other fields at the foresight event. Virtually all participants stated that they learned a lot from participants particularly from their diversity. With respect to climate change, participants made linkages from food and water security to the possibility of wars, environmental refugees, and many ethical issues that might have to be addressed. One of the key assumption learnings was that though Canada might win, there would be many losers (hungry people). Though there was an economic win for Canada, this gain created an ethical concern or a challenge of Canadian values to be open and helpful to others.

- **Participants learned from each other.** Not only did people learn about other opinions, knowledge, and perspectives, they also learned that each action they took or did not take had consequences for others. In the climate change exercises, this fact led to a consciousness of impact and a thoughtfulness in selecting innovations, options, and actions. For example, some participants stated that they realized that not helping a neighbour during negative impacts to climate change, though potentially reducing the resources of the person, could build social capital in the community (i.e. that you might need the help of that neighbour at some point in the future).
- **Participants demonstrated social ‘unlearning’.** Through the various foresight exercises participants realized that having one optimal solution or one policy was ineffective. Participants discussed that they needed all different types of sciences accessible across the country to increase the likelihood that different communities could adapt to climate change. They also realized that just having the government ‘own’ the responsibility of climate change was impractical and that the more people who were knowledgeable and prepared could help create a sector adaptable to climate change and survive.
- **Participants were more thoughtful of second and third order consequences.** As a result of learning the perspectives of others, participants began to think more about actions and implications to others than previously. The participants noted that their thinking had changed, not only did they learn more and appreciate the points of views of others, but because they became acquainted with people outside of their ‘traditional’ system, they were more conscious of the implications to others. In essence, participants expanded their ‘system of consideration’.

These observations suggest that participants gained a type of knowledge empathy. Knowledge empathy suggests consideration of the opinions of others, understanding a wider range of consequences to others and over time. This broadening of participant consideration creates a thoughtfulness that decision making is not taken lightly and with broader levels of consciousness to others.

### *3. Adaptive Capacity Findings*

With respect to adaptive capacity findings referred to in the various reports, the common observations focused on considering alternative options and actions having some ability to simulate the change. Specific observations emergent from the event reports include:

- **Sharing knowledge, perspectives, and know-how was essential in developing adaptive capacity.** In the climate change foresight exercises, participants shared information and perspectives to generate an understanding of the issue, urgency, and a common focus. This heightened consciousness increased the likelihood of more participants observing, sharing, and acting in the future. Realizing that water could be a scarce resource, initiated discussions on how to conserve water and protect its misuse and plans for sharing with Canada's neighbours.
- **Foresight exercises create a context to innovate and think out how those innovations may play out.** Foresight exercises give a context for simulation to think what is required, what might be the nuances of action to minimize or maximize impacts or consequences to others. In the climate change foresight actions, participants highlighted that there may be a market for meat but that market and how we produce may be different than the current model.
- **Foresight highlights inhibitors to action** which is an essential adaptive capacity itself. Though foresight provides a context for simulation, the foresight exercises also provide a context on the obstacles to inhibit innovation or behaviour change. In the climate change context, participants highlighted that short term economic gains could decrease the sustainability of the land. Having a long term vision on the family or corporate farm could be essential to ensure the land and water resources to sustain more than the current operator. As Scharmer (2013) refers to one's awareness of their own 'blind spot' is very important in making change successful.

These observations highlight that foresight impacts adaptive capacity by increasing the number of options available and surfacing barriers to take action. These two aspects are vital to successfully drive and complete change as it is often the lack of awareness of barriers that thwart change.

#### *4. Sustainability Findings*

With respect to sustainability findings referred to in the various reports, the common observations focused on the realization that the process is continual versus striving for a final destination. Specific observations emergent from the event reports include:

- **Sustainability is a journey; not a destination.** Many participants highlighted that sustainability is what the group strives for but one never arrives because the context is changing. With respect to climate change, participants highlighted that one constantly needs to sense and adapt and that this process is continuous.
- **The destination or the milestone to sustainability is perhaps innovation.** Sustainability is what participants stated they strive for, but the measurable output is perhaps innovation. Innovation is a way to state that you moved to that sustainable direction. The idea is to keep innovating to be sustainable. That is in climate change, the changing climate, water accessibility, pest movement, and market movements have to be constantly sensed so one can innovate continuously to sustain.
- **To be sustainable means one has to sense or anticipate the future and adapt.** Many participants used the analogy of Wayne Gretzky in that Gretzky skates to where the puck will be, not where the puck is. This analogy was repeated in the various documents. Thus foresight or thinking about/anticipating the future is an essential skill to both innovate and be sustainable.

In the foresight reports, participants suggested that sustainability is a journey and must encompass vigilance in anticipating and being continually in order to adapt to uncertainty, complexity, and changing conditions.

#### *5. Other Findings*

There were many other repeated and valuable findings referenced in a review of the foresight event reports. These learnings included:

- **Narratives are useful to convey the intricacies of complexity.** The traditional reductionist approach is habitual in the decision making of today. The reports discussed that the understanding of narratives or scenarios act as metaphors to

embed many trends to have more fruitful discussions. Analyzing trends one by one was too difficult for the group, but the scenarios helped them address many points at the same time. For example, scenario names like ‘Hot and Hungry’ helped participants discuss policy and science options rather than looking at each trend independently.

- **Innovation is an output to the outcome of sustainability.** For the ‘old paradigm’ focused on efficiency and measurement, innovation is an indicator of sustainability. However, in the new paradigm, not all things are known. There is more uncertainty, therefore innovation metrics are needed. These metrics cannot be in the old format where you state the outcome and measure against that. With the context changing, and not always in ways known, it is necessary to have a plan and adapt as the plan unfolds.
- **Leadership pulls these many threads together to weave whole cloth.** One hundred percent (100%) of participants stated the value of foresight was to expand world views and perspectives through the participation of diverse stakeholders. Leadership must create the true ‘learning organization’; preparing and nurturing change; consciousness of changing trends and monitoring of signals; fostering the learning environment that is conscious of the future and moving towards it. At the same time leadership must achieve goals in the present. And finally, leadership must be aware of the challenges of paradigm change; having a plan to address the old paradigm habits, patterns, and protocols that can inhibit action.
- **There is lag time to action.** Perhaps this point relates to social learning. Learning needs a place and time. As participants increase consciousness, for example reflecting on the possibilities under climate change, they need time to think of options, actions, practicing those actions, and creating some critical mass (new social learning) of the new paradigm to bring more people on board. Often action is desired; however grossly underestimated are the energy and time commitments to think and reflect on the processes inherent in making change and taking action.
- **Pluralistic solutions means outcome based flexible frameworks.** Policy and program development need a new mechanism--one that fosters understanding and nurturing of diversity, variety, and innovation. Having frameworks that are flexible, enabling more than one type of solution, has not been well taught. From

the foresight exercise on climate change, the reports highlighted that policies need to focus on the outcomes versus the outputs to enable many solutions; thus policies need to be less prescriptive and more innovative in themselves.

- **Redundancy is important for resiliency.** Information sharing and dissemination needs to be expanded. The more people who know, share, are aware of the problem, and have a mechanism to communicate, the more likely someone will take action.
- **Adaptation in agriculture is not just the responsibility of agriculture.** Successful adaption requires adjustment from the systems in the periphery. In the climate change foresight exercises it was evident that collaborative work with wildlife, health, public safety, military, and immigration, amongst others, was essential for adaption in agriculture in response to climate change. A complex adaptive management process is needed.
- **Governance needs to be integrated.** As mentioned in previous points in this section, responsibilities do not just rest with government. Successful adaptation in agriculture to climate change requires attention and commitment from farmers, processors, marketers, wildlife groups, cities, provinces, banking systems, and many others.
- **The contract between science and society must change.** The power of experts in institutions is losing force. Science must be integrated with society to understand the needs, consequences, long and short term impacts, and second order implications. Within this point brings in the nature of transparency, privacy, and ‘who holds knowledge holds power’ concepts.

Other meaningful observations include that complexity is difficult thus metaphors and narratives can help understand the implications of numerous trends and drivers converging. This aspect is important because many policy making processes are heavily evidence based. How do policy development processes need to adapt to convey complexity and the future? Also, the findings suggest that the decision making framework is broader than understanding a system, but needs to have ways to include systems of systems, multiple levels of learning and governance, suggesting that societal involvement in thinking, doing, and responding must be increased.

f. Notations Corresponding to the Sustainability Heuristic Model

In general, a review of the reports produced at the end of each foresight event on how agriculture may have to adapt to climate change, highlighted strong references to the Sustainability Heuristic Model. Key indications of this conclusion refer to the benefits and learning from the context of the foresight exercises. Secondly there were many references to learning from diverse stakeholders to challenge the status quo and highly new options not obvious to individuals. The diverse stakeholder environment highlighted learnings and actions required for consideration. By reducing concentrations of 'like' people at the event, there was an open forum for ideas, challenge, and innovation. This learning increased the capacity of the group to recognize change (there were many references to the value of increased awareness or consciousness), shared learning, and the articulation of various actions.

In addition, from the analysis of participant interviews, the most consistent observations included an emphasis on social learning (new knowledge and perspectives) as well as the ability to simulate action (what the researcher views as developing adaptive capacity). By stating new options and ideas or innovations, analyzing their impacts on others, imagining what it would take to do those actions; the capacity to adapt or take that action was heightened. What was mentioned many times and not explicit in the Sustainability Heuristic Model was the need to innovate and that innovation was an indicator or milestone to track movements to sustainability.

g. Specific Learnings on 'How Agriculture will have to Adapt to Climate Change?'

Not only did the foresight exercises provide participant insight to the foresight process and the Sustainability Heuristic Model, the exercises also informed participants of specific actions agriculture may have to take to adapt to climate change in the future. From the event reports and the participant interviews, the following illustrates the key points mentioned:

1. **Climate change is a broad based system impact.** All actors and agents will have to take action to make a difference. Government cannot manage climate change on its own but can play an important role in regulations, science, carbon

markets, and other incentives. An enabling environment that shares information will be useful to motivating multi-level action and behaviour change.

2. **More types of science are needed.** First of all, climate change will be variable across the country meaning that different areas will have to deal with different conditions (drought and flood in different parts of the country). Secondly, climate change, perhaps a hotter climate, may support a movement of pests and crop types. Continued agronomic research will be required to test crops, new rotations, and pest management as crops move north for example. Thirdly, new sustainable production systems may have to be considered. Variability in climate and productivity may effect economic models meaning that less energy intensive operations or fewer input systems may have to be studied. Fourth, science will be needed further up the value chain to support new business opportunities. For example, in order to create a value stream for Environmental Goods and Services (EG&S), more precise science will have to occur to record carbon capture opportunities so that a credible and tradable system can exist.
3. **Due to climate variability, flexible policy frameworks that emphasize outcomes will be preferred.** Since different approaches may be more useful in different parts of the country or even in the same area but in a different year, policies and programs will have to reduce their 'prescriptive' activities and be able to measure compliance based on outcomes.
4. **Integrated governance will be required in order to keep everyone informed, engaged, share information, and motivate action.** How can integrated governance occur? Perhaps an increase in societal discourse is one mechanism can promote integrated governments. Perhaps a forum to raise consciousness of the issue, advancements and disappointments, and generate a sense of urgency to act will motivate action.
5. **Adaptation to climate change will not only involve agriculture, but also systems peripheral to agriculture.** These systems include energy, health, transportation, environment, and others. True adaptation to climate change stems from changes in the values, beliefs, and actions of individuals in all of these areas at more or less the same time. The root change in the system conditions is the action of individuals.
6. **Diversity is recommended at all levels.** As mentioned in this section, diversity in science, in solutions, in policies, and actors and agents will be an important

mechanism to adapt to climate change. Some farmers stated that having land located in different regions may be a way to diversify considering micro climates. Scientists emphasized the diversification of science is essential to support the diverse nature of the country, plus address shifting weather, pest, and cropping patterns. Policy analysts also suggested having a variety of ideas, tools, and solutions may be required to help people of different financial capability choose some type of action (though it may not be the optimal action) based on their means.

These findings indicate the need for diversity and plurality. There needs to be more stakeholders, more participation, more options, and policy frameworks of more choices in order to increase the ability to adapt to climate change over time.

#### h. Conclusions on Case Study 1

From an evaluation of the foresight documents produced and the analysis of participant interviews, the observations suggest that foresight is a constructive way to examine complexity and uncertainty. By examining what could happen in the future, participants are able embed thoughts on the future into present day decision making.

In addition, the key components of the Sustainability Heuristic Model were emphasized. Of particular interest was that foresight does increase social learning and adaptive capacity. For example, participants stated they gained a shared understanding from diverse perspectives from the foresight exercises.

In addition, foresight provided a forum for problem reframing and the broader consideration of options. Next participants stated they had social learning. Social learning was demonstrated through the creative application of learning to new options and innovations including the recommendation of specific advancements in science and technology developments. Then participants illustrated enhanced adaptive capacity by examining the changes in actions, behaviours, and organizations proposed. Participants stated that these elements are essential to move towards sustainability, but insufficient to guarantee action. These same participants identified that leaders may be required to support action or change but that there were simultaneous barriers to action such as institutional inertia, lack of openness to change, and a lack of leadership to motivate

organizational change. It may be necessary to add to the Sustainability Heuristic Model two additional processes; that of leadership capacity to put these plans to action; and that of innovation, which is to create the conditions for change to the future.

3. Case Study 2 – Health Canada – Developing a Sustainable Health System

a. Objective and Scope of the Foresight Series

By 2010, there were a series of Federal elections in Canada with the top concern of Canadians being viability and having sustainable access to Canadian health care. There was concern about budget cuts within the Federal government, realization of a decreasing future tax base, and an increase in health care services demand that will be further increasing in the long run due to an aging population. Given the trends of an aging population and increasing needs to this cohort, combined with lower birthrates contributing to a diminishing tax base, and the realization that a growing part of the health care budget was going to chronic disease management (preventable ailments in many cases) versus acute care; governments, health care providers, and citizens were concerned on the future viability of the existing health care system. The Health Canada foresight team was tasked with the question on how science and technology (S&T) could improve the sustainability of the Canadian health system.

Insights on developing a more sustainable health system for Canada were obtained from studying future trends such as the changing demographic and global trends, while analyzing trajectories in science development in a foresight series of three events with diverse participants (participants from government, the health system, and health care users). The participants identified critical system changes that would be required to develop sustainable health care under a different demographic and economic paradigm. Participants stated that Canadians need to understand and anticipate change as a basis for understanding risks, developing policy, and making decisions to support the future health of Canadians.

b. Summary of Each Event Report

In this foresight series, three major events occurred. The first event reviewed trends and drivers and created four scenarios that could emerge in Canada's health care future. These four scenarios were determined by analyzing two highly impacting but highly uncertain trends being:

- The availability of financial resources to maintain the existing level and quality of health care services; and
- Societal values and ethics would focus on the health of the collective or the health of individuals.

The group examined the four scenarios and highlighted twelve technologies that would aid all four the scenarios to be more sustainable. Sustainability was defined as using less resources to deliver the same level of care or diverting resources to more appropriate services. In this case a solution was more sustainable if it provided or enabled more services at the same costs or provided the same service or outcomes at lesser costs.

The second event examined the health system and the policy environment to support the health system. In this event the group highlighted that as patients become more knowledgeable on issues, prevention, options, and levels of risk; that patients would be more in control or at the center of their own care. The participants engaged in a foresight exercise to more clearly define what ‘patient centered care’ could look like. The group then developed the ‘health system conveyor’ which was a model that differentiated the population as people who are looking after themselves, people who would look after themselves with some support; and those who cannot look after themselves. The model was a metaphor to explore how a flexible policy environment with alternative tools and options can reduce bottlenecks and use the resources more effectively to increase outcomes by aiming for the same outcome, but offering three different types of support.

The third event was a synthesis event that came up with a comprehensive framework on how a sustainable health system could be organized, how to build a more flexible policy environment with multiple tools, and how these changes could impact the sustainability of the health system. Key findings included that though having access to health care services was important, ‘equity’ was not defined in equal access to services, but in equal opportunities to achieve healthy outcomes. Many people are willing to invest in their own health, but may require different tools than other people to achieve the same or similar outcomes. Enabling people by providing information and counselling for informed choices, increasing access to options, and changing the societal understanding of risk,

could reduce bottlenecks and increase innovation while enabling more Canadians to be healthier and productive over time.

The following table summarizes the key findings in each event. For a more detailed summary of the event reports, refer to Appendix III.

Table 4.4. Summary of Outcomes from Each Foresight Event to Research Questions on Case Study 2 – Health Canada: Developing a Sustainable Health System

Event Details	Outcomes	Key Findings Related to the Research Questions	
<b>Scenario and Innovative Technologies Event</b> August, 2010 2 days 35 people	<ul style="list-style-type: none"> <li>-understanding trends /drivers impacting health</li> <li>-developing 4 scenarios to study existing/future capacity requirements</li> <li>-identified 12 health tech for health</li> </ul>	<ul style="list-style-type: none"> <li>-Participants thought the largest uncertainties to study are finances and values.</li> <li>-Aging population and a decreasing tax base were major concerns.</li> <li>-50% of the budget funds chronic disease mgmt but the system is built for acute issues and this is where bottlenecks occur.</li> <li>S&amp;T can enable individuals to care for themselves, reducing bottlenecks in the system.</li> <li>-Multi-pronged approaches can do more with less.</li> <li>Ethical questions - right to live/die moving decision making from experts to individuals.</li> <li>-Personalized medicine can help people if we can gather aggregate data changing the privacy nature of medical data. People are willing to share data for better therapy.</li> </ul>	
<b>Policy Analysis /Health Systems</b> October, 2010 35 people	<ul style="list-style-type: none"> <li>-understand policy implications across scenarios</li> <li>-what policies inhibit sustainable health systems in the future</li> </ul>	<ul style="list-style-type: none"> <li>-Few believe that the current rigid acute system can change; i.e. doctor billing.</li> <li>-S&amp;T could help the WILLs / WOULDs to be healthier which could change the health system from the outside.</li> <li>-Health and wellness management including mental health enhancement is an essential system condition to maximize health of everyone for a long time.</li> <li>-Patient centered health systems are likely the way of the future.</li> </ul>	
<b>Synthesis Event</b> June, 2011 2 days 30 people	<ul style="list-style-type: none"> <li>-understand science/policy implications in each scenario</li> <li>-adaptive policy framework needed in the future for sustainability</li> </ul>	<ul style="list-style-type: none"> <li>-Prevention, healthy living, physical/mental health reduces chronic diseases/increase productivity.</li> <li>-Current health system is bottlenecked as we address chronic conditions in an acute system.</li> <li>-Government is nervous on bearing the burden of prevention and chronic care, however, S&amp;T is enabling all types of individuals to be healthier. Flexible policy frameworks that enable individual and family support for health would be useful and less expensive.</li> </ul>	<b>Old Paradigm</b> <ul style="list-style-type: none"> <li>-To be equitable, one size fits all</li> <li>-Experts, doctors, or government decides for patient</li> <li>-Design the system to solve the problem</li> <li>-Focus on length of life</li> <li>-Focus on physical health</li> </ul> <b>New Paradigm</b> <ul style="list-style-type: none"> <li>-Equitable outcomes by having multiple policy options; Enable patient decision making with information, options, and risk assessments; help with decision making when the patient can't; Need to influence systems outside of the 'acute health system' (activity/obesity)</li> <li>-Health expectations change with age, focus on quality of life/wellness</li> </ul>

c. Participant Interview Analysis Findings

i. *Research Participants*

In the Health Canada foresight series focused to identify how to develop a sustainable health system, there were approximately 50 diverse participants representing government, industry, and civil society. The foresight program organizers were conscious to maintain the diversity of participants from these groups in order to refrain from a particular perspective to dominate or over-power discussions. In each event, organizers aimed for approximately 33% of participants to come from those three main interest groups. Other types of diversity were encouraged such as diversity in ages, representing various minorities, and gender.

This research focuses to obtain the perspective of these participants on how thinking of the future impacts learning and capacity development in order to move towards sustainability. An initial research list was selected with the criteria that the participant had to attend two or more events in the foresight series. Thus, the initial research invitee list consisted of 25 people. This group of people were invited by email to participate in the research. Of these 25 people invited to participate in the research, fifteen people agreed to participate in the research initiative to capture their opinions, perceptions, perspectives, and actions taken as a result of the foresight exercise. Of these 15 interviewees, 8 were male and 7 were female. One person participated in an event, but left frequently to attend other work matters and in effect was unable to contribute significantly to the findings.

ii. *Communications with Participants*

The initially screened list of 25 participants were sent an introductory email, indicating the nature and purpose of the research, informed on the types of questions that would be asked, were informed of the time commitment involved in the research, and the parameters of the research on their ability to withdraw, not answer questions, and to follow up with the research supervisor and/or ethics review board. Respondents who did not reply within two weeks were sent another email as a reminder. The confirmed participants resulted in 15 interviews in this case study.

Once the foresight participant agreed to participate, an email was sent to confirm the date and time of the interview, with an attachment of a summary of the foresight events to aid memory or recollection. When the interview call occurred, the researcher reminded the participant of the nature and purpose of the research, ability to withdraw and/or not answer particular questions, and key contacts to follow-up. Once these parameters were reviewed with the participant, the research asked if it was 'ok' to participate. The interviews were conducted by telephone with the shortest interview taking 40 minutes and the longest interview being 2.5 hours. The researcher conducted the interview by speaker phone and typed the responses of the participant verbatim. If the speech was too fast for the researcher to capture, the researcher asked the participant to repeat the answer or parts of the answer.

*iii. Summary of Participant Responsiveness*

All participants who were interviewed answered all of the questions, were very cooperative and forthcoming, and asked for a summary of the research findings when available. All of the participants were informed that the researcher would keep to the time limit of 45 minutes. Two participants needed to keep to the time limit due to following appointments, the rest talked as long as they wished to share information. The researcher was surprised as to how willing and open participants were to share their perspectives. All participants answered all questions presented to them. No one withdrew from the research at the time of writing. All requested a summary of the research once completed.

*d. Summary of Themes Highlighted in the Participant Narratives*

The following table illustrates the various themes highlighted through the participant interviews related to the research questions. Refer to the participant narratives in Appendix D for detailed comments. The main themes included:

- The foresight process helps to understand the broader system, uncertainty, and complexity which enables participants to explore new options that support multiple objectives at one time (versus exploring actions that support one aspect at a time).

- The study of the S&T trends enabled participants to redefine meanings of equity and alternative means to increase sustainability of the health system. The group seemed to have surprised themselves on seeing this alternative which they commented that they had not considered before.
- The foresight series fostered learning from each other and heightened adaptive capacity. As a result the group stated that they saw new options that they could see themselves supporting in the future.
- By changing some of the system parameters, such as ethical questions on the right to die and having more individual choice on risks; participants felt that bottlenecks could be removed.
- By enabling people who were interested to prevent illness and improve their own lives, participants felt that the bottlenecks and costs within the system could be reduced, improving the sustainability of Canada's Health System.

The following table illustrates the more detailed findings.

Table 4.5. Summary of Themes Highlighted in the Participant Responses

Theme	Details
<b>Foresight adds clarity to uncertainty/complexity.</b>	-When there is less uncertainty or more certainty, then people are more likely to act. People still want a sure thing.
<b>Foresight showed that external system conditions are essential to achieve better health outcomes.</b>	<ul style="list-style-type: none"> <li>-By examining and changing conditions in the peripheral systems, the sub-system of health can change.</li> <li>-50% of the health care budget is being used for chronic issues; systems such as active living, healthy aging, active schools and work environments will increase health.</li> </ul>
<b>S&amp;T can be an enabler to change behaviour for better healthy and productivity.</b>	<ul style="list-style-type: none"> <li>-S&amp;T can help individuals manage their health and conditions to reduce bottlenecks to the current system.</li> <li>-S&amp;T can empower individuals and decentralizes control and power.</li> </ul>
<b>Foresight fosters multiple levels of social learning.</b>	<ul style="list-style-type: none"> <li>-Participants share diverse perspectives and learn from each other...sharing of knowledge, empathy, better understanding of the problem, and more options to consider, generating cohesion, trust, common language, and common understanding of the problem.</li> </ul>
<b>Foresight helps people address conflict.</b>	<ul style="list-style-type: none"> <li>-By imaging the future, participants can explore the kinds of relationships they want, and the behaviours and actions they need to take to reach that state.</li> </ul>
<b>Foresight is prospective to retrospective thinking building adaptive capacity.</b>	<ul style="list-style-type: none"> <li>-By accepting that change is constant and thus, developing that competency to anticipate change (being anticipatory) can enhance adaptive capacity.</li> </ul>
<b>Foresight highlighted that flexible policy platforms requires multiple potential options.</b>	<ul style="list-style-type: none"> <li>-Policies need to move from 'prescriptive, one size fits all policies' to a clarity in outcomes enabling multiple ways to get there; adaptive policies.</li> <li>-Solutions are within and outside the health system.</li> <li>-Solutions are also in the social and ethical domain...right to live, die, refuse treatment</li> </ul>
<b>Foresight is necessary for action but it is not sufficient.</b>	<ul style="list-style-type: none"> <li>-Decision makers need to be involved so they can take action. Big changes take time.</li> <li>-Foresight is essential for leaders; complexity, innovation.</li> </ul>
<b>Foresight showed western paradigm emphasizes the short term over the long term.</b>	<ul style="list-style-type: none"> <li>-Though organizations are using more foresight and studying the future, they are more likely to choose a preference of the short term. Leaders need to learn how to balance the present and future or transcend short term thinking.</li> </ul>
<b>Movement from government responsibility to that of the individual.</b>	<ul style="list-style-type: none"> <li>-How to manage those who want to self-manage and those who can't manage at the same time? Now government or doctors decide. What if mistakes are made? Who is responsible?</li> </ul>
<b>Foresight processes change participant thinking.</b>	<ul style="list-style-type: none"> <li>-Processes help participants' surface/challenge assumptions.</li> <li>-Metaphors such as the health conveyor help people deal creatively with complexity. Visuals, artists, and scenarios increase creativity and innovation.</li> <li>-Challenging contradictions can help people innovate.</li> </ul>

Table 4.6. Summary of Participant Observations per Event/Foresight Methodology

<b>Event</b>	<b>Positive Statements about the Event</b>	<b>Negative Statements about the Event</b>
<b>Scenario Event</b>	<p>Learned that one must take care of themselves early on. Many skills to manage health are not doctors or nurses, but nutritionists, trainers, and life coaches.</p> <p>Realization that the existing system is not sustainable. S&amp;T can help all types of medical practitioners, families, individuals, and institutions.</p> <p>Interesting ideas include food policy, regenerative medicine,</p>	<p>Saw many innovations but hard to change path dependencies in the system...payment, billings, doctors' role.</p> <p>Hard for all people to get into the process...there were people who were new to foresight and people who were experienced in foresight...this difference caused some repeating and confusion.</p>
<b>Policy Event</b>	<p>The “Health Conveyor” model was a metaphor that really helped the group conceptualize innovation in the healthy system, particularly outcome based and multiple solutions ideas.</p> <p>The group could come up with many innovations, liked the idea of a flexible policy framework but struggled how that flexible policy frameworks would be regulated or managed.</p>	<p>Many participating organizations could redesign the system, but had greater problems visualizing the changing of the existing system. The learning that S&amp;T could slowly change the system from the periphery was very good, but frustrating because of the dominance of wanting to change the system in the most efficient manner (from the inside). Key difficulties were: was it possible to allow individuals to make decisions for themselves and changing doctor power.</p>
<b>Synthesis Event</b>	<p>Realization that many changes for chronic illness management and prevention happen outside of health.</p>	<p>Though exciting that prevention can happen outside of health, there was a struggle on how would one efficiently influence these systems to manage multiple objectives. It is hard for traditional organizations to relinquish control to enable a systems change.</p>

With respect to sustainability, participants felt that sustainability is a long term end outcome where the end is never reached. Foresight can help provide a context to strategize and take action. If one keeps applying these processes correctly participants felt that there will be movement towards sustainability. Participants felt that foresight can impact sustainability because the foresight process explores the elements that are uncertain. In many cases, these are elements that others have not thought about a lot. They share information, knowledge, perspectives, and their hopes and fears in order to contextualize or ‘bound in’ some way this uncertainty. It is anticipated that perhaps this exploration together is part of the ‘foresight magic’, going through this united discovery, and participants feel connected and develop a shared perspective and understanding. If sustainability is a journey into the unknown, foresight is can be that exploratory process that helps identify the direction and how to plan or pack for the trip. However, this is not a one-time planning process, but more of a continual learning, sensing, and adapting. The goal of sustainability is thus more of a way of life versus an end outcome.

The interviews highlighted that thinking about the future, anticipating challenges and opportunities, then innovating and taking action is more likely to get one to sustainability. It seems that all of these steps are essential to become sustainable. So why doesn’t everyone take action?

The research examined the narratives to identify what participants stated that inhibited action. Some of these summarized points, which are also referenced in the two previous tables included:

- Many of the suggested changes focused on changing the position of established health care entities, such as the scope of work and billing power of doctors. Though people, including participating doctors, felt that billing needed to change, they felt that doctors would never give up their position of power.
- Other strong path dependencies inhibited change, including the view that doctors know best and that hospitals are places where health care occurs. Though people felt that there were more options, many participants expressed concern that if there were too many options that doctors would leave to the United States and not be there when they required acute care.

- Some people felt that there are many people who cannot make decisions about their health and too many changes could make the health system inaccessible and inequitable to many.
- Health care institutions are so big and are almost impossible to change; therefore why bother.
- If changes occur in the periphery of the existing health system, i.e. eat better and exercise more; though this is good, it takes much longer to make change than changing doctor billing right now. Though changing doctor scope of work and billing right now is a more optimum solution (make the biggest changes in the fastest way), it is unlikely to occur because there are many vested, powerful, and entrenched positions at play.

Profound in this set of observations is that rigid path dependent areas are hard to change from an optimization point of view. Observations suggest that these changes are most likely to occur from the periphery where there is less rigidity and overall resistance to change. Another key observation is the relinquishment of control from established power authorities. In this case it is the release of control from government and/or doctors to decide the right to die or choose alternative therapies more in line with the individual's values and beliefs.

#### e. Document and Participant Interview Analysis

The following section analyzes the findings from each event report in terms of the research questions. For a detailed report on the documents being analyzed, please refer to Appendix III.

##### 1. *Foresight Findings*

With respect to foresight findings referred to in the various reports, the common observations are as follows:

- **The foresight process provides insight into uncertainty and perhaps the requirements of innovation, however, much work is required to create action.** Strategies are required to honour and provide for the present, another strategy for the future, and a plan how to address old paradigm inhibitors from

impacting the move forward. Foresight is the first step in gathering information, learning, and thinking out options. In this case study, the foresight project took the findings to management and had a plan for the future, but did not address fully the present (there were recommendations on how to fund the future plan with a 20% budget cut), but the third strategy was not explored at all (to explore the action inhibitors).

- **Foresight gives insight to change, but change of a well-established status quo is just hard to do.** Some participants referred to this work as the 'heavy-lifting' and just like water, will prefer actions that take the least resistance. Supporting change agents, creating an enabling environment for change is essential, thus, perhaps the reason for all the talk by participants on transformational leaders. People understand that change is constant, heavy lifting is required, yet these changes are so hard to do. Comments from participants suggest that new thinking on change management might be needed, to consider the resistance to major changes and how many changes happen to the surrounding systems. Thus, the training for leaders needs to embrace not only foresight and various types of planning, but peripheral systems influence – impacting external system conditions to move the system. Obviously there is so much more than just having foresight exercises, but without foresight exercises, it seems that deriving this consciousness and action through influence would take so longer or perhaps happen so late that one is reacting versus pro-acting. Some examples illustrating the difficulty to change the status quo include the previously mentioned changing the scope of work of doctors and other health care practitioners (like nurses) – giving nurses more scope and responsibilities or doctor billing were unlikely.

These findings suggest that there is a role for a leader and organization to realize its own blind spots and inhibitors of change or action. By this realization, they need to take action to enable learning, motivate the confidence to explore, and realize inherent challenges and biases that thwart action.

## *2. Social Learning Findings*

With respect to social learning findings referred to in the various reports, the common observations are as follows:

- Participants in the health foresight exercises did mention that **in extreme situations like Ebola or possibilities of terrorism that decision makers are more likely to act if there are potentially large catastrophic losses.** However, when there is the presentation of an opportunity, decision makers prefer to wait for more information or more certain conditions. This point is interesting, as it may mean that transformational leaders may have to employ a different strategy if the future holds upswing or downswing.
- **Participants stated that foresight provided insight into innovation; however, there seemed to be some nuances dependent on the type of innovation.** Though not using the same words or the same language necessarily, participants stated that if the change or innovation requirement was novel, then courageous innovators had to put their innovations out there, have some social learning on the technology to develop a critical mass, then the technology would be taken up. However, if there was some good understanding on the change or innovation, social learning could motivate the use and uptake or even further tweaking of the innovation. Obviously social learning on the future is useful, but depending how much is known or understood, social learning could perform a critical role. Further exploration is required to understand how social learning occurs to foster change.

Extrinsic motivators for change appear to be crisis events or strategic endeavors like the search for innovation. Both of these foci create an impetus for change and focus resources, metrics, and attention to achieve their desired results.

## *3. Adaptive Capacity Findings*

With respect to adaptive capacity findings referred to in the various reports, the common observations are as follows:

- **Decision makers to have the power to act, need to be invested in the foresight process.** They should attend the events or at least be very interested in organizing the process and hearing the insights. However, everyone who attended the foresight event did take action, though not in an 'overall action plan'. This is a much more decentralized action plan.
- **Those who acted, acted within their sphere and very interestingly aimed for the better outcomes but used different tools.** This point is quite interesting because it illustrates that learning influences people. After the learning experience, participants were motivated to change and move in a certain direction without a concrete plan and prescription or stated commitment. There is not a lot of knowledge on how to design policies and plans in this way. Perhaps action occurred because health is very personal and it is clearer how one's own choices influence their health. It seemed that action was more clear and precise in the health actions than the climate change actions which seemed more distant and nebulous. In fact, most people made direct changes to their health versus waiting for the health system to change.
- **There is a tendency in planning to make plans for the optimum solution which may require those central system changes that are virtually impossible to make or achieve** (i.e. in the health foresight series, the most commonly referred to example was getting doctors to change their power on billing to reduce bottlenecks in the system). Even doctors who attended the foresight events acknowledged that this point had to change and that doctors were aware of this point, but felt that the doctors would not relinquish the power that they held on billing.
- **Foresight highlighted that in the future, there are more things that we will have to learn to live with or be handled like chronic management.** Illustrations such as living with cancer, HIV, Ebola, foot and mouth disease (FMD) instead of dying, is a type of adaptation of our thinking in what has been viewed as a 'life or death' situation.

These observations suggest that individuals must want to change. When enough individuals share in these new beliefs and actions, then a critical mass is created socially and through a newly formed consensus arises like a new paradigm for consideration and possible adoption to practice.

#### *4. Sustainability Findings*

With respect to sustainability findings referred to in the various reports, the common observations are as follows:

- **Innovation and experimentation are essential for the journey of sustainability.** Depending on the timing or knowledge base of the innovation and the type of social learning that has occurred may mean that the transformational leader must be conscious of other trends when addressing the present, moving to the future, and tending to the subtle path-dependent habits that may thwart movement to sustainability. In order to experiment and innovate, the leader can illustrate a tolerance for failure (as not all experiments or innovations work), sharing learning from successes and failures, and creating 'safe' spaces to develop these innovations.
- **There is a general dominance of deciding in favour of the needs of the short term versus the long term.** Though this behaviour was alluded to in the private sector, discussions ensued that government, due to 4 year electoral cycles based on re-election, are bound to the short term as well. Participants highlighted that they thought government should be able to transcend this behaviour for the common or public good, but that short election cycles inhibit 'heavy-lifting' for the future.

Leaders and organizations need to be reminded that being sustainable is a long term endeavor, require the organization to adapt to new circumstances in an 'ever-greening' fashion. There is no end destination, just an overall way of being through time in order to be responsive to an uncertain future.

#### *5. Other Findings*

There were many other repeated and valuable findings referenced in a review of the foresight event reports. These learnings included:

- There was some disagreement that **some foresight advance work should be conducted to reduce the time commitment of attendees and virtually an equal number who stated that the exercises went too fast** and did not have enough time to absorb the learnings. There seems to be a correlation that people experiencing their first foresight event need more time to understand the process in order to suspend disbelief of future imagining. This point requires further exploration.
- **Metaphors, narratives, and visuals help participants make sense of complexity.** These types of tools needs to better understood as to how they can have a more strategic role in decision making and planning. Currently reductionism and comparisons analyze changing trends, but do not enable the ease of understanding when multiple trends converge.

Different types of people learn in different ways, therefore foresight approaches should vary and convey information in different ways to appeal to different learners in different parts of their sustainability journey.

#### f. Notations Corresponding to the Sustainability Heuristic Model

In general, a review of the reports produced at the end of each foresight event on how to develop a sustainable health care system, highlighted strong references to the Sustainability Heuristic Model. Key indications of this conclusion refer to the benefits and learning from the context of the foresight exercises illustrated in Table 4.5. Secondly there were many references to learning from diverse stakeholders, particularly the learning from people outside of their usual lives (in this case, people outside of the direct health care providers). This learning increased the capacity of the group to recognize change (there were many references to the value of increased awareness or consciousness), shared learning, and the articulation of various actions (refer to Table 4.5). What was mentioned many times by participants but was not initially articulated as part of the Sustainability Heuristic Model, was the need to innovate and that innovation was an indicator or milestone to track movements to sustainability (refer to Table 4.5). Another critical point was the importance of leadership to take foresight findings and put these findings into action (refer to Table 4.5). This point seemed very important and was

perhaps underestimated in the foresight series planning that was intended to lead to sustainable action.

g. Specific Learnings on 'How to Develop a Sustainable Health System'

Not only did the foresight exercises provide participant insight to the foresight process and the Sustainability Heuristic Model, the exercises also informed participants of specific actions that may have to be taken ensure that the health system meets the needs of Canadians in the future. From the event reports and the participant interviews, the following table illustrates the key points mentioned by the participants:

Table 4.7. Participant Highlights of Key Subject Matter Themes to Develop a Sustainable Health System

Theme	Details
50% of budget treats chronic ailments; most of the funding goes to acute care.	-Who will pay for extra services out of hospitals to help people lose weight, better manage diabetes, support aging at home, etc.?
Health requires a systems approach.	-Many of the chronic issues management investments need to occur outside of the acute health system (i.e. healthy communities, schools, working environments, support to manage stress and get more out of life, food policy).
S&T/big data concepts bring systems together making transdisciplinary decisions.	-Linking activity (calories out), with eating (calories in), giving immediate feedback and suggested advice or reminders may help people manage some aspects of their health.
A sustainable health system may not just correct issues but actually increase performance.	-New S&T enhancements, hormone therapies, etc. cannot just prevent illness but can increase productivity, performance, and minimize health problems in the future. Examples include hormone management, cognitive therapies, and physical fitness.
S&T can change power relationships in health.	-Internet on information, diagnostics highlight problems before they are problems, remote monitoring helps individuals manage diabetes themselves. These changes threaten the power of the physician/traditional experts/decision makers in the system. Easier for patients to keep digital records and get second opinions;-Seeing what you could look like if you do x or don't do y can be very motivating for behavioural change.

Participants highlighted that many of today's health problems require attention outside of the health care system. This larger systems approach confounds the way the decision making and funding hierarchies operate. Systems do not exist to address these issues with Canadians in a constructive fashion.

h. Conclusions on Case Study 2 – Health Canada: Developing a Sustainable Canadian Health System

From an analysis of the documents produced after each foresight event and a review of the participant interviews, the following observations are made:

- 100% of the participants stated that they enjoyed the foresight exercises for many reasons, but particularly because they could better understand complexity and they learned from each other.
- All participants clearly emphasized social learning: the ability to learn from diverse perspectives, implications of action or inaction, and knowledge towards a common problem shared by the participants.
- Many participants (10/15 interviewed) stated that the foresight exercises helped the group with creativity and innovation to look at the problem in a new way, come up with options and solutions, and reflect on how behaviors, actors, and actions would have to change in order to achieve sustainability. These actions were substantiated by the actions and ideas suggested in each end of exercise document reports.
- Many participants stated that foresight, learning, action planning, and other innovation or creativity exercises were necessary but insufficient to take action. Leadership was highlighted as essential to take these ideas, put them into action, help the organization be open to change, achieve key deliverables in the present, and address countervailing actions/habits/protocols dominant in the old paradigm that work against the future plan.
- Many participants (9/15) stated that they became aware of the lag time between an increase in consciousness of change in the future, coming up with ideas, trying these ideas out, and finally committing whole-heartedly to change. Many participants stated that they thought that foresight would lead directly to action, but that developing new approaches, fine-tuning them, and adopting these innovations is not an instantaneous process. Changes to the status quo are

often initially rejected, require tweaking, and development of a critical mass before being fully adopted.

- Most participants made changes to their health and their health circumstances (many became fit, lost weight, and improved their self-management of diabetes and other conditions). Participants stated that through participation, they raised their level of consciousness of many health issues (that a growing amount of chronic conditions could be prevented) and took action to improve their own health and influence their work. Participants also commented that the results of the foresight exercise were difficult to convey to others to the same level of intensity that they felt, suggesting that high level decision makers or leaders should make the commitment to attend to inform their decisions.
- In the sustainable health systems case study it was the most evident that there are rigid old paradigm structures that need to be changed and if they were changed, would make the fastest changes (e.g. doctor scope of work, billing). Through the foresight work, participants commented that affordable science and technology that could enable people/patients to improve their health (lose weight, control calories, manage diabetes) could be a significant game changer in that it devolves some of the power and throughput of patients away from doctors and the current acute care system.

The Health Canada case study validated that foresight is a useful tool to understand complexity and embed careful consideration of the future into present day decision making. Participant interviews highlighted that foresight significantly contributed to social learning about change and innovation and that the discussion of these changes increased individuals' adaptive capacity to be more sustainable in the future. Of particular interest in the health case study, 100% of participants discussed the personal changes they committed to in order to improve their health. However, these same participants also stated how difficult it was to manifest larger social changes discussed in the foresight exercises. Where possible and within their capabilities, participants in foresight can make change, but there appears to be much institutional inertia to commit to or operationally develop larger scale social or institutional change. Perhaps this understanding of group change is an important element for further research into sustainability.

#### 4. Cross-Case Analysis

##### a. Introduction and Methodology

Two case studies were constructed based on an analysis of foresight exercises and participant interviews to address sustainability (agricultural adaptation to climate change and sustainable health systems). An analysis of findings from each event's report and the results of interviews of 15 and 16 participants, along with the organization and intention of the foresight exercises were used to gather insights to understand the foresight process in relation to achieving sustainability. Specific observations were gathered that explored the foresight process influence to social learning, adaptive capacity, and the proposed theoretical construct of the Sustainability Heuristic Model. Each case study examined these relationships within the confines and context of the focal question (either agricultural adaptation to climate change or sustainable health systems). Those insights can be applied to the specific focal question.

In order to determine if there are broader based generalizations that may be applied to other issues desiring sustainability, it is necessary to conduct a cross-case analysis. Through an examination of the processes, intention, similarities and differences in the report analysis and participant narratives, it may be possible to suggest that there are applications to areas outside of these specific contexts. Should significant similarities exist, it may mean that foresight processes may provide common insights to other questions or exercises exploring sustainability. Though further research will be required either way, a detailed study of this nature may provide a stepping stone to further elaborate on foresight processes and their impact to achieve sustainability.

##### b. Analysis

By comparing the insights extracted in the construction of the case studies, one can identify if there are commonalities that may be applied to other foresight exercises aimed at achieving or being sustainable. For the purposes of the cross case analysis, the researcher will compare the following elements:

- The intent and organization of the foresight event;

- Key observations in the event reports corresponding to the foresight methodology (that is, are there similarities with findings from the scenario event, for example);
- The types of specific recommendations derived from the foresight events (are there similar types of recommendations); and
- Key observations made in terms of the research questions and the Sustainability Heuristic Model (how foresight impacts social learning, adaptive capacity, and sustainability).

The following table delineates the similarities and differences observed in each of the case studies in relation to the key elements being analyzed.

Table 4.8. Cross-Case Analysis of Similarities, Differences, and Other Notations of Two Foresight Programs Focused on Sustainability

Comparative Element	Similarities	Differences
<b>Intent and Organization of the Event</b>	<ul style="list-style-type: none"> <li>-Events focused on sustainability</li> <li>-Trends and drivers/scenario development</li> <li>-Participants enjoyed the foresight programs</li> </ul>	<ul style="list-style-type: none"> <li>-The foresight climate change event used more foresight methodologies (systems mapping, innovative solutions sets).</li> </ul>
<b>Key Observations During Specific Foresight Processes</b>	<p><b>Scenario Event</b></p> <ul style="list-style-type: none"> <li>-Diversity of participants increased social learning and adaptive capacity</li> <li>-Provided understanding of complexity / uncertainty</li> <li>-Strong statements on sharing, learning, and group cohesion – better understand problems, uncertainty</li> <li>-Scenarios helped surfacing of assumptions</li> </ul> <p><b>Policy Event</b></p> <ul style="list-style-type: none"> <li>-Saw need for flexible frameworks/multiple options</li> <li>-Realization that things were not sustainable as is</li> <li>-Realization that change and action needs to expand from government to others</li> </ul> <p><b>Science Event</b></p> <ul style="list-style-type: none"> <li>-S&amp;T were viewed as critical to enable individuals to play a stronger role in awareness and adapting.</li> <li>-S&amp;T increased redundancy and resiliency (increased number of players and options).</li> <li>-S&amp;T helped all players make decisions, including the provision of information articulating risk.</li> </ul> <p><b>Systems Mapping</b></p> <ul style="list-style-type: none"> <li>-100% of women involved liked it, 100% of men involved did not like it. Gender preferences?</li> <li>-Participants stated a change in power relationships (traditional institutions vs. greater individual power)</li> </ul> <p><b>Innovative Solution Sets</b></p> <ul style="list-style-type: none"> <li>-All participants attending this event really liked the event in its ability to generate creativity and innovative solutions that were very applicable.</li> </ul>	<p><b>Scenario Event</b></p> <ul style="list-style-type: none"> <li>-Some advance work was done by reviewing trends and drivers and some pre-assemblage of the scenarios...there were participant comments that the process went too fast – not enough time to have learnings soak in.</li> </ul> <p><b>Policy Event</b></p> <ul style="list-style-type: none"> <li>-The health event was more personal as health affects everyone, thus options were precise.</li> <li>-In the climate change event, there was the realization that markets could play a role to increase adaptation to climate change. In the health event, the group struggled with privatization; but could see the gov't funding other services in prevention.</li> </ul> <p><b>Science Event</b></p> <ul style="list-style-type: none"> <li>-Climate change had a formalized science event; whereas the health event had an S&amp;T analysis in the scenario event.</li> <li>-Science in climate change centered on ability to track carbon for markets; the science for health proposed was more at the individual monitoring and tracking.</li> </ul> <p><b>Systems Mapping</b></p> <ul style="list-style-type: none"> <li>-Not done in the health foresight series, generally but discussed.</li> </ul> <p><b>Innovative Solution Sets</b></p> <ul style="list-style-type: none"> <li>-Not formally done in the health foresight series; though the methodology was applied in the scenario</li> </ul>

	<p><b>Synthesis Event</b></p> <ul style="list-style-type: none"> <li>-Both events emphasized the same high level generalizations including:</li> <li>-Movement from prescriptive ‘one policy fits all’ - to flexible policy frameworks emphasizing outcomes and multiple ways or solutions to get you there.</li> <li>-Movement from expert/institutional control/ decision making to networked/decentralized systems.</li> <li>-Foresight is necessary but insufficient on its own to generate action...there are further steps that need consideration including transformational leadership, strategy development, and influence.</li> <li>-Government was interested in the long term implications and very quickly lost interest, ignored, or had other short term priorities and did not make changes. However, individuals attending made changes.</li> </ul>	<p>event to use clear contradictions to gather ideas on practical solutions.</p> <p><b>Synthesis Event</b></p> <ul style="list-style-type: none"> <li>-Climate change adaptation seemed easier to implement by creating new models, innovations (markets for carbon, EG&amp;S); health adaptation requirements seemed difficult (many of the recommendations were to change the system from the inside but participants felt that this was impossible).</li> <li>-If path dependency in the health system was pronounced in the existing model, the greater resistance to change. In the climate change series there was less done, less established, and a higher level status quo thus, the addition of new models/markets/regulations would be easier to implement vs changes from within.</li> </ul>
<b>Specific Recommendations in Each Foresight Program</b>	<ul style="list-style-type: none"> <li>-Both had the same general types of recommendations such as flexible policy platforms and more options.</li> <li>-Both required a values shift.</li> </ul>	<ul style="list-style-type: none"> <li>-Differences in the specific recommendations.</li> <li>-Differences in “what it means to me”.</li> <li>-Old policies were barriers to change.</li> <li>-Foresight is costly.</li> </ul>
<b>References to the Sustainability Heuristic Model</b>	<ul style="list-style-type: none"> <li>-Both foresight series stated that there beneficial social learning on the problem, perspectives, options</li> <li>-Both stated that adaptive capacity was enhanced (options, change in frameworks, redundancy, and innovation).</li> <li>-Both stated that change is hard and was underdeveloped on how to incite change.</li> <li>-Both stated innovation, new circles of social learning involving disruptive and incremental innovation was important, and that transformational leadership was essential...these are new additions to the Sustainability Heuristic Model.</li> <li>-Both stated that sustainability is a journey versus a destination.</li> </ul>	<ul style="list-style-type: none"> <li>-Items mentioned consistently in the interviews but not in the Sustainability Heuristic Model includes:</li> <li>-Recognition of the path dependencies needs to occur with strategies in place on how to reduce the impact of those overwhelmingly dominant habits and behaviours.</li> <li>-Strong leadership is required to move people to the right actions.</li> <li>-Inaction is often linked to the leaders or decision makers (inclusive of individual actors not challenging the primordial value statement). It seems no one wants to be viewed as the bad person to change what people so deeply assume.</li> </ul>

### c. Conclusions on the Cross-Case Analysis

A review of the table comparing various aspects between the two case studies indicates many interesting findings. Though these observations are made only comparing documents and testimonies of participants, they highlight that the foresight process generates many similarities. Firstly, though the two foresight exercises did not follow the exact same program (both in number and type of events), they did both touch on similar areas to discover the trends and drivers, create scenarios, analyze those scenarios for policy and science implications, study changes to the system to achieve sustainability, and make specific recommendations. Secondly, both foresight series highlighted that diverse participant discussions lead to sharing of information, developing trust and reciprocity, a better understanding of the problem, complexity, and uncertainty, an appreciation for various perspectives, and the development of various options. This point was the most consistently reported observation and a direct result of the foresight exercises. Thus, with these common findings it is possible to say that these foresight exercises contributed to social learning and adaptive capacity.

Next, in both foresight exercises, participants perceived heightened adaptive capacity identified by increased consciousness of change, possible options and actions, and discussions of changed relationships and agents. This statement supports the second most observed insight from participants, that foresight builds adaptive capacity through the development of options, ideas, new institutions and technology, and novel relationships. An anomaly that was consistently noted by participants in both foresight exercises was the importance of innovation and leadership. Though 100% of participants saw a benefit to foresight, 97% stated that foresight did not directly lead to action. Many comments from participants included the importance of leadership to enable innovation. In addition, participants commented on the importance of leadership to honour the present with a strategy to go forward, consideration of a plan for the future, and the wisdom of the leader to realize that there are habits or policies in organizations in the old paradigm that can inadvertently thwart movement from the past to the present. Participants highlighted the need of adaptive capacity and perhaps intuition of a ‘transformational leader’ to manage institutional inertia and motivate these three trajectories all at the same time.

Finally, most participants discussed sustainability as part of a journey, that the anticipation of change and enabling this change was necessary preparation for action, but would be insufficient on its own. Most participants stated that foresight increases learning and the preparation to act, but that additional steps are required. Some recommendations of additional steps that may lead to action include developing a strategy for the present (must keep buy-in and current needs met), developing a strategy for the future (need to know where the organization is going), and thirdly the organizational unlearning strategy or change management strategy (not sure what it should be called) but the strategy that acknowledges the inherent strength in the current paradigm and path dependencies that disable the true movement into the future.

In general, the elements of the Sustainability Heuristic Model were evident, but in both the reports and more so in the participant interviews, highlighted that innovation and leadership was very important to create the conditions and actions to adapt to change. These are elements that may have to be entered into the Sustainability Heuristic Model. In reference to the last statement in the previous paragraph, strong or influential or transformational leadership is required to be aware of the future, help the organization become aware and self-adapting, address the present, address the future, and be so knowledgeable or intuitive to identify the obstacles of the present paradigm to resist the future. Often these inhibitors are subtle and not blatant, requiring intuition, empathy, learning, experimenting, and adapting as they manage forward.

With respect to the differences between the two case studies, there were two dominant points. First of all, the health foresight program was easier for people to see the implications to themselves. This point is important because in the participant interviews, virtually all participants took actions to improve the condition or circumstances of their own health. However, in the climate change foresight program, the problem was more diffuse and though there was a sense of urgency to act, many of the actions highlighted in the reports, such as creating carbon markets and water tracking, had not yet occurred. Perhaps this is because the responsibility for compliance or the rules for compliance typically rest with government and government was not yet prepared to act? The reason is unclear. Secondly, though participants took some actions, these actions were more variable (in type of action, intensity of action, and continuation of action). Perhaps having a vested interest or seeing one's vested interest is important to incite change? Perhaps

the cross-case analysis highlights a necessity in foresight exercises that is not always practiced, which is to make the findings meaningful directly to decision makers. Often foresight surfaces assumptions, learning, and required actions but without an immediate reflection to all levels of stakeholders. Speaking with the foresight organizers suggests that in these two cases, led by the Government of Canada policy units that Government did not want to be forced to taking action, but to learn and be informed for later decision making. However, maybe this approach is wrong, or maybe it is part of the learning and adaptation process (to become familiar and use to a new idea), or maybe the reflective stage must be included in all future foresight programs requires further exploration.

## 5. Conclusion

The researcher created case studies from two foresight series focused on sustainability. In general it was observed that there were primarily similarities in the identification of elements from the Sustainability Heuristic Model. The significant amount of similarities may indicate that foresight exercises can increase social learning and adaptive capacity that may lead to the approach or way of being to be sustainable. However, also common to both case studies is that conducting foresight exercises alone does not generate policy action as highlighted in the foresight exercises. Though participants noted that anticipatory thinking like foresight is a necessary condition for sustainability, and most participants expected the foresight findings to lead to action, the foresight process alone is not a sufficient condition to incite action towards sustainability.

As indicated by comments from participants, transformational leadership is required to take the results from foresight, the ‘anticipatory intelligence’, and convert that knowledge to action. Participants also highlighted that this leadership approach is not like the leadership that is commonly trained (high level implementers) to make sure plans are in place; but leadership that fosters learning about change, innovation on what that change could look like, strategies for the present, strategies for the future, and management of the non-obvious obstacles to change. With more agents and players involved in a context of uncertainty, this leader must influence an understanding of the future, with experimentation, and adaptation. There likely is no exact plan and even if there was an exact plan, success means adjusting that plan as required along the way. This approach requires the leader to be a new way of being, teaching, exposing, innovating,

and sharing, while tolerant or even expecting of failure. The current status quo or paradigm is not yet enabling of such leadership. Practices such as today's emphasis with precise metrics and progress in the short term, with participants wanting to know what to do precisely and why; do not encourage adaptation to changing conditions, but reprimand leaders for path deviation and missing targets at the expected milestones. Very likely the nature and training of employees must also change to be receptive to this leadership approach.

Since the two foresight exercises exhibited significant similarities versus differences, it is reasonable to believe these findings may be generalized to other areas seeking sustainability using foresight. Given that this analysis is focused on only two case studies, further studies are required to strengthen the possibilities of broader based generations; though a starting point has been established for further study and replication.

Are there other reasons that could explain these similarities? Yes. Foresight is a new skill or competency to the Government of Canada. The foresight exercises were coordinated by the same person, though with great variety of the people on the foresight team. In addition, there are/were a limited number of consultants proficient in the foresight methodologies. Though there were differences in the consultants involved and the exact type of exercise they facilitated, there is overlap on the approaches used. Finally, the researcher evaluated both foresight initiatives, but perhaps with the same lens biased by findings in one case study creating the lens for the second case study. To remedy this potential issue, the researcher reviewed each case study separately giving a one month pause between the construction of the specific case study to reduce the likelihood of imposing the 'findings framework' across cases. Though precautions were taken to minimize biases, it is possible these elements may have contributed to similar observations and findings. The only way to be sure would be to expand the case study comparison with other foresight events with different researchers using a similar methodology. Thus, there a case for future research.

## V. Discussion

### 1. Introduction and Problem Restatement

Given the notion that sustainability is desirable in many disciplines, determining how to operationalize sustainability, particularly the aspect of balancing needs of today with those in an uncertain future, would be impactful. Therefore, the focus of this research is to see if foresight (the study of the future) leads to social learning and heightened adaptive capacity to increase sustainability. Thus, does the consideration of the future integrate into present day decision making lead to decisions to improve sustainability?

One of the major challenges in this type of research is that the idea of sustainability is socially constructed and that this construction may change over time depending on changes in actors, changes in endogenous and exogenous conditions, and other factors. Therefore, this research did not evaluate if decisions were more sustainable or not, but focused on the primary issue on how the use of foresight can address the temporal dimension inherent in the definition of sustainability.

The research goal was to understand how the foresight process embeds the consideration of the temporal dimension in the context of sustainability. The research objectives included:

- To increase comprehension on how foresight embeds the future to social learning;
- To increase understanding on how foresight embeds the future in adaptive capacity development;
- To illustrate how foresight influences decisions and actions in the two theme areas of study; and
- To gather insights on how foresight influences other areas of the participants' lives.

To address the research goal and objectives, the various types of questions guided the research process. These questions were structured to extract participant insights on the foresight experience, learning, and the development of adaptive capacity, changes

within the individual and changes within the thinking of the collective. The questions also prompted discussion on the participant views on the relationship of foresight to the process of sustainability, outcomes of foresight exercises, and insights on the relationship of foresight to action.

To identify the impacts of participatory foresight, inductive research methods, such as case study preparation and analysis, was used to identify the phenomenology evolving from the various events. The two case studies were created capturing the intention, process, outcomes of each event, and also included a review of participant narratives resulting from telephonic interviews. The case studies were a description of the foresight program's intention, analysis of the foresight activities, and analysis of the findings from the 'end of event' reports and participant interviews to record statements of social learning, adaptive capacity enhancement, and sustainability intentions. In effect, the case study is a description of the processes and findings that occurred approximately five years ago.

To add richness to the case study, participants who have attended the foresight events were interviewed to determine their understanding of foresight and their reflection on their personal experiences, changes in awareness, their own learning/group learning, enhancement to adaptive capacity, and movement to action. The interviews focused on areas of learning, capacity building actions, and sustainability actions that resulted after the foresight project. The interviews captured the participants' descriptions of taking action or not taking action, extracted other factors that the researcher may not have considered in the model, and determined the application and relevance of the foresight exercise to other areas of life. The purpose of this approach was to surface nuances that were not anticipated by the researcher which can be explored in more depth through a more open-ended exploratory approach. The disadvantage of this process was that the findings were relevant to the case study as only two case studies were created, however, the results were very similar between the two cases suggesting that there is room for further research as there is the possibility that the findings may inform broader models for application and inferences.

## 2. Reflections on the Case Study and Cross-Case Analysis

From the perspective of commonalities and similarities, foresight participants stated that issues are becoming more complex and foresight was a useful tool/process to better understand this complexity. For example, participants stated that foresight fostered social learning of changing trends. The discussion on changing trends increased awareness of the current inherent assumptions and lens that individuals, organizations, and policy makers use to frame their view of the world and decision making. In addition, within this complex environment, participants stated that foresight exercises that generated thoughtfulness on the consideration of options and their implications assisted to ‘make sense’ or chart a path forward in uncertainty and complexity. Participants also stated that the combination of exercises made them more aware that planning in complexity and uncertainty was an issue and that having options increased their capacity to proactivity consider uncertainty (plan for it) and to be more adaptive when the plan did not roll out as expected. This reflection is very interesting because it perhaps addresses the tension between foresight and strategic planning. Foresight gives you a sense of change and some options to consider. Strategic planning is the more tactical action of clarifying the objective and setting a path forward to deliver. Consideration of new directions, realization of complexity and uncertainty, and increased adaptive capacity are also useful skills in ‘execution or the implementation’ of work plans as it is rare that the plan unfolds as anticipated. This anticipatory intelligence can be applied to anticipate uncertainty and foster success by increasing leadership adaptiveness when required.

100% of participants interviewed (and maybe those who agreed to be interviewed were more willing to contribute to the research study) stated that the most immediate value of foresight was learning from diverse participants and the nature of the exercises. Participants learned other perspectives, new knowledge, consequences of action and inaction, and new options for consideration. This ‘knowledge empathy’ created a different condition in the nature of participants as they were later able to derive solutions or options not solely for themselves or from the point of view of the organizations they represented, but for the benefit of the system or group of stakeholders. This point is important as government held many consultations that resulted in intense lobbying by the various organizations, hell bent on advocating their position, often knowing that their position had negative consequences for others. In the later stages of the foresight exercises, the group stated that they had elevated their consciousness that there was

not enough money to solve all problems, that some compromises had to be made, and often solutions presented were thoughtful of this point. One example of this behaviour stands out. In the first foresight event on agriculture adaptation to climate change, a person from a livestock organization was lobbying strategies to sell more beef. By the end of the event, the person left the room distraught stating that they needed to address their constituents to start to prepare for a beef market impacted by climate change. The individual stated that this was a profound shift never addressed in the organization but warranted consideration. Therefore, foresight can be a useful practice to increase social learning and knowledge empathy to create an atmosphere of co-creation and collaboration instead of the typical lobbying/consultation method.

The second most common observation amongst participants in both case studies was that studying and discussing these options increased the ability to adapt. The ability to come up with options and simulate and/or at least discuss the structure, behaviour, and organization of change, highlighted what profound shifts needed to look like. The visualization of alternative actions surfaced value shifts, possible inhibitors of change, and adaptation requirements. From the participant interviews, the researcher sensed that people could begin to visualize action. Thus, in general, foresight was an experience that fosters creativity and innovation to consider the future. However, participants noted that this experience did not guarantee action. In the health foresight series, the researcher noted that most of the participants made changes in their activities to improve their health at a personal level, but were not as effective in making change at a systems level. In the climate change foresight series, people (particularly the farmers) who had day to day decision making with respect to their own land, made conscious decisions to adapt to climate change; however there were no system wide actions taken. The researcher postulates that perhaps decision making is taken at a personal level that later, with an increase in critical mass of individuals taking action, leads to system changes OR foresight highlights an interdisciplinary type of relationship between systems and the systems of government in agriculture, environment, and health were not able to coordinate to effect the types of change required. This observation may mean that new governance structures are needed to govern complex issues or more 'bottom-up' value changes need to be discussed by the population to foster such coordination.

In summary, the foresight exercises fostered consideration of the future through increased social learning and adaptive capacity that would prepare each person to take action towards sustainability. Through the exercise themselves, participants were impacted and somewhat changed, indicating that decisions that they would make in the present would embed their learning, ideas, and respective behaviour changes. Thus the exercise created a mechanism that thoughtful consideration of the future would impact decision making leading to increased sustainability.

### 3. Overall Research Reflections

#### *What was congruent with the literature?*

Participant interviews emphasized that sustainability is a way of being or a journey; not a destination. The goal of sustainability requires a constant outlook, often calibrating and adjusting to changing circumstances. Participants noted that foresight does not necessarily create a fun or enjoyable experience for everyone; different people pick up on different value depending on their initial starting place and willingness to experiment. It does seem that people self-select for foresight events because they all learned perspectives, options, and gained value from the exercises. Thus foresight provides a way to look for changes, reframe the situation, and adapt as required.

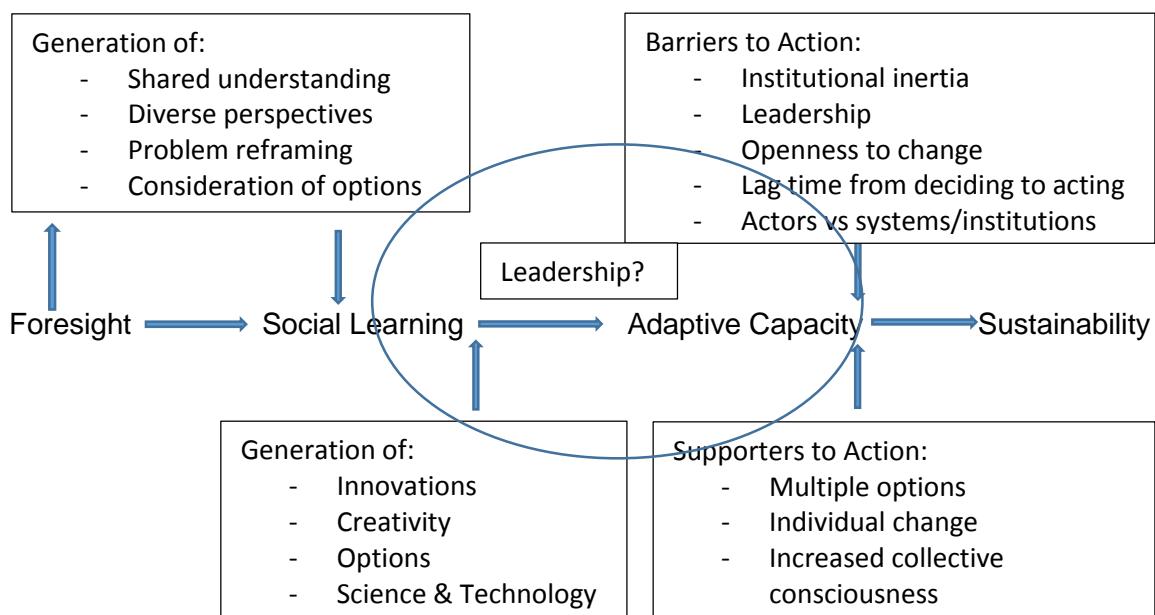
The researcher observed that there were primarily similarities in the identification of elements from the Sustainability Heuristic Model (foresight, social learning, and adaptive capacity). Both case studies highlighted that foresight generated social learning and that social learning fostered innovation and creativity that increased the number of options available for consideration. These similarities indicated that foresight exercises can increase social learning and adaptive capacity that may lead to the approach or way of being to be sustainable. However, also common to both case studies is that conducting foresight exercises alone does not generate action. Though participants noted that anticipatory thinking like foresight is a necessary condition for sustainability, foresight alone is not a sufficient condition.

The researcher concluded that the integration of these disciplines, such as foresight leading to social learning, social learning creating adaptive capacity in the form of the Sustainability Heuristic Model as proposed in the literature, is novel in the literature. The

interdisciplinary model is alluded to but not defined, connected, or tested previously in the literature. This Sustainability Heuristic Model, at least in the two case studies analyzed, holds striking similarities in supporting the model and provides the potential to be further tested to lead to more broad based inferences for practice, research, and theory.

Participant interviews and reviews for the foresight reports have further informed the Sustainability Heuristic Model in the following manner.

Figure 5.1. The 'Sustainability Heuristic Model' Enhanced by the Research



This enhanced or informed Sustainability Heuristic Model illustrates how foresight exercises create the environment to explore and learn change (social learning) and generates innovation to increase adaptive capacity, all leading to thoughtfulness and action to increase sustainability. What the research also adds to the model is that change does not appear to be instantaneous after the foresight activities, thus highlighting the barriers and supporters to action. The research has informed part of the puzzle and perhaps has created the framework to further research how action can be manifested as a result of thinking about the future. The circle in the middle suggests that leadership could be a key element of the model where the leader needs to create the conditions in the organization to have prospective thought, learn from diversity, identify

changes and innovation requirements, be conscious of the barriers of change, and generate an environment that is conducive to learning and experimentation in order to become adaptable and this being sustainable.

*What was surprising?*

Participants stated that foresight exercises were insufficient on their own to generate action. Understanding in this area requires further exploration. Participants identified that there was typically a lag time from the exercises, learning, reflection, and action. Action has many components from increased consciousness and awareness, coming up with ideas, visualizing the implementation of these ideas, piloting the ideas, having others follow along, and finally fully taking on the new practice. Where action was taken was at the personal level, but both foresight exercise series participants highlighted that it was very hard to take system action.

The researcher noted that there were some knew learnings that surfaced in both case studies:

- a. innovation is an output that one can measure or see movement towards sustainability; and
- b. leadership is key to take the foresight learnings and do something with them.

Participants stated that reflecting on the foresight exercises, they realized that more work is required. Further work is needed to balance multiple competing initiatives such as strategies for the present, a strategy for the future, and managing the transition from the old paradigm to the new. 21/31 participants commented that an aspect that has been missing is the dominance of the old paradigm and how habits, practices, path dependencies, and protocols can inhibit movement to the new paradigm. Transformational and empathic leadership may be required to manage and honour those beholden to the present, those moving to the future, and bracing the team for the change (with some failure and bumps) to move forward.

What was different between the two case studies was that the options or suggested actions proposed were very case specific. However, amongst those case specific suggestions there were commonalities in approach, such as moving from one policy fits

all, to flexible policies. The other difference between the two scenarios was that in the developing sustainable health systems foresight series, all participants took action to improve their health. This was less consistent in the climate change foresight events. Perhaps this difference exists because health is very personal, making the update of action clearer and within the decision making power of each participant.

*What are the implications for practice?*

Often foresight activities are organized to find the new policy or the key strategic action. However, identifying the options is important, but not sufficient to make changes. Participants noted that transformational leadership is required to take the results from foresight, the ‘anticipatory intelligence’, and convert that knowledge to action. Participants also highlighted that this leadership approach is not like the leadership that is commonly trained (high level implementers) to make sure plans are in place; but leadership that fosters learning about change, innovation on what that change could look like, strategies for the present, strategies for the future, and management of the non-obvious obstacles to change. With more agents and players involved in a context of uncertainty, this leader must influence an understanding of the future, with experimentation, and adaptation. There likely is no exact plan and even if there was an exact plan, success means adjusting that plan as required along the way. This approach requires the leader to be a new way of being, teaching, exposing, innovating, and sharing, while tolerant or even expecting of failure. The current status quo or paradigm is not yet enabling of such leadership, given our precise metrics and progress in the short term, with participants wanting to know what to do precisely and why. Very likely the nature and training of employees must also change to be receptive to this leadership approach.

Note that some participants discussed institutional inertia as a barrier to action or change. This element was discussed and acknowledged by participants. Participants general stated that transformational leadership was required to transition this inertia and create an adaptive environment in institutions to be more open, receptive, and adaptive to change.

*What are the implications for research?*

The findings from the two case studies were very similar and thus, could contribute greatly to broad based inferences on foresight, social learning and adaptive capacity. The Sustainability Heuristic Model could be explored in the application of relevancy to models that can be used to advance decision making to support the grand goal of sustainability. The researcher is confident that the foresight process can contribute to social learning and adaptive capacity and perhaps is a process that needs to be introduced to schools, university programs, and other strategic training to deal in uncertainty and to increase consciousness and actions towards sustainability. The area requiring further research is the dynamics and nuances of linking the program to action. Participants noted that leadership should be involved to convert these options to action, but the evidence in the case studies is not sufficient to evaluate if this is true. Perhaps the foresight activities highlight value shifts that need to occur in society before system shifts could be made? Perhaps society is tiring of disciplinary oriented governance approaches which are focused on spheres of control versus the attainment of interconnected behaviours? These are large areas of study that could inform the final connection to action.

*What are the limitations of the study?*

The researcher proposes the Sustainability Heuristic Model as a new theoretical construct to explain the connection of foresight leading to social learning and that this learning can further develop adaptive capacity. Together, these learnings, options and changes can foster sustainability. This research argues that the concept proposed in the Sustainability Heuristic Model is evident in both case studies with great similarities. Though these observations were strong, they are only applicable to the two case studies. These observations may hold true for a larger more generalized model but should be further explored for robustness.

## VI. Conclusions

Sustainability is the goal of many organizations and leaders. We see examples of striving for sustainability in everyday life; from health systems, to the construction of cities, agriculture and food production, and economic sectors. A review of the literature on sustainability identifies that there is no methodological framework to achieve sustainability except to consider everything as much as possible (Wilber's Integral Sustainability Theory seems most relevant and up-to date with the inclusion of multiple perspectives to rationalize the individual and collective world views (Wilber, 1997). The researcher suggests that becoming sustainable means rationalizing the present with an uncertain future (Da Costa, Warnke, Scapola, & Cagnin, 2008) (Floyd & Zubevich, 2010) (van Egmond & de Vries, 2011). Because of these issues, the theory of being sustainable is not sustainable because the literature suggest there is not a practical way forward (Bonevac, 2010) (Scheirer, 2005).

In this research, the goal was to explore if embedding the future in present day decision making can increase the likelihood of being sustainable. The researcher proposes a theoretical construct called the Sustainability Heuristic Model, which argues that:

- foresight creates social learning on an uncertain future, enabling a participating community to see challenges, opportunities and options for consideration and action; and
- foresight practices enhances adaptive capacity to practice, simulate, or visualize the actions and behavioural changes required.

The research surfaced that within the foresight literature, foresight adds consideration of the future to the dominance of the present which is very important to achieve sustainability. Therefore, the researcher proposes the Sustainability Heuristic Model (foresight increases social learning and adaptive capacity which intern informs decision making to increase sustainability) as a novel contribution to the literature to facilitate the operationalization of sustainability. To inform the application of the model to everyday life, the researcher interviewed 31 people who participated in two long term foresight studies focused on sustainability (agricultural adaptation to climate change and developing a sustainable health system). From a review of event materials and from participants' interviews, the researcher constructed two case studies that explored how

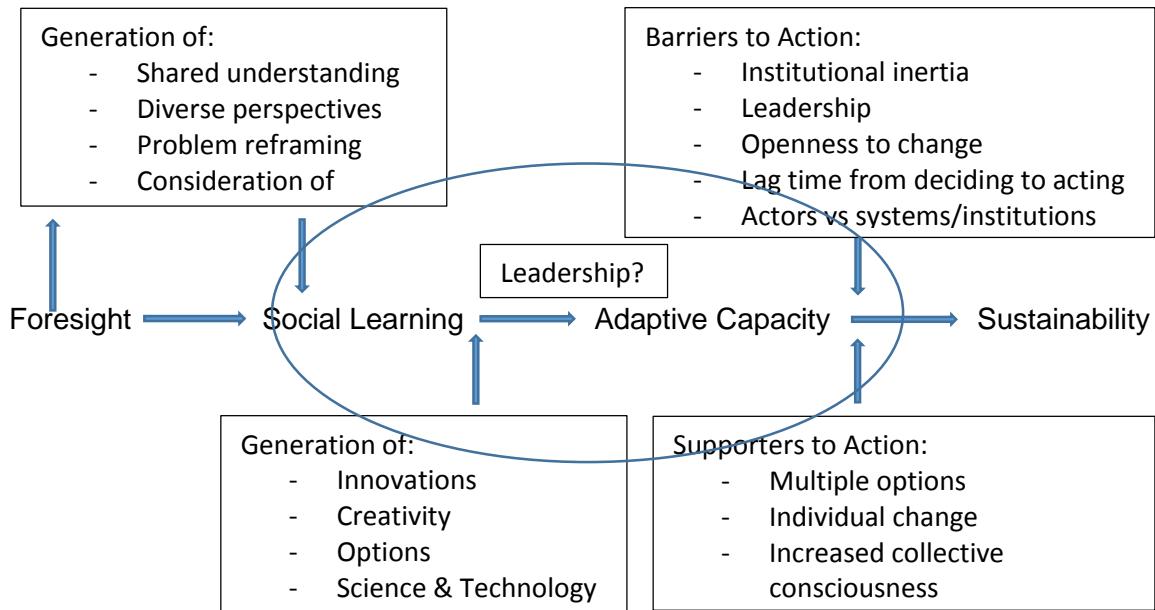
foresight contributed to social learning and adaptive capacity that would lead to sustainability.

The analysis of the two case studies and the cross-case analysis indicates common similarities such as:

- Achieving sustainability is desirable, but the road is more of a journey or way of being, then a destination. This observation indicates that individuals and groups require constant calibration of planning with uncertainty and changing trends.
- Foresight increases social learning on complexity and uncertainty. This shared understanding creates a common platform for the generation of a wider range of options, innovations, and creativity. Achieving sustainability requires the consideration of more options and implications. For example, participants realized complexity, uncertainty, and changing assumptions (models and trends). Foresight created a platform to visualize or contextualize these changes in a holistic and manageable way.
- Foresight increases adaptive capacity through its thinking processes, social learning and innovation generating exercises. These future oriented exercises create a platform to simulate, experiment, and visualize behaviour change moving towards sustainability. For example, participants realized that they needed flexible policy approach, as no longer would one size fit all.
- Foresight supports social learning and increases adaptive capacity that is necessary for action, however, these activities are insufficient to ensure action that enhances sustainability due to barriers to actions such as institutional inertia, traditional leadership, and resistance to change.
- The research supported these conclusions and contributed to the new ideas to be considered in the Sustainability Heuristic Model, such as:
  - Barriers to action (institutional inertia, traditional management/leadership, lack of openness to change, lag time from decisions to actions) need to be thoughtfully considered and accounted to move to action.

- Supporters to action (having multiple options, individual change and experimentation, and raising the collective consciousness) need to be thoughtfully considered and accounted to move to action.
- Transformational leaders can be the ones that can manage the barriers and create an environment for the supporters to move to action by achieving the requirements in the present, while making consideration of the future amongst people, organizations, and institutions to enable adaptiveness throughout the system.
- New leadership must be able to address the inherent conflicts identified within the system. These conflicts include rationalizing the present with the future; time for foresight in addition to strategic planning; and the policy tensions desiring to shape the future with uncertainty (inability to control the future, but position ourselves for a range of futures).

Figure 6.1. The 'Sustainability Heuristic Model' Enhanced by the Research



Therefore, the Sustainability Heuristic Model and its enhancements contribute to new knowledge in this field. For the first time, the literature has a starting point on a methodological manner that the consideration of the future can be brought into present day decision making. Specifically, the foresight method contributes to social learning in the understanding of complexity, uncertainty, and the nature of change. Finally, that the generation of more options, the enhanced practice to plan yet embed adaptiveness for the ‘unforeseen’, can enhance the actions we take towards sustainability. However, the research did indicate that foresight in itself is insufficient to lead to action. Nevertheless, the research did identify additional elements for consideration such as addressing barriers to action and leveraging motivators to action by leaders. This additional piece of the model can be a potential starting point for replication of the research and further exploration of how one can translate the new anticipatory intelligence into action.

For the researcher, the most profound learning has been that foresight is a skill essential to manifest sustainability, but for more reasons than initially hypothesized. Initially it was proposed that foresight exercises were necessary to understand the future and that having insight into the future outcomes was the end objective; however, post foresight exercise interviews from participants involved in two case studies, indicate a more robust finding. This important finding is that foresight not only gives insight to uncertainty, to the potential actions and options, but also to the paradigmatic inhibitors (actions, practices, and behaviours) that run counter in the transition from one paradigm to the next. That is, foresight can and should be used to inform the development and execution of the three key strategies: one to manage the present, the second to innovate to the future, and the third to manage the obstacles of the transition from one paradigm to the other. Thus the term foresight has taken a similar evolutionary path as the definitions of sustainable development/sustainability in that foresight and sustainability are more of a journey than an end outcome. This final statement is profound in that foresight is not solely the anticipation of the technology or options of the future, but the wisdom to inform the transition between paradigms. As has been stated, it is not necessarily that human kind is inhibited by the ‘good idea’ but the lack of success to leave the old for the new. Success is not the knowledge of the end destination but it is the ‘creative-destructive’ process to see the new, provide for today, and manage the change between the two worlds.

Though these results are not absolute as they only reflect the learnings from two case studies and the cross-case comparison, however, the striking similarities in the broad-based findings illustrate paradigmatic change, the benefits and difficulties of foresight, and overarching observations indicate that the benefit of applying foresight to questions desiring sustainability may have global merit and application. In addition, this trend would suggest that adding the competency about thinking about the future and strategizing using this anticipatory intelligence may be applicable to the knowledge base developing and training leaders. The leaders of the emerging future may require to understand and use foresight in the increasingly changing, complex, and interconnected world, not so much as a ‘unit’ in an organization, but as a competency in leadership and decision making. A most interesting research endeavor would be to explore this trajectory along as the result of this research.

Therefore, the researcher proposes the Sustainable Heuristic Model as a contribution to new knowledge where the use of foresight can be used to operationalize the thoughtful consideration of the future into present day decision making focused on sustainability. In effect foresight fosters social learning and an increase in the range and number of options which can improve sustainability. Thus, the Sustainability Heuristic Model and the various foresight exercises explored create a theoretical construct and a series of actions that can operationalize sustainability.

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## VIII. Appendices

### Appendix I: Interview Questions

#### a. Case Study 1 – AAFC – Agricultural Adaptation to Climate Change

##### **Interview Questions for Case Study 1: AAFC -Climate Change Impacts and Adaptation in Agriculture from 2010-2030**

In 2009, AAFC hosted a series of workshops to explore how the agriculture sector may have to adapt to climate change.

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KQ: In the agriculture and climate change foresight project, how did your perspectives on the future of agriculture change? What were the most important learnings for you in the project?

KQ: In the process, was there a shift in shared understanding or awareness of new possibilities within the group? How did the group perspective change?

KQ: Did the exercise lead to a realization that there may be multiple options to address the issue of agriculture and climate change? Did the exercise lead to a realization of the need change within the group?

KQ: In retrospect, did the process encourage and lead to decisions, actions and change? Were there changes in thinking, actions taken, awareness, and learning? Did the project support thinking and actions that would enhance sustainability?

*Summaries of events will be distributed to interviewees so that they can read the preamble prior to the interviewer asking questions. To ensure participants read each section, the interviewer will read the heading, ask the participant to read that section, ask if there are any questions, and then the interviewer will ask the participant each question orally. If the participant wishes, the interviewer is prepared to read the preamble orally.*

#### [\*\*AAFC – REQUIREMENTS OF THE CANADIAN AGRICULTURAL SYSTEM TO ADAPT TO CLIMATE CHANGE\*\*](#)

#### [\*\*EVENT 1: SCENARIO DEVELOPMENT MARCH 11-13, 2009 IN CALGARY, ALBERTA\*\*](#)

The following questions will ask you about your learnings in the AAFC scenario event.

A.1. Did you attend the AAFC Climate Change Adaptation Scenario Foresight Event? If no, please go to Section B.

A.2. What did you experience in the scenario planning event? Process, learning, awareness, change, action, group dynamics? What did you hear or learn that you did not hear of before? What was profound or memorable from the event?

A.3. What points did the group learned or stated that they had increasing awareness or concern?

A.4. Did the exercise lead to a realization that there may be multiple options to address the issue of agriculture and climate change? Did the exercise lead to a realization of the need change within the group?

A.5. Which actions did you take? Did others take? What were the results? Under what conditions might action still be taken?

A.6. Anything else you would like to comment on the scenario development event?

#### **EVENT 2: POLICY ANALYSIS WORKSHOP, 2009 IN OTTAWA, ONTARIO**

The following questions will ask you about your learnings in the AAFC Policy event.

B.1. Did you attend the AAFC Climate Change Adaptation Policy Foresight Event? If no, please go to Section C.

B.2. What did you experience in the policy event? Process, learning, awareness, change, action, group dynamics? What did you hear or learn that you did not hear of before? What was profound or memorable from the event?

B.3. What points did the group learned or stated that they had increasing awareness or concern?

B.4. Did the exercise lead to a realization that there may be multiple options to address the issue of agriculture and climate change? Did the exercise lead to a realization of the need change within the group?

B.5. Which actions did you take? Did others take? What were the results? Under what conditions might action still be taken?

B.6. Anything else you would like to comment on the policy event?

#### **EVENT 3: SCIENCE ANALYSIS WORKSHOP, 2009 IN OTTAWA, ONTARIO**

The following questions will ask you about your learnings in the AAFC Science event.

C.1. Did you attend the AAFC Climate Change Adaptation Science Foresight Event? If no, please go to Section D.

C.2. What did you experience in the science implications event? Process, learning, awareness, change, action, group dynamics? What did you hear or learn that you did not hear of before? What was profound or memorable from the event?

C.3. What points did the group learned or stated that they had increasing awareness or concern?

C.4. Did the exercise lead to a realization that there may be multiple options to address the issue of agriculture and climate change? Did the exercise lead to a realization of the need change within the group?

C.5. Which actions did you take? Did others take? What were the results? Under what conditions might action still be taken?

C.6. Anything else you would like to comment on the science implication event?

#### EVENT 4: SYSTEMS MAPPING WORKSHOP, OCTOBER, 2009 IN EDMONTON, ALBERTA

The following questions will ask you about your learnings in the AAFC Systems Mapping foresight event.

D.1. Did you attend the AAFC Climate Change Adaptation Systems Mapping Foresight Event? If no, please go to Section E.

D.2. What did you experience in the systems mapping event? Process, learning, awareness, change, action, group dynamics? What did you hear or learn that you did not hear of before? What was profound or memorable from the event?

D.3. What points did the group learned or stated that they had increasing awareness or concern?

D.4. Did the exercise lead to a realization that there may be multiple options to address the issue of agriculture and climate change? Did the exercise lead to a realization of the need change within the group?

D.5. Which actions did you take? Did others take? What were the results? Under what conditions might action still be taken?

D.6. Anything else you would like to comment on the systems mapping event?

#### EVENT 5: INNOVATIVE SOLUTION SETS WORKSHOP, NOVEMBER, 2009 IN EDMONTON, ALBERTA

The following questions will ask you about your learnings in the AAFC Innovative Solution Sets foresight event.

E.1. Did you attend the AAFC Climate Change Adaptation Innovative Solutions Sets Foresight Event? If no, please go to Section F.

E.2. What did you experience in the innovative solutions event? Process, learning, awareness, change, action, group dynamics? What did you hear or learn that you did not hear of before? What was profound or memorable from the event?

E.3. What points did the group learned or stated that they had increasing awareness or concern?

E.4. Did the exercise lead to a realization that there may be multiple options to address the issue of agriculture and climate change? Did the exercise lead to a realization of the need change within the group?

E.5. Which actions did you take? Did others take? What were the results? Under what conditions might action still be taken?

E.6. Anything else you would like to comment on the innovative solutions workshop?

#### EVENT 6: EXTERNAL REFLECTION WORKSHOP, JANUARY, 2010 IN OTTAWA, ONTARIO

The following questions will ask you about your learnings in the AAFC External Analysis foresight event.

F.1. Did you attend the AAFC Climate Change Adaptation External Analysis Foresight Event? If no, please go to Section G.

F.2. What did you experience in the external reflection event? Process, learning, awareness, change, action, group dynamics? What did you hear or learn that you did not hear of before? What was profound or memorable from the event?

F.3. What points did the group learned or stated that they had increasing awareness or concern?

F.4. Did the exercise lead to a realization that there may be multiple options to address the issue of agriculture and climate change? Did the exercise lead to a realization of the need change within the group?

F.5. Which actions did you take? Did others take? What were the results? Under what conditions might action still be taken?

F.6. Anything else you would like to comment on the final analysis event?

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#### Section G: Peripheral Learning

G.1. What do you see as the value of using foresight personally? (How has it affected your thinking? Has it changed your perspective? The way you think about things? What things?)

G.2. What is the value of foresight in larger groups? What do you think are the applications? The benefits? Difficulties or challenges of foresight?

G.3. How has foresight has affected other areas of your life? Work?

G.4. What do you think is the relationship of foresight to action?

G.5. In retrospect, does the foresight process encourage and lead to decisions, actions and change? Were there changes in thinking, actions taken, awareness, and behaviour? Did the project support thinking and actions that would enhance sustainability?

G.6. What might be other tools to use to increase awareness, explore options and take action?

**G.7. Other things you would like to share.**

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b. Case Study 2 – Health Canada – Developing a Sustainable Health System

***Interview Questions for Case Study 2: Health Canada – Developing a Sustainable Health System***

In 2010, Health Canada hosted a series of workshops to explore how to develop a sustainable health system.

KQ: In the sustainable health systems foresight project, how did your perspectives on the future of Canada's health system change? What the most important learnings for you in the project?

KQ: In the process, was there a shift in shared understanding or awareness of new possibilities within the group? How did the group perspective change?

KQ: Did the exercise lead to a realization that there may be multiple options for policy to address the issue of developing a sustainable health system? Did the exercise lead to a realization of the need change within the group?

KQ: In retrospect, did the process encourage and lead to decisions, actions and change? Were there changes in thinking, actions taken, awareness, learning and behaviour? Did the project support thinking and actions that would enhance sustainability?

**HC – Developing Sustainable Health Systems**

**Event 1: Scenario Foresight Event, August, 2010, Ottawa, Ontario**

The following questions will ask you about your learnings in the Health Canada scenario and innovations foresight event.

A.1. Did you attend the Health Canada – Developing Sustainable Health Systems Scenario and Innovation Foresight Event? If no, please go to Section B.

A.2. What did you experience in the scenario planning and innovation event? Process, learning, awareness, change, action, group dynamics? What did you hear or learn that you did not hear of before? What was profound or memorable from the event?

A.3. What points did the group learned or stated that they had increasing awareness or concern?

A.4. Did the exercise lead to a realization that there may be multiple options to address the issue of developing a sustainable health system change? Did the exercise lead to a realization of the need change within the group?

A.5. Which actions did you take? Did others take? What were the results? Under what conditions might action still be taken?

A.6. Anything else you would like to comment on the scenario development event?

**Event 2: Policy Analysis Workshop, October, 2010, Ottawa, Ontario**

The following questions will ask you about your learnings in the Health Canada Policy Foresight event.

B.1. Did you attend the HC Policy Foresight Event? If no, please go to Section C.

B.2. What did you experience in the policy event? Process, learning, awareness, change, action, group dynamics? What did you hear or learn that you did not hear of before? What was profound or memorable from the event?

B.3. What points did the group learned or stated that they had increasing awareness or concern?

B.4. Did the exercise lead to a realization that there may be multiple options to address the issue of developing a sustainable health system change? Did the exercise lead to a realization of the need change within the group?

B.5. Which actions did you take? Did other take action? What were the results? Under what conditions might action still be taken?

B.6. Anything else you would like to comment on the policy event?

**Event 3: Sense Making/Synthesizing Workshop, June, 2011, Ottawa, Ontario**

C.1. Did you attend the HC Sense Making/Synthesizing Foresight Event? If no, please go to Section D.

C.2. What did you experience in the sense making event? Process, learning, awareness, change, action, group dynamics? What did you hear or learn that you did not hear of before? What was profound or memorable from the event?

C.3. What points did the group learned or stated that they had increasing awareness or concern?

C.4. Did the exercise lead to a realization that there may be multiple options to address the issue of developing a sustainable health system change? Did the exercise lead to a realization of the need change within the group?

C.5. Which actions did you take? Did others take? What were the results? Under what conditions might action still be taken?

C.6. Anything else you would like to comment on the synthesis event?

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**Section G: Peripheral Learning**

G.1. What do you see as the value of using foresight personally? (Probing questions may include: has it affected your thinking, how? Has it changed your perspective? The way you think about things? What things?)

G.2. What is the value of foresight in larger groups? What do you think are the applications? The benefits? Difficulties or challenges of foresight?

G.3. How has foresight has affected other areas of your life? Work?

G.4. What do you think is the relationship of foresight to action?

G.5. In retrospect, does the foresight process encourage and lead to decisions, actions and change? Were there changes in thinking, actions taken, awareness, and behaviour? Did the project support thinking and actions that would enhance sustainability?

G.6. What might be other tools to use to increase awareness, explore options and take action?

G.7. Other things you would like to share.

## Appendix II. Participant Responses

### a. Case Study 1 – AAFC – Agricultural Adaptation to Climate Change

Table A. Summary of Themes Highlighted in the Participant Responses

Theme	Details	Corresponding Participant Code for Reference
The foresight exercises provided understanding on the <b>intersection</b> of agriculture and climate change.	<ul style="list-style-type: none"> <li>-Agricultural assets should be preserved or protected from foreigners.</li> <li>-Science integration is needed...natural sciences are needed to increase productivity under duress, but also social sciences to get people to do the right things.</li> <li>-Climate change impacts make the food system very vulnerable.</li> </ul>	AFMF03F  AJBJ10M, ASRJ13M  AJKF10M, AJBJ10M, ASRJ13M, ATBF16M
Participation in foresight can help <b>address conflicts</b> .	<ul style="list-style-type: none"> <li>-Foresight exercises create a space to deal with difficult scenarios.</li> <li>-Most people are optimistic and do not want to study the negative.</li> <li>-By surfacing conflict, participants can plan reconciliation.</li> </ul>	ABFF03M, ACEJ19F, AFBJ10M, AFJF10M, ATBF16M  ABFF03M, AILF11F, ALMJ11F, AJKF10M, ATBF16M  AAMF12M, ACEJ19F, ASRoJ28M, ABFF03M, ALMJ11F, ATBF16M
Foresight provides <b>some clarity in uncertainty</b> .	<ul style="list-style-type: none"> <li>-The diversity of participants expands perspectives and world views broadening knowledge, implications, and points of view.</li> <li>-The foresight process can put some scope on uncertainty.</li> </ul>	ABFF03M, ACEJ19F, ANHJ13M, ALMJ11F, ASWJ13F, ASRJ13M, AJKF10M, ATBF16M  ABFF03F, ANHJ13M, AJBJ10M, ALMJ11F, ASWJ13F, ATBF16M
<b>Foresight reveals that a systems approach that increases redundancy can increase resilience and thus sustainability.</b>	<ul style="list-style-type: none"> <li>-The foresight process highlighted an increased consciousness of the system vulnerabilities and potential for resilience; such as trust in the food system which impacts the ability to protect Canadians and global trade.</li> <li>-Stakeholders tend to take a reductionist approach; however foresight aids in the understanding of actions and consequences to others.</li> <li>-Solutions or approaches often lie outside of the direct sector; holistic systems approach is required; energy, environment, health, inputs, and outputs balance provides solutions on the periphery.</li> </ul>	AAMF12M, AFMF03F, ACEJ19F, ASWJ13F, ASRoJ28M, ABFF03M, AILF11F, AJBJ10M, AJKF10M, ATBF16M  AAMF12M, AFMF03F, ACEJ19F, ALMJ11F, ASRJ13M, AFKF10M, ASGF11M, ASRoJ28M, ATBF16M  ABFF03M, ACCJ27F, AFMF03F, ACEJ19F, AFBJ10M, ASRJ13M, AFJF10M, ATBF16M  AJBJ10M, ABFF03M, ASRJ13M

	<ul style="list-style-type: none"> <li>-Investments in resiliency science are needed (more crops, more pests, new markets).</li> </ul>	
Foresight highlights the <b>interconnectivity with other systems.</b>	<ul style="list-style-type: none"> <li>-The events increased consciousness that actions impact others.</li> <li>-There was much learning about the interaction of agriculture and climate change.</li> <li>-Due to the foresight exercises, there was an increasing awareness and understanding of the complexity and interconnectivity of agriculture with wildlife, economy, health, and environment.</li> </ul>	AFMF03F, ACEJ19F, AJBJ10M, ASWJ13F, ASRJ13M, AJKF10M, ATBF16M AAMF12M, AFMF03F, ACEJ19F, ALMJ11F, AFJF10M, ASGF11M, ATBF16M, ABFF03M, AILF11F, AFBJ10M, ASRJ13M, AILF11F, ASRoJ28M, AFBJ10M AAMF12M, AFMF03F, ANHJ13M, ALMF06F, AFKF10M, ASRoJ28M, AILF11F, ACEJ19F, AFBJ10M, ASRJ13M, ATBF16M
Foresight exercises foster <b>social learning at multiple levels.</b>	<ul style="list-style-type: none"> <li>-Foresight increases understanding and empathy of others. It can increase group cohesion.</li> <li>-The group learned about agriculture, demographics, fine system nuances, and the power of We.</li> <li>-Learning from diverse stakeholders have huge benefits such as developing a common language, mutual understanding, increased perspectives, sharing knowledge, and understanding consequences for different stakeholders. There were significant learnings from different perspectives of agriculture and those stakeholders.</li> </ul>	ACEJ19F, AFMF03F, AILF11F, AAMF12M, ABFF03M, ACCJ27F, ALMJ11F, ASRJ13M, AJBJ10M, ANHJ13M, ASWJ13F AAMF12M, AAMF12M, AFMF03F, ACEJ19F, AFBJ10M, ASGF11M, ATBF16M, ABFF03M, AILF11F, ANHJ13M, ALMJ11F, ASRF13M, ASRoJ28M AAMF12M, AILF11F, ACEF19F, AJBJ10M, ALMJ11F, ASWF13F, ASRoJ28M, ASRJ13M, AJKF10M, ACCJ27F, ANHJ13M, ABFF03M, AFMF03F
Foresight exercises enable participants to <b>see the value of multiple options.</b>	<ul style="list-style-type: none"> <li>-There are many varied options so higher level guiding principles are needed versus specific outputs for policy – no longer one size fits all (narrow policies won't apply across Canada). Need more information sharing and less control from the state. Concepts like resiliency and redundancy are needed.</li> </ul>	AAMF12M, AFMF03F, AILF11F, ACEJ19F, ANHJ13M, ALMJ11F, ASWJ13F, ASRJ13M, AJKF10M, ASRoJ28M, ATBF16M

	<ul style="list-style-type: none"> <li>-All participants need to be open to more broad perspectives to see more possibilities and options.</li> <li>-There is something to the nature of disruptive action, to make change. Motivation, values, leadership.</li> </ul>	AJBJ10M, ASRJ13M, AJKF10M, ATBF16M AFBJ10M, AFKF10M, ATBF16M
Foresight exercises <b>generate creativity and innovation</b> that can help sustainability.	<ul style="list-style-type: none"> <li>-The foresight process leads to innovative, out of the box thinking; it leads to innovation.</li> <li>-Foresight enabled thinking of the long term; ideas, thoughts, and innovations to become more sustainable.</li> <li>-Social media and the ease of connectivity can make deviants, innovators, experimenters easier to connect with each other and create paradigm change that might be slower without that connectivity.</li> </ul>	ABFF03M, ACCJ27F, AILF11F, ACEJ19F, ANHJ13M, AFBJ10M, ALMJ11F, ASWJ13F, ASRoJ28M, ATBF16M ANHJ13M, ACEJ19F, AFBJ10M, ASRJ13M, AJKF10M ABFF03M, ATBF16M, AFMF03F
Foresight generates <b>thinking and innovation which eventually leads to action.</b>	<ul style="list-style-type: none"> <li>-Foresight processes change the participant; you become aware of assumptions, habits, new thinking; but it is hard to translate the findings to others. There are people who can see changes and disruptions farther out...they can feel lonely but often will be validated over time.</li> <li>-Foresight is a precursor to action, but it may take a long time before people see massive change. Participants need time to think, make a plan or strategy, practice the action, then to internalize and support that action. Individuals take action, but it may take time to generate a critical mass.</li> <li>-Foresight processes surface assumptions and make participants face them, aligning beliefs with actions. Taking action is harder than we think.</li> <li>-Foresight opened my mind; changed my way of thinking.</li> <li>-Many foresight participants took individual actions...they changed their behaviour.</li> <li>-Exercises focused on new ideas, new models, but more is needed to focus on how to transcend the present paradigm.</li> <li>-Foresight is necessary for action but is insufficient on its own. It takes time to learn, reflect, experiment, generate critical mass, perfect, and influence others.</li> </ul>	ABFF03M, AILF11F, ACEF19F, ANHF13M, AFBJ10M, ALMJ11F, AJKF10M, ATBF16M  ABFF03M, ACCJ27F, AFMF03F, ACEJ19F, AJBJ10M, ASWJ13F, ASGF11M  ABFF03M, AFMF03F, AJBJ10M, ALMJ11F, ASRJ13M, AJKF10M, ATBF16M ANHJ13M, ABFF03M, ACEJ19F, AILF11F, AJBJ10M, ALMJ11F, ATBF16M AAMF12M, ACEJ19F, ANHJ13M, AJBJ10M, AJKF10M ABFF03M, AILF11F, ACEF19F, AFJB10M AILF11F, ALMJ11F, ASRoJ28M, ATBF16M

<p>Foresight processes revealed that the <b>western world tends to take the short term view.</b></p>	<p>-Government cannot take bold action due to pressures to win a four year election cycle. Others outside of government must aim for long term vision. Perhaps with collaboration.  -Short term vision is killing the world (environment, economy, society); however it is really the future problems that you can do something about. The future is compared to the present.</p>	ALMF06F, ALMJ11F, AJKF10M, ATBF16M, ABFF03M, ACCJ27F, AJBJ10M, ALMJ11F, ASGF11M, ATBF16M AJBJ10M, AFMF03F, AILF11F, ABFF03M, ACEJ19F, AJBJ10M, AJKF10M, ALMF06F, ATBF16M
<p>Creating conditions for <b>change require bold courageous transformational leadership.</b></p>	<p>-Action takes courage, to go against the status quo. Often one can be viewed as a deviant without many followers. Often they can do this by paying attention to the future and delivering on the present needs.  -To lead in complexity and change transformational leadership means relinquishing control and increasing influence. It means balancing the future and the present; educating the organization on the future and what to look for; and creating permission and conditions for innovation.  -Leaders need not know the future, but make the organization aware that the future is there, to pay attention, to experiment and innovate by anticipating. Often their skills are in influence and communications.  -Leaders attend foresight to have insight on how to take action.  -Leaders need three strategies: needs of the present, move to the future, and work around the old path dependencies that work against the future.</p>	ASGF11M, ASRoJ28M, ATBF16M, AJBJ10M, ALMJ11F, ASWJ13F ASWF13F, ATBF16M, AFMF03F, AILF11F, ACEF19F, ANHJ13M, AJBJ10M, ALMJ11F, ATBF16M ASGF11M, ASRJ13M, AJBJ10M, ATBF16M, ALMJ11F, AAMF12M, ABFF03M, AFMF03F, AILF11F ALMJ11F, AAMF12M, ABFF03M, AFMF03F, AILF11F ABFF03M, AFMF03F, AILF11F, ACEF19F, AJBJ10M, AJKF10M, ATBF16M
<p>There are <b>foresight tools that can help participants make sense of complexity.</b></p>	<p>-Visuals are helpful to understand and convey complexity.  -Narratives help merge many complex trends together for participants to address.  -More than one foresight event is helpful to develop new thinking and innovative ideas.  -All female participants enjoyed systems mapping and all males disliked that methodology. This point may indicate that different methodologies may be useful to reach different stakeholders. A possible explanation may be that females have an interest in the relationships amongst stakeholders.</p>	AAMF12M, AFMF03F, ACEF19F, ANHJ13M, AJBJ10M, ALMJ11F, AJKF10M, ALMF06F ASWJ14F, AJKF10M, ASRoJ28M ALMJ11F, ASRoJ28M All sixteen participants

### *Individual Participant Responses*

AAMF12M

KQ: First, the complexity of the system. I knew there was an agricultural system from production to the consumer, nationally and internationally, but I became aware that the degrees of complexity and interconnectedness was more. We see environmental forces, economic factors and I was not as aware of these. Thirdly, my knowledge base on agriculture increased substantially, particularly the demographics of the age of people in agriculture, aging of farmers, and difficulty of young people to get into agriculture if they didn't inherit. With respect to climate change ...my knowledge increased....the reports are not quantitative....the water supply is under threat. About climate change, I knew about the science from other work. At that level, I understood the vulnerabilities, but I didn't learn precisely what it does to wheat production or beef production. I learned the importance of climate change and their relationships, but the complexity of the system with respect to climate change was different. Policies and politics, consumer views come into play, demographics, how all those parts interacted, I didn't think about it and it was useful learning.

KQ: The group was composed of experts and generals and both learned from each other. That type of learning helped the entire group to get a greater understanding of what agriculture and climate change matters and how it is interrelated. We all learned about the degrees of uncertainty and unpredictabilities in the group. Some were more certain and became open to variability and vice versa. Everyone I spoke to indicate an increase in understanding and the degree of satisfaction that comes with that.

KQ: Everyone realized that there were different possibilities and options. It was not clear what the preferred options were until the options were cast in fundamental terms. I am mean, that without knowing the specifics, one would aim for the policies that enhance resilience. Not just for pork, fertilizers, or manufacturers but resilience overall. Resilience is more a state of mind and way of thinking instead of stating I am going to do A, B, or C. Until you are confronted with the situation, then you decide the action. One level is satisfying and on another it is not satisfying....not a sure thing but having options. Some people want the sure thing and it doesn't exist in these types of problems. I think the most important thing to give those who have a bearing of the system...those in the agriculture system, and those who control policy, to have a better understanding of the system and understand the dynamics. Too many people have a bearing on a system and exercise the bearing from too limited a knowledge base. They might be thinking about the right thing in their area, but not the other areas. But a system functions reasonably when all or most parts of the system are well addressed.

KQ: Definitely yes, it did. One important challenge is how to influence and convey this to people who were not part of the process. The reporting out without having been there were interesting but they would not significantly change my view. It was clear but general but difficult for the reader to relate to it. Videos that were done have a greater impact than the written text. In the Canadian context only a small fraction have science training, and a small fraction have policy training....therefore we are not realizing the gap. It is like speaking a different language where they can only understand portions of it. That is why communications is so important. What are those effective ways beyond and above the written word? A written report is necessary but not a sufficient conditions for change.

## Event 1: Scenario

### A1. Yes

A2. My primary recollection was the very large number of thoughts, perspectives, and points people made and the challenge to distill something out of that. People offer views and may use quite different words to describe the same thing...so you need to provide time to explain what they mean. They are divided by language and need to develop a common language. It was a very rich discussion. Most people participated, relatively few said nothing. That was probably a function of the invitees. It is important to choose people who talk. Great atmosphere. I was surprised by the wide number of topics which translated that the agriculture and food system was really much more complex than I thought it was. Just to get convergence on a meaningful focal question, meaningful to all there, we struggled a bit with that. Then distilling uncertainties...these are normal, but these were my observations. Climate change and geopolitics. If you put it up first, you still would have had the discussion...it is part of the process. It takes time to work through that process...and time is a function of the complexity embedded in the question. There were a lot of people. It takes time to bring them to a level of comfort. For those familiar it is a bit monotonous. The challenge is to bring them to the same part.

A3. I learned the complexity of the system and the interplay of science (physical science, social sciences), politics, and the overlying aspect of climate change were the most new and interesting.

A4. They learned that not one method (tillage) doesn't work everywhere. They talked about enclosed agriculture as a possibility. Growing the steak outside the cow. Producing food in a medium. They were interesting. Some information on water required to produce a kg of beef or wheat, why we needed so much water, especially for beef.

A5. Yes, I reflected on my own personal habits and those of my family...it accelerated our interest in high quality and locally produced foods. It also enhanced our respect for food, so we make a deliberate attempt to minimize wastage and reduce the amount of prepared foods that we purchase and consume. We make an increased effort to support Canadian produced food. I am not particularly price sensitive, but if it comes from Canada I will pay more. I used the methodology in my various work, past work and now in consulting. I learned about the methodology. I wouldn't choose a group of 70. I would bring the group together for longer periods. There was significant learning on climate change and I have taken some of that into my energy related work, and on the future of communities.

## Event 5: Innovative Solution Set

### E1. Yes

E2. The diagrammatic depiction was useful. When one looks at a schematic representation it was very good and helpful. It was a good rendition of the materials and

it showed the complexities and summaries to the discussions. It added humor and enjoyment on these tough assignments. I thought it was good. It permitted me and others to see their ideas reflected more meaningfully than a series of bullets. But these kinds of charts are dangerous. If you present them to people not part of the process, they take them too literally like comics and this becomes counterproductive. The diagrams have to be seen in context. We used the COIN method, the polarization was very good to force a different way of thinking. Personally, I think it is better than a systems map because I find that systems maps have too many arrows and you can get lost. I find this approach more appealing to me.

E3. This was a more organic portrayal. System maps are powerful but not very human, but the other depictions are more human. The approaches or the innovative solutions did not depend on large details, but they depended on understanding some fundamentals or principles. I think people understood that...that is why we got to resilience...it has many manifestations in terms of details. They didn't get to what are the overarching things in all four scenarios...but I guess they got the principles or fundamentals. We need more capacity to do science. We need higher levels of resilience. People might find these self-evident. But it is not.

E4. This led to a learning that narrow policies will not work across the country. We need resilient systems, but each region would have to come up with ways of doing it based on their land, climate, and problems. This meant having flexible policy and leaving control to others in the region. This is hard to achieve, particularly at that time. We have provincial boundaries, but water flows from AB to SK and these environmental issues may change the jurisdiction. Are we flexible enough to enable this?

E5. There were actions, but not directly. We did do things at ARC differently...applied the learnings to the biological group at ARC...i.e. the application of cattle feed to periods of drought and there wasn't enough hay to finish cattle. Through the climate change work we saw drought might occur more frequently, if we don't have hay because of drought, then what would we do? Then we looked at Jerusalem artichoke, the tubers, because they contain sugar and other nutrients. It turns out that the stems and leaves (it grows 8 feet in height) produces a lot of biomass which can be a feed...it is drought tolerant and grows in marginal choices.

## Section G: Peripheral Learning

G1. The real value in using foresight methods is that they complement ones learning that is by and large retrospective. Most of our learning is on historical occurrences. WE don't want to overlook those, but the foresight approach adds. You want prospective thinking and analysis, you are better off making decisions for one's self and organizations. It is a complementary way of looking at the world.

G2. A major value of looking at things from a future perspective is to satisfy disagreements and unpleasantness that are often shared from members in the past. It enables a discussion among people even if in the past they found themselves in a position of conflict. You can overcome that by being futures focused. It takes you away from petty current issues and problems. Like the Hatfield's and McCoy's visualizing a positive relationship in the future. This is valuable in groups like departments and corporations where you have schisms and divides...which you can only get through

when people retire. In some respects the futures thinking is equivalent to have a new enemy...a way to unite people in a proactive way. Most organization when they confront a situation, metaphorically circle the wagons, but the group of wagons doesn't go anywhere when they are circled. That is where futures thinking is valuable. It also develops a common language, the complexity, the relationships, the possibilities also.

G4. There is an assumption that foresight leads to actions, except for those who really want to take action, but this is typically not the case when we do foresight work. It is not typical for the Minister or Deputy Minister to be present. People in the hierarchy spend the time, attend, and explain, but there lies the problems. It is overlaying with the problem that most foresight exercises don't arrive at specific recommendations. The number of specific actions directly attributable to foresight work is small because we don't invite decision makers to have the responsibility for decisions. If you were to try and get senior people who were decision makers involved, you have to ensure that the topic is of high importance in their eye and that they are required to do something...to have a compelling focal question from their perspective. A compelling question from most decision makers involves an element of urgency. That urgency is not perceived even though it should be. For example, what is required by 2030 or 2050 to many decision makers, particularly those we have, don't imply urgency, therefore, it is difficult to get them involved...to get the budget, time, and staff people to attend. In our culture, half a year is a long time. For the Swedes, Fins, Swiss it is not. I am not even mentioning the Japanese. I am talking about those close to us. We think short term. Sometimes those thinking short term have an advantage i.e. in the mobile phone business...but if you want to deal in health, climate change, this is not short term. Making sure one picks the right topic and translates itself to senior level people. Based on my experience, it is necessary to do more up front work than we typically do...the notion of coming in with empty flip charts is not an efficient process. Some pre-sessions to pre-think, pre-writing is desirable. When we have meetings they have to be intense meetings. They tend to be intense if you have more senior people present. If the prime minister was there, they would prepare. Though sometimes people will fake their persona, be guarded, say what they think they should....again this can change with the facilitator, and the PM to encourage openness.

G5. Sustainability is a function of many more things than just foresight. Foresight can contribute to sustainability, but they are not the only or even the primary determinant. The sustainability of agriculture may be more a function of politics and financial conditions than these actions. I think they are necessary, but not sufficient. Leadership is about thinking in a forward way. You can do this in a variety of ways. Napoleon started a different legal framework, Trudeau did the constitution, but they both thought that the future of their countries needed change. Foresight is particularly well suited for conflict resolution...Merkel, Holland, and Putin. But there could be a time to say what could be a future for EU considering Russia...where do we want to be in 30 years in our relationship. This is a good foresight question. This is the basis of strategy. Foresight does provide sound bases to develop sound strategy and sound basis to implement strategy...this is what should be done in Greece. You can't do strategy without doing foresight...doesn't mean you have to do scenario planning, but you need something like that. Otherwise strategy is just an extrapolation of the present.

## ABFF03M

KQ: I remember being enthralled with the process and being involved in something ground breaking. There was little agreement that cc would have big impacts even though I was funding climate change in agriculture projects. The most innovative minds were actually identifying cc stresses in crops and formulating new theories on genetic mutations and improvements at that time. It hit me that at the strong end of innovation that we had the capacity in Canada to be a leader in this...but at the political end (the cowboy politics end) we had little awareness and little interest to explore or prepare for it. It was a fascinating event to see this cataclysmic crashing of innovation in climate change with on farm awareness. My own perception of climate change on that was that whether you agreed with David Suzuki or not on the cause of climate change you knew that something real was happening. It formed a new perspective for me that agriculture needed to adapt to have agriculture pick a position to adapt...it should prepare its future and how it could thrive through such a tremulous and unknown changing event.

KQ: I think the goal posts got moved 10 yards in that event. I think people could no longer deny the impact of climate change on agriculture. The fact that they were surrounded by people and learn from each other forced them to reevaluate their positions, they were forced to face a dynamic changing future.

KQ: We needed multiple policies, lots of climates, lots of implications for the rest of the world. Farmers needed to learn that they needed to diversify their risks...had to have new crops, different rotations. Going to more diversification was a needed to mitigate their risks.

KQ: I would preface it as agriculture being a sustainable input. I think it forced a thinking of potential new policies, it forced people to think outside their own operation and industry as to how agriculture as a whole could maintain its position within Canada as an economic and political force within a shrinking rural landscape. It was the fact that the group saw agriculture not just as agriculture, but agriculture impacting security, immigration, etc. It meant agriculture had to participate in these discussions as agriculture sector was not participating in these discussions. This was a huge global or larger system awareness of these second order impacts. There is a real humanness to address the different scenarios to acquiesce self for others. How can the rest move on possibly without me?

### Event 1: Scenario Development

A1. Yes

A2. A3. I remember people had a hard time or incapable to deal with doomsday scenarios. I think it goes to the fragility of the social fabric and the hope that farmers deal with that tomorrow will be better. That scenario in particular was a difficult one for an average primary producer to grasp. I remember individuals fighting that that wasn't plausible and it could not happen. I remember being stunned for the sake of the exercise to make our thinking stretch in that direction, they could not do it, and they recoiled into little balls or fetal positions during those discussions. The process lends themselves to contrarians where there is a good time to debate. That type of personality becomes influential and distracting. This happened 6 years ago and I am still impressed

by a few people being outraged. It was a good exercise to make me reflect my own assumptions which I didn't do before. You get sucked into that people persist in agriculture and push ahead and that everyone will be there...and not realize there can be legitimate losses and decimation (think the pork industry). There is a loss of livelihood, personal lives, it forces people to see the potential in loss in each scenario...but this is a good thing to do.

A4. It was a great exercise on policy thinking but lost on policy makers. Going from an exercise like this bring ample thoughts to prepare and expand potential, but you come back and go back to your burning bush...we didn't talk how to move from status quo to this new work.

A5. The pulse guys moved faster to sustainability versus those like the beef sector to this day. Some groups...the newer groups adapted quicker. I think the difference is leadership and entrenched positions...the lack of willingness to address and adjust your assumptions. Look who is leading the sustainability charge now. Look at beef now...U.S. and Australian market share is growing and we are sucking.

#### Event 2: Policy

B1. No

#### Event 3: Science

C1. Yes

C2. If I am recalling correctly, the thing I was impressed about was the agriculture strategic thinking model...versus just producing more agriculture. More discussion on robust systems thinking...there were advocates in the industry as well for that model of crop thinking. There was a like-mindedness than primary crop guys thought about before. I can't remember the one project, but Janette McDonald from Pulse talked about it later and it moved along in a few years after this.

C3. The conversations around ecological goods and services and policy adjustments were good. I couldn't identify how I could be involved with it. It was a hard thing to make it happen. I couldn't see how it would move forward. I didn't know who could make it move forward.

C4. This was in Alberta and a lot was happening here as well. ALMA had just been started and there was early days of Alberta Innovates...so there was uncertainty who would lead that charge...everyone was looking for new models and we didn't know what could exist and come forwards.

C5. We had new research models, but were these enough. We funded beef research but we needed systems research on crops and forage and beef. Where would this occur?

#### Event 4: Systems Mapping

D1. Yes, I came on day 2.

D2. This was the most frustrating experience ever. Just thinking back I saw people starting to own the process and drive the process vs the organic focus. They were driving outcomes versus the organic discussions.

D3. The map component left me confused and befuddled and it was not easy to understand. It does not lend itself to be a quick learning tool. Too hard to sort out what was a driver and implication.

D4. There were group learnings like innovation and leadership, which was interesting, but the maps did not aid my learning.

#### Event 5: Innovative Solution Sets

E1. No

#### Event 6: Synthesis

F1. No

#### G. Peripheral Learning

G1. G3. I think that the exercises forced people to question their own perspectives on innovation and strategic thinking. It lent itself as a useful concept to a high level of thinking...in building short term or 5 year strategic plans while having the possibility of looking at innovative platforms and how those could be part of a future stepping stone 10 years in the future. For me, I began to think much more about, and was heavily focused on industry outcomes, as opposed to the drive of industry or how they should go. I was managing \$27 m of research investment...I was laying platforms that may have contradicted each other...now I looked at how things were enabling or building for the future. I think that this played out in future years as well...I left myself open to many futures and different opportunities. I think it truly opened my mind on technology platforms.

G2. The usefulness comes from ...I think there was more payoff from the earlier exercises by forcing the group to question its own perspectives and whether it was going to be part of the future of agriculture or not. I think many come in with the assumption that of course they are...but for many thinking strategically for all uncertainty, how they are best prepared to deal with the future ...they explored political uncertainty, climate change....and many other change perspectives and possibilities that could occur.

G4. I think foresight can lead to action....do foresight and be a change agent...even if it is sparking a dialogue for the first time, it brings a new perspective to what that group was changing before. If nothing else, it is confirmation of those early innovators and thinkers...it is affirmation of a formalized process that they are on the right path. It can change current leaders but also inspire the next wave of leaders because they bring these ideas to the next wave of leadership. So is leadership theory always behind? I

don't know. I think progress following this is highly correlated to the strength of leadership in science, policy, and organizational governance.

G5. I don't know if people realize that foresight leads directly to sustainability but it lends a credence to thinking of options and how these may play out in future years. Thus it is more likely to lead to sustainability. The process helps with the analysis of current thinking of organizations and either gives them or other individuals other ideas to bounce off of. Those who graduate to adapt will be those visionary thinkers and leaders. Commitment has to happen to be a change leader...when you back to the Pulse vs beef option is where you see the chasm in their visionary thinking.

The process lent itself to a network of likeminded people. I gained profound respect for guys like Mr. K in the beef industry most didn't know about him...I put him on a contract to be a 3<sup>rd</sup> party observer on a process we were organizing (this guy was at the foresight). This guy became influential to provide leadership in the beef sector. The industry was there all along, but by finding them in the foresight events, I found these leaders and worked more with them. It was during the foresight as a side bar that I met him at the foresight because he was visionary he became someone I worked with him in the future. When Alberta Innovates did start...the foresight became part of what it was supposed to do. But foresight has to be done well. We sponsored an event that didn't ask the right question or was too narrowly focused and it fell apart. Its best application is in questions of a big nature.

In the policy discussions on crop systems thinking, when you think about beef forages, then it is different way of thinking...crop rotations seem small compared to climate change....its benefit is from bigger questions and then apply learnings to narrow questions. You can then take the learning to the next issue, or agriculture and the investments required. Like in Finland and Sweden it is those grand societal questions where it is best to use these processes.

## ACCJ27F

### Event 5: COIN

We didn't have to bring people up to speed. There were new people and we had to address it. There were enough people in the room that were confident and we could progress. We had scenario vignettes which were super helpful to get people to interpret the scenarios quickly. When we explored the contradictions then they could identify solutions. There were many solutions that came from here.

They were still leaning more to finding good solutions from existing knowledge, but there was a lot of relevance of what they came up with. They came up with solution sets of all 4 scenarios. Then we saw the common subset. They said that there is stuff we can do that no matter what we can be better prepared.

Because they did independent analysis and then the synthesis...they realized the foresight exercise of four scenarios, but they got to a set of actions to best prepare them no matter what. Then we got some unique stuff...if we do this we will be half way there for the truly innovative stuff. People had a strong sense of confidence that they would be in the driver's seat. They made good use of it. They used the innovative solutions sets from the stakeholder group...they leveraged the existing infrastructure to edge those solutions forward. They were building something with the bricks.

### Event 6: Wingnuts

(Lego Serious Play (copy write)) I think that Lego is proving to be a powerful tool for high to mid-level innovation. They learn how to do it quickly and what it does is create a metaphor. The bricks are place holders in their mind. As they put the bricks in the model, they create a hierarchical piece of knowledge by the freedom that the metaphor gives them. The play component enables creativity...gives them permission to be out of the box. If you look at the literature on play...put relevance on creativity and you have innovation. The model we were instructed we blew that all apart and now we can use it as an amazing tool. We spent \$15,000 on Lego. They can let go of old thinking and old dependencies. Its 3-d, captures interdependencies, and builds a system.

Two things people don't know how to do it but think they can....how to solve a problem and how to write a plan. They can do 5% but there is a need for a process and a tool to help people. My grade 10 chemistry taught us how to analyze a problem and then the answer would jump out at you. I have been looking for other ways to help people do it. If I hadn't known that I would have tuned out and forgot it forever. Foresight helps them to explore and solve complex problems.

Government, Academia and Business...only people to innovate is business and then business will change mindset of the people will force the government to action. Academia will provide evidence to take action. We need all three but government can't do it by themselves.

## AFMF03F

Now I work mapping all the steps of innovation, like a fishbone, using Cooper with change, gurus in France, and I work on how to focus on a new market with a new technology. I am integrating a strategy on value creation, what type of steps and management processes you need to start a company and establish innovation. I show them the road map and then it is easier for them to manage. (The interviewee has invented an innovation model with many affiliates to help with all the parts of innovation).

KQ: Overall what came out really strong was that climate change will impact agriculture. We will use more northern land than before and we will produce more variety in more places. With temperatures shifting then there are different opportunities, therefore we have to work with farmers to introduce new crops and rotations. They need to be aware of the change and follow the shift gradually. I also learned that the land is getting scarcer at the center. Farmers are purchasing land for their own survival. Are we as a society protecting land from foreigners? They want to buy the land....are we thinking about our long term future?

KQ: I would say yes....because the discussions started like superficial...the more the group exchanged information they got more experience, plus with the guest experts to enlighten and answer questions. They had sharing of information, more sharing and understanding, greater holistic understanding. I recall that by the end they all agreed that climate change was important. In the policy side, I found that people had different visions, but the other events there was a sense of urgency. In policy we had a lot of different government departments so it seemed that they were applying different lenses...not as much as the whole perspective.

KQ: Yes, we really have to plan ahead and have a long term vision. We are working on such short term issues that we are ignoring the long term. Canada was so big with many climates, we can't deal with this with one policy.

KQ: I feel that in the process that what was missed was the action plans and the follow through. We didn't have any more budget to continue....so we needed to enable each participant to make the change. I think they got ideas but they needed extra support and action. We are trying to build a broader perspective. They need to continue the discussion, they need to make once a year to act and report back. To be able to have policies or programs to support these changes. These are the baby steps we could achieve over a 10 year period...so how are we progressing to change the goals. Government changed their mind on climate change...but this is unacceptable. WE have the elements to say this is real so what are we going to do about it of the next 20 years. We shouldn't let the government stop this. This is an epic systems problem...we change governments so often ...we end what we started and don't continue. Changing government every 4 years, these long term projects don't match. Think about the Japanese perspective that plan for your next life...you bring a level of knowledge at a higher level. You can't reinvent the vision every 4 years. One thing really traumatized me. In 2000 I was close to NRC. We had a conference where the president of NRC said we ranked 12<sup>th</sup> in OECD in innovation and by 2010 we want to be 5<sup>th</sup>. That goal was in my mind...last time we looked we are now 32nd in R&D and innovation in the world. This is us. We can achieve great things and 15 years later we are at the end of the line. Our system is not working and we don't have a long term vision. We have to have some capacity to develop a long term vision with some continuity.

## Event 1: Scenario Development

A1. Yes

A2. I liked the scenarios....I learned that food shortages globally could affect sovereignty, highly efficient operations. Forced march to resilience...we need to adapt. These were the strong points what came out. The scenarios helped challenge our assumptions...this is how I think about things. You bring your own knowledge and you learn from others and you need to hear these other perspectives.

A3. Just yesterday I was talking about absorptive capacity...those events have a big impact on the group level of knowledge. It is like interest creating interest ...knowledge is building that that is what the scenarios help doing. The different assumptions are revealed. The diversity of the group gives you other perspectives....you start adapt your own thinking because you see a different perspective.

A4. The biggest change was that we needed a big vision. Climate change impacts everyone. It takes many perspectives. I remember the Albertan saying to me, that I am from Quebec and he thought we could never agree. This broke barriers.

A5. I became more aware of protecting the land...I realized that mother earth needed protection. I sort of went closer to the aboriginal ways of respecting the land. It is changing and I depend on the land to survive. We need to change our way of exploiting the land. Not to spoil it with chemicals to produce quality food. Short term visions here is so different than my years of experience with the Japanese. There are learnings from Western-Asian cultures that we could learn from. We need to sensitize people to the protection of land...not to sell to foreigners, protect it from pollution, chemicals, and innovate in our approaches. We need more health and environmental orientation to our decision making. Being aware of these assumptions I have become clearer to voice my opinion and choosing projects in line with my values.

## Event 2: Policy Event

B1. Yes

B2. This is the event I felt that everyone didn't go home with the same common vision. I learned we needed more monitoring...on water, we need to be more organized and outcome focused. We needed to be proactive and not reactive.

B3. We needed to action on it and not just discuss. We talked about natural capital and sustainability. We needed leadership, talk about this and do actions sooner.

B4. Idea on advanced leadership needing to play a role...it was highlighted that good leadership had to be there.

B5. It was the group making the biggest difference...by us learning more from each other was very powerful. The consultants at this point were less important...it was the power of the group that was impressive.

### Event 3: Science Event

C1. Yes

C2. The competition of agriculture in the energy market...it was a short term vision...now at 2015 we don't have many projects any more on food, fuel and fiber. What happened? We had a fashion show and the clothing was made from agriculture fibers. But did we have the proper tools to balance the residue or waste to use the fuel and fiber. Can the government intervene to sell corn to fuel? When food stocks went down, price of corn went up, people went to wastes to produce fuels or other renewables? At this time, food was cheap. Now we have entered a paradigm of expensive food where food became more important than fuel. Can we stop a farmer selling his food to other sectors? It was a policy question...can you do that? Should we control that?

C3. We needed to focus on a broader vision...the group noted that we needed to bring a balance. We need to consider the environment. The science is there to support this decision making. Science is there for support in advance...they have to plan for this versus doing the science on what is happening now. With this approach to science we can support the long term perspective.

C4. Group change was to evolve from a short term to a long term approach...this is how we could achieve sustainability. R&D in this context is essential.

C5. More work should have happened in science. Government cut resources in science, innovation, and no climate change focus. We dropped the ball...we are now 35<sup>th</sup> in the world in innovation. We had strong science and this is a decision that will impact our long term capacity...we have eroded it.

### Event 4: Systems Mapping

D1. Yes

D2. The mapping is very helpful to show who is playing, the relationships, the behaviours...gives you an idea on how you have direct and indirect impacts to the system.

D3. Integration was a key or major factor. I liked the innovation options and market options. All together the integration becomes demanding...you need to support the whole system without speaking yourself too thin...hard to know how to do this...maybe transformational leadership. You no longer can directly control the outcome...choices have to be made even if it means if you have to let something go.

D4. Helped people realize how every action can have influence in other areas..therefore you have to be aware of your actions could have unintended consequences. You need to choose big directions because you don't have direct control.

D5. I need to consider my actions, how to change me and my organization...gave me a bigger perspective that I can make differences intended or not.

#### Event 5: Innovative Solution Sets

Consultant was good here....different perspective on the history of TRIZ and foresight. Geo-political discussion on the impacts of change. His persona did things with a different perspective.

E1. Yes

E2. I recall how animated people were. People were finding the solution...challenging and pushing each other to reach out and gather your knowledge to build something new. We were clinging together with ideas with a combination of solutions. The different people helped bring innovative and creative solutions. How to even create new value. It was a challenging event and very animated with the artist and the way people responded.

E3. The contradictions in each scenario forced people to push out of the box and cling together. There was a magic in this event. I see different perspectives now, I see something now...I learned something.

E4. I think that the group in general felt this way too.

#### Event 6: External Reflection

F1. Yes

F2. It was pulling out the highlights and reflection of what had happened. We learned many things. We were missing the action plan. It all died when the government ended it. Where was the leadership?

F3. Group saw it was many distributed actions...how would we make this happen when the government isn't on board.

#### G Peripheral Learning

G1. It made me a stronger believer in foresight. Foresight is a strategic tool which should be mandatory on strategic units and government. We must consider the long term and get out of the short term vision which is killing the economy.

G2. Group learning...one individual can't be perfect but a group together can reach perfection. Learn from each other and become more powerful. Foresight enables the group to learn and become more sensitive at a higher level.

G3. I use foresight elements in my own work by integrating the perspective of the long term in decision making. I teach at university at the masters' level in the engineering school and I have a specific module on foresight and market analysis. When I talk about market intelligence I talk about foresight. Foresight is the key to have a broader vision;

private sector should do foresight to build an economic system. It is also included in my teaching. There is a foresight school in France, we can do it here, and it exists.

G4. Foresight is of no use if you don't have the intention to act. It can help people think and practice change. People in their daily activities will not step backward and have a broader view. So if you offer them the time and moment to consider other perspectives this can change their way of acting.

G5. There is always resistance to change so you need leaders that will promote change to make change. Otherwise the nature of the human being becomes too comfortable. People and the economy was comfortable, people became lazy and went for easy money. Comfort seems like our short term goal...it takes people who are not afraid to stand up and try to make a change. You need to bring leaders that are willing to step up.

G6. Foresight is a must integrated to training leaders, sustaining a new economy and project.

## AILF11F

KQ: The biggest thing for me is the appreciation of how much climate change is likely to impact agriculture. Particularly where agriculture takes place and its implication to food, people, communities, and globally. I didn't have a full appreciation until I went through these foresight events. Climate change was always focused on the environment. This was good to dig deep into agriculture.

KQ: I think that over time there is a greater appreciation among the group...because it is such a diverse group. The appreciation of their points of view. A greater awareness of all the different people impacted and impacting the issue. Listening to diverse perspectives and broaden your own views. People were more reserved at the beginning and by the end they were let's do this, let's work on this together....there was more of a group focus by the end.

KQ: Yes, definitely the foresight processes helped people understand a variety of options and that there was a combination of different options. There were differences on how to solve the problems. That was one of the biggest benefits of foresight, you widened the lens and the options.

KQ: I think that foresight, in order to get those results, depended on the participants. The participants could be an opportunistic collection at times, and not always take it to action. I am not sure if there was the right combination of participants to get results. To ensure you have proper expertise of agriculture, the mix, the representative of the different sectors, and people who have a mixture of science and policy perspective and understand how to effect change. Perhaps there was not enough of the various groups. I think it is actually the label on the person, but perhaps people who have the sort of are the out of the box thinkers. We did have a good cross section but this wasn't enough but we need people to think out of the box.

### Event 1: Scenario Development

A1. No

### Event 2: Policy Event

B1. No

### Event 3: Science Event

C1. No

### Event 4: Systems Mapping

D1. Yes

D2. This was my first systems mapping workshop and I was impressed with the process. Out of this workshop for sure...I was interested to see this facility and meeting the people, the systems mapping was an interesting way to appreciate the complexity and the interactions you need to keep in mind when you are thinking about these issues. Thinking about the relationships was an important emphasis that I don't usually think about in science. I liked the people and I liked the opportunity. In science we think about our own domain so appreciating the complexity and interactions are beneficial. There was a speaker and he was very good and it increased my base knowledge. It helped me understand the bigger issues. I really enjoyed that and bought his book.

D3. At the beginning people were focused on their own world, but by the end there was an appreciation of the sense of urgency and awareness of climate change.

D4. The whole concept perhaps of leadership stood out and the need to be more accepting of alternative ways of approaching issues.

D5. I think that every time I went through one of these exercises it stayed with me to a certain extent...I would sketch out players and relationships because it gave me another perspective on relationships. I felt these relationships were becoming more important. Now it informs my general thinking. I would draw the agent and draw arrows to and from to have a better understanding on the best way to approach the problem, move the problem forward, or see solutions.

#### Event 5: Innovative Solution Sets

E1. No

#### Event 6: External Reflection Workshop

F1. No

#### G: General Learning

G1. It has changed my perspective...personally it has got me to think about the future and bring it back to decisions. I think about things way more broadly. I think that it has made me more broad minded. It has made me look at it to the other way people approach things. I notice that many people do not look at things too far in the future. It has made me appreciate that they have their own perspective. It is important to understand how other people approach issues. Based on my experience I can help them look at a longer term perspective. It has been most helpful to see how others approach things and not me to apply a longer term understanding.

G2. It builds understanding where groups are 'me' focused and by the end it is more of a togetherness because of the greater understanding of the opinions and perspectives of the collective group. This tool helps build mutual understanding. It is more useful in emerging and zoonotic diseases because of organizational awareness and cooperation to deal with these issues. There are always innovative ways to look at diseases been around for a while. FMD is a good example, globally there is an idea that we should not

kill all these animals, we can deal with them, they don't die, and there might be another way to deal with it. Old problems in a changing context having a rethinking...think measles now or HIV-Aids.

G3. I use it with my kids to see the bigger picture.

G4. I think it difficult to quantify...there is a long delay if there is any action. How do you measure action? There may be action but is it measurable? Action at the individual level on how you approach decision making, at the group level, at the policy level...in the latter it requires a big delay to align so many forces. The way the government is set up decisions do not have a long term focus. It is hard to get the action based on scenarios, but it doesn't happen in the short term because 4 year election cycles. At the individual level, there are things people can do, but action can be taken quickly; but at an organizational level...the political cycle doesn't consider the long term.

G5. The focal question is key and if you get that wrong you don't get good information. We did an exercise on BSE, but it was crap and I think it was because it was the wrong question....it seemed to be a question of BSE and climate and not at all the original intent. The question should have been given BSE and global impacts, what direction do we want to take on BSE in Canada? A market focus and management focus would be better. I don't remember exactly but it didn't go anywhere.

## ACEJ19F

I now work for a landscape cooperative set up by the Fish and Wildlife Service (FWLS) to set up thinking at a new scale of regions, such as in my work to bring together four eco regions. So what we try to do is plan across state lines and agencies and find common ground. We look at climate change, urbanization, etc., things that require a higher level decision making...drought, river flows, and sea level rise. I have used the foresight stuff...the decision making framework....set up the 4 quadrants...I get them to see these scenarios.

KQ: The complexity of the issue and the impact of the political response due to those scenarios. The complexity was the big realization. The benefits of the exercises were the different perspectives. They were all interested in agriculture but they were so different. The political decisions have such big implications. The implications of those things needs to be better understood to make good decisions.

KQ: Yes, it gets to the diversity of the backgrounds. There was overall an increased understanding and it turned into empathy for other people's perspectives. Over the course of the program you got to better understand what others look at in a daily and weekly basis. Small group discussions got into personal changes....as an individual...we started to talk more about what we could or would do personally. For example, forced march to resilience....what can I do to cope, prevent problems....

KQ: When we did the policy implications, there were slight tweaks in policy could move you from winners and losers to hot and hungry. Not everyone needs conservation tillage....no more one size fits all. There has to be flexibility with policy decisions and they need to be monitored. Can have good intentions but might end up with results that you didn't anticipate. That monitoring really needs to happen ...climate change is slow...we need to have feedback mechanism to tweak actions within the general policy intention. Complex adaptive management is important to have the monitoring and adjusting...this is different than the policy by itself. Monitoring is hard and expensive and tends to get neglected but it is really the success tool to make policy change occur.

KQ: The process led the long term discussions on sustainability...like all projects, it ended...and there wasn't that continual refinement. No one continued to check and follow up. The process had really great potential should the conversation be reignited. It might be hard to get them in the same room...in perhaps video, or other things or means. The development of the scenarios and the thinking behind them was interesting and stimulated the creative side. We need this type of dialogue to continue. Especially in agriculture...it would be good to continue that dialogue...it is so complex and important. From my Ducks Unlimited side ...having the conservation perspective to continue because we are dealing with the same issues ...even in the US. There is not enough water in the South Colorado River...no water means that there is no rice and thus no waterfowl habitat. The level of water in the river affects the economy and the environment. One change such as this impacts farmers, conservationists, people who live there, hunters, etc.

### Event 1: Scenario Event

A1. Yes

A2. What sticks in my mind is the extremeness of the scenarios. In the hot and hungry for example, you get to the place you would talk about border protection, clamp down of immigration...the extremeness of the situation. It didn't leave a good feeling about the potential of humanity. We talked more about the chaotic then the orderly....mostly because that seemed to be most probable. It would be hard to get people cooperating. There would likely be a chaotic event that got us to world order. Forced march to resilience...to get to that better state something really bad would have to happen. You know better but to get people to cooperate you would need a unifying event. The disparity that came with that discussion. We knew we needed a unifying event to get over our boundaries. It takes a long time to change societal values...a lot of personal decisions are made daily that cumulatively and over time impact the environment...I won't buy a Tahoe but a smart car....in government there wasn't enough impetus for government to take action. Just at the time we did this....the focus on climate change died in government. In the forced march to the resilience...we would get to the good stage but bad things would happen. The catastrophic event would give us agreement to protect, to make the bolder changes that we are hesitant or selfish to not want to do each day. To do the right thing we would have to preclude others to have our lifestyle. It reminded us of the Hunger Games....created that world because of starvation, but then that looked old. It would be interesting if people have been that thoughtful after the Hunger Games. For those of us who work in climate change and try to get people to see it...you could see the potential now.

A3. I later bought more energy efficient appliances. For me it was one more piece to help me talk to others to bring awareness. I lived in Small town Saskatchewan...all young women wanted 2-5 kids each to keep the school open. Can't you think beyond....overpopulation especially when you come from Saskatchewan? I could see that....but others can't. Why do people not see that their individual actions have such broad implications? Seeing the future changes you, it changes your perspective. Someone in Saskatchewan who hasn't thought about climate change, sea level rise, that whole islands will disappear. It would be interesting to see these people think about the Hunger Games....it is frustrating to see this. I can see the future and it drives me nuts that those who don't have the exercise are small and short term mindedness.

A4. How to get more people to see these implications? How to you get them to see beyond that fuel prices are down? I was at Calgary, Ottawa, and Edmonton. My last recollection of the last exercise, the group was speaking more in terms of what we can do, individual actions. How can we get people who have not gone through 3 or 4 workshops...how do you take those messages back? How to change those perspectives? We talked more about what we could do individually, but also collectively? Even if you don't see it in your community (focused on avoiding closing the school)...it is really a series of small decisions that normal people need to make...the government reflects what society wants. This all takes time...do we have the time? Climate change happens quickly and slowly...it won't be all...some are happening now and some take longer...it is not going to be black or white. We did talk about the cattle side...my husband and I talked about making the operation more efficient...we reduced the cattle herd so we could re-evaluate the pasture resources we had....we tried to make it more efficient. Fuel efficiency and costs and foot print. We had an environmental farm plan....it contributed to our awareness. We had quite a few discussions on climate change in our household. We were all driving in different directions...we recognized the

implications though we couldn't do much about it. We did things like try to do all errands on one trip one time a week instead of driving to town every day.

A5. It all dropped due to a lack of political will. When there was a minority government and we could discuss. But the majority government stopped all discussions on climate change. We could not research, we could not discuss. We had dialogue with opposition but it doesn't mean we shouldn't do it. This choice was ridiculously stupid.

#### Event 2: Policy Workshop

B1. Yes

B2. I remember talking about the market impacts. How we have an opportunity to address the science to address the market. We had talked a lot more about the role of agriculture as being part of the solution, not just the recipient, but also that agriculture could be a major player to influence how climate change would go. This sticks out as well.

B3. At the same time of these workshops we were working on the wetland carbon protocol. It wasn't done (completed) at the time...I remember talking about conservation and agriculture as hand in hand. You could do agriculture and conservation...they are not mutually exclusive. There was a big realization on this. There was a greater realization of interdisciplinary endeavors...agriculture and health; agriculture and conservation; agricultural market opportunities and conservation...things we thought are traditionally opposed are not. EG&S discussion...you can generate income from a market that you previously you didn't have access to, while improving the resilience of your operation. At the same time you reduce emissions and improve conservation. Shelter belts, leaving residue in the soil for water and nutrients.

B4. There were multiple options and opportunities in the contradictions

B5. Lots of actions should have been taken but weren't...mostly political. No unification on the topic...it was taboo to discuss.

#### Event 3:

C1. No

#### Event 4: Systems Mapping

D1. Yes

D2. I remember discussing the cross cutting market based instrument...that consumers have confidence in those markets and that there wasn't such a big burden on regulations and that we don't want to be overrun by regulations. Having consumer confidence and efficiency with some standards...but not onerous. How to get consumers interested in bees...how to get interest. How to balance...that comes to the role of government but reluctance of government to go there. Integrated innovation was needed.

Market based instruments and the role of government to have standards but not to be the leader....to facilitate the innovation but not do it just manage it.

G1. I would definitely use it again...I am profoundly changed.

G2. The whole in depth discussion of potential discussions helps groups see the implications from their actions. You need a facilitated discussion to bring that to the forefront. I use them in my work in the US...what can those scenarios be, what are the implications, what does it really mean...if the consequences are x, then what should we do. I thought the foresight exercise helped people think out of their comfort zone.

The process was very useful for groups...where you can really get in the discussion. You need the good diversity...but not too large to be cumbersome.

G4. Foresight informs our ability to act. I can make better informed scenarios...resulting in action depends on your agency. For those with a mandate to act...foresight makes you think about your choices. The ability to influence your agency depends on a whole host of practices...it can inform actions. I am not sure if it is direct. It can help lead to action but doesn't always do it. It is a change process but you need courage or leadership. Maybe foresight identifies action, but the action needs to be taken when all seems good or when the opportunities present themselves. This may not happen right after the foresight exercise. In fact, I would say the foresight is more leading edge and the action happens quite a bit later.

G7. Some of these things stick with you. The process and exercise has stuck with me. I was fortunate to be in that program. How to have this discussion when you don't have these events. I don't know what that answer is.

The benefits were the ability to emphasize with others...it is not so easy for all people to do that. Some do it better. Some can't do it at all. Now I have 13 individuals in 3-4 states and getting them to agree on basics is hard. Where is the overlap and build this focus and plan together. I use elements of those exercises to bring people together, see the extremes, find the common ground which can be clearer in extreme quadrants, and make a plan to go forward.

## ANHJ13M

KQ: At that time when we were looking at it we saw hotter and drier conditions, but for the last 3 summers we were cooler and wetter. Yes, science was right, we were going to get more extreme events but they wrong on what type of events. It opened my mind, I always had an open mind. It allowed in all ideas. You make your ideas on evidence as opposed to ...I guess it is feelings or inside things...as opposed to hard evidence. You have to weigh the hard evidence because there are snake oil salesmen too.

KQ: Yes, the dynamics of the group puts forward its knowledge base. For one thing, when we talked about hotter and drier weather...the 30 year bureaucrats said we need to work on equipment to save moisture for producers. Obviously they were in Ottawa too long. They were farm kids...we brought forward that Saskatchewan is a world leader on conservation tillage seeding, inventors of that equipment, and that wasn't the issue. The issue was we needed more plant breeding, but not just plants but animals to allow for them to perform better in hotter and drier conditions. Whether it is drought tolerant wheat, horses, sheep...but there needs to be breeding programs. Once we got that concept up then the discussion in the group changed direction.

KQ: The 4 quadrant graphs we did, we could see where certain decisions led us and a lot of ideas seemed good at the time...you plotted them in the graphs and you saw what you were thinking...then you could see that it shows it wasn't a good idea. After we talked yesterday, I was at the crop production show...I met a gal doing a doctorate in public policy, she talked about the different kinds of decision making and where people are coming from, when I talked to her and reviewed the material for the interview and this all came together for me. People sometimes think their idea is best, or opposed to change, with all the options revealed it ...having the ideas put on the graph, it showed the direction a person or group ...it helped form the idea they should do.

KQ: With the proper facilitator, any time a group sits down and has a conversation on where they are and where they are going will help them. With foresight, it specifically looks at the future, whether a specific distance in the future or not...we looked at 20 years...it had a direction, it didn't lead to a specific conclusion, but got everyone thinking 20 years, environment, cc, ag, sustainability. Whether you call it foresight or other terminology it helped immensely on how to look at our individual future s and agriculture as a whole. Not just western Canada and this helped.

A.1. Yes

A.2. It was the first time I as at something like that that was so diverse in the people who were there. It was interesting to me to bring together so many different views and not that I was opposed to anything like that, but it was the first time I had that opportunity. Getting all those views and perspectives focused in one direction was very powerful to me. Not that I am near that caliber, in my position now, that is what we try to do on a regular basis...we bring diverse points of view, and beliefs and backgrounds and focus them on a single direction. What I learned there was that type of focus can be extremely powerful. Because of that I as successful in bring in people like that for our own needs.

A.3. It was the first time I sat in on a complete discussion on weather patterns. What I was doing with the direct seeding and a lot of my practices...it confirmed I was doing the right thing. Now that it got too wet, conserving moisture wasn't in my best interest. A lot

of confirmation I was doing right. For the group, provincial and federal reps, there was this thought that they had to put agriculture into the future. There were thoughts of trying to do it in the future with programs or money. Farmers don't turn money away, but information is really the most powerful tool if this is given properly for good as opposed to evil. Info can be used negatively or misinformation is used. Producers are often quite skeptical about info they get. It has to come from a reliable source. I focused on prairies....you get into British Columbia and you see different weather patterns as will Ontario and eastern Canada. There are different actions for each region. It was quickly realized that there needs to be flexible and regionalized policies...not one policy fits all. We see that in GF2 (Growing Forward II Policy Framework) and it may be more so in GF3 (Growing Forward III Policy Framework).

A5. In hindsight, you see some of what we did in GF2 because the programming in GF2 is more regionalized. Unfortunately in some provinces the environmental farm plans have fallen off the map. Saskatchewan has gone to a watershed or group plans. Alberta and Ontario have dropped them or put them to the back. The provinces have more say in the programming. It is more flexible in regionality. It shows the blanket doesn't cover everyone equally.

B1. Yes

B2. I remember a bit about the EGS and carbon footprinting. That was one session that was very faint. Policy is my forte and I should remember.

C1. Not there

D1. Yes.

D2. I don't remember any shifts. By that time, a lot of the group was not there. The first groups were very big, but after the sessions were more like groups of 25. There were a core group, then some new people. By that point, the core group had gelled a bit and we were going in a similar direction. Those coming to the odd one followed instead of leading to new directions. When we saw we needed leadership and innovation, the core group had learned that you went into these things with an open mind. Whether they were gun-shy the newbies needed to have an open mind. That is a lot of what the process did. Philosophical ideas are concepts. There was less of this going on...the ideas brought in as a group as a whole were being processed differently. As opposed to the huge shifts in the first one.

E1. Missed the event.

F1. I was there.

F2. What I really noticed was the realization by everyone there...but everyone that I talked with and dealt with, and especially the bureaucratic side that there was an importance of having not so much flexible policy as it was important to have ...it was

more trying to have...much of the policy created is responsive...two or three steps behind the curve....it takes a long time to get where it is going...as opposed to quick decision making and policy being leading instead of responding. I just had another realization. There is a lot of criticizing our current federal government because they are leading this country with policies that are changing agriculture and trying to be leading as opposed to responding. I have criticized them for that and I have realized what I am doing. They are responding to areas such as old requests ...they are responding to old problems....it is an older issue, they are doing things that other governments haven't done. They are leading that charge where other governments wouldn't go. Bill C-18 opens the door to UPOV 91...but no government has enacted it. Now the government will enact it and this will bring changes to the Canadian horticulture industry. The horticulture industry is pushing this. Because horticulture is not a major player in agriculture in western Canada, it is major in the east, they haven't had the influence. Now this federal government is listening to them and seeing the possibilities for eastern agriculture as well.

G.1. The value of foresight is opening minds...getting individuals and groups to look at issues and focus on the specific times in the future on different scenarios and not decision making but decisions to be made. Getting the realization that decisions made now will affect the future. You need to know what you want your future to look like so you can make the decisions now in the future you want to go. Both for individuals and groups.

I try to apply the thinking in the life, but my personal life is not so disciplined. I try to do it, but often I don't write it down for future reference. In APAS we are using this concept and these concepts on working into the future. A five year plan and a rolling five year plan. We don't look at it all the time, but every 2-3 years and it is very important to the future of the organization to be looking into the future and ensuring the decisions you are making now are the right ones to get where you get where you want to go.

G4-7. When foresight is done properly now the definition of properly can be debated, when it is done right it can direct future actions and current actions as well. Your current decisions shape the future. When it is done right, when one looks at future scenarios, the decisions that need to be made, if they are done in a timely fashion, they can make current and future actions easier to do. You need to guide the long term perspective...having the long view and then tweak current actions. That is something...prior executives were on the steering wheel and cranking it hard...now that we take the longer term view...we are heading into a direction and it is so much easier to know or go after certain decisions because you are already going in a certain direction.

KQ: We developed the agriculture policy framework, other reading I was doing recognized impact of climate on the planet, could see in the media that the planet would be warming up, so I was aware that we had to think about how agriculture was going to function in a hotter world, because it would raise the average temperature...would be wetter, hotter, so what would be the impact of that. We think this is an important issue, we don't understand it...need to figure out what the implications to agriculture, might be...as climate is a huge factor in agriculture.

Perceived water constraints...if planet warms up and things get drier ...cattle in western Canada if more drought....if the temperature went up the tree cover, grass, weeds, would change...for example, issues from the south would start coming up....it takes 5 years for ag practices to adjust to a new environment...we might need new ag practices...our framework supports the old paradigm.

KQ: The results confirmed the issues I thought, group confirmed my initial speculations, we should spend more money from a science since how this would all play out....powers that be said climate change was not an issue...we were getting insight but government model wanted to stay away from climate change.

KQ: I liked the scenario approach with the 4 quadrants, gave you the necessary mental structure to evaluate the future....gave you some sense to test practices or action....how does that change the structure....if was difficult for others to use that framework in the same way I did. Not everyone bought in ....over time they did...I liked the different perspectives...as information came forward there was more cohesion in the group

Liked the coordinator watching the interactions among people, dealing to manage the process to all these nonverbal cues....

KQ....used the concept approach of scenarios in my basic policy approach...I picked it up as a tool...I found it very useful. I learned a lot of factual information from the speakers, which showed me that the academic inputs were valid...what is interesting now...there are all kinds of studies coming out...environment and climate change is real, there is risk...now this stuff we were doing is becoming 'mainstream' thinking...I find it interesting that it took that long....if you ask Gavin what the people on farming were doing....there was learning but the governing party is not interested in climate change....25 years after it is talked about it becomes mainstream...this process was useful to have diverse perspectives in the room...got flavor and impacts of different stakeholders....scenarios has applicability to all questions.

I liked some scoring like the impact achievability matrix....divided the solutions to high impact but hard to do, high impact and easy to do...low impact and easy to do, etc. Sorting tools were usefully generally apply.

If you did different axis you got more or less in the same place....didn't have to defend each scenario. I think naturally in 3 dimensions....if you find that 3<sup>rd</sup> axis that gives you insight...foresight did this some....

KQ...changes in the group....power of the conversation...documented the fact that before they started that government was the big player....by the end the individual was

more important...there was a lot of scope of the individual ...there was a change of thinking of the group in the room. People from different perspectives came together and by the end had come together as more of a community....Not sure if that translated when that went home.

KQ ...action...wrote internal reports on the results, PFRA was doing the practical stuff and I wasn't connected to them. When there was an environmental connection, I was more aware of what it was and I was more willing to speak up on an environmental impact...I didn't have decision making, but would contribute to the discussion....I felt I understood more and felt it was a good body of knowledge so I felt confident to be a type of expert.

I think the biggest part is change management....if you do foresight, you have better info on future possibilities. About better actions to take action....need to convince powers that be and we didn't spend a lot of time doing that...the political environmental wasn't right...you would be swimming upstream.

Foresight is first half of the equation...you need to lead the change to implement solutions...I didn't do a lot of that...had the political environment been open...I could do more.

If the political environment is not conducive to make changes...then it is not happening....might have more impact to people; with more decision making...i.e. a farmer or an association

Referred to Kotter....foresight developed a sense of urgency...things were moving quickly, we needed to react...change takes 10-15 years before temp would stop rising as quickly...long lag and delay to see impact....biggest finding is the sense of urgency...if you don't convince decision makers then have no forum for action. We had people in the middle, but not the action makers.

KQ: I would rather solve tomorrow's problems today vs yesterday's problem. Foresight taught me that the future problems are the ones you can effect. This was profound.

KQ: I continually apply the foresight thinking...in the work I am doing now I work in the regulatory domain....what the job is, what will the job require in the future....therefore, how to help the first...what the job is to help them change for today and in a platform for tomorrow as well....you need to maintain a broader perspective.

It solidifies the importance of future thinking....how it might turn out in the future. I did that matrix with more resources and less resources....more cooperation and individual work....as resources get less you move into a crisis management box...you really need to move to a more cooperative environment where you are better able to function with fewer resources.

Scenarios and impact achievability matrix has been used again and again.

#### Event 1: Questions

First questions....remembered the focal question....liked the discipline of looking at ++/-- /+-/-

A4. It was hard to get people to be in a scenario that they didn't like. That took some time, but at the end of the day, we got reasonable well thought out scenarios that represented changes in the quadrants so consistent scenarios...need good leadership to get to this point...you need a process...and not a talk....huge impact was the coordinator and the facilitator to keep it going. There were people who could not advance and only through facilitation and follow up that people got to the end goal.

Development of the axis....had a good discussion on which was highly impacting and highly uncertainty, and that scenarios with + and - , had more diversity vs focusing on a positive scenario. Trying to set up an extreme area of focus that you can think through on how to change policy perspectives. If it is not extreme you can't see the learning. It diffused people having an opinion to state it, select and vote on axis so a diverse group can go forward

Could have added another dimension but it may have made it too complex

Then how to get people to understand a scenario...and that worked well.

A7. There were eureka moments but I can't remember specifically what they were.

A8. Political will to go forward in government and organizations need to exist to go forward. Someone has to recognize that there is a sense of urgency and willingness to go forward. Social issues are important and it is not just science.....high commodity prices vs affordable food under climate change....also the collaborative stuff....as you move away from doctor services to community services...that shift needs to occur.

A9. Green bins...land fill constraint....deal with garbage different.

A10. We didn't deal with implementation...mostly learning, and strategic elements. Didn't define what should be done yet.

## Event 2: Policy

We focused what kind of thinking is in each scenario, what gets you out...what changes have to occur.

Now we went more in-depth. Environmental policies, agriculture support policies, do they work, are they the impacts we want, do we need new policies or tweaks. Discuss the process on which policies to take...what works in more than one quadrant. Try filter out what has sticking power.

EGS (environmental goods and services)....moving from goods to services, and also farmer's not just providing goods but also environmental services. Excitement by farmers to be saviors in climate change. Dual function....food and services. Notion you could get an income stream.

Agriculture organizations had to start to do things different. Where I was in government in research branch there wasn't a lot I could do except to inform up and include

references to it. Things are more complex...could be a market for how something is produced...like carbon foot printing.

#### Event 3: Science

Big learning was to connect science to the value chain. Sometimes science is science but we need to think about the science on new parts of the market. Science looked at things in isolation ....crop A production didn't look into Crop A storage to maximize science as part of the value chain. Emphasized that science integration is important...science solutions at the production side are good for only a few years....a new crop variety needs to be replaced every 5 years because of climate, weeds, needed the constant rejuvenation in science. It underpinned the innovation programming I designed in Growing Forward. Linked science to the market, clusters, expansion in the concept of agriculture...agriculture and health, agriculture and environment, agriculture and consumers relationships....influenced how I worked with the ADM (Assistant Deputy Minister) to change the integration of DGs (Director Generals). Divided the country into eco-zones and the kinds of science you do need to be eco-zone focused. It was hard to get national focus because they weren't relevant across all. Advancing national agriculture by emphasizing regional needs and resources....look at what is relevant in that location ...how does it affect farmer livelihood. Understood the nuanced complexity of agriculture.

#### Event 4: Systems Mapping workshop

What are the nature of relationships out there, who do you have to work with and how. The group I was in ...the group didn't work well, but others and other groups worked well. This is hard to do. Brings to mind to keep the same participants? Or would it be better to change the people?

Big learnings were that innovation was just added but it needed to be everywhere. Need collaboration. Need some changes and new partners. The idea of influence was important and gaining strength.

It was a hard exercise. One group poorly facilitated. It worked for some people and not for others.

This is useful but less so...but hard to determine what the issues were here as some groups had good feelings. What is the current situation and what might have to change....i.e. power relationships.

#### Event 5: Innovative Solution Sets

It came down to focused actions. Realized it was up to other players and not just government. The graphic artist was interesting and helpful. The visuals become very important to diagram the thinking of new systems.

Comes up with options for various groups to consider and invest it. Lots of discussion of new economic models on carbon and water....set up policy, but then in businesses and farmers. New accounting and accountability.

Decision makers aren't here. How to influence action? We had more operational types participating. How to translate the experience and the time investment into an incentive for them to buy in and take action.

We don't have a process to convert this learning into the political process. Maybe apply this in the systems mapping. Innovation sets would then derive what you should tell those people. Moving from understanding to those people that make change.

#### Event 6: External Analysis Event

All boils down to a couple of things...holistic views and outcomes vs outputs. Then take this philosophy in the context on leadership, complexity. You can't just act on one thing and you have to do it holistically and the science has to be more than on production...you need to influence science to market. Need to adapt to future problems. This is useful and wise as this is likely where you can influence.

We learned to convert people that this is holistic issue and move on multiple fronts. We needed to say that on this front, we need to do x, y, z. We needed to convert from strategic space to a tactical space. We left it to participants to do it. It almost suggests to me....still need to do this....and get to the action. Need to find someone who is willing to make the move, or target those individuals and help them to make the move. We never got to the specificity of individual action. You could take this fundamental frame and go one at the time.

Find people who are willing to go there versus people who ought to. As opportunities pop up you have the material to start to help these people. But these people need to self-identify.

#### Section G:

Participated in HC ones. And I conduct my own in my head. I try to do a foresight exercise on my own to force my thinking.

Benefits to large groups...a diverse group of people is required to do a good foresight job, and people who didn't take together, they had a better understanding of their impacts and consequences. The larger group builds better understanding and helps future collaborations. Have learning from others, perspectives, impacts of actions on those change actions. How do you affect them, they affect you, and changes amongst. Gets diverse group of people on the same page and now they have the ability to move forced as a collective.

G.5 a. Exposure to diverse perspectives which allows you to see a situation that is clear to you but through another's eyes...uncovers areas that you did not think about.

- b. Evidence and learning, and sharing, THD (Thomas Homer Dixon) for example, had credible research information that was hard to argue against. Lots of learning, understanding of their perspectives and concerns...optimizes the whole versus the part
- c. foresight helped creativity....what is the nature of the scenario...how might you deal with contradictions, how would you change behaviour, policies, actions...forces you to think differently than you would otherwise...that is why the process is important
- d. it does if the decision makers are listening, interested or in the room...we say participants change, but were they the decision makers?
- e. provides clarity...find things that work in more than one scenario...hedge your bets

G.11. Be Bill Gates and maybe we were Nicholas Talib (Black Swan author)...what are the different possibilities and if they came to pass what would it do....what is a better way to position ourselves to be flexible. Hard for people who don't understand uncertainty.

## ALMJ11F

KQ: I was working on the climate change file for the Alberta government. It was at the top of my mind at the time. One of the major barriers to taking action on climate change was uncertainty. We couldn't say how it would happen, who would be impacted, etc....there isn't the commitment to explore climate change in a proactive manner. I was hoping with foresight we could get people to address the sources of uncertainty. A lot of people don't dispute that climate change is happening. Changing climate change has profound implications on society, economy, environment....it is a long term uncertainty. The long term uncertainty is overwhelming. Needed to unpack the uncertainty. We need to do something now. That was my hope going to the exercise.

KQ: I think about the diversity of opinion in the crowd. There were people like me, pretty educated about climate change. There were people who were or not educated but just didn't believe in it. The XX Association (taken out for anonymity) lady didn't believe climate change was going to happen. It was an eclectic group of people and this was quite powerful. It demonstrated the effectiveness of the scenario exercise to have a conversation on a difficult topic with diverse opinions. It allowed people to state their opinion and move forward. It created a space for an effective conversation with a group of people. I think the scenario creation exercise was the most valuable. It built cohesion amongst the whole group. The groups got smaller as we went along. At the end of the scenario exercise you had a bit of cohesion. You gained permission from the nay-sayers to go forward. They learned a lot from each other. Then we did the policy and science events. When we did those exercises...what stuck as the unwillingness of the scientific people to go through the process? I have experienced that since in other foresight events. They have a hard time using imagination and cognition to advance. The natural scientists have a hard time if they can't quantify stuff.

The systems mapping is powerful to get a snap shot of today. We should have done it earlier. But maybe it didn't matter much. It is good rigor to establish the relationships today. I don't think it is foresight but it is a powerful piece to go forward.

I found the contradiction exercise was a strong opportunity to look for solutions. Having the artist there tapped to a lot of senses...visual, acoustic, had a chance in the exercise to look for creative solutions. When I look at the whole set of exercises together ...you could see the people that stuck with it...like JK...you could see a progression of their thinking. It was a powerful exercise to educate and getting their permission to carry on. The set was more powerful than the independent event.

KQ: I don't know if impacted my actions...because I was immersed in it. The big impact was how to address big groups of people. It didn't change my mind...I had gone through an extensive thought process on the issue. I was atypical. Others had a casual thought process about it.

KQ: For the group, for a lot of people in the room, it elevated the importance of the issue. You could hear that from the conversation and questions. Initially they maybe didn't think it was that complicated, but one thing could be said, that the naysayers had a better appreciation of the policy dilemma that the government faced to address climate change. People believed in it, there was many people demanding something from government, some haven't thought about the complexity of the issues...not just on their own farm, but international trade. They could not just ignore other people's opinions and

action. Cohesion of the topic was one of the biggest gains. There was a lot of learning about the issue, about other people's opinion on the issue. In my PhD work, about 62% of the people said the value of the foresight events was what they learned about climate change and what they learned about other participants in the room.

KQ: Action...from a personal perspective it didn't change my perspectives...I was already there. From a larger perspective, I hoped that the government of Canada would take action. That they would take the info from the whole exercise and give the learning serious consideration to influence policy. I was profoundly disappointed that the Government of Canada ditched the whole thing and didn't do anything with it. From the associations, like beef producers, I hoped they would take the issue more seriously. I didn't think they would sell their cows because they fart methane....but I hoped that they would be more open minded, that they were open to discuss with others and other organizations. I am not sure I could say it happened. For some people at the individual level it happened, but I am not sure others did it. The government of Canada project finished and budgets cut. Some of the key people moved on. The government was not entertaining climate change.

KQ: Thoughts on foresight. If definition of foresight is the rigorous study of the long term future, then the greatest value is that we can spend the time to think about the long term. Most people don't do it. The exercises related to that activity, people have new knowledge and insights. From the foresight work I have done, foresight gives new thoughts and insights...it is indeterminate how you might apply them. They impact but there may not always be attribution. If foresight is done well, you can deal with uncertainty. To avoid pitfalls, contingencies, and other is pure exploration. Most do foresight for contingency planning because they need to make decisions and investments today given uncertainty. If you knew what the future was you would know how to do. We know how to manage risk...but uncertainty is poorly understood. We study tornados, we know how they work, but we don't know when and how they hit....the value of foresight is not risk management...it is grappling with uncertainty. The ability to unpack uncertainty ...through the foresight process you can gain understanding the make better decisions.

KQ: I have applied foresight to other areas of my life. I was employed in the foresight of process in many topics...health, farming, the north, digital education. How it has been done is different approaches, i.e. workshops, conversations, dialogue...generally the engagement of groups of people around the focus question that relates to the long term process. I am not sure if it is the right people and question or the process. I have always used learnings and understandings that I have gained through specific foresight topics and methodologies almost daily in my thought processes in my tasks and my job. I am working in innovation and I use my foresight knowledge and skills in this work. From the context of future uncertainty...in innovation....this is a big link...innovation is on the leading edge and making investments. I advise investments in the Glenrose Hospital to promote in house Innovation...I use this thinking every day. These investments must be good for today and tomorrow. You have to constantly be aware where the trends are going in innovation.

KQ: Biggest challenge of foresight is linking to action. The challenge emerges from uncertainty. If we could quantify these things, then people would act. The fact that they are undefined activities that will derive benefits to undefined populations and timelines...makes it very difficult for people to make decisions, actions. For government

this is hard because of the electoral cycle. They need certain things to get elected. It is almost impossible unless you have definitive proof. We have decision making processes based on burden of proof which is difficult to translate to action.

#### AAFC Event 1: Scenario Planning

A1. Yes

A2. Yes

A4. When you start to elicit emotive responses it is an indication that you are challenging people's embedded assumptions. P stormed away...there were other emotive responses...people were uncomfortable...some farmer after 2 days I can't understand why we are having this conversation...couldn't understand why we would discuss such a negative scenario. This challenging of assumptions is important. Whether you are a follower or not, if the event is well done, you have emotional responses...these responses or moments change them...history was written by emotion...I think when people have emotional responses means a shift and they don't return to the same point. Getting people to stick with it was difficult. People needed to go through multiple iterations to evolve the thought process. As budgets were being cut the events got smaller. If we could have worked with that 60 continually, maybe we could have done more. Did we have the people in the room who could have acted on stuff? They didn't have decision making power to make a big decision. I remember you saying that a farmer about trying to consolidate land but learning about cc decided to talk to family and not sell land. There were no elected officials in the room. The people weren't really the elected officials to make decisions were not there. It is almost impossible to get that time commitment.

A6. Group discussions good, learn from each other. It is not the positive or negative but those ½ ones. The upper left hand is the difficult one scenario. Everyone wants the positive or utopian one but it breeds disbelief. They don't want to talk about a gloom and doom. Remember Herman Khan was accused of thinking of bad and it will happen. Lower right hand is difficult too. Upper left hand is a story of improvement but not impossible. It tends to be the most educational.

A7. No moment of the group change. Probably two months later they saw something in the paper that you had the reflection...at the session itself there wasn't a powerful moment.

A8. For some people there was....most were casually interested. The lady from the XX Association that beef production may not be the same under climate change.

A9. I don't particularly remember an action statement or stating I am going to change things yet.

A10. Scenarios as we did them with 4 quadrant...I see criticism of that approach. I see it replaced by computer aided modelling, but I would argue that every one of these more modern approaches, if you peel the onion, you are fundamentally getting to those same 4 quadrants. They might say it is simple or old fashioned but it is effective. I haven't seen evidence of newer ones being more effective.

## Event 2: Policy Event

B4 and 5: Policy event ...getting back to having the right people in the room. If I recall, we had middle management policy wonks. I remember feeling frustrated that there were very few people to act. They could observe or participate and write a briefing note and that was it. Wasn't clear any of them could do things. No way to translate info to elected officials. It was a nice chat with smart people but they were not the right people to make the decisions.

No particular learnings for me but there were new people so they were having learning. For those continuing you could see evolution in group thoughts. (Memory poor on details).

B8: Can't remember the policy learning. I was going to many foresight events and climate change events and I can't remember details. I remember the farming community needs to conserve carbon and water...at the time that was a pretty straight forward directive. If you did this, could you conserve water and carbon you wouldn't go too far wrong.

B9. There were a number of things like sustainable production protocols...that was a call to action. Whether it was taken was unclear. If we could reconvene that group now...what happened? Because whole process end in government. When Harper withdrew from Kyoto then the whole climate change group was gutted even us in Alberta. When he backed off, jobs changed, file died. Now [Premier] Prentice wants a climate change strategy. No long term vision. There was wishful thinking that farmers would get carbon credits for good land and water strategy. This all fizzled out. 2008/09 world was in a recession and this moved out of climate change. Forestry...environmental practices...all took a back seat.

## Event 3: Science

C4. There were people not suited to this conversation...particularly scientists not opened to the process. Number weren't at the scenarios. They tuned in to the telephone conversation....some were very negative in my interviews in my PhD. They weren't dominant responses from any other groups. This was an interesting observation. The science community was frustrated with Harper. Harper was not strong on science. Investment in the science capacity ...a lot of rhetoric symptomatic of the times. Was it really directed at this or statement of frustration to the science community (many cuts in the field of science at the time). The science event was almost an outlier.

I think the scientist cannot physically go to this fs space. My husband is a scientist and he struggles with my work in foresight. He can't go to that space. Their brains are wired in some way that there is some barriers to this action. My friend is a scientist can't give an estimate....there is a group of people wired such and couldn't go there. I guess if there is a learning out of it, science or scientists were trained and self-selected in the field...doing this work in the context in the scientific processes aiming for certainty, burden of proof is against everything they stand for.

They are driven by government money, they don't have decision making. They had very little control over their ability to act on it. If you think about the sustainability of the process...if you have the wrong people in the room, then the sustainability of the process is impacted profoundly.

#### Event 4: Systems Mapping

D4+: The systems mapping is a process that regardless of the process, the scientist could appreciate it. It is factually driven. What are the agents, relationships, and influence? I don't consider it a foresight process but a support tool to augment a foresight process but it is not foresight because it is embedded in the present. It imposes a discipline of thinking to make people account for all the elements of the system. Otherwise there is a tendency to focus on the elements you like. It is good to see all elements and see relationships, you can see the gaps, the flows, and this is impactful and informing decisions we do today we could see what we do. Because of this action we can id who and what needs to change. It is fundamentally factual with a burden of proof.

D8. You were looking at policy initiatives...innovation was key. But this is a key for everything. Not just cc. Innovation we are all trying to figure it out. It emerged here but likely would emerge everywhere else. Innovation needs to be everywhere.

#### Event 5: Innovative solutions Sets

I remember this was a powerful exercise. I remember thinking too bad there weren't more people there. There were only 5-10 from the original event. But in terms of order it would be interesting to do this earlier after the scenario event. It really did ...was powerful to look at the elements of the scenarios to analyze the differences amongst scenarios, contradictions, common themes, what are the solutions to address opposing issues. I wish we could have spent more time...like 3 days. There was a sense of satisfaction, that they were moving towards a strategy or plan. They could see elements of things that they could do. Scenarios gave them trends and anxiety. But in this exercise we came up with actions and assignment of roles.

There were a lot of ah-has ...I remember the feeling of the event, but I can't remember the specifics. There were new thought processes.

I would say that this contradictions thing...I would say there is potential in the approach...it was a pilot...I don't know if it was done again. I think it is a process that could be built on. People felt very excited and satisfied.

#### Event 6: I did not attend.

G1. JIF (Jasper Innovation Forum) events – North, health, communities, cities...many foresight activities. I would say all the imagining and cognition you are doing scenarios though you may not call it foresight.

G2. Personal benefits of foresight...foresight needs to be undertaken with a specific purpose in mind. You need to be very clear on what you are trying to achieve. It certainly dictates the methodologies, choice of people focal question. The more foresight work I do I see the benefit of defining the right question. The value of foresight increases exponentially on the quality of preparation going into it. Clarity of the question, expectations, full process planned out from beginning to end, what will be done with the information, identification of the receptor capacity for the work. Government doesn't have that done clearly. The ability to take nebulous insights and understanding in policy process is almost 0. Uncertainty is paralyzing in govt. The successful application of foresight to generate long term value...if the capacity of those people who are asked...then you have little efficacy.

G3. Value of foresight for large groups...there is a lot of benefit to gain understanding, build cohesion, lots of opposing points of view, then undertaking foresight is powerful to have the good conversation...only way to have effective communications. If you are using foresight to make strategic decision making...it will only be successful if top people are involved in the process. History tells us that if top people build culture of foresight and forward thinking then it gives them a competitive advantage. If you use foresight to think about a new or desired future or vision then it is effective for that. You have to be specific about what you are trying to achieve. Then have those decision makers there.

G5. Foresight is powerful in them all if it is done well. This is the problem when measuring the effectiveness of foresight because different things are called foresight. There is huge diversity on how foresight is designed and delivered. Some are under resourced. Some not enough time. If you have appropriately resourced and participants, then it is extremely powerful and should be part of the judicial duty of any leader in the 21<sup>st</sup> century.

G9. The disjuncture between foresight and action is uncertainty. If you can impose certainty, then people take action. In western society we are brainwashed where decision makings is based on burden of proof. Our thinking is limited to the past. Our aversion to risk is taking action against what we have accepted or done in the past. The relationship is estranged. Until we change our educational processes and our beliefs we have a hard time to still deal with uncertainty.

G10. I have more than a casual interest....yes, it has impacted me in that way. From a negative perspective, the tendency to think too far in the future is a detriment. It is hard to accept the future is uncertain. You can wallow in it and can do it always, you don't work in the short term...can make it hard to live in the present. Sometimes I regret taking foresight as an area of study because my thinking becomes ahead of others and this is very frustrating and lonely.

## ASWJ13F

KQ: Not sure my perspectives changed. I think they became more informed. I didn't go in with perspectives but had a vague understanding. I had to participate and articulate...it brought focus to it and learn how to articulate them. Key learnings...the different perspectives stuck out for me. We talk within the ministry but getting perspectives from different people, areas, and experiences and this was an eye openers for me. The importance of narratives...based on the 4 quadrants, and how the narratives made it real. How important it is to tell a good story. I am trying to build that skill. To create narratives is very powerful.

KQ: I think it was more how people will willing to open up and express what was bouncing up in their head without being guarded by it. As the group works together, you get natural in your participation. This was the shift in the group being open and honest.

KQ: Yes, I am not sure from the group, but my personal experience, I come from a science background, and I do a trend line and predict what can happen. Going into the future there are many trend lines. You have to think of many. The trend that is most trendy may not occur. If something doesn't change this is where we are going. If you want to change the trend you need to change your behaviour. If you want to change the current trend line, then change is required. How today's decisions affect the future?

KQ: I am not sure that our ministry and others may have experienced this as well, I don't know if you want to call it a level of maturity or comfortableness with this approach...'winky-washy' science...there needs to be a comfort to use a new approach to make decisions in this area. In our ministry we use foresight to help inform us but not directly to make change. We have integrated foresight into current mechanisms vs foresight as its own driver. When we were doing these exercises, what we were doing was very high profile. In terms of recognition of a unique contribution of itself. It needs to be a visible element. In our ministry it is a background to inform not high profile for decision making. It is hard to attribute benefit because it is background.

What is sustainability? We look at economics, environment and social. We wrestle with the definition of sustainability...the ability to maintain certain standards...it needs to perhaps incorporate growth. Foresight can inform decisions to lead to sustainability. In climate change you need foresight to need to think about the future to inform action...it feeds into that process.

A.1. No

B.1. I was there.

B.2. Two things. One was the categorization of uncertainty versus impact and how devising a list of those 2 clarifies on what to focus on. That is one tool I have used over and over. It is a good way to focus your thinking...to have things bubble to the surface. There was an afternoon session, it was populating putting bullets in the chart....it seemed straightforward, but doing it was not as easy as it seems. It does take insight and constructive thinking. Listening to other people and trying to link them to your thinking and then collectively coming up with a short list of items. The importance of different perspectives and a consensus that incorporates those different perspectives.

B3. For me both from a group and individual thinking, the full ah-ha moment happens at the end of the day. I am the type of person that needs to see the full package...the end of the day solidified thinking of the group. Both me and the group as well. This is how it fits together and how it all fits together.

B4. I think so I think that was my feeling. There is not just one answer there are many ways to approach that. You really have to think about different experiences and how people will use different policies and programs. It is more of a realization that nothing is as simple as I hoped it would...range of options is necessary and how they will use it. Not everyone will use it the same way or experience it the same way. There will be a range of impacts. Systems will always be complex and I learned to see the complexity. How to handle the complexity of all this was an eye opener.

B5. I think that we were just beginning to explore how we might use foresight. For me what I took away the practical experience how it can be used and to integrate into practices in place. For me the big learning was doing foresight. Learning by doing was very effective....to experience it helped me understand it. To bring it back to where I work...to teach colleagues and to build the capacity in our ministry and use this to help inform your policy and program development.

C1. No we were in severe travel restrictions.

D1. No

E.1. No

F.1. No

G1. It helps me anticipate and it helps me with work planning with what is coming in the future. I use it my personal work planning....senior management anticipation, different policy and program development, it has helped me in planning. Even in the strategic planning work I do now, I use tools in the collective fs toolbox...particularly the strategic thinking that precedes strategic planning. How to take yourself into the future to disrupt alignment ...to think about possibilities without constraints of the current realities. Backcasting...how to go backwards and say if we want that, how to go backwards. I use this in all types of work. We also did (Ontario public service) did an experience with horizon scanning. I applied horizons scanning and systems training to help me focus on what we are doing within scanning and to help colleagues sort through what we needed to do horizon scanning. It has changed how I approach my own work to change the range of possibilities and which is most appropriate on decision making. Last year manager went on secondment and we had to figure out our work load. We did an exercise to sort through what we had to do and when we had to do it to realign our work. Very practical applications in different areas.

You changed my thinking. I feel more confident to approach complex situations. This has been very helpful.

G2. It helps understand different mechanisms for facilitation. It gives new tools to lead a group through an exercise. It helps big groups to try to think outside the box. In government we are much defined on how we operate and this impacts how we approach and thinking through things. Using foresight helps us go outside and develop a free thinking space. Foresight provides a mechanism to create some creativity and innovative thinking and imagine outrageous ideas and have them considered and discussed.

I am not sure if people are freaked out by foresight. It depends on the environment. We are in a climate with fiscal challenges. It depends on the audience. It is embedded in certain pockets are comfortable to help in complexity. It is hard to measure. It is behind things rather than being a high profile mechanism on its own.

G3. In my personal life to be more directional on where I am going. I have tried that for my career and what I want to achieve in points of my life. The one time that impressed me with it...WFS (World Futures Society) event by a guy from Brazil who was funding research. They developed a timeline of certain times they wanted to achieve and they funded things along that timeline. I would like to do more of that...to plan, check in, and see how things are going. It is an ongoing process and I will use more in the future. I am using these to be more proactive in my outside work life.

G4. I think that there is a relationship with foresight and action...I don't think it is direct. It builds a knowledge base to take action. It helps plot a path forward and provide some comfort. To take actions outside the status quo is always a risk...helps flush out the risk of inaction. It builds the context and the different nuances. It removes the feeling of unknown risk to create a feeling of known risk.

G6. I look at the research literature...I am a bit geeky...foresight helps me see if we use the same tools or do we need other things. It helps me to think of other areas...the area of policy and programs and how it can be better informed...knowledge translation...how different audiences can learn from each other....use more social research tools, how do you look at behaviour and how to measure behaviour influences how we do things. If we can understand how culture and behaviour is fostered and affected. I have now looked more to social research...this is new to me because I am more on the natural science. These techniques help me be skeptical to what is currently used and can we try something else. It has opened up my thought processes to see if there are current changes. It encourages me to go out of my domain, to experiment or innovate. Someone may think a certain path is defined in the program and policy but to be aware that there is a shifting over time and go back and check because change is constant and by the time something is put in place, the sector has already changed.

It has expanded my vocabulary. Now I can articulate a wicked problem or understanding what is meant by wicked problems. This goes back to complexity...with problems with no real answers or partial answers and learning to live with that. It is hard to find space to think about long term problems with you are dealing with short term issues. Finding time for long term thinking is so valuable. If you only do short term thinking then you realize the big gap you leave. These are 2 overall take a-ways.

## ASRJ13M

KQ: This was one of the first climate change discussions...first on adaptation versus to reverse climate change or develop strategies to stabilize. The notion was that the horse was out of the barn and we needed to adapt. Multiple players had to adapt to survive, to thrive in some cases, to derive benefits from climate change that we might not have now. It did hold promise to provide advantages to climate change. To adapt and develop strategies to put us in a better position. I had not heard too much about it until that point in time.

KQ: I think the scenario development approach event in Calgary was an eye opener you could see people went in with entrenched points of view that changed when they had to force their thinking into different scenarios. Each of the 4 scenarios were different worlds as people forced thinking ...in general there was a change...there were multiple possible directions we could go to...all players in the agri-food domain had to learn to work together to adapt or take advantage of the changes going on.

KQ: People coming to the realization that with climate change we might have to adapt to the extent of whole types of activities...types of crops, cultural practices might have to move geographically across the country. That had all kinds of implications on science, practices, information, and training. This notion of the shifting geography was a light on. The realization that agriculture had to change versus supporting policies of government that might be striving to change how climate was changing. We might no longer be able to change the climate so we might have to change agriculture. Markets abandoned and new markets sought, new crop needs and practices needed. So a big change in impact to localities.

KQ: We think of sustainability of the sector as a whole, there would be individual winners and losers ...how to sustain agriculture as a sector. The awareness extended beyond niches sustaining their practices to bigger system changes to help the sector survive or thrive. The scenario development processes supported that.

Looking at systems within the broader systems point of view.

### A.1 Yes

A.2. Good venue....not too packed, broke up in groups. We had a lot of fun to name the scenarios. Label on what we were talking about was helpful. It was fun doing the scenarios. The naming of scenarios was useful to crystalize the diversity of context.

A.3. I learned how others worked or looked at the world is quite different than yours...was an eye opener. It gives you an opportunity to see where others are coming from. Blending these points of view together can take you in different directions. I like scenarios because you can systematically go through the options plus learning about the people and how they think and how they view the world. I liked meeting players from different parts of the agriculture system. You really see the complexity of the agriculture sector.

A4. Discussions were at a high level. There were options in terms of the need to take radical steps...in adaptation radical steps maybe needed to change markets, crops, and

practices. Food security is important, agriculture is part of the economy, and it affects the safety and security of the country. Agriculture is so multifunctional and multi-necessary...we can't abandon it we must do it differently. It is too interconnected with human health, safety of Canadians. Wide range of positive outcomes agriculture produces...we don't have the choice but adapt and do better. There is pressure to be innovative in how we might adapt. We had a safe environment to play with to see options.

A5. We were questioning the wisdom of owning a family cottage given water and climate change. We went from having a cottage to not having a cottage. It drove home the point the Fore-Can initiative on animal health....we worked on one health of animals and human health. We took how climate change could affect both and affect managing risks. It impacted the systemic and systematic thinking that we pulled in to the animal health initiative.

B1. Yes, I was there.

B2. Implication of livestock as a greenhouse gases. Traceability side consumers want to know that animals have been raised in environmental circumstances. Trace animals back. Safety of the product from contamination and related hazards how to track back to how products are produced.

B3. Livestock production, climate change could result in areas being animal production friendly...with growing incomes from other countries this could be good. Opportunities could result stemming from climate change. There could be benefits from Canada.

C1. Not there

D1. Yes, I was there. I liked Gwynne Dyer's presentation.

D2. Did not have a satisfied feeling. The discussions were interesting but it was hard to arrive at bottom lines. It was hard to determine what it all meant. I found system mapping a less satisfying analysis. Very complicated. I am not sure about the findings on concrete bottom lines. The discussions were great but there has to be a way to come up to a final product that were easier to understand.

D4. There were options but almost so many that they were incomprehensible. There were too many relationships.

E1. Not there.

F.1 Not there.

G1. For groups foresight is difficult because of hospitality and logistics to get groups together. There is more we can do in terms of communications technology to help

counteract that. We are doing a strategic plan visioning piece virtually...I guess we could use those tools here. Difficulty in selecting and getting the right candidate to attend. What is the right candidate? Difficulty to find the right candidate, facilitator, etc..

Hard to go to many events with competing priorities. Hard to do foresight in the 0.5 day time period.

Value of foresight to force diverse participants with a common interest to think about variability and how futures might be played out. How they can coordinate together better. Used the foresight scenarios to do animal disease research priorities in Brazil. We used scenarios from foresight to look at the future of animal health research in the Americas.

We got an awareness that the right set of tools to help groups to think out the box and to think harmoniously. Today dealing with global threats and security, terrorism, infectious disease...we need to bring in a variety of players...the globe can benefit plus individual countries can have their own priority analysis within this context.

G3. Yes, I have used the tools in an informal way to think about variability in how the future may turn out...diametrically opposed futures and how I might set myself outcomes would turn out no matter what happens. I think the organization tries to use foresight though we seem to be in an environment where past forecasts are not so accurate. Drivers of globalization and emerging infectious diseases and vulnerable population....threat environment is increasing, but tech in communications is bringing faster awareness of threats. Now some of these ideas and trends are coming true...i.e. one health framework...i.e. animal human health lab, invested in Ebola research....we are now building a global network. What we did in foresight 20 years ago is now paying off.

G4-7. I think that in my work with infectious diseases it is easier to use foresight and have it taken seriously because people are afraid of diseases and pandemics. The fear creates a crisis that people feel they will be liable if they don't think about these implications. Having fear or a crisis helps a lot.

## AJKF10M

KQ: The biggest learning was to put some rigor to my view of the future. I see it as a tool to help me to get a bit more deliberate as I think about where our farm need to be, where do the organizations need to be....what skills, attitudes, actions have to be done to think this way. In terms of climate change, it wasn't new information, but it was a new perspective on how it would impact our farms. The guy spoke in Edmonton, he asked what we thought was the most important element....I think that in terms of agriculture we are always aware that weather has impact....farmers are always looking at the history and changes.

KQ: I think there was some shifts, and the value there was that everyone there from national defense, health people, farmers, scientists, policy people, where I saw value was the opportunity to hear each other, and you can hear them coming out of their own soil. It made our discussions richer. Having just farmers in the room, we don't get that variety. With all of the participants I saw this. People who were there on behalf of a farm organization, tended to be less open to hearing others, because in their mind they knew what they had to defend. I wasn't there on behalf...I was interested in agriculture but I didn't have to defend a position or head off a lobby. I guess that is an important element, how to leave the perceptions and the hats behind. There is more value in the process....one of the people there from Ontario Federation of Agriculture at the time he was defensive of the issues, I saw him the other day in London, Ontario, and he had shifted in his thinking....maybe his learning happened or manifested later. We had different discussions in 2009 compared to 2014. DM...at the time he had to defend this organization, but now as a leader he became more open.

KQ: I don't know if this is cynicism or old age, the less stake that I have...in my 20-30s I said if we could get government policy makers see our way, we could make progress. One of the things I came to was that you have to go home and do it yourself. I learned this at the foresight. Though I know you need some consensus to change directions, but you have to implement yourself, and you can't be reliant in the system or government. There is decreasing policy interest in the federal and provincial government. If we don't take responsibility and the leadership then it doesn't happen. Government doesn't have the leadership or attention span. They don't have the resources and they don't see the upside to be more deliberate about it. It is really hard to keep agriculture on the big hairy monster biting government priority list. This isn't all bad, but it is a realization. This process gave me insight to science and policy thinking and they are gone. You have a few still poking around.

KQ: Yes in some ways. It is part of a process to create awareness in the farm community, awareness that we have a social license that we had to work to maintain. The conversations that are acceptable in general meetings have been pushed by consumers and activists...i.e. climate change, water use efficiency...it is much more acceptable to discuss and debate. I ran a session and called people from the sector and held a discussion with people in the room. I am so glad we got started on this. It wasn't on his agenda and he didn't know how to do it. I did it...I see this behaviour in many more places now. We can be more sustainable in agriculture because we are more aware to lead to our customers.

## Event 1: Scenario Event

A1. Yes

A2. I think the mega trends at the beginning...big 15 trends, where we worked the framework and built the scenarios. There was enough openness to hear each other and messing with connecting climate change with some of the bigger political streams. Understanding that you could structure a discussion systematically into quadrants different potentials. These are not predictions but possibilities, but you have to stretch out the trends. People wanted to go to the nice outcome...resolutely green planet...they had the wish to go there...they had a panic that we would do diametrically opposed. There was a wishing and fear going on, and then it became comfortable to work in the zone...forced march to resilience to work on this slowly. People's hopes, dreams and fears impact their view...your assessment is still based on your hopes, fears and values. Understanding how important values are and understanding the values that drive your actions.

A3. Because it was an opportunity to focus on a topic...agriculture and climate change, I think that people in general it allowed us to pick at the scabs around it and dig through the implications. We got deeper than we would have had a general session on climate change.

A4. I think so, they got out of the muddle in the middle, easier to study the extreme scenarios. I.e. vertical farming discussion...which I thought was wingy. A lot of these things we came up with more options...more places to grow stuff, can we reduce inputs, there was more detail as to where the options may be.

A5. Not yet...they likely took ideas and could work on them. Maybe on understanding the power of the consumer.

## Event 2: Policy Event

B1. Yes

B2. I think that a lot of trends were getting more traction....like EG&S, traceability, sustainable production protocols, food safety...maybe even the need to measure and report. It helped to consolidate policy in a few key ideas. Maybe we can explore these options a bit more.

B3. It inched a few people in places of influence to push forward on things that were fuzzier. For example, traceability....it was barely discussed before, but now there was some understanding of what it could look like. How can we make money on these attributes....was it going to be a burden? There was a recognition that it would be a burden but there might be an upside.

B4. EG&S got people excited. It got recognized. If we are looking at these potential scenarios here are some incentives to move people forward.

B5. EG&S could be real. It might work. On measuring what you are doing, outstanding what are you doing, doing more than how many bushels and price. This gave us a chance to respond and develop EGS as an income stream. WE needed to

communicate better. If we look at all the social media to tell the story about farming...effective leadership, storytelling versus just facts or education. We need to tell people a story...it works better....it certainly drove me to connect with people.

#### Event 3: Science Event

C1. Yes

C2. Big one for me was the connection between trust and food. It has always been with me after that. Science says we can do something and society suggests if we may do something. How do we engage in this aspect? There was a big push on innovation stemming from here. Innovation was led by science but it had to become real on the ground. The discussion on integration was not new but became more urgent. On eco-economics...we are starting to see it ...carbon impacts, water efficiency.

I struggled with this a bit was the science people were from science of the federal departments and they had small tools and dwindling resources.

C3. An opportunity with scency people to apply science to the market...it is not just we can do it, but we can do things typically science....what are other implications to gene therapy. We hear more of this on to partner in to get closer to immediate demands. There is immediate science or long term science...who is arguing for that. There was the first realization of science on the marketing side...it wasn't just agronomics....not if we can do it, but how does it get to market in consumer discussion.

C4. There was some ah-has. EG&S but they didn't do anything. Some of this was political...we don't want to do this, but today we are seeing people in the value chain being compensated for this. How to measure this so we can get paid for it.

C5. Value chain is doing this...now we need some standards. For example the wetlands legislation in Alberta gets 2 or 3 for 1. It is in legislation and land use framework, the legislation includes capacity to use tradable credits...they have it here.

#### Event 4: Systems Mapping

D1. Yes

D2. I had a hard time in the exercise but I liked the findings...innovation, market instruments, redundancy and integration...I found the process frustrating, but what came out was solid stuff. Yet what was pulled out was decent insights. It wasn't my bag, but I was glad to go through it.

D3. It did help define the complexity, and it did make me more aware of the players and behaviours. You can't put eggs in one basket, you must invest and push in many places.

D4. It made more real that it is not just as simple as it looks in the coffee shop. It went from a few big dots to many smaller dots. That wasn't totally new to me but became clearer to the group.

D5. The need to connect to consumers, the need to be innovative across the board. I have seen a review of Millennials and GenX, we lived in a world of hierarchy...the scientist, the Minister, authority was granted by office. For my daughter's world, authority is granted by relationships. I don't trust you until I know you. She doesn't grant them authority unless she knows they care. It was the district agriculturist...where the authority was and they could fix things. When I look at my kids I see this profound shift...this is a shift to my thinking on the farm. I was open to hearing this values survey.

#### Event 5: Innovative Solution Sets

E1. Yes

E2. I liked the artist...it wasn't bad. I sent my kids to a farm business thing in Winnipeg and there was an artist and she just loved it. It brought me back to that. When you have to draw it out you have to focus. People would add or correct her and this brought some cohesion to the group. I was a good reader but because it was spatial and it was something I saw the connection of thoughts. I found it helpful. I told my wife the most about it...she found it interesting and she doesn't often find my work interesting.

E3. I liked the contradiction ...how to stretch to innovate that both are true. I think we live in a world to be black or white...we try to negate people who are against what we are for.

E4. At the same time I was going through mediation training....I am not sure what drove what, but it aligned with this exercise. Can we get past win and lose to win and win. I am not sure where the influence came from. Conflict resolution became a bigger thing and I find its use everywhere. It changes the way you look at the game...do you have to have a winner and loser or can you do win-win...a total change in lens or viewpoints. Many older people come with a win-lose intention or perspective. Today this thinking is an anomaly.

E5. This thinking is way more prevalent today and this was an interesting tool to help achieve the win-win.

#### Event 6: External Reflections

F1. Did not attend

#### G. Peripheral Learning

G1. I speak at engagements 10 times a year and it impacts my messaging and what I present. In my farm operations, we focus more on ...one of the discussions were on rights and how we deal with different issues like water and irrigation. We spend \$10 million on investments. We have focused more on reaching out to our community, value chain, and consumers...it kept me on that trail. I used foresight to make these investments...it cost us an extra 20% on pivots but we felt it was an investment for the future. We were in the process to use more technology on efficiency...GPS, monitoring

and mapping. We are not yet seen the returns but we are willing to do it because we see it converge.

G2. I did a foresight process with eco-trust with environmental groups in Alberta. We used some of the same people and consultants. I pushed some new ideas called the Straw Man to push the beef industry to a sustainable industry to recognize the water, carbon, sustainability work. We had resistance from the leadership and they came out with the plan...they adopted the work we did. ALMA supported our work to look at the beef industry. I think there is impact in group to share knowledge and come up with new ideas. We should have had it done with AMIRA...Alberta Monitoring and Reporting Association....we should have done more. It requires people who want to engage...it takes time...how to get it spread out wider. There is an adjustment of thinking. If everyone is busy how to do get it to happen.

G3. We are now using it on our intergenerational farm transfer.

G4. It is a big leap. You need the foresight to see ideas. But why do we act or not act? We are afraid, we don't know what to do, and maybe we have to look here. When Policy makers are decide....they say they channel an economist. It is not as quick or direct as we would like. It takes time, supports a cultural change. Thinking is one thing, but acting is another. It is like research and on the ground farming. We need the research and then how to apply on the ground. Maybe there needs to be an innovation step. I think of my kids who will be taking over the farm. I would love to see them take something like this, but they are not ready or wanting or interested in that. There is that need for that extension but you need a group of peers that are engaged in the same conversation. Networks like the feedlot business in the Picture Butte area...a few people saw the potential...an organic group of people working with the same people built expertise and courage and improved leading edge on North American grain fed beef. If you are not in a conversation with those equally engaged you are going to have no or spotty actions. If I see a gap in these thinking and stretching them along because I don't see people playing in the same area. I have to search them out and I don't see them enough to push us further. We are social, our businesses peak with each other, and if there is no one thinking about adapting to climate change...you almost have to build that group somehow...twitter and some social media stuff is starting to fill that gap. The adoption of social media is helping the leading farm community....who I don't see on there are scientists or policy makers. I see consumers and producers.

G5. There is a lot of learning, everyone is smarter...at least you make choices knowing more.

G6. I don't know. I think foresight is good and important. How to get people there? I like that stuff so there are people who want it...the value is pretty high and I would like to see more people in it.

G7. Thinking about change and managing change is very important and undervalued and poorly enabled. You need a leader to enable it, create a community to focus change, and gives the innovators a community. Perfection is the enemy of progress.

ALMF06F

KQ: This was my first and only foresight exercise. I don't go to exercises with break out groups. I don't like to be in a group...if they are morons it is a waste of your time. I come to hear experts and people to inspire me. I am not good in unstructured discussions with strangers.

KQ: I feel that if I am in a focus group, it is because people don't want to hear what I have to say. This was different because it is not people you have to consult with but people we invited.

#### Event 5: Innovative solution sets

E1. Yes

E2. I really liked the artist. It was great to keep me amused to show what people said...it added a lot to a meeting. I would like to have her at a meeting I ever go to. I liked that she really represented what everyone had to say. I am not aggressive enough to get the ideas out in a group but she heard everyone. I liked the people. Part of my problem was that I felt I had no stake in the outcome. I felt this would feed in some government process....it might affect my work. I am a farmer and I know what they do affects the whole industry...but I guess I feel that government is disconnected to me.

E3. I enjoyed the guest speaker....the climate change scientist Thomas Homer Dixon (THD)...I liked listening to him. I was impressed that a speaker of such prominence was lending his time on this.

E4. Underlying thing was that government was weak to implement. I felt this wasn't going to affect me. If I could see that they would use it and I can get the benefit it would be good.

E5. It is hard to separate the process from the inadequacies of government. This is the first time I am working in a non-government job...we study something and we do it. Government doesn't want to do it. We have the same contradictions, but we are interested to do something about it. I can definitely see applying the method to my work and it would be useful. But government and anything associated with government is so useless.

#### G: Peripheral Learning

G1. If I don't look for something new I won't find it. With global warming we don't know what to do, if we don't do anything we don't advance.

G2. You can practice doing things in the future....maybe I am more likely to act.

G3. If I want to make a decision....I think of a person I admire and I learn about the decision....in a way you are identifying my assumption with the individual I am calling.

G4. Bringing people in with different views is really good, but when you have a guest speaker, do you negate the benefits of diversity? Or were they more unified because they went through multiple exercises. Interesting discussion on having power policy people in the room....if the big person is in the room, then people lobby and don't discuss openly. How to overcome this contradiction of discussions, ideas, etc.

G5. Thinking about sustainability is probably a good thing to promote change....a bunch of people focused on the outcome. People were not on their phones, they were engaged. These days it is harder to find people in a room so engaged...there is a lot to be said for this.

I think I will spend time thinking, meeting others, gives me ideas.

G6. I need to figure out my actions....I have unused potential. If I could organize myself I could do something but I don't know what that might be. These processes are useful because they can guide your thinking and get you thinking out side of the box.

## ASGF11M

I attended only 1 event so we did not do the introductory part because it all referred to one event.

Event 3:

C1. Yes

C2. I liked the exercise to look into the future. To sit down and think about things that may happen was refreshing. There were a lot of different perspectives, given that there were some common themes. I agree with most of them.

C3. Almost all I do now are on environmental goods and services (EG&S) and those values and to do science that is relevant that we can communicate to broad audiences like government, consumers, the public. If we can't get the information out there then we can't make it real. We have done a good job at this on the Prairies. Part of this is due to conditions on the prairies like heavy rainfalls so people are more open to learning solutions. The success we have had are focusing on the right ecological services and to tell that story and these things were discussed at the workshop.

C4. I remember the group really got introduced to adaptation and resilience...like ok...we should start thinking about that. People were focused on growing new crops and then we discussed about wetlands buffering climate change...they were more open to those ideas.

C5. They probably felt that by the end everyone plays a role. Initially they said the federal government had a big role to play...to get things in place like research, policy, and incentives. My current thinking is that this is a big role to the federal government and they need to do it. I think it will require some major climate related event before they take the measures required. What I see out here is that governments are afraid to put policies in place, particularly regulation that may negatively impact voters. We are having progress in Saskatchewan and Manitoba because of the flooding. The provincial governments are taking steps they were afraid to take previously.

Whatever I do I just ignore the federal government because they aren't going to do anything. The Feds are similar to the province...they react to the disasters. We concentrate at the provincial level. In Manitoba there was an announcement for wetland regulation. We did the science and helped there. We did it in partnership. Keystone agricultural producers we need to have wetland regulations to stop drainage and to restore them. Our research shows drainage takes nutrients from the farm and cause water ways eutrophication. Government is taking the opportunity to deal with Lake Winnipeg being eutrophied. They would never have said it before. These environmental problems allow them now to score points with the electorate. Climate change is a bit different...flooding happened this year...it is different. When we are pushing the values of wetlands I stay away from climate change because it is not a good driver at the provincial level. They don't care about climate change...they care if a road is flooded. They don't see that as climate change but they see it as bad weather. I am total for doing something about climate change but government and people are not good at doing things for the long term. We work at many different levels. Hit when there is a

crisis. Make partnerships. We work at the regulatory level. I like the carbon and water quality markets. We push for regulation first because draining a wetland moves nutrients out the farm land. I don't believe in giving an incentive not to drain.

There was a lot of good research done by government that was held up by feds not believing in climate change. Also the point is that people don't read. That information is not published.

#### G. Peripheral Learning

G1. G2. It was a great exercise. I am not sure what we did with it. The big players didn't act but were seeing people act on the edges. Foresight is great to learn, to see options, see the complexity, but how to get it to action.

G3. We use foresight internally...we talk about how agriculture is going to change in 30 years...not as structured as what was done. But we look at trends, power positions, where we can apply pressure. We have taken many routes to get policy changed. We talked about this earlier...we need to be politically relevant...hit when there is a crisis...flooding...and hit the media. We got smarter. Prepare the foresight but hit the action at the right time. Therefore, foresight and action are not always correlated.

Those radio ads in Saskatchewan made us famous...I am just moving some water, I am just moving some water...then the hospital got flooded. This brought a complex topic to the surface. There were many small bad actions in agriculture drainage and overall we have a system problem.

G4. On action...hmmmm. We thought government could do something but they are powerless. The same thing with science. You can't do science alone. Then we thought you have to go to the minister...then we can see action....at least at the political levels. Foresight gives you knowledge, ideas, and options, but you need that political savvy and relevance and this is not always open after you have the good answer. You might have to wait for a disaster and then when it happens you are ready....and government and others are not. This is the entry point. We will always work with the government, but now we do it different. We use that political animal/communications much better but we internally think long term so we have those good ideas. You need to use a different mechanism to get to action. Action is hard...I have had to hire 2 political groups on how to make it happen. It is a different process. But once you influence and can move the system, you have to have the ideas. They are linked processes but they are not the same. If you want to move forward, you have to have the players there. We have policy people who work for us but know what to do...how to lobby to meet political people to see what they are interested in and then we morph the idea into that context. For example, we talk about flooding, but we are Ducks Unlimited and we don't talk about water fowl...they don't care about birds. I don't talk about climate change...they don't care...they care about flooding, road damaged, polluted lakes...so how to generate environmental and economic info to do the right things but through those contexts. When we sit down we sit with science, policy and a communications person. Begin with the end in mind. For years we did the linear approach...do research and go on, but this didn't work. We start with what are the positive benefits to the government to do this or what is the negative of not doing this. Then we work from there. Science was a big part...now it is only part of it...we need these other intelligences and other angles.

G5. Human beings are not altruistic...they are selfish. We need to understand we need regulations so we think about the future.

G6. Foresight is key to sustainability...you need to think what would/could happen, you need options, you need frameworks. You need to do them on topics of critical importance, visible and serious to do something with the information.

G7. The future requires courage...to not be afraid to lose their job. If the federal government thought they would be voted out because of climate change, that they would do something. But they don't, they want to get elected. They have even worked more to take things off their balance sheets. The successes we made on a wetland fund...we did the work, the economic analysis, the tax guy...then gave the finale to the government. Also we use media way more...get the discussion out there, create the awareness, then government pays attention. Foresight could do that. You don't have to get everyone involved but vocal people, thought leaders, etc. People are actually followers. It is not the concept to get everyone together and see what the public wants to do...the general public is very poorly informed. They are asked because they are votes, but they aren't the knowledgeable ones. You need people but not absolutely everyone.

KQ: Getting a sense...I always knew that agriculture fit into a larger system but finding more about the depth and complexity in which agriculture is embedded. Also finding out the scientific and technological advancement of agriculture...I was a futurist and strategic intelligence officer...and I was amazed in the use of GPS to fertilize and I gained a new respect for the Canadian agriculture sector. It changed my understanding of the sector's ability to deal with change. Becoming a futurist and moving from geopolitics and I was interesting in factors governing security...food security was a growing thing...as a humanitarian enterprise as well as an issue in global peace. Climate change is a pervasive destabilizer of peace and these workshops helped me broaden by thinking on climate change.

KQ: I have seen some foresight workshops that were one off...part of a day or a day...and I felt that those would be useful to tease people, but not necessarily sophisticated. This process with multiple workshops and add new things that were missing from a previous phase...was a more sophisticated approach to allow the development of collective intelligence ...it allowed more people to learn and go deep across the workshop.

KQ: Methodologically I worry a bit on how the events are moderated. Some exercises try to organize the cohesion artificially. Those that are trying to convey a nuance. It is the sharp edges that needed to be carried forward. This format allowed the continuation of exploration and learning.

KQ: I think in terms of growth of understanding....of trying to predict and forecast. The foresight workshops there was a blossoming in alternative possible futures. Some things are part of our control and some none of our control. We had a good identification of the range of influence...i.e. short term versus long term. There was a type of maturation with a battery of workshops building on each other.

KQ: In the short and long term it helped different players to explore and expand their understanding of sustainability. But since we are embedded in organizations, we learned how others thought. We also saw things that were very innovative but we were not sure what people could actually implement. It gave us some insight in biases and shortcomings of organizations to act. It gave us a sense of opportunities short and long term.

#### Event 1: Scenario Event

A.1. Not there (but he was there)

A2. I don't recall any specific event. I was looking at the warm up for good brain storming workshops...have a speaker to stimulate. It takes time to get their own terms and references are. It took time to have events to share and learn, to explore and develop differences in the same term. E.g. the word risk...each of them has a different definitions. By these batteries of workshops and space in between you have time for ideas to incubate. You pull information, you learn from others, it makes the input richer. This is good to have space in between because you need time to synthesize to develop new questions for next time.

It is important to have a variety of different actors, but gave me more concrete knowledge on how players are broken up and how the sector looks. Knowing who the players are, what they are doing, what are their responsibilities, what they think is important...this is so much more valuable than theoretical discussion divorced from concrete players. The bricks are the different players and you get to meet them and build valuable working relationships. The workshops produced outputs, but they were also a catalyst for community building.

I know I like the systems event. I thought it was valuable, but I can't remember a lot of the event. I like learning how the industry was created and how it has changed. This gave us insight as to how future changes could occur. It brings in feedback loops, inertia in different parts of the system. This systems approach is good to see how the system is organized but the dynamic elements as well.

G1 G2. It has been a way of putting together an understanding of alternative possibilities. The term coming together is risk assessment or risk management...people feel that is limited. If you do risk assessment and foresight it informs each other systematically. It helps me understand my personal affairs and helps groups understand alternative routes...even if they are detours. Then understanding to look for mutations and surprises. Looking for desirable and undesirable changes. It is useful to find meta-solutions.

G3. My decade as a futurist in public sector and security...all hazards such as natural disasters and national and international security , as well as industrial hazards....this gave me a broad background. I look at societies and resilience. Foresight learnings from climate change affects all of these...natural disasters, national and international security. These workshops helped me understand climatic change and its impacts and then looking at natural and societal systems...it helped me understand how these might link or have domino effects. It gave me a perspective of implications of systems upon systems. Climate change has such broad implications. When I came into these workshops I had some sense of climate change in history, but the exercises cemented my concerns. In the past few years I have given a dozen presentations to natural security...in each of those I have talked about my learning of climate change and how climate change is dangerously subtle....you can't look at the long term sustainability of a political system without examining the link to climate. It has helped me teach others to learn about the future and see the influence of climate change on national intelligence...where it was force that we neglected because it wasn't an actor or player but to see how economies, trade, international relations were affected. Now some of the most dangerous geopolitical environments would be dramatically impact India by monsoons on nuclear plants, large scale flooding already with racial tensions, and climate change comes in to disrupt social and environmental and economic fabric.

These workshops looked at climate change in relation to agriculture as a primary dimension of food security. But for Canada and internationally climate change is important to the health of the fisheries and oceans. Agriculture is the all more important because aquaculture is at risk (acidity of the ocean, overfishing) if the oceans die then agriculture has to make the difference and this will be a historic challenge as agriculture doesn't have excess stocks at the moment and 30% of global protein come from the oceans.

G4. It makes us wonder how the elements of foresight might have been an element in policy making. If it hasn't been, then how could we miss something so fundamental? Foresight helps us understand alternative futures and what is the past of each alternative future...how did we combine the resources we had ...what could pop up...we look at combinations and permutations. Foresight makes explicit what for a long time has been implicit...it helps us check our assumptions. If foresight is an ongoing exercise it helps us define new economies of action or economies of alternative action.

G5. Foresight is essential in sustainability. There are such powerful forces and modalities that threaten sustainability built in the economy and society, that foresight can explicitly identify what shapes the world around us, then the possibility of finding sustainable paths without the types of mix and match testing that constitutes foresight. I think we need foresight to broader communities, society, and mass media to understand the issues. I think foresight needs to be introduced to high school...departments of economics, sociology, and biology...each contributing its strengths to the fs process. It will introduce the notion of all levels of possibilities, each perspective brings limited wisdom, therefore sustainable futures needs to embed all the learnings of these multiple dimensions.

Things that limit this thinking is the gulf between the humanities and science...to understand the sophistication of everyday thinking...requires the basics of thinking and wisdom of both. Science in Public health but also the sociology to integrate these actions, to motivate and take action ....how to get people to reengineer their society and their lives. That is what sustainability means...we are part of that reengineering...we can't impose this...all must do it.

G6. We are talking about a conception of democracy that is participatory. We are talking about engagement across disciplines, or across communities, but it needs some things in everyday life to change, but then what gives people a sense of values, beliefs, cultural change. How do we change our identification of these fundamentals? Man versus nature; man separate from nature; now seeing man as part of nature...the Anthropocene era...the incrementally, the very small changes of billions of people can have large impacts on global systems. I.e. people poo-poo we can change the climate. How with so many people we can have dramatic impacts. Whether it is projects in bureaucracy or in society...we need to expose people to think out of their boxes. Within your profession to learn, then learn other disciplines...this is a lot of extra homework for them. Can we encourage curiosity and reward curiosity...this involves exploration to think more broadly. The foresight movement, the environmental movement is to work with youth...youth don't carry as many responsibilities to weigh them down...and more curiosity in general.

The use of narratives I would like to know more. On one hand, the narrative as a story to help find the links it can be useful because people think what is next or the bigger picture. What I worry about but I am not sure if it is a problem...there is a problem of the narrative to drop factors we don't understand well. In intelligence we work on intelligence assessments...for policy makers we would tell them the story...if there were some puzzles we would throw them out so the narrative was clean. We need to talk about the pieces of the puzzles that were missing or we were uncertain about. So I would like understand more about the power and weaknesses of the narratives. In talking with professional intelligence and military analysts....some have asked me about

the place of science fiction...to help people explore the unknown and unfamiliar then it creates some excitement...you can do that with narratives....it encourages the use of imagination and test it back...you can take the learning of what makes it possible....a type of dialectic...there are constraints and limitations.

KQ: I learned the foresight methodology on the scenarios. I read about it before...how Shell was the beginning of that really. I was really an old Porter strategists. I gained tremendous respect for the foresight. Foresight reinforced my thinking on climate change. 10 years ago I felt very lonely and it was a great help to me because it provided the structure and methodology to look at agriculture through climate change. It reinforced that we needed to plan for the worst but work towards the best. From that point on ward, I used the method for many questions. In both the beef and the pork industry, most of the problems they endured during the last 10 years were self-inflicted because they didn't consider this type of approach. I have delivered some talks on this...people are recognizing that not taking the long term, and the climate change scenarios to make robust decisions...i.e. the water decisions, the amount of water withdrawal today...not just the water evaporated. The big one for pork, was in 2007, they decided to lobby hard Health Canada to change the protocol to allow the feeding of raloxfomate to put on the weight on the pig. Many countries banned the substance. The companies were so intent of getting weight on the pig, but didn't consider market demand...huge pork demand but Canadians were banned because of the hormone. This was clearly understood after the fact. The interest in getting weight on the pig was huge. 10 years down the road and now the big operators like Maple Leaf and Olimel have stopped buying from farmers who use it and now are starting to reenter that market. Industry was looking down versus down the road. They lost at least \$1 B. In Beef we got a Korean agreement 10 months after the Americans. Korean changed the view of BSE. We didn't get a free trade agreement in 2008, US got one, now we are getting one because of our future look on disease management. Now US has 2.8 year duty advantage. We don't do enough foresight. When we do it and few people understand it, they don't want to be changing the status quo. This aspect really dominates. People tend to use wishful thinking. You need a courageous leader and persuasive power to get the leader who is charismatic and courageous to take on what is a tremendous amount of status quo. It is a slippery slope from the peer pressure from what I see as an insidious thing...from a tendency to benchmark everything...we are totally driven by benchmarking to the US, even though we benchmark wrong things. The leader would do what the US is not doing, they would disrupt the system to be highly successful, but people benchmark to the leaders and their peers which is problematic. This is the difference between disruptive innovation and incremental innovation. If the paradigm is ok, then benchmarking and incremental innovation is the way to go. If you can win by changing the game, then the disruptive innovation and 'first in courage' is essential. US consumes most of the changes internally so there is no risk as compared to the Canadians.

KQ: It wasn't a 100% but in general it moved to a view that everyone had to take responsibility. There were outliers who continued to believe that essentially what the group saw was highly significant future risk. But the good news, the vast majority, their view changed during the exercise.

KQ: I remember that definitely there were multiple options. There were multiple scenarios and we had many choices. In general the idea was that it was a lot cheaper and easier to reign in some of the GHGs earlier than later. There was a time issue here. Things would work better the sooner we started. We needed to understand incentives, credit markets, and science on how to develop the market side. There have been many moves towards tradable credits. But they are minor value to where they should be.

Most of the issues are around the true amounts of sequestration. We see this coming, we see evidence about 2 meters down in the prairies is a lot of sequestration. The grass evolved with us, when you took bison off, and the old grasslands original wild prairie grass the roots go 2 meters. The grasses were resistant to fire and sequester carbon. Now grass has evolved to shallow roots...due to man-made issues, now sequestration takes place in the first 6 cm and not deep enough for resilience to the elements. Ecological evolutionary processes were symbiotic with the grass and the bison. The credit issue which would have been applied would be a big value. We haven't won that one yet, but it started in those foresight events. Carbon tax comes out of this....a carbon tax would be beneficial to Canada or we will end up with a quota system on carbon and Canada would be a price taker. So countries like the US, Japan, and EU would be highly interested in that. They would own the quota and buy it cheapest.

KQ: Absolutely no doubt in my mind that it started a wave of thinking. It is a process and it takes a long time. It takes a long time because the resistance is so dramatic. People are making money now, these people attack the new idea, when they can't attack the idea anymore because it is obvious, then they see how they can greenwashing. We are in the greenwashing stage. There are some steps in the right direction. This results in the beginning of the change.

#### Event 1: Scenario Event

A1. Yes

A2. Trend and drivers discussion. Building the scenarios was profound. The process I really liked. I knew about them, but I was a convert of the Porter stuff. I come from a company that lived and died by the Porter model. If you didn't look at the future or possible scenarios, that there was a wisdom there to inform our planning.

A3. Now I use both models to plan and it has made a difference in my work.

A4. People who were the most skeptical, even they began to realize that the danger of falling into the disaster scenario was higher than they thought. I think they were surprised by people's concern of this. It was believed by many to deny climate change, but they became skeptics; the group skeptics became believers. They all moved and they all moved to the point that it wasn't a mitigated disaster for Canada. Everyone's view changed somewhat.

#### Event 2: Policy Event

B1. Yes

B2. Four very possible distinct scenarios where you could do the same action or policy, but the outcomes come out. We can do well or poorly. If we can go beyond mitigation to adaptation, and with advance planning, we could fare quite well.

B3. We saw incentives and market options that could be real for the first time. We needed science out of the agronomic field only...moving to the market side to enable these opportunities.

B4. We are seeing many discussion of carbon and water markets. Progress is being made here.

#### G: Peripheral Learning

G1. It is absolutely key to any good decision making....personally or in business. You need to think about the future. Bringing everything you know to the discussion is very good, then creating what can happen. I do this in all the boards I am on now...that is how we play it now. The process changed me from the Porter model to the Shell oil model. I think it works because once you lay out the possibilities, then people want to know how likely it is...that is where the discussion is. The impact and likelihood analysis is very interesting.

G2. This discussion is great in groups because it can address what was discussed earlier which is taking courageous actions with people who don't want to change.

G3. I have a grid or table that I use to help my decision making (Rumsfeld idea). On the right hand side are the knowns, and the left hand side are the unknowns. Unknown unknowns are black swans. Have we mitigated it all where we can build resilience out of the blue? The unknown knowns...those are things others know but we don't. 99% those are the things that blind side us. Rakhomene in pork...some people knew this but most didn't know. This was a clear cut case where the unknown knowns get us. The idea is to move to the work into the knowns. You also have to pinch yourself, because our known knowns are assumptions...they are reality. The group looks at an item as knowns but they aren't...that is where all hell breaks loose. That is where the assumption is deadly wrong. I think there are many climate change issues mirrors this same process. We were picking away of that Rumsfeld thinking.

G4. To the degree that ...without some foresight, it is pretty hard to have positive outcome unless you have some thinking of future events. Key is the likelihood of the foresight event happening. If it is in the realm of not possible or plausible then there is no action. The likelihood of the happening seems to move people. It can work as a threat or as an opportunity. This is where you get the conversion to action. A negative scenario moves people to action in the extremes. The majority of action tends to get there by opportunity. In climate change stuff people are investing because of the opportunity, they know they are going to make money of green solutions. 90% of work done on green solutions is helping them make money...save electricity, save water. All the actions are in that realm. The next piece of the puzzle...look at McDonalds dealing with sustainability in beef....they have done the easy stuff...trying to figure out how you will raise cattle in some sustainable manner or change the way you grow wheat to make a bun, it becomes more difficult and highly complex. Many actors, agents, innovations ...that part of the exercise is long term in terms of reputation....doesn't have a short term payment. On the opportunity side they move quickly.

G6. Look at the Rumsfeld model which is also quite useful.

G7. We don't seem to have enough of a public interest in the topic. The interest lies in specialists in companies or government versus a way of thinking. People don't

understand it in a public manner. Why isn't there interest in the public or media? Japan has a long term view but they don't have diverse perspectives. When I look at most governments, the reality is ...Eisenhower talked about it....there is a lot of corruption. We have party politics so we don't discourse with society. Maybe the Europeans have more discussion and collaboration because they have more independents and compromise is key and to have compromise you need discussion. In Canada so much of our economy is dominated by energy, and government kept in place by energy. Today I would argue the energy industry is ahead of the government in the way of thinking. Energy guys were asking government to cut back on expansion in the oil sands. Some of the leaders in the energy field knew they had to control carbon. There is no recognition in the federal government. People in Ontario are saying we have the cheap Canadian dollar, where is the manufacturing....it has been wiped out...it is not there. It is not the normal corruption, but it is a way government works to motivate winning in the short run. They invest in the short term for votes. I don't see that changing soon. It will take a change to rebalance that. This is not just an issue for Canada. I see it everywhere. The more we allow large interest groups to run everything. It amazes me how little Canadians know, it is a bit more than the US. There is a problem at the root of this--there is no specialized knowledge with future thinking. This rough spot in our economy is good...we need to face our challenges to sell our minerals and pump our oil. We need to have challenges to advance our thinking. These issues that we are seeing, the global issues like climate change, water withdrawal, economy--the problems are so large now that it does require people to start thinking about it. They need a structure to think to emerge their courage. Democracy supports discussion, learning and debate. We have had some cut in democracy. No discussion, no knowledge sharing to increase resilience. The suppression of ideas is bad for democracy.

b. Case Study 2 – Health Canada – Developing a Sustainable Health System

Table A. Summary of Themes Highlighted in the Participant Responses

Theme	Details	Corresponding Participant Code for Reference
<b>Foresight brings clarity to uncertainty and complexity.</b>	<ul style="list-style-type: none"> <li>-When there is less uncertainty or more certainty, then people are more likely to act. People still want a sure thing.</li> </ul>	HLMJ11F, HCCF27F, HJB10M, HAMF12M, HSDJ27M, HMFF09M, HDEF10M, HFMF03F, HIVLF11F, HSWJ14F, HJSJ12M, HJKF18M, HSRoJ28M, HBCJ29M
<b>Foresight highlighted that external system conditions are essential to achieve better health outcomes.</b>	<ul style="list-style-type: none"> <li>-By examining and changing conditions in the peripheral systems, the sub-system of health can change.</li> <li>-Since 50% of the health care budget is being used fr chronic issues, systems such as active living, healthy aging, active schools and work environments. Improving these systems will increase health outcomes for longer periods of time.</li> </ul>	HDEF10M, HFMF03F, HLMJ10F, HFBJ10M, HJSJ12M, HSWJ14F, HSDJ27M, HJKF18M, HMFF09M, HSRoJ28M HDEF10M, HIVLF11F, HJB10M, HSWJ14F, HJKF18M, HMFF09M, HSRoJ28M
<b>S&amp;T can be an affordable enabler to change behaviour for more healthy and productive lives.</b>	<ul style="list-style-type: none"> <li>-Science and technology can be very useful to help individuals manage their health and their conditions. S&amp;T can also help people manage people or the health of other people which can reduce bottlenecks to the current system.</li> <li>-S&amp;T can empower individuals and decentralizes control/power.</li> </ul>	HJSJ12M, HBCJ29M, HLMJ10F, HFMF03F, HSDJ27M, HJKF18M, HMFF09M, HSRoJ28M
<b>Foresight fosters multiple levels of social learning.</b>	<ul style="list-style-type: none"> <li>-Participants share diverse perspectives and learn from each other...sharing of knowledge, better understanding of the problem, and more options to consider.</li> <li>-There is social learning on the impact of actions or inaction on others. The process can develop empathy for others.</li> <li>-Social learning is fostered by the foresight processes which can generate cohesion, trust, common language, and common understanding of the problem.</li> </ul>	HBCJ29M, HDEF10M, HFMF03F, HIVLF11F, HLMJ10F, HSWF14F, HJB10M, HFAJ12M, HSDJ29M, HJKF18M, HMFF09M HAMF12M, HFMF03F, HMFF09M, HJKF18M, HSWJ14F, HLMF10F, HJB10M, HJSJ12M, HSDJ27M, HMFF09M, HSRoJ28M HCCJ27F, HFMF03F, HIVLF11F, HLMJ10F, HSWJ14F, HJB10M, HJSJ12M, HSDJ27M, HJKF18M, HMFF09M, HSRoJ28M

<b>Foresight can help people address conflict by exploring how they would like the world to be in 20 years.</b>	-By imaging the future, participants can explore the kinds of relationships they want, and the behaviours and actions they need to take to reach that state.	HAMF12M, HSWJ14F, HSRoJ28M, HCCF27F, HIVLF11F, HLMJ10F, HJKF18M, HMFF09M
<b>Foresight adds prospective thinking to retrospective thinking to build adaptive capacity.</b>	-By accepting that change is constant and thus, developing that competency to anticipate change (being anticipatory) can enhance adaptive capacity.	HAMF12M, HDEF10M, HLMJ10F, HBJ10M, HAJ12M, HSWJ14F, HJKF18M, HMFF09M, HSRoJ28M, HSDJ27M
The foresight process highlighted that flexible policy platforms highlighting <b>outcomes requires multiple potential options.</b>	<ul style="list-style-type: none"> <li>-Policies need to move from 'prescriptive, one size fits all policies' to a clarity in outcomes enabling multiple ways to get there.</li> <li>-Need to share solutions so there can be social learning of options and ideas with individuals adapting these suggestions to their own circumstances and needs.</li> <li>-Not only do we need to share solutions, we need to share solutions on the systems outside of health...i.e. how to stay active in a sedentary work environment.</li> <li>-Solutions are also in the social and ethical domain...right to live, die, refuse treatment, experiment, etc.</li> </ul>	HDEF10M, HFMF03F, HIVLF11F, HLMJ10F, HBJ10M, HJSJ12M, HSDJ27M, HJKF18M, HMFF09M, HSRJ13M HBCJ29M, HDEF10M, HIVLF11F, HLMJ10F, HBJ10M, HSWJ14F, HSDJ27M, HJKF18M, HMFF09M, HSRoJ28M HBCJ29M, HDEF10M, HIVLF11F, HSWF14F, HBJ10M, HJSJ12M, HSDJ27M, HJKF18M, HMFF09M, HSRoJ28M HAMF12M, HBJ10M, HSDJ27M
<b>Foresight is necessary for action but it is not sufficient alone.</b>	<ul style="list-style-type: none"> <li>-Decision makers need to be involved in the process to get best value from foresight. Involve the people who have the decision making who can take action.</li> <li>-People can make small changes, but it takes more work, planning, and time to make big changes.</li> <li>-Foresight processes are essential for leaders of the 21<sup>st</sup> century: to see change coming, now to spur innovation, gain learning and knowledge in changing complexity, teaching their organization to be aware for change and adapting.</li> <li>-Once you have a sense of the future, you need to take this information and make a strategy. Then you act through the strategy.</li> </ul>	HCCF27F, HIVLF11F, HLMJ10F, HSWJ14F, HBJ10M, HJKF18M, HMFF09M, HSRoJ28M, HAMF12M, HBCJ29M, HFMF03F HMFF09M, HBJ10M, HJKF18M, HSRoJ28M HLMJ10F, HSWJ14F, HAMF12M, HCCF27F, HFMF03F, HDEF10M, HBJ10M, HSWJ14F, HSDJ27M, HJKF18M, HMFF09M, HSRoJ28M HAMF12M, HDEF10M, HIVLF11F, HFMF03F, HLMJ10F

		HJB10M, HJSJ12M, HSWJ14F, HSDJ27M, HJKF18M, HMFF09M, HSRoJ28M
Foresight highlighted that current leaders and the western paradigm <b>emphasizes the short term over the long term.</b>	-Though organizations are using more foresight and studying the future, they are more likely to choose a preference of the short term. Leaders need to learn how to balance the present and future or transcend short term thinking.	HAMF12M, HFMF03F, HDEF10M, HLMJ10F, HJB10M, HJSJ12M, HSDJ27M
<b>Movement from government responsibility to that of the individual.</b>	<p>-There is some concern that can we trust people to decide for themselves. Some people want to take more control of their health, some people can't take care of their health. How do we manage this?</p> <p>-We have a system set up where government or doctor decides what is best? How do we enable the decisions of others? What if mistakes are made? Who is responsible?</p>	HAMF12M, HBCJ29M, HDEF10M, HLMJ10F, HSWJ14F, HJB10M, HSDJ27M, HSRoJ28M  HAMF12M, HDEF10M, HFMF03F, HLMJ10F, HJB10M, HSDJ27M, HMFF09M
<b>Foresight processes change participant thinking.</b>	<p>-Processes help participants surface and challenge assumptions.</p> <p>-Metaphors such as the health conveyor help people deal creatively with complexity.</p> <p>-Visuals, artists, and scenarios increase creativity and innovation.</p> <p>-Challenging contradictions can help people innovate.</p>	HBCJ29M, HDEF10M, HIVLF11F, HSWJ14F, HJKF18M, HMFF09M, HSRoJ28M  HCCF27F, HSWJ14F, HJB10M, HMFF09M, HSRoJ28M  HDEF10M, HIVLF11F, HJB10M, HJSJ12M, HSWJ14F, HSDJ27M, HMFF09M, HSRoJ28M  HCCF27F, HDEF10M, HFMF03F, HLMJ10F, HJB10M, HJSJ12M, HSDJ27M, HJKF18M, HMFF09M, HSRoJ28M

Table B. Participant Highlights of Key Subject Matter Themes to Develop a Sustainable Health System.

Theme	Details	Corresponding Participant Code for Reference
50% of the budget treats chronic ailments, yet most of the funding goes through acute care.	-Who will pay for extra services out of hospitals to help people lose weight, better manage diabetes, support aging at home, etc.?	HAMF12M, HBCJ29M, HDEF10M, HLMJ11F, HBJ10M, HJSJ12M, HSDJ27M, HJKF18M, HMFF09M, HSRoJ28M
Health requires a systems approach.	-Many of the chronic issues management investments need to occur outside of the acute health system...for example, healthy communities, schools, working environments, support to manage stress and get more out of life. Food Policy can help people afford and access healthy food. Mental health management was highlighted as an issue likely to expand and require greater attention in the future.	HBCJ29M, HDEF10M, HIVLF11F, HSWJ14F, HBJ10M, HJSJ12M, HSDJ27M, HJKF18M, HMFF09M, HSRoJ28M, HFMF03F
S&T and big data concepts will help bring systems together and make transdisciplinary decisions.	-Linking activity (calories out), with eating (calories in), giving immediate feedback and suggested advice or reminders may help people manage some aspects of their health.	HBCJ29M, HIVLF11F, HDEF10M, HJSJ12M, HSDJ27M, HMFF09M
A sustainable health system may not just correct issues but actually increase performance.	-New S&T enhancements, hormone therapies, etc. cannot just prevent illness but can increase productivity, performance, and minimize health problems in the future. Examples include hormone management, cognitive therapies, and physical fitness.	HBCJ29M, HDEF10M, HBJ10M, HJSJ12M, HSDJ27M, HJKF18M, HMFF09M, HSRoJ28M
S&T can change power relationships in health.	<p>-Internet can provide information, diagnostics might highlight problems before they are problems, and remote monitoring may help an individual manage diabetes themselves. These changes may threaten the power of the physician or traditional experts/decision makers in the system. Easier for patients to keep digital records and get second opinions, etc..</p> <p>Seeing what you could look like if you do x or don't do y can be very motivating for behavioural change.</p>	<p>HBCJ29M, HDEF10M, HIVLF11F, HJSJ12M, HSDJ27M, HMFF09M, HSRoJ28M, HAMF12M, HSWJ14F, HLMJ11F, HBJ10M, HJKF18M</p> <p>HAMF12M, HBCJ29M, HFMF03F, HBJ10M, HSWJ14F, HSDJ27M, HJKF18M, HMFF09M, HSRoJ28M</p>

## *Individual Participant Interviews*

HAMF12M

### Event 1: Scenario

A1. Yes

A2. A3. The health piece had stronger actions to the individual. In the agriculture they eventually got here too. In the health case the critical element was how the individual behaved and looked at health and to decide to look at their health. This was a fundamental change, as time went by there was good reason to think that people will take more charge of their health...who wants to be sick? You have access to information, tools, access to health care providers around the world. The individual can take more charge of their health than ever before. It doesn't mean the government or hospitals aren't important but the individual has more choice. The health care system has not yet made that change to the extent it has to make. I remember we talked about the right to die and today (4 years later) it is coming up. Things evolve. Even in the right to die, the centrality of the individual to make that decision. It changes the role of the health care provider to prolong life to support the individual in what they do or want to do. That is a very different situation and a remarkable one and it is underpinned by technological development, information, tools, assisted devices, diagnostics, Wi-Fi, all in a manner that was not possible before. The role of the state in the health care system and that of providers will profoundly change.

A4. A5. I have used this professionally at AITF, this work became an important part to form the health initiative at AITF to take advantage to facilitate the role to enhance the capabilities of the individual. When I had some health issues, a hernia problem, I didn't lift anything...it just happened. When I want to the health care system and I used my knowledge on how to use and negotiate my care better. I didn't impact the surgery. They had an inefficient system, but in Alberta we have home care paid by the Alberta government and the nurse comes to your house and look after you at home. They drive around and check on me. I gained insight to that. I began to assert my individuality as I could see this is the way in the future.

### Event 2: Policy

B1. Yes

B2. The wills, woulds, and won'ts was a thoughtful categorization. The proportion of people in the categories is going to change. There are more who will over time. The number of who won't will likely decrease but not to zero. Maybe at 10% level. I.e. like 17% still smoke. No amount of learning, off putting packaging will make a difference. But I think if well over 80% do good things then it is movement in the right direction. This framework lent itself to understand a very complex system much better.

B3. The group realized there was going to be a shift from centrally controlled health. They struggled how this could be possible but saw it happen with technology. Technology that shows what I could look like in 20-30 years will be very impacting to help people change their behaviours now. There will be peer pressure and bring the

future to now. People learn by facts or experiences. But it is difficult to have experiences about the future, except through simulation. Technology will make this possible.

B4. We invested in health research to develop technology to help individuals manage their health. It personalizes the future. We learn by something we experience personally. There is a high level to make this possible in health. That insight which came from this project was a very powerful insight. It provides increased opportunities for Canadian companies to produce these technologies and purvey it.

B5. The most important question from a methodological point of view is to look at foresight to action...this is a methodological problem we need to work on. Now I am working on helping people to develop strategy and I use foresight tools and I put them to action.

Involve people who have to take the action...at least in the importance and the strategy. Don't try too many actions at the same time because most organizations aren't capable of doing it. Try one, implement, learn it, and go to the next one. Often they try to change too much and nothing gets done. It is overwhelming and with day to day challenges there is no capacity. Organizations need redundancy to seize opportunities and be flexible so give people time.

## Section G: Peripheral Learning

G1. The real value in using foresight methods is that they complement one's learning that is by and large retrospective. Most of our learning is on historical occurrences. We don't want to overlook those, but the foresight approach adds. You want prospective thinking and analysis, you are better off making decisions for one's self and organizations. It is a complementary way of looking at the world.

G2. A major value of looking at things from a future perspective is to satisfy disagreements and unpleasantness that are often shared from members in the past. It enables a discussion among people even if in the past they found themselves in a position of conflict. You can overcome that by being futures focused. It takes you away from petty current issues and problems. Like the Hatfield's and McCoy's visualizing a positive relationship in the future. This is valuable in groups like departments and corporations where you have schisms and divides...which you can only get through when people retire. In some respects the futures thinking is equivalent to have a new enemy...a way to unite people in a proactive way. Most organization when they confront a situation, metaphorically circle the wagons, but the group of wagons doesn't go anywhere when they are circled. That is where futures thinking is valuable. It also develops a common language, the complexity, the relationships, the possibilities also.

G3.

G4. There is an assumption that foresight leads to actions, except for those who really want to take action, but this is typically not the case when we do foresight work. It is not typical for the Minister or Deputy Minister to be present. People in the hierarchy spend the time, attend, and explain, but there lies the problem. It is overlaying with the problem that most foresight exercises don't arrive at specific recommendations. The number of specific actions directly attributable to foresight work is small because we

don't invite decision makers to have the responsibility for decisions. If you were to try and get senior paper who were decision makers involved, you have to ensure that the topic is of high importance in their eye and that they are required to do something...to have a compelling focal question from their perspective. A compelling question from most decision makers involves an element of urgency. That urgency is not perceived even though it should be. I.e. what is required by 2030 or 2050 to many decision makers, particularly those we have, don't imply urgency, therefore, it is difficult to get them involved...to get the budget, time, and staff people to attend. In our culture, half a year is a long time. For the Swedes, Fins, Swiss it is not. I am not even mentioning the Japanese. I am talking about those close to us. We think short term. Sometimes those thinking short term have an advantage i.e. in the mobile phone business...but if you want to deal in health, climate change, this is not short term. Making sure one picks the right topic and translates itself to senior level people. Based on my experience, it is necessary to do more up front work than we typically do...the notion of coming in with empty flip charts is not an efficient process. Some pre-sessions to pre-think, pre-writing is desirable. When we have meetings they have to be intense meetings. They tend to be intense if you have more senior people present. If the prime minister was there, they would prepare. Though sometimes people will fake their persona, be guarded, say what they think they should....again this can change with the facilitator, and the Prime Minister to encourage openness.

G5. Sustainability is a function of many more things than just foresight. Foresight can contribute to sustainability, but they are not the only or even the primary determinant. The sustainability of agriculture may be more a function of politics and financial conditions than these actions. I think they are necessary, but not sufficient. Leadership is about thinking in a forward way. You can do this in a variety of ways. Napoleon started a different legal framework, Trudeau did the constitution, but they both thought that the future of their countries needed change. Foresight is particularly well suited for conflict resolution...Merkel, Holland, and Putin. But there could be a time to say what could be a future for EU considering Russia...where do we want to be in 30 years in our relationship. This is a good foresight question. This is the basis of strategy. Foresight does provide sound bases to develop sound strategy and sound basis to implement strategy...this is what should be done in Greece. You can't do strategy without doing foresight...doesn't mean you have to do scenario planning, but you need something like that. Otherwise strategy is just an extrapolation of the present.

## HBCJ29M

KQ: For me we were doing a certain amount of the one offs. We were doing the UK post notes...the dual use, synthetic biology. We were just talking about starting foresight. It was a lot of one offs. From this stuff, we had pushed the boundaries that many of us got pushed back on. We weren't out any more than 10 years. We were looking at the innovation cycle...it will take 8-10 years to arrive at the doctors. In this project we were pushing the boundaries. I wasn't sure if they (HC people) were ready for it. Stuff was out farther than their comfort level. I remember there was a bit of push back. We started to call it more foresight, but there was some pockets of environmental scanning. Now there was a threat level. When we did the foresight we used graphics and we could communicate with many people. Some got it, some understood it better, and some didn't get it.

In my career, I had come out of the health system provincially. It was rigid in its uptake. I don't know how far or how the comfort level would be...where the accountability lies. The project opened up the optics of what the options could be.

The foresight program came up with delivery and change in the delivery. Though they got it, it would be hard to do. Bricks and mortar created path dependencies. We needed to think of the open hospital idea. To prevent sickness. Of not having to fly women down from Timmins to Toronto to have a baby. The use of computers to do localized diagnostics. That there were many more options due to technology and this technology was helping people to take better care of themselves.

KQ: I saw a demographic difference in the older and younger people on the uptake of new information. I saw an increase in openness and acceptance of other perspectives.

KQ: Yes the process highlighted many options. That technology could enable many people to better care for themselves and be pulled out of the system. How the decision making could be done by individuals versus just doctors. Another thing was to emphasize healthy living options....to manage yourself better to have increased productivity. Currently we have a lot of reactive mode of policy...need more doctors...give us more doctors. We needed to take a systems approach, help individuals be healthier to reduce waiting lists. A health care provider is more than a doctor and a nurse. We need social workers, nutritionists, exercise trainer, physio-therapy, etc. was all part of that. We need that multi-disciplinary team to make decisions about individuals.

KQ: Components of the learnings will enhance sustainability. These are the things I have been saying at the NRC. We are all type A individuals and want to see uptake of our results. The foresight work puts ideas and options into the nether world where decisions are made. Parts of the work that we do are considered and built into some of the decisions. The way the system works, you won't see it happen immediately and the whole plan. You will see some things be taken up in a year or two.

### Event1: Scenario Foresight Event

A1. Yes

A2. A3. The profound things were having a dialogue...health needed that. Also the food policy, functional foods were the newer things. These were new...bringing in new stuff. Regulatory reform was the start of that ...I found it interesting that dialogue on true regulatory reform still needs to happen. We talked more about data about decision making. Kind of big data usage. Using genetic and genomic info as well as bringing the data together for analysis for trends.

Data for decision making really came up ...this hits me in retrospect. More off-site patient monitoring...moving away from bricks and mortar. Only in the last couple of years we saw it come to light. We talked about an allocation of health credits and you were then motivated to look after yourself more to save the credits when you really needed it.

A4. Multiple options include community delivery....they were seen as social welfare but needs to be considered as part of the health system and to be healthier. We talked about deskilling which was having cheaper medical professionals ...nurse practitioners, physician's assistants, medics, an EMS to start an IV. The skills had never really been talked about ....this was cool.

Community centers, more skills, seemed like a destabilization of the system. It took away the gold standard that people expected. Wellness stuff was taking away from the gold standard that people got used to. We talked about health outside of bricks and mortar. This shook people up. It was a bit against the norm. Health care is the Canadian thing delivered a certain way. There were services for the elderly and the youth...they were used to this kind of thinking. Changing this...would it be new money in the system or is it reducing hospitals and doctors....how would this happen?

This international regulatory equivalence was being pushed...this is only being talked about now. What is accepted in the UK would be accepted here. This would make things cheaper. HC is only now starting to move on this. CFIA can't quite get it right on phyo-sanitary issues.

I remembered the technology. It looked right.

## Event 2: Policy

B1. Yes

B2. I remember the acute care provider was the emphasis but we needed a networked approach and decentralized to deal with chronic care. This was 50% of the budget and we needed to deal with this group in a different way.

B3. Groups saw that there was different tools and policies and approaches were needed to help different people. Basically the use of technology and on-line support can help people make better choices. Having more informed people in a language they could understand. That dialogue was really starting then. People talked a lot of the informed patient. Doctors were reticent in some way...are you a doctor or an expert to self-diagnose. Lots of discussion on self-diagnosing and threatening the role of the physician.

B4. Saw more future problems of mental health...the next epidemic. How to deal with marginal population...talked about the determinants of health, etc. The mental health is a type of silent, still misunderstood issue.

B5. Diabetes care and self-management has really taken off. The idea that the patient and family can manage better has helped and reduces the time the doctor has to deal with gangrene, etc. Now Bell has the big promotion on mental health...let's talk about it.

C1. Did not attend

G1. G3. YES (big yes). Over the years, the use of foresight or components of foresight, other than the thinking out of the box and be more proactive, I have tried to mentor younger folks ...it really brings more common sense about things and not being so scientific. Look at multiple options and the practicalities of what can happen. I can impart a futurist narrative on any theme....how it fits in policy. I have used it to impart to my kids...you have a sense of what you want to do in life...how to set yourself up to achieve them. So I use it all the time.

G2. Foresight has been hot cold hot cold in government over the last 10 years. In those cycles, people have forgotten about it or never had a chance to do it. If you are in with a group of people who have had exposure to it, you can more easily have a discussion on the options and possibilities than people who have not experienced it. For me, there are multiple misinterpretations on what foresight is. There hasn't been a common nomenclature or use of terms, but in many ways, if you talk with many people at NRC....is it about the science fiction writers? When you say to people that everyone is doing foresight, ....horizon scanning, gathering intelligence, conferences (hearing different perspectives) then they start to get it...in organizations like the NRC...they hear a president talk about foresight...the first question is what foresight can do for me? I ask them what you know about foresight. Have you done any thinking about what it is you want? The dialogue issue is still a problem...foresight is not seen as an accredited profession. Those who get it understand it. Those who think it is a bit of quackery...don't believe it. They want a degree in photonics ....especially in the hard natural sciences...until you start giving them examples. You look at DRDC and they get it. Military seems better at using it. Limitations of foresight in my world is the life term of a government.

G4. It provides options for informed decision making. The action part is the hard thing. The uptake to make change is hard. It is hard to go against what has been established. You are always up against the train of thought that exists. Unless they can see the new opportunities, it is really difficult to accept it. There is no peer review or evidence because it is in the future. The only places keeping foresight strong is where there is fear. Ebola, terrorists, in the context of emergency management where there is a big potential of loss, fear, death. Then these areas are keen.

G5. In profiting areas like NRC you have an interest in scanning to look at technology, but it is harder to keep the momentum to be proactive (looking for more opportunities). Where there isn't the deaths or fears then there is interest when things are good or a lot of money. In this round of projects we are doing for emerging technology, we are doing a lot in health...elderly, remote communities, how to make lives better. Listeria is endemic...it is everywhere...most who die have compromised systems or they are old.

The inspectors in the system are unionized government employees with a degree of on-going monitoring. In CFIA it is not happening everyday all the time...NO. In DRDC there are people watching every day.

G6. If you have an accepting culture of foresight where it is embedded in the organization, then it can be effectively action oriented to respond to needs. People need to understand the purpose and how to do it. The big challenge is that it is often done in isolated units and it requires investment. At NRC some VPs want it done in secret to make them smarter...to give them info for strategic decisions, but not really as the whole group doing it.

G7. Absolute openness and collegiality, but this is virtually impossible. The issue is sustainability. You can call it foresight or something else but in effect it is thinking about the future. Technology road mapping....was in vogue years ago, waned, and now is becoming sexy again. Maybe the word foresight is a problem...it makes it a thing without evidence. It is a challenge to make it seem like something whoo-hoo. The problem with the label is that it is associated with things too far out there and roll their eyes.

G8. What has brought me great delight or great disdain...it is from a foresight discussion. It forces people out of their comfort zones. It is not a prediction and they want that. Whatever it is...there is great insight and great consternation. But this is where the learning is. The problem is foresight is work, people want answers and they don't want to spend the time for something that is not a sure thing. They also want it for free, with no investment in outside resources.

Too much of the senior cadre in government are head-nodders. They change their politics like their underwear. I see them increasing in interest but they are too quick to drop it if it is against the grain and doesn't support the government view. It is like university...professors can excite, there is knowledge, the uptake of the student. If the student doesn't use the knowledge ...is it a problem of the knowledge? Maybe? Could the prof do more to excite? Does it depend on the kid? Does it depend on the context to use the information? It is complicated and many areas are involved. It is hard to attribute.

## HCCJ27F

KQ: The complexity and the scope of what needed to be considered were in fact understandable. When you look at the problem what the future looks like...you get a big blank, but with the process and facilitated discussion it became a more manageable set of understanding the problem. It provided boundaries to the problem. I had a good understanding of the problem.

KQ: When we first started the process, each had their own axe to grind...each had their own top issue. Because of the process we arrived at a consensus of what the real issues were...collectively they shifted the mindset...moved from acute to chronic...we brought them to a common place to an element of clarity they didn't have when they walked through the door.

KQ: The realization of change was heavily mitigated by the fact that change was possible. I felt that there was some resignation...we got to levels of understanding but that the system was not going to change. When we got to the policy issues, they understood the issue and the industry. The policy makers were a black box. It requires big change and how do they go to policy....it was hard to figure how to follow through on what they said. They didn't trust that the existing mechanisms would make the changes. There was a dose of reality putting some water on the fire.

KQ: Yes, it has could enhance sustainability because it provides clarity and usefulness of action. The strategic foresight process finds a way to look at important thing and make decisions relevant to the scenarios explored, thus the recommendations coming out of it are good, especially due to the diversity of the stakeholder group...more diversity, better recommendations. But the process did not engage the decision makers. Try to inject it in the policy process. If we expected this to follow through we would have had to engage the decision maker.

To get policy makers involved, what I found that works, but what has worked for me in the past...find the senior decision maker...a small engagement of them into the overall process, so that you get from them their concerns and constraints. You set the parameters of the nature and quality of process. Get them a bit involved. Design the process with their input. If they identified different constraints you can explore that with them. You use that as part of their input...here is what is possible with the realities of today...then this is within the framework we can conceptualize. No decision maker will agree in advance until they design it. They will tell you that you will deal with them seriousness.

### Event 1: Scenarios

A.1. Yes

A.2. What was critical was not to lock into the redefinition of the status quo. We had creative like people there....we needed that energy. What I found that they assessed the relevance of their own knowledge to the contradictions presented. They didn't innovate. The process not the people let them down. Most people are uncomfortable to go into a mind space of not-knowing.....we weren't able to get them to an 'ah-ha' moment. We got a serious consideration of the known to the challenges. We didn't get true innovation....we can do it totally different.

A3. Their understanding of the situation, their confidence increased, and knowledge that something could be done. From the point of view of what it is all about ...good recommendations, better sense of comradery, better understanding of the issues...but they arrived there with the knowledge they arrived in the room.

A3. They saw many options but many of the known options.

(Talking about COIN in the climate change project...it helped let go their own understanding....)

#### Event 2: Policy Analysis

B1. Yes

B2. From this event, the will would won't structure, gave them a strong opportunity to demystify the human aspect. There are all these reason why you can't or do it. The will would won't personalized something so complex, then when you thought about it at a personal level then we could make a decision. That was a tool or outcome that allowed us to come on an agreement and do triage on the information infinitely faster. These types of grouping allowed the group to think of customized solutions. The wills became the easiest to do. The woulds we need to nudge them over the edge...we looked at different resources and solutions. The won'ts...they are just not going to...yet they are still members of the society so what do we need to provide. We came up with unique and relevant solution sets that were useful and relevant. In the old world there was one policy...but now we needed 3 types of policy solutions that were relevant to the stakeholder group. It made the solution sets smaller.

B3. The group got off their high horse and became common sense human beings...we have different problems and different things to do. They dug deeper and worked hard. The wills are so easy. The bleeding hearts were concerned about won't and now they were in the lead. It gave an equal voice to all groups. The use of a metaphor is useful to a complex situation, helps the mind synthesize in many experiences to make decisions. You can play with a metaphor and you are not wrong.....if they are on the defensive they don't play. But in a metaphor it allows more room for explanation.

B4. It lead to multiple options and to a clear recommendation and understanding that you needed multiple options, there was no one size fits all.

B5. I became more compassionate about the needs of others in the health system. I considered myself of the wills and better woulds, but now I had compassion for the others. And now I had an understanding because it wasn't my history or life experience. Now I look at won'ts completely differently.

B6.

#### Event 3: Synthesis Event

C1. Yes

C2. Brought in a bunch of contractors, we had to re-create the dynamic, he understood the flow, was shaking things up. ZZ she was trying to say the right thing....for sales mode. We had lost some of the momentum. The biggest thing was that...3 of us did the work. YY selling stuff. 3-4 of us doing work. Because of the diversity of the group ....brand new people made things difficult. We synthesized what we did in front of the group. How to communicate stuff....government hierarchy...what else could we do...could we engage the media...no no no.

C3. We were trying to get practical...real challenge was that anyone could listen. The funding the budget, the structure supported the old path dependency.

C4. There were options, but the problem would be risky to get fired.

C5. The only way to overcome psychological inertia would be to have the larger group and more people like JB would have helped.

G1. It is an essential process. I use this as a strategic planning process in all that I do. I use the systematic process to make sense and relevance. In Zen training, the mind can't conceive a negative...now we are asking people to make a strategic plan on a negative...an unknown future...it is impossible. I use this to carve out our own future exercise. Without foresight they can take their own knowledge for a better future but they don't broaden the world view. All engineers are licensed and 30% are women, and we have good ethics. What is futuristic about that? When we do foresight with industry what are the things worry you the most? What could happen? Black swans? What are you seeing on BBC as emerging? Then you get stuff and can fill it in...this is preparatory discovery analysis learning for decision making

G2. I love that way of thinking. It opened my eyes for the things we just talked about. Once you experience it you can't go back. Here was a tool to help people experience an uncertain future. I subscribe to Shaping Tomorrow and took foresight training....there are a lot of commonalities and personal preferences approach. There is a body of knowledge and just like any tool kit, the more you can pick the right tool for the job.

G3. It forced me to back up 2 steps in all I do and not necessarily to assume what I know is good enough...that there is more I can learn from others before I plan.

G4. They are not directly linked. Foresight leans to lead to action, but it is not sufficient to define action. Foresight gives you clarity on what to do. Now we have a process that provides clarity. Then we can decide what to do. Without the clarity we can't get people to do things.

G5. Foresight drastically increases the possibility that those actions are sustainable to ensure they are relevant to the sustainability you desire in the future.

G6. TRIZ or COIN – Contradiction Orientation Innovation (Russian Problem Solving Algorithm) by Altshuler.

G7. Ah jeez stuff....what we did at agriculture and health was introducing something that was much easier. You can tell a pioneer...they have the arrows in the back. This strategy is ahead of its time. For Bureaucrats and government this is too hard. It is the early adopters, the assertive, the NGOs, there is interesting passion to introduce this preliminary thinking. This is cool. It is needed. I proved this in every consulting

engagement done. When we choose our strategic directions the tools to get you there...there are 2-3 ways to get there...this innovation piece is important. This is where we need to overcome...the innovation. The Spanish people say failure rate is 98% on new initiatives to manage change is 78% and on innovation initiatives it is 98%. It was the outcome of the issue of 3700 execs. Less than 2% have figured it out.

## HDEF10M

KQ: For me it was the realization from talking to others that our system is a bit messed up. As the system has progressed, the chronic side has grown. If you were to design a health care system today, you would not design the one we have today. If we could get the chronic part out of hospitals, in areas they shouldn't be in, but they are in expensive acute care. The decision makers are stuck in old think and not new think. I am not a health care expert...but the decision makers couldn't see the future or deal with the future because there was so many impediments...not the right structures and the right areas. To me foresight isn't about mapping the future, it is about looking about something in the future, and it that was going to happen, to determine what do I need to do now. This event put people to map the system and how they could be part of the future, but they were stuck in old think. They talked about the cost of beds...if they took out the chronic part, then acute would look after itself. My neighbor used CHEO as an emergency...she didn't do thinking herself. I grew up on pioneer medicine where you start off at home. But this woman used an emergency approach as the first step which messed up the system. Once they are in beds you can't get them out because society hasn't figure out what to do with them. That was the big learn. As they were mapping the system there was a frustration on where it should be going, but there wasn't hope to get there because the present system was so complex. Even the exercise to map the history of disease and medicine to see why we are where we are, I was surprised people didn't know the reasons. I take away that this sense of history ...how war, I hate war, but it was such an innovative tool to define medicine...MASH, Florence Nightingale, Albert Schweitzer on sterile hospitals in Africa. Village grew up with unclean sewers...this whole thing was useful to see how history unfolded and maybe this could influence the future. It was profound for me, that since these exercises I have done numerous projects and I have learned about this mapping of journeys and as you map there are influences and where you start things may not end up there....it is the history, future, and system dynamics.

KQ: I think so....the core group...of those who were regulars...like LB, DWs who had been in the system as a top bureaucrat ....now he is a consultant. He changed to an innovator ...the future changed for him. There was an array of unusual tools to people's everyday experiences to learn. For me the artist who was drawing as people were talking peoples' pupils opened up more. When we went to do the Lego exercise to build the new health system as a different way to express a new policy....they never would have done this...it got people out of their comfort zone and moved them further on their evolution to the future of the health system. There was a change on how they looked at their expertise. The synthesizing session was successful and not successful...for some it was too radical. Some reacted against it...they couldn't play with Lego, couldn't get there. There was different stimulus for different people...there was a lot of right brain and left brain thing...there was a side bar in CUSO to build a bridge and everyone was working together...a person came in and destroyed it...they watched people's reaction to what happened (they were teaching changes in culture and perspectives)...some people were watching the different stimulus. The artist, the facilitator, the speakers, the Lego, etc. Then took away all the comfort. How to do this? It wasn't a confrontation...it just wasn't the same...some moved on and some weren't why they were there.

KQ: There was a realization of change, they had a clearer sense that the road they were on was not sustainable, but the future was too complex. They had a clearer sense there was a better way out there, but the system and the structure was so inhibiting. No

one knew how to get out of the conventional actions. There was a sense of frustration if we are to have change on innovation they are going to have to break the system. No one said it explicitly on how to break it. S&T was highlighted as a way as people taking control and doing their own thing. It is the point end (like a spear) and we see things happen in small ways but will it change the whole system? I am working on a government project on genomics....there is so much on the science on genomics...maybe it can change the system. My doctor is a good doctor but she doesn't spend her time reading. I am bringing questions to her and giving ideas such as should I be taking "Naxium" is that a good drug for me. Not everyone can keep track. There was so many ideas and options....there was overload. There were ah-ha moments for people...not necessarily for the group.

KQ: Yes, but the yes ...gave people in the room a break to understand to system and stop the clock to see what the future could be. They could see the options, ideas, clearer. I am not sure they moved the yard sticks as a group. 60-70% of the leaders would use something in their own sphere of influence....no big one policy movement, but there were enough people at the table to take the approach to their area of work or interest. DW would become a better consultant, could give better advice because he saw different things. Individually they would be thought leaders but not one big change. In looking back when the artist was drawing to have the lab close by and all the other services were nearby...they pictured the world and they saw areas that were good to change...if they were going to use the sustainable banner they saw what they had to do. They saw the obstacles and almost stopped. They couldn't see how to transcend. Some saw that S&T would enable people to break out of the system and do things differently.

#### Event 1: Scenarios and Innovation

A1. No

#### Event 2: Policy

B1. Yes

B2. We spent time after the sessions discussing....the age group was younger, there were some boomers. The older people felt that with education that they could make changes, they would eat better and do better, there was going to be success there. The woulds and the won'ts was a tough slog....I think that the age or the demographics of the group had problems here. In the won'ts they say that they had to continue to help them. I defined myself as "c" conservative...fiscally oriented and needed to help the poor. The innovation side was unclear...could it be the wills, would S&T liberalize the woulds. The won't was likely to be a center oriented government thing.

B3. There was personal growth in many people, in their learning and understanding of the situation. But I would say that the group didn't find one way forward...there wasn't a high level involvement of the conversation in one way forward. Their personal knowledge was good, they learned things, they saw options, but it was unclear one way forward. People were engaged...they didn't leave or do the blackberry...this led me to believe there was a personal investment in the conversation. People definitely understood more...but groups saw different understandings....S&T, will would won't,

impediments. They all saw S&T as an interesting piece of the puzzle, there was sexiness to it, but it wasn't a panacea. Perhaps the learning was that this change would be a journey more so than a destination. On the journey towards a sustainable health system, that elements would have to think this way. This was like having a policy and put an overlay...they got a chance to talk about the many things S&T could do but it was like having guiding principles, but not necessarily a stated formalized change.

B4. The world changed...their lens changed for policy...they couldn't put the rabbit back in the hat. Policy was one big thing and there was one big policy. I think what the group found that when you looked at the sustainable health system that there was more options, they were at different entry points on this journey, so the big policy was not going to solve it. They needed to work together to collaborate to assess the patient and help them, but it was not the same solution to everyone. Therefore, the patient had to own and carry the information....patient make some decision, but that the solutions could be different for the same condition but different people. We thought the doctor and the system knew better, but there are various life goals, there are options, there is quality of life. Therefore we need a framework and changes of responsibility in decision making and ownership.

B5. From the session, I think that on a personal matter, I think I understood that I could change, I could doubt the system, that the doctor knew best, because of this event, when I go to my doctor, I take my pills and do a double check do I need to take them. I question more, I bring more options and ideas. I have also changed some things, eating better, walking better...I think about the prevention issue more. I don't want to be in a hospital that puts me in a room. I see the system differently in a personal basis. I could do more than before. I am alive because of the old health care system....I had cancer and it was well treated. But there is a part that I can do better and this knowledge has got me to exercise this option. Also using medicine to fix us but we can use this knowledge to be better to maximize our performance. But I have responsibility in this...the person has to be willing to have that. It is in our interest to do this and making this clear could be very powerful.

### Event 3: Synthesis

C1. Yes

C2. I remember there was a wonderful uneasiness of it. I remember when people were discussing, it didn't follow the natural progression of meetings. There were uneasiness. It was a cool weirdness. There was a personal journey to figure out how things could or would come together. It wasn't so structured. There was a squeamishness...some point you want it to be normal like in Strategic planning...you do the guiding principles, the environmental scan, then how to get there. People were out of their comfort zone...this was a good thing, because in developing the sustainable health system, there were a lot of normal frustrations, having gone through the experiences and there is a way forward, how can we transcend and move the yard sticks and how to do it. It was difficult. There were diverse people in the room....it proved positive and negative. People were on different spectrums.

C3. There was a start of some linear facilitation but they people got up and challenged it in different manner. There was an unsurfaced assumption that people weren't smart to make good choices, government had to make it for them. This was polarized who were

feeling they knew more than their doctors and they were seeking action. This meant the power of the individual was increasing.....the system can't deal with that. If I give the individual power they couldn't see the system work.

C4. They saw multiple options but they didn't know how to devolve these system and individual responsibilities...there are some who can but there are won'ts...you can't give individuals power 'carte blanche'. So on chronic and maintenance or performance management we can enable individuals to maintain or do better, but perhaps to the worst case...to acute emergency, etc. then I need the state to survive. I now do moderation, I have steak and share. In the cottage instead of beer and coke I buy Perrier and drink good water for casual work. I did sense in the meeting that there was a power of the individual and how this would work in the collective system.

C5. I have taken more responsibility, I have more challenges or debates and expectations with the system. There was a fat person, the system could deal with them with a heart attack but that person has to want to lose weight and help themselves.

#### G. Peripheral Learning

G1. On a personal basis, I am not defining the future, but allows me a sneak preview of what that future could look like, therefore, I can say....if the future is more about inter connectivity for example, then I need to change my health and improve what I am doing, so I can enjoy my future. I want to be around for my grandchildren. I got married later. I use foresight to say what the world would look like and reflect what I need to do now. I bring the ideas into peoples' work. I am a media consultant on the story...designing place mats to help them to think about their future...in a world of government for 18 months or 3 years or an election cycle.

G2. They need foresight to go out of that time frame to do inform their better decision making. More people are understanding the world...in a security mode. It is not as sexy on everything but in the military, disease and terroristic things. I do think they use foresight to see other aspects of what the future is. They think the future is very short term in most people's mind. They will have more impacting decisions to look further in the future to inform decision making.

G4. I wish it was a more direct correlation, or a better link. I do think foresight is not fully understood, it is a sexy tool and gives ideas. But change needs to be further explored. There is a lot of discussion on change, but there is not enough action on change...they are less frightened about change, but still not in the sweet spot to do the action.

G5. Without foresight there is a mental barrier. If you don't stretch your calendar further than otherwise. The future is too short term for most...they short change it....maybe 5 years. Foresight allows them or forces them ...the Star Trek way to go beyond...otherwise we stick on our universe and comfort zone.

G6. Foresight is more 10 years. The futurists go beyond. It is still is not an everyday tool kit or an arrow in a quiver of change leaders. But it should be there...it should just happen, it should be part of your regular thought process, but for now it is still a sexy tool.



## HFMF3F

Now I work mapping all the steps of innovation, like a fishbone, using Cooper with change, gurus in France, and I work on how to focus on a new market with a new technology. I am integrating a strategy on value creation, what type of steps and management processes you need to start a company and establish innovation. I show them the road map and then it is easier for them to manage. (She has invented an innovation model with many affiliates to help with all the parts of innovation).

### Event 2: Policy Event

B1. I only attended this event.

B2. We cannot pretend that everyone understands things at the same level. Someone says everyone has the same instructions and one set of service. I saw that you have different categories of people at different times. You need different people and different tools at different times of life. If we took this approach we could minimize the number of people going through the acute system.

B3. The awareness of the whole system made us see that people with the means could help others. Kind of the social capital idea. We have different perspectives and we didn't consider the other groups as much. A strong community meant we had to think about that...a strong community meant that I could do things to help the won'ts.

B4. We say more policy tools and options but also not just government doing it or to consider that government didn't just have to support hospitals and doctors but that there were less expensive ways to provide support in those communities.

B5. This thinking could lead to more sustainable outcomes, but we have such a big support for the old way. We need a cultural change to realize the community versus just acute support. We need to change the social behaviour. In my university class we asked the students (foreigners) how they are reacting to the cold winter. I was talking about cultural perspectives...what strikes you mostly when you land in Montreal. I was shocked to get on a bus and they are all looking at the phones....in Africa we talk...this was striking. I saw an old lady standing and young ones sitting....I almost told people to get off the seats. The young generation is not aware of these actions required in society. I think we are losing this social sharing in perspectives...the young are sharing amongst themselves but not with different levels. Young are provocative and violent in discussions.

We did to talk more to have people share these perspectives...I am not sure we have figured this out. We are not rich enough to support the current type of health system.

### G Peripheral Learning

G1. It made me a stronger believer in foresight. Foresight is a strategic tool which should be mandatory on strategic units and government. We must consider the long term and get out of the short term vision which is killing the economy.

G2. Group learning...one individual can't be perfect but a group together can reach perfection. Learn from each other and become more powerful. Foresight enables the group to learn and become more sensitive at a higher level.

G3. I use foresight elements in my own work by integrating the perspective of the long term in decision making. I teach at university at the masters' level in the engineering school and I have a specific module on foresight and market analysis. When I talk about market intelligence I talk about foresight. Foresight is the key to have a broader vision; private sector should do foresight to build an economic system. It is also included in my teaching. There is a foresight school in France, we can do it here, and it exists.

G4. Foresight is of no use if you don't have the intention to act. It can help people think and practice change. People in their daily activities will not step backward and have a broader view. So if you offer them the time and moment to consider other perspectives this can change their way of acting.

G5. There is always resistance to change so you need leaders that will promote change to make change. Otherwise the nature of the human being becomes too comfortable. People and the economy was comfortable, people became lazy and went for easy money. Comfort seems like our short term goal...it takes people who are not afraid to stand up and try to make a change. You need to bring leaders that are willing to step up.

G6. Foresight is a must integrated to training leaders, sustaining a new economy and project.

## HIVLF11F

KQ: I think that over time there is a greater appreciation among the group...because it is such a diverse group. The appreciation of their points of view. A greater awareness of all the different people impacted and impacting the issue. Listening to diverse perspectives and broaden your own views. People were more reserved at the beginning and by the end they were let's do this, let's work on this together....there was more of a group focus by the end.

KQ: Yes, definitely the foresight processes helped people understand a variety of options and that there was a combination of different options. There were differences on how to solve the problems. That was one of the biggest benefits of foresight, you widened the lens and the options.

KQ: I think that foresight, in order to get those results, depended on the participants. The participants could be an opportunistic collection at times, and not always take it to action. I am not sure if there was the right combination of participants to get results. To ensure you have proper expertise of agriculture, the mix, the representative of the different sectors, and people who have a mixture of science and policy perspective and understand how to effect change. Perhaps there was not enough of the various groups. I think it is actually the label on the person, but perhaps people who have the sort of are the out of the box thinkers. We did have a good cross section but this wasn't enough but we need people to think out of the box.

### Event 1: Scenario Event

A1. Yes

A2. The artist was memorable. It was very impressive. It kind of insightful to see how helpful it was to unite the group. Also then the value of things being drawn out to make linkages and clarifying themes. I am looking at the summary...the 12 technologies...at the time I thought it was just a list...now I look at it and I really like it and it is really relevant. I wonder if in the 4 years since this has been done and we are moving on this.

A3. I can't remember.

A4. They need good data to make good decisions...relevant for people and collectives. I am linking 3 of these...innovation and others, good standards, good recording, and then using the information at all levels. Perhaps the whole notion of focusing on prevention as a big innovation in general to reduce bottlenecks in the system. Prevention and early identification would make cost savings and make the system more sustainable. That type of big picture approach to sustainability and expenditures is important to prevention. This is multi-faceted.

A5. There was a similarity I brought to CFIA on the data collection, privacy, and decision making. There were great similarities. It is a universal problem that needs to be addressed...the value of good information.

### Event 2: Policy

B1. No

Event 3: Sense Making

C1. No

G: General Learning

G1. It has changed my perspective...personally it has got me to think about the future and bring it back to decisions. I think about things way more broadly. I think that it has made more broad minded. It has made me look at it to the other way people approach things. I notice that many people do not look at things too far in the future. It has made me appreciate that they have their own perspective. It is important to understand how other people approach issues. Based on my experience I can help them look at a longer term perspective. It has been most helpful to see how others approach things and not me to apply a longer term understanding.

G2. It builds understanding where groups are more focused and by the end it is more of a togetherness because of the greater understanding of the opinions and perspectives of the collective group. This tool helps build mutual understanding. It is more useful in emerging and zoonotic diseases because of organizational awareness and cooperation to deal with these issues. There are always innovative ways to look at diseases been around for a while. FMD (foot and mouth disease) is a good example, globally there is an idea that we should not kill all these animals, we can deal with them, they don't die, and there might be another way to deal with it. Old problems in a changing context having a rethinking...think measles now or HIV-Aids.

G3. I use it with my kids to see the bigger picture.

G4. I think it difficult to quantify...there is a long delay if there is any action. How do you measure action? There may be action but is it measurable? Action at the individual level on how you approach decision making, at the group level, at the policy level...in the latter it requires a big delay to align so many forces. The way the government is set up decisions do not have a long term focus. It is hard to get the action based on scenarios, but it doesn't happen in the short term because 4 year election cycles. At the individual level, there are things people can do, but action can be taken quickly; but at an organizational level...the political cycle doesn't consider the long term.

G5. The focal question is key and if you get that wrong you don't get good information. We did an exercise on BSE, but it was crap and I think it was because it was the wrong question....it seemed to be a question of BSE and climate and not at all the original intent. The question should have been given BSE and global impacts, what direction do we want to take on BSE in Canada? A market focus and management focus would be better. I don't remember exactly but it didn't go anywhere.

## HLMJ10F

The difference with climate change and health is that I wasn't working in health. I didn't come in predetermined or educated position on health. As a result of the health foresight work, my thinking on health evolved quite a bit.

The most powerful session was the last event, the synthesis event. I got a lot out of the session. In large sessions you get interesting conversations but that day with the small group thinking on 'what does this mean'. This was a powerful day. On that day I changed my mind on health insurance. Until that point I was against private health care. After that, seeing the changing nature of health services, the will would wont', most people don't need big event insurance, I could see that there was a portion of health care where you need that highly trained people, as long as it was affordable, I was able to do it and it was worth it. This was something I learned and I could take action on.

As a result of that health work I did more work. Now I work at a hospital. I took an interest in health that I had not had previously.

In general I felt that the work was not far out enough. It opened me to a global health care system.

There was more political attention and short term issues and more players. Perhaps more short or medium needs to there is attention to the findings.

Groups were smaller and homogeneous. Because public health, there were a lot of government people, not as much diversity. Frustrating that people were regurgitating what the government view was...there wasn't enough independent thinking or creative thinking.

G1. JIF (Jasper Innovation Forum) events – North, health, communities, cities....many foresight activities. I would say all the imagining and cognition you are doing scenarios though you may not call it foresight.

G2. Personal benefits of foresight...foresight needs to be undertaken with a specific purpose in mind. You need to be very clear on what you are trying to achieve. It certainly dictates the methodologies, choice of people focal question. The more foresight work I do I see the benefit of defining the right question. The value of foresight increases exponentially on the quality of preparation going into it. Clarity of the question, expectations, full process planned out from beginning to end, what will be done with the information, identification of the receptor capacity for the work. Government doesn't have that done clearly. The ability to take nebulous insights and understanding in policy process is almost 0. Uncertainty is paralyzing in government. The successful application of foresight to generate long term value...if the capacity of those people who are asked...then you have little efficacy.

G3. Value of foresight for large groups...there is a lot of benefit to gain understanding, build cohesion, lots of opposing points of view, then undertaking foresight is powerful to have the good conversation...only way to have effective communications. If you are using foresight to make strategic decision making...it will only be successful if top people are involved in the process. History tells us that if top people build culture of foresight and forward thinking then it gives them a competitive advantage. If you use foresight to

think about a new or desired future or vision then it is effective for that. You have to be specific about what you are trying to achieve. Then have those decision makers there.

G5. Foresight is powerful in them all if it is done well. This is the problem when measuring the effectiveness of foresight because different things are called foresight. There is huge diversity on how foresight is designed and delivered. Some are under resourced. Some not enough time. If you have appropriately resourced and participants, then it is extremely powerful and should be part of the judicial duty of any leader in the 21<sup>st</sup> century.

G9. The disjunction between foresight and action is uncertainty. If you can impose certainty, then people take action. In western society we are brainwashed where decision makings is based on burden of proof. Our thinking is limited to the past. Our aversion to risk is taking action against what we have accepted or done in the past. The relationship is estranged. Until we change our educational processes and our beliefs we have a hard time to still deal with uncertainty.

G10. I have more than a casual interest....yes, it has impacted me in that way. From a negative perspective, the tendency to think too far in the future is a detriment. It is hard to accept the future is uncertain. You can wallow in it and can do it always, you don't work in the short term...can make it hard to live in the present. Sometimes I regret taking foresight as an area of study because my thinking becomes ahead of others and this is very frustrating and lonely.

Conversation continued to the management of her health. She had some surgeries and some personal reflections. This type of conversation went for another 30 minutes.

## HJBJ10M

KQ: Didn't have a lot of impressions when we started because I was working in agriculture. Food and nutrition was related so I was interested but didn't think about health care so much. Maybe I thought about doctors and hospitals, wait times, etc.

KQ: The health system was evolving beyond the original doctors and hospitals focus...as the population was aging there were increasing demands, chronic ailments and conditions were more important...more important to manage than cure...changes the perspective on what has to happen, what kind of relationships are important...needed systems thinking. More complex system than we talked about. You might not need doctors to help you...homeopaths, massage, etc..

KQ: Gave me a better understanding of the real issues that were fundamental of the health system as you go to a collaborative relationship based future. Budgets were tight so future solutions needed a collaborative approach. Gave a new conceptual framework to think about things. More aware of weight management and consequences. It is a useful backdrop to my job as a consultant in the health system. How to design regulations differently given these changes. This is influenced by what or how you perceive the future pressures. These things influence my writing, research, recommendations.

KQ: Group got into the fact that you move from the doctor and hospital model need to engage community, other health professionals. Prevention is important. Delivery is in the hands of the provinces. The federal government transfers funds to provinces. They have a narrow scope of aboriginals and military. Overall the government has a disjointed policy environment.

### Event 1: Scenario Foresight Event

Scenarios were interesting....the individual and collective, and having resources or no resources...the thought processes were good. How the process needs to change. We have way more than doctors and hospitals. What you need in a comprehensive health system...with an understanding of the big picture for the health system.

Doctors and hospitals are paid by the public health system. The future of chronic diseases is more in the personal domain or funded by others. People still want things to be paid by others. We were introduced to provincial, regional, and city wide approaches...the idea of having a healthy, active, productive community. We also realized that the rural health situation is different than urban. Could have integrated system in Toronto but can you do it in Inuvik?

On a city basis it makes sense to look at the health system if we want to integrate prevention, performance, and chronic issues management. Active work places and communities aid in prevention. This broader view is likely to be better than the traditional way. Look at regional system or rural system...old age home with triage and fly them into a city.

### Event 2: Policy Analysis workshop

Wills, won't, would was interesting. Needed more or dualistic policies. One solution doesn't fit everyone. Demographic shifts and chronic ailments take almost 50%. Wellness vs long life...possibilities of policies for euthanasia...if 80% health care costs in last 6 months of life...then maybe one can consider it. Understanding what you want for the rest of your life, how do you want to live it, going away from living just longer....for example, like rethinking to take chemo to live 2 months more. Health and wellness requires more integration. Thinking about the policy of regulation in this context. Direct action on these issues are not possible. Some stuff is relevant...i.e. how the IT (information technology) stuff we are doing to better structure information digitally to make it visible the supply chain for drugs and packaging...can do different types of analysis.

### Event 3: Sense Making/Synthesis Event

Takes the theoretical learnings and this takes it to clearer action items. De-skilling...having people opening them up, surgeon does it, cheaper people close it up.

People don't like change and we didn't deal with that. People refusing to go along. I think it is because they are afraid they can lose their job. If they have to implement these changes then don't expect them to be enthusiastic. Power of the people doing things manually that you can do automated and they don't embrace the change because they will require skills they don't have. We need to do foresight on how to lead change. If you have to change everything...too hard. Do a specific change.

Need to be common principles and you will see change happening. For us the policy guy makes a change in a certain area...the following up activity will not do it. Need a few areas to be coordinated and we are too random. Need a concerted effort then you can't get it to move.

We identified a number of areas of practical focus, but you would have to dig deeper to make a plan on how to do it. We got a lot of good ideas to get people in the various head space. Need to keep it up over time on what you are doing. Need some reporting and monitoring.

### Peripheral Learning

Participated in health care foresight events. I conduct my own foresight in my head in order to address some big change and strategy elements that I need to consider in regulatory reforms. I try to do a foresight exercise on my own to force my thinking.

Benefits to large groups...a diverse group of people is required to do a good foresight job, and people who didn't take together, they had a better understanding of their impacts and consequences. The larger group builds better understanding and helps future collaborations. Have learning from others, perspectives, impacts of actions on those change actions. How do you affect them, they affect you, and changes amongst. Gets diverse group of people on the same page and now they have the ability to move forced as a collective.

- G5 a. Exposure to diverse perspectives which allows you to see a situation that is clear to you but through another's eyes...uncovers areas that you did not think about.
- b. Evidence and learning, and sharing, THD (Thomas Homer Dixon) for example, had credible research information that was hard to argue against. Lots of learning, understanding of their perspectives and concerns...optimizes the whole versus the part.
- c. foresight helped creativity....what is the nature of the scenario...how might you deal with contradictions, how would you change behaviour, policies, actions...forces you to think differently than you would otherwise...that is why the process is important.
- e. It does if the decision makers are listening, interested or in the room...we say participants change, but were they the decision makers?
- f. Foresight provides clarity...find things that work in more than one scenario...you learn ideas and strategies to hedge your bets.

G11. I learned to be Bill Gates and maybe we were...coming up with options, building in redundancy, diversifying, having a series of experiments in the background so we could react faster when opportunities arise.

I think about Nicolas Taleb who wrote Black Swan...what are the different possibilities and if they came to pass what would it do? What is a better way to position ourselves to be flexible? This is hard work for people who don't understand uncertainty.

Change management needs to yet happen. We went to a certain place, we need to lead change after this...we need to pick a few and get them done. How to set up an event but then have the material and resources to get things done. This part is missing.

## HJSJ12M

The interviewee has a debilitating condition (a type of muscular dystrophy). He was interested to participate but slow to speak due to his illness. He was very open to discuss. We had a conversation at his kitchen table as Jack could not drive and it would be difficult to hear his voice over the phone.

KQ: I was aware that there was a big challenge with health and technology, also health and the systems concept...which is important in health. Health is a series of fragmented jurisdictions with isolated authorities. I was aware of the fact that many people outside of the health system do not talk outside their domains or boundaries that they have. The notion of a whole systems look and in the future with technology built in as change drivers, not just technology but social as well, was an interesting challenge. We had done some previous work in 2003/4 on the future of bio-health, so I had some sense of the impediments, some of the unrealized opportunities, some of the technology drivers, and the socio-economic context.

KQ: I thought the group really jelled together as unit very effectively. Foresight helped trigger that, which it often can do. Second, there was a sharing of experience and frustration at the current fragmentation of the health system. A sense of misplaced priorities, inability to have a reasonable experimentation.

What was most profound for me what the hierarchy of needs...deal with chronic issues, the social-economic line up of challenges that had to be addressed as a technological new paradigm. The project gave me a better understanding of what a patient centered health system would look like. The paper I did attracted attention on the foresight community (the report on technology) on the basis of this report I was invited to the EU commission to a group of patient centered public health, personalized medicine, a conference in Turkey and had a journal request to write an article on patient centered technology enhanced health systems.

The event was facilitated well and supported well by the various specialists including the cartoonist (graphic artist).

Regarding event 1, I realized how complicated the situation is. When I am faced with a 2x2 matrix...where do we think we are now and where do we think we are going. What are the different strategies that can show dynamic action to move from one to the other?

The second workshop make great strides towards strategy. Took ideas from the first session and formed them to a coherent strategies, though Health Canada was not really prepared to listen.

We need to experiment but this is a problem in the current health system. Hard to experiment because there is risk but also the payment structure does not encourage innovation and experimentation. Not unlike the problems I saw in my earlier career when I was a senior demonstration officer when I was trying to equip houses in the north with energy efficient systems. The system then used mortgage support as a way to control costs, operating costs were treated independently, so to demo a housing system in use which would save energy operating costs required a bit more money in mortgage costs but the system in place was to control mortgage costs. Because the system

restricted upfront costs it encouraged inefficient houses and more costs in the long term. This is an example of a contradiction in the short term and long term.

The 3<sup>rd</sup> event was a good one, it took a generalized discussion of the future and moves it to a targeted and strategic focus. As a foresight tool you need to get to strategy...hard to do from a single meeting or just 4 scenarios. Many practitioners are under the impression that you can do foresight in isolation from strategy but this is not the case. It was a focused discussion, the ability to hone on the target without distractions, all the players or participants came with a reasonable sense of knowledge of the system from the previous events, background of the previous meetings and foresight focused the ability to hone in on strategy and strategic challenges. It was one of the most focused foresight outcomes with how to deal with systemic opportunities and actions.

I recall a certain sense of coherence amongst the group...a certain sense that the health system could develop the capacity for experimentation which included the best information resources up front, then the system could increase the number of reasonable choices.

There was a meeting between the socially oriented and the technologically oriented to get over the problem on how to run the system more effectively and efficiently.

KQ: I recall there were many good ideas that were eventually packaged to the Health Canada management team who chose to ignore it because Health Canada had been dealt out of the game by Harper.

KQ: Foresight to action. It must happen through strategy. Foresight is not action in itself and it can't be directly translated to action, unless it goes through strategy and then the commitment to deliver. Foresight creates the basis for strategic choices. Strategic choice gives a platform for elected officials and leaders to take action. They can see the strategic options. People who think foresight leads to action don't want action or don't understand how it works.

KQ: After the events, I used foresight practices and learning in that event for policy discussions in Europe and Turkey. My experience in the health area was useful and applicable to my career and the committees I am on globally.

A5. With respect to adaptive capacity requirements....the capacity to handle patient centered data was needed in a way to allocate resources in the system effectively. The whole preventative framework and the technology that enabled prevention or maintenance enhanced the way to deal with problems before they became acute was undervalued or ignored. This was 50% of the costs of the system. The balance of acute and chronic and how you manage those resources in a participatory context needs urgent attention. Foresight identified that outcomes of health are important so how to address that. It exposed the terrible bias in the system where it makes doctors responsible for decisions and gatekeepers of the health system and they have ...instead of approaching in a holistic way, they tend to isolate a condition versus promote a lifestyle. There are perverse incentives in the system. The real challenge is how future doctors are trained as managers or integrators in the larger system. Doctors should have data support clerks....information needs to be received and analyzed on how to intervene earlier in prevention. The way doctors work needs to be adjusted. Now they see people, write prescriptions, do referrals, review and give feedback versus treat or

advise on lifestyle because they treat the symptoms of chronic issues. I think the next generation of general practitioners should be really different in their approach.

The federal government needs enhanced fiscal capacity to not only support innovation in health but to be an active partner and contributor to health...the leadership role to support experiments and as well to actively support technology experimentation and demonstrate outside the boundaries of the current system.

Good foresight requires groups...it is a collaborative endeavor. It is integrative and insightful only through sharing diverse viewpoints. The speed of technology transfer can be dramatically enhanced by foresight led experiments. Foresight opens people to learning diverse experience and gives them a sense of shared commitment to the future. I used to think policy could do that, but I don't think that is the case. I think that there is low policy imaginative capacity left in government. Therefore it has to happen in another forum. It is easy to have negative policy where everyone is negatively empowered to say why you can't do x or y. They are critical but not providing any innovative alternative. I think it stems from the leadership from the PMO (Prime Minister's Office) and its agenda of command and control.

In my introduction to foresight is a story of the energy crisis...the 70s...the same background as the Shell guys...a future where oil is scarce, highly priced, or problematic. We are there. It is problematic to address. The future world sustainable economy, or health or other domains or that perspective from energy is useful in that it shows you how contingent the future is, how uncertain it is, how it may be tilted by events creating consciousness raising. Foresight is fundamental to innovation. Innovation is about the concretization of the foresight imagination into products and services that will service a world that does not yet exist but has to evolve.

The Health Canada foresight was one of the most successful processes in that it developed strategic focuses. It engaged people, maybe the not the right people, but you can only engage those willing to participate. You only find out in hindsight if the imagination, people, opportunity, were useful to frame the landscape of possibility.

## HSWJ14F

KQ: I was surprised by how much food was involved in the discussion...I am from ZZZ. I expected food wouldn't appear...but food came up everywhere. That particular event raised how much you could do with supporting tools to ...that was the first time I could see the two arguments and create a visual map of our discussion. The visual didn't change my understanding but others really ...who are visually dominant it was a great addition to the discussion.

KQ: I remember I came late...middle of the morning. I didn't have the benefit of the first starting off...so I think the shift was more of a dynamic shift...we did work in different groups with different approaches. I think we all went along together because of the different mechanisms.

KQ: Absolutely...multi options, multiple levels of complexity, a lot of it was behavior related....that is the difference with health and agriculture....health is very personal, but in agriculture not everyone grows their own food. People make individual decisions about their health every day. It is much more at the individual level....government provides the service but there is a lot more individual thing. Food is a cultural thing. In health every day is a new day and an individual experience.

KQ: Not as much group action decisions and change as in agriculture. Here we saw health integrates with many more groups. At OMAFRA I have not had direct relations with health, however, it helped the thinking process...my thinking process that we need to be more than agriculture and economic development ministry. That food and health are intricately linked. This will be more evident in the future. This was a shift in my thinking. At a work related level I recognized that the tools and thinking process was helpful....it was the processes to bring people in the discussion that I applied to my day to day work. Over time...I am a food scientist so perhaps this influenced my perspectives of health...it expanded the range of possibilities that I should think about. I began to feel twitchy about these relationships...think more of food and health and health in general. I found so much is behavior based. There is an intersection of consumers requesting information and agriculture having to make available this health based information, for example, nutritional labelling, involvement of technology, like how smart phones can be enablers of communication and now enablers of health tracking and decision making and linking people into possibilities. Even though food was a driver...I see it as food, health and technology. From my background, there is a talk of one health...human and animal health and this is a different aspect and this discussion needs to become more dominant.

A1. Yes

A2. The graphic artist was very memorable. I still use those pictures. You connected me to JK which we have had many works together from Ministry of Health and Long term Care and now at MARS. It goes to those interconnections...to reach beyond those initial connections that impact health. This health issue and these combinations of things are becoming more important. The tools and connections and who you should link to and the bringing into it the new thinking...shaking up our views of things. How these connections can be used in new and different ways.

Since this event, there has been advances in technology to drive the connection of agriculture and human health. My instructor has a thing in her arm that tracks her movements. We see these tools to help us improve our health....apps on smart phones like fitness pal tracking food. Do these things really help our health or is it a fad...we need still to see the results. We need to see how it weaves itself to the internet of things. This is new and exploratory and we will see the results in the future. Having some thought processes to shake our thinking. As baby boomers age maybe that will drive it ...or maybe younger people will build it into their everyday lives. It is still too early to see. At OMAFRA there has been some more references of health...there is a continuing interest but not yet figured out. It has stayed on the radar.

A3. There was different perspectives than the AAFC one. For the group it was a new way of thinking was profound. We all come from different areas. All of a sudden we are a system that is connected in different ways. I am not sure if the scenario axis was an 'ah-ha' moment but it was interesting to see. Understanding that this system was extremely complex....it pulled it to the front. People weren't surprised the axis was a resource shortage and focus on individual/collective. It reaffirmed people's fears that were powerful drivers.

A4. Individual versus collective...these weren't separate. The collective drives the individual choices and vice versa. There are a lot of grey areas...they aren't totally separable...one is a bit of a driver of the other. It is a dualistic thing...they are not opposites but they are connected. This creates a complex issue...chicken or egg and how do you tackle something when they are connected. Then there is the economic capacity piece which is connected. It made a lot of sense but complex. The individual piece is not funded yet they are related. Because this is not new but we seem to be stuck on how to make it different. Though there are things in these quadrants ...how to do this?

How to change some of the things that have been embedded? Regenerative medicine is new....food policy is around. Some is historical and some is a clean slate because it is a new field. It is interesting to me the mixture of different tools, characteristics, knowledge bases, and diverse decision makers....who is going to pull this all together.

A5. I am not sure if it is from the event, but to today there is a bigger recognition to the fuller value chain...the product, how it is produced, the environmental footprint, does it have CLA or some element connected to my health. The recognition that there are many urban consumers and less rural consumers...there is different nuance to food and food policy and the reasons why people are interested are shifting. Many are not raising their own food....but they are interested how it is produced and how it is connected to health. This is due to more living in urban centers...more ethics...more drivers to unpack in these agriculture decisions and interests. People want to eat healthy....you see it in the news, the different areas of interest.

Weight and food addictions...shows on televisions....cooking shows....built in drugs and entertainment. Intersection to technology....it is all front of mind. Underlying relationship of food and health that needs to be fully dealt with...anorexia, bulimia, and obesity.

It was part of the building process to me...it was an interesting professional development opportunity due to all the things going on in the session. Interesting to see how others see how to approach the complexity of the issues....at the province we didn't have that

economies of scale. There were many interesting people. I enjoyed the health event because it was out of the realm of my work...which broadened my thinking and added different experiences to my work experiences. Just thinking about the other possibilities on how to do your work and other concepts in life...it was interesting and I enjoyed it.

G1. It always helps to think about long term outcomes in the back of your mind. Most of the time this is an advantage...remembering everything you do now has a relevance in the long term. It is important to address the long term in short term or present day decision making. Always keeping in mind the implications of today's decisions.

G4. It is part of the environmental scan of what you are doing. It is one of the pieces important to developing an action plan. It needs to be considered as part of the tool box...it is an important piece but not the only piece or factor. There are many things that contribute to the need for action. It is part of the range of elements. Feeding into the background elements leading to action. It removes some of the feelings of riskiness to taking an action ...when you use foresight tools you can map out the eventualities to taking action...can remove the perception of risk. Keep going through the processes to see the risk and benefits and see the benefits of sorting through complex interaction and be more comfortable with the actions we take. Disrupting the status quo is scary. There is a comfort with not changing. We as a human race are not comfortable with change...though we should be as change happens all the time. It can give us practice on how to change. In some ways foresight is comfortable....doing the PhD allows the inquisitive questions raised in a safe space in a foresight space to explore or ask uncomfortable questions.

G5. This thinking and practicing enhances resilience. If you are able to adapt to changing environments then you have a better chance to being maintained. If you don't keep up with the changes you will be negatively impacted. In order to be sustainable you need to be anticipatory. A lot of it doesn't happen by fate and luck...there needs to be some intention to it. You need to determine some action to take to that continued relevance to society and that continued contribution to people's lives...both at a personal and organizational level.

Foresight aspects are helpful to broaden thinking and consider different options to create a broader spectrum of possibilities. Some might think this is a risk but having the ability to think about the future and where you are at is useful. Even if you want to maintain the status quo you should know what you are giving up. Foresight can contribute to that environment. These are critical thinking skills. These are good to do for everyone. Is this for high school? It is a good skill to have. As we move through the evolution of society...more knowledge based society...how we continue to build those critical thinking skills. This is important component to our everyday society and the evolution of the broader society that we are in.

HSRJ13M

A.1. Yes

A2. I can't remember the events.

Though the interviewee was signed into the events, he left multiple times to attend to office business. The interviewee could not remember the events, even with the reminder summary material.

KQ: I recall that the different perspectives of different individuals who were attending. I came from a private sector who focus on consumers and innovations and things get to market that help people. But there were other people in the health system and it was refreshing and enlightening to hear the perspective of others and I can hear other people. I was a lobbyist and my job was to interact with senior level government individuals...so to hear a broader perspective gives you a better sense of things...where they are coming from.

I recall discussions around change is required and resources are required ....where people who don't have resources can't help themselves....that model was insightful...to realize that not everyone is in the position that we are in, and they need the system to help them. I look back and we aren't doing very well. These were a couple of things that come to mind.

I looked at the 12 innovations...we made some progress on some and no progress on others. What sticks out here are the needs for information and records and cards with people's data. Other countries and jurisdictions are better at this. In Canada the most successful data collection is in the military where people are obliged to share their data. In some projects in the United Kingdom they are also very big on sharing anonymized information....it is a pretty good approach ...this is not a privacy issue. This is starting in a health system and data can be used as long as it is anonymous. They share data but no one knows you are sharing data.

Regulatory reform...pharmaceuticals and medical devices...our system is risk based. In 1998 Canada got a head of a lot of jurisdictions. Pharmaceutical regulations are very out of date....there isn't any new progress. The other thing I notices, especially with this government is that they don't care about health care. I suggest an innovation fund to help innovative devices...it is a provincial jurisdiction. They take a hands off approach. It is hard for provinces to lead a national initiative. I said this there...I am a contractor now....I don't care...I can say what I want.

KQ: I think that ....if I became more aware of the perspective of others and understood where they were coming from and likely the opposite occurred...others understood others. People are engaging. It creates understanding but then people go back in their own world. We talked about what should be going on...move chronic care out of acute care. \$55/d homecare or \$1200 hospital care. The need for people to take personal ownership of their own health. The concept of living well rather than how many years enjoying a good lifecycle...a longer healthier life. Those are things we are talking about.

KQ: Euthanasia is a question....abortion. We allow if you want or not. The need to get away from illness care and get to prevention. We haven't got there. We are doing same things we did 30 years ago. But what has happened as we get more informed, that position isn't the last word. My family physician now asks me what I think is wrong with me versus a doctor just telling me. We talked about this for years. I used to work for a premier councils on health in Ontario....health is not hospitals...it is wealth, housing, lifestyle, way back, we still know is true.

Yesterday I walked 24,000 steps and 15 km...I monitor my steps on my iphone. I pay attention to what I eat, I pay attention to exercise. I have changed my behaviour and

adapted. I eat chicken wings and beer 1 x a month. I haven't gone to a restaurant in 2 weeks to be healthy. I am going to Japan and I will eat healthier there. When we were in Hawaii I ate primarily Thai food and I lost 15 lbs...just by exercising and a good diet. As you get older and learn more...I am walking a lot for 2.5 weeks in Japan and I will be healthier...I can walk 20 km a day. I have embedded keeping fit ....even more so now. I am stronger now than when I was 20s. Yet on the system we learned things and we know better and there isn't the change. Everyone wants to get elected but they won't do the right thing...just the things to get elected.

In the medical devices...I see things that could make a huge difference but yet we don't have those changes...no willingness to address these large system inefficiencies where they spend 85% of the money. Lack of willingness of the changes. I see it in Toronto...battles with policy and fire services...we don't need them as much...when their jobs are threatened you are going to react and protect. You don't want to lose your income so you protect the status quo as possible. That is what has helped me. They are afraid of what change might mean.

KQ: I think going through the exercises...I did several with industry....latest was the future of medical innovation and technologies...the discussions are amazing as what is here already and what is going to come. Closed system insulin pumps ....3-D printing and put a cochlear implant and they can hear with a 3D implanted ear. This is great. How to afford new tech? We need to change to change the way they system operates so we can afford them. You eat what you kill concept. I see that is becoming more prevalent. There are inequities in health...people with money can do this. 6 weeks ago a friend having a CT of a knee done...7 week wait...went to buffalo, paid \$600, came back and asked the doctor for next steps. On the other side some people wait a year. Well it's a wait list...why do they put up with it? Why? We wait because that is how we do it here. If you have the resources...more people are doing this...or move out of the country...for climate and for health reasons. If you have the resources you have more options. I think it does, but the process of change or sustainable change takes a long time. E.g. of a guy used brain simulation to try an innovative surgery...I will practice on a simulation model and when I am confident to do the procedure.

#### Event 1:

##### A.1 Yes

A2. The graphic artist was cool. First time I have seen that. She drew what we were discussing...since then I have seen it a couple of times. A former colleague is doing that now. It is now a big thing to show visually what we are discussing...which helps create cohesion in the group. This process piece stood out. When I look at the scenarios, I find interesting the learning in each scenario. Health R Us, Dog Eat Dog, etc. ...I liked the terminology...when you look at the specific points we learned under each session.

A3. We started talking about doctors and hospitals but that is not what we should be doing. We need to talk about lifestyle change. We talked about clinics for procedures...cataracts can be done in a clinic...don't need a hospital. It takes 3 min per eye. It is funny to see surgeons doing cataracts...mostly because billing hasn't changed. There is no need for this. We are only trying to deal with this now. WE are

still opposed to the private sector orientation...private contractors work for themselves...they get paid for what they do....they can have efficiencies.

A4. Hospitals should deal with the uber sick....if you go to the hospital you can get sicker...c-difficile. We talked about those things but we haven't gotten around it making the big changes. Cataract...e.g. we have 17 colleges in the province of Ontario...if you are nurse you can only do a certain scope. We know we need to open these things up...but it doesn't happen. They don't want lower trained or skilled people to do this stuff. Radiology....creates a barrier of entry...I can read a scan in India less expensive than download Toronto. The doctors put things in place to put barriers to that. To read a scan I need to be a member of the Ontario College. We don't have the courage to do the right thing, but stronger to protect our entitlements.

A5. We have a federal S&T (science and technology) strategy, but it is worthless. There is a role for federal policy makers to create a strategy for S&T but it is poorly done. They know they should do better, but it is just not on their priority list. This government health is not a priority. NRC is their priority but NRC is 100 years old. For 95 years they did discovery, bench and good research...they were economic development agency.

Five years ago government says we are not happy with ROI (return on investment), not enough innovations, so we are going to restructure it. The NRC in the health programs decreased. It is time to build more of those simulators, but now they don't do that anymore. They fired all the scientists and now they help companies with product development versus developing novel products themselves. It worked before, but now they have crippled it. Now you have a culture change and trying to be consultants, convincing private companies to view them as consultants...now they have to get work and contracts and achieve revenue targets. If they are not successful their programs could die. I help the NRC figure out what they needed to do to become innovative.

I have used the foresight work to help them see the future and then see how they need to change. They have 5 programs, we can do regulatory....I said no you can't...you can do medical devices development or micro fluidics, point of care diagnostics....you will not make money providing regulatory reform. Now I help them get their using the knowledge I have picked up. Let's go to companies in the US and see what they need....but we can't go there because we are a government agency.

## Event 2: Policy Event

B1. Yes

B2. I remember the will, would, won't. I was a would, but now I am a will. I use the technology and information and I am in great shape. I need different hand holding and support in the would category. In the won't category I am just there and can't get out. I realized that I have been in them all. This is also interesting that you need different instruments. In won't the obvious one is the native communities in the lack of progress...the act in place, the unwillingness to change on many people's parts...the individual, communities, etc...they are forced in the won't camp. I hear again people in a community of 400 people saying we need jobs and education...well you are not going to get jobs where you are. I have friends in NFLD who fly to AB for work. In the won'ts, some choose, but in many cases we created that category and they can't get out.

B.3. The group realized that there needs to be supports in education and actual management. You have to pay attention and have hope and put processes in place. It just occurred to me again...initiate support monitor catch or help those who slide backwards. You need to have data and information. In Washington DC they have a pharmacare program that monitors prescription use and it can flag who is overusing pharmaceuticals or you can see adverse reaction of many medications.

B.4. See above...there are things we can do ....we see there are options...These approaches need to be different for each category ...requires different assistance...could move you up and catch you when you fall. Now we have a one approach system for everyone...once you are acute.

B.5. Now with these perspectives I can take action...I learn, I can afford the tech. But the system is not changing for those who can't do it on their own.

G.1. I think it is great to use foresight so you don't need a crisis. We then need leadership to make it so. These things are hard to do. You need the authority to make the decision to do the right thing, but our systems are biased to the short term solutions.

G.2. We learn things we should be doing. We see the courageous actions we should be taking. But can we do them. Physicals...not necessary ...we do it for billing...why go? There are many things we can do ...we need leadership.

G.3. We see what is required...I make the changes when and where I can. The problem is what is needed in the system.

G.4. We don't have willingness, political direction. Some folks in the exercises feel it is a waste of time...it makes you think about things...why and how to address issues. I did this with the NRC...in the medical device program we built in a new concept development activity every year...I want to hear new ideas and radical thinking...you need to go through the exercise...to challenge yourself and not cruise. Need to look forward.

G.5. Innovate or die. It is an American saying...you innovate or die. You must look forward, doing the research, the other guys will catch you and then you are done. This sustains. If you innovate you will sustain. You will have new ideas, better ways of doing things, more effective and innovation. I am a huge fan on how to teach more like this in innovation, and how to build a business around it...you sustain through innovation and new ideas. If you sit still you die...blackberry, Nortel. Others caught up and now they are done. Even individuals who attend...it broadens their thinking, it enlightens them. Even if it is just a little bit it adds.

G.6. At that time I thought why are we doing this? What is this about? Since then I feel that this is exactly what has to happen, we can't stop doing it.

## HJKF18M

KQ: I am also a foresight specialist in the health care sector as well. I was working in the field...overall I wasn't surprised. I was surprised that the discussions reflected my own work in Ontario. The fact that the federal level was doing it was that we were all coming to similar conclusions with different people.

KQ: I went to two events. In the second event with the wills, would and won't, people were changing their minds and getting more engaged. The first one there was some scenario work and we talked about the implications of those scenarios. There was a lot of reluctance to work with the scenarios. The people in our group couldn't see the point. They saw it as a chance to discuss but they weren't really engaged in it...approaching like a case studies and studying it, but they weren't necessarily believers in the scenarios. The exercise happened too fast. Wow...I get why doing the 2x2 approach but I don't like the 2x2 approach when applied to policy issues because it forces people to simplify complex issues. It was hard for them to boil it down to the drivers. I would have used the morphological approach used by Godet ... don't need 2 axis...can have more than 2 like 4-5 drivers. For each driver come up with micro scenarios. Then you weave a scenario from 3 micro-scenarios. I just like this approach better for this work and I was perhaps biased. It went too fast requiring a bigger leap of faith. Ultimately people were happy by the end, but were struggling with the process. By the second one, people learned more, learned each other, and were much more creative by the second event.

KQ: It was clear that there were many options. It was less clear on how they would make this happen....the power politics and how to influence politics. That part didn't point much towards political influences. That is a great idea if only I could get my Minister to pay attention to this. They realized that the billing had to change, funding silos had to change, but they didn't know how to make the change. They felt that taking the ideas to the Deputy would be political suicide. Partially also because of the specific domain topic...because of the nature of how health care is delivered in Canada. Health Canada helps with health transfers but health care is a provincial responsibility. Some of the provincial people didn't have direct health professional people or delivery.

KQ: Definitely, the usefulness of this case was getting people thinking, to validate their fears and aspirations to see what could be needed to transform the system. They enjoyed the new insights and discussing it. Frustrating was how you would change the very entrenched organizations.

HC: Event 1

A1. Yes

A2. Nothing specific...but I was pleasantly surprised that people came up with common implications across the four scenarios. I do foresight myself, I saw people could fill in the blanks with interesting ideas. I remember that people said food policy, prevention, technology were new and relevant approaches. The current system of hospitals and doctors is insufficient.

A3. They talked about how they underutilized science and technology as a whole. Also how hard it is to get innovative technologies adopted. We are underutilizing S&T. S&T would be a liberator to get the change required. The power dynamics were very difficult to change, because health care professionals have power and don't want to share. However the S&T listed gave more power to the individual patient. However, if patients do more on their own is the public system obliged to treat them? Not all of these issues are worked out. How can we de-skill, change the scope of work?

A4. We are seeing more options: patients learning more and doing their own research, driving their own needs; doctors treating more with offsite monitoring; more types of treatments and professionals...dietician's, exercise people, etc. We need to have a hands on and team based approach.

A5. People are preventing better, the wills are getting healthier, the woulds are doing better...i.e. kids in schools without sugary treats, changing meals in schools. The health care system is stubborn to change, yet S&T can help people change and make demands themselves. Yet the health care professionals take on a lot of risks and take on the spot decisions without a lot of information to help them along. They take risks on the procedures themselves...but when it is the policy or structure ...they are risk averse.

## Event 2: Policy Analysis

B1. Yes

B2. I really liked the frameworks produced...the will, would, won't. Later on what became the treadmill model came up on the event. People really liked the event. The metaphor and framework was useful to enhance their creativity. They felt the recommendations were concrete and doable....particularly the policy actions.

B3. I think they became a lot more explicit about what made Canada's health system complex. They really saw it here....they thought it was hospitals and doctors, but they saw you need many many leaders to change things. If you wanted to be proactive, you had to give information to people. You have a lot less direct influence on people. People in different categories you could change the amount of responsibility...there was a dichotomy....the wills could take more responsibility, but for won'ts maybe the doctors need to take more responsibility. This was a change from doctors decide and people can't control. In the hospital or doctors' office the doctor has more responsibility and control. But outside the physical setting of health, it is harder to control.

B4. The group learned how to state that the system is complex...they were explicit...this was a surfacing of awareness. They also saw the benefit of redundancy, that many players need to make change. Also that we need to use straight forward policy approaches versus convoluted. Now you want to embrace the complexity...instead of one policy or the highway. I think people were smart policy analysts...they may have known this, but it was an opportunity to say it out loud.

B5. Since this session, people have become more aware to converse with a physician so that they listen to you. You present info, physicians are listening too, and people who have those needs are taking extra steps to share information, and getting learning and good solutions on each side. IT (information technology) is so underutilized. For 20

years we have been trying to do it and yet medical professionals still aren't being trained in colleges and universities. This has been keeping files and just store them electronically.

## G: Peripheral Learning

G1. I love foresight as a concept and a policy/strategy tool and I use it whenever I can both personal and professional. My job title is not foresight anymore. I don't have a chance to do a foresight project, but I draw up future scenarios. When I do policy work I get people to use scenarios to help me and others to think about outliers. It provides extra texture on a product could be deployed and consumed. It gives me perspectives to question my assumptions, it makes me a better strategist because I remind myself what valid assumptions is or which need to change. It enables me to think of different solutions...how the solution performs in optimum scenarios and difficult scenarios. When I open my mouth to make a suggestion people listen to me because I offer something different.

G2. Definitely it works in groups, but it needs to take time and doesn't overwhelm people. It can be resource intensive which can be a drawback, but cheaper shorter exercises work as well. The group can learn from each other, learn assumption, and learn how agents and behaviors change. The group becomes wiser. I bait and switch...to use cases to turn them to future looking forward scenarios. No sense building only 1 scenario.

G3. I use versions of these events in my work every day. I do product design work...I use current scenarios not trends and drivers...how to producers identify key needs...it begins easier to talk about it and then we start to draw in the future. They see they value of the mutual learning. Then they are interested in future scenarios...they then want to talk about how they use their product...this is a future time period so now they are interested.

G4. That is a difficult one. Ideally foresight results in action. But really it needs intensive design and change plans. Overall plans tend to be high level. I see people call me 5 years later and say...you mentioned it and can you explain it...now we are ready. I am not sure there is an immediate policy action. It takes time. With policy there is a tendency to procrastinate action. I am part of a solutions lab....which is a design thinking school in health...we do action learning...learning by building prototypes. When I think about foresight...this approach is more action oriented. Rules in government and the nebulous thinking of policy makes it very difficult to move forward.

G5. Definitely...it gets them thinking. This is the first step. Action takes longer and often there is inertia. You are challenging something very entrenched. This part requires some strategic change management concrete plan to make the change.

G6. I use similar methodologies...but a bit more appreciative inquiry to get people comfortable and then I draw in the future.

G7. As a non-profit I identify the risk and the risk takers and we can do it...government takes too long for many reasons. This is ironic...with these policy issues there is no evidence in the world to ensure the right action. They are very afraid and not

appreciative of complexity. Because we call problems complex you will not have enough evidence to make decisions. The action learning allows you to practice and try and make changes as you go along. In effect you create information to better inform the adjustments you need to make. In policy you spend the next 6-9 months of data...figure out who has done this... and even this doesn't work because it might not work here.....by the time they figure it out they roll it across the nation....then they wonder why it failed. The foresight events help to change the thinking of bureaucrats...it forces them to rethink the vulnerabilities of their policies and solutions.

#### HMFF09M

KQ: I guess in terms of change, what I know generally speaking, there was a refinement in the utility of the exercise and its value. By purposely looking at scenarios, ways we could imagine the future play out, that we could get insights to our present day...what things we would need to do. Initially I was skeptical in scenario planning to inform actions today. I was always concentrating on the here and now to create change. Taking the time to think about the future wasn't on my mind. At the end of the process, it was very useful to think about actions I might need to take. My perspective on changing about the future to inform the present. The think that jumped up the most, was thinking about all the issues we discussed plus policy and regulations. I don't know I was thinking about things in S&T and innovation. I recognized that I had a narrow definition of innovation and S&T. I think through the discussions we had, the end place for me was that there were different inputs and it expanded what I could imagine it being. Food policy jumped out...there is S&T and I never thought it would be part of science and tech and innovation. I ended up with a greater sense of appreciation of all the things that make up innovation.

KQ: I would say that there was a general refinement to people's thinking. People were willing to consider more than they would before. Their perspectives on what was possible was influenced by the richness of the discussions, greater appreciation of complexity, the levers and factors that influence approaches to go and individuals could take to make things better. There was a general willingness to listen and consider other perspectives. We covered health, individual, societal, it stretched my mind to expand my thinking.

KQ: I do think that there was the development of multiple options and everyone appreciated it. I am not sure that there was a feeling that these options could lead to solutions. Solutions that were implementable. My impression for me after the exercises was feeling overwhelmed and cynical. My own mind was stretched to consider other options, then realizing that these are logical to solve our problems. This was the realistic side of me...it makes a good reflection of the options. Especially the scenarios which we looked at opposites. At the end of the exercise I felt overwhelmed, but look at the different ways it would be acted on by different actors, I quickly became cynical. I began to realize how anyone could chose them and implement the solutions---but would they?

KQ: The only way I think that these ideas could be turned into sustainable actions or actions that were sustainable and had an impact, as they were developed into solutions, they would involve the decision makers (authorizing the decision makers to make those choices). I am not sure those decision makers would be willing to create more pain for themselves. Why would government give themselves more pain to change doctor payment schemes or spending more money on prevention where there is no guarantee

of a result? I looked at everything was great to generate ideas and knowledge but I am now recalling individuals stating the resistance to make the change. The fact that we didn't have decision makers others than individuals made it difficult to know what factors may have made these options actionable or easy to implement. There were a few factors we couldn't consider because we didn't have the political decision makers. I have thought about these things in the past...I have been taken by some examples from Finland and Sweden where MPs (Members of Parliament) are involved in working with the public to consider options and implement solutions. In Canada, we don't have that level of political participation. Would that have made a difference? Would it have it make it more actionable? I don't know. We rarely push ourselves to that space to engage all actors to truly correct the situation and bring the change. The Canadian way is to take a big topic with many ways and skimming it without going deep. When I think about the collaborative process...I think about the speaker Dr. Karl Heinrich Robert...it didn't deal with health per say, but became healthier with less hospitals and doctors. The benefits as they were described spoke to all of the different participants. Because the issue that was discussed was discrete enough it was manageable. In health, Canadians tend to believe that health is the number one election issue, but when it comes to solving a problem they don't know what to do. We don't have bite size problems but none those that affect the system. There are temporal realities, definitional realities, it all depends on what the goals are. Does foresight establish the context...to see the comprehensiveness and complexity, then it is great. But then to get the solution? It has to be used consistently all the time to give the same approach and solutions over time. Health impact assessments is one of the things that tweaked me...that people make decisions on unconscious thoughts and things easily recalled rather than evidence. I wonder if they had a health impact assessment could they come to a more rational choice for the population. We try to get people to think about the information presented to them, but the value of foresight is to think about complexity and deal with something more manageable. If I felt that the foresight developed context and select options and actions for decision making, then the event would be more successful.

#### Event 1: Scenario Foresight

A1. Yes

A2. Profound would be on ubiquitous sensing. It was an area where there was some excitement in the discussions and practical applications being developed...in clothing, in the home. Those were the conversations during breaks. For some it provided them with them how individuals would be engaged with this potentially hierarchical view of the world. That paradigm could still potentially shift to participate in the capturing of data...tools, sensors, clothes, and people who could have access of the data, then this is where I could look at my own data in real time and make choices. It was fun and democratic. At the time, my hack background as a part time designer, as a person who is visual, and others gain from seeing certain kinds of concepts...I found that from an individual point of view there was an additional tool to see things differently and see things they were hearing. Good for discussions and understanding. How we can understand through imagination...a more holistic way to internalize complexity. Whether it was looking at the scenarios diagram or mapping, help develop the relations....spoke to auditory and visual people.

A3. Group gelled with the artist and refined their thinking and views towards the end.

A4.

A5. There is one tool...the health impact assessment would help them refine their decision making. I remember being at McGill university to transition of "magstra cards?" (I am unsure what this is). There were so many new and interesting technologies that I thought that government will be able to adopt or figure out to use these things in day to day practices as a regulator. I said to myself in my frame of mind in regulatory modernization....Australia and others had done protocol, decision methods, etc. to accept other views or ways to accept other forms of regulations. This was coloring my mind. How and when would the federal government deal with the changes that are dealing with in this technology space? I netted out by thinking if they use the health impact assessment, this could help them make a decision. They need help making decisions.

#### Event 2: Policy Event

B.1. Yes

B.2. The most profound element...I was thinking about other things on how technology could spur individual action. I was thinking that individuals would be excited about sensors, information, and technology to learn about themselves and make decisions. What does this look like...to have self-regulating people....currently we were more centralized....that the government would do things and make a profound change, but with this distributed technology, how individuals might react to things in spite of government. This is a situation of where people will do what they want to ...either what government could do or wanted to do. I felt society was moving to a more individualistic patterns as time marched on as these technologies would facilitate people doing things and much more intelligible to them than government and government regulations because of immediacy. The people who would be able to do this..."will and would" categories would benefit from this type of technologies.

B.3. Group was a bit polarized on would this create inequities or would this free up cash to deal with the moments. People let their guards down and were able to take broader topics and talk more honestly. It may not have been honesty or more honest or maybe their minds were changed. At the first event the facilitators asked how many had been through a foresight exercise before...the second event were used to and being able to talk about more than the narrow issues. We could see the complexities better and share broader thoughts and were more accepting of the complexities.

B.4. The group realized that change might be that individuals may be enabled to take over to improve their health and be faster and nimbler outside government. That the technology could enable people to take control of their health and do more, leaving government to deal with won't.

B.5. The technology was already taking off, Bayer, diabetes information to help individuals manage their own health. Also the lady in the session who self-diagnosed ovarian cancer and lived and only lived because of her own motivation and influence. Also there was an ethical concern on the meaningfulness on 23 and Me and causing panic and the insurance companies and who would have this information. There were

ethical questions and we revealed that we were using the old paradigm that government knows best and has to control it.

### Event3: Synthesis

C1. Did not attend

G1. Peripheral learning (we went through this section quickly as the interviewee had to leave to another appointment)

G1. New ideas, new options, understanding complex systems. It has expanded my own thinking to think outside the box.

G2. I think that foresight helps groups understand complex systems and expand the number of options.

G3. I see that foresight has helped me explore complexity, larger systems (as I much preferred solving discrete precise problems), and generate ideas and options.

G4. I think that the foresight process helps to generate knowledge sharing, understanding and options. I do not think this is enough to generate action. Somehow decision makers need to be included in the whole process. A very serious discussion needs to ensue to ensure that decision makers can have input, ideas and discussion on how to make difficult changes easier. No one wants painful decisions....for example, the idea of changing the physician's billing scheme...we need to talk to decision makers and doctors on how this would practically occur. That was the difficulty of the foresight process, we came up with multiple options but the changes required were extremely difficult (doctor billing schemes, having more preventive programs versus acute care...but would that be extra money or would money come from the acute side? Would that action guarantee results? Big questions requiring big decision making.

G5. I think it leads to awareness, cohesion, learning, and determining multiple options. I am less convinced that it leads directly to action unless decision makers are in place and they are motivated to honestly hear the tradeoffs and do the heavy lifting required to make the required change. I am less convinced that 4 year election cycles are conducive to embed long term considerations in decision making...we are too trapped in the shorter term, 4 year actions to get elected which may not be the bold change actions required. We should really look to Finland and Sweden. Elected officials participate in foresight like activities, there is less "party" politics, people tend to work together to generate solutions.

KQ: I used the health findings in the long term national security based on the population looking at demographic trends and health trends looking at the vulnerabilities and resilience of societies to disaster. In the first instance...it was so valuable because it is foundational to national security and defence.

A lot of work as a futurist in public safety in science and technology and my own personal interest is looking at S&T as it fits into everyday life and society. How does S&T fit in everyday life? Here was something was personal, tangible, that everyone could use and benefit from. As far as we look at health in relationship to chronic issues ...obesity as a threat to the public purse and productivity...how to engage people in healthy lifestyles. Science is exciting...weather it is robots or info on a health card, it is that dimension of health to get people in the discussion. Look at watches and wristbands are health monitors...as a way to engender public discussion that is exciting and has promise...but it is not a universal solution.

KQ: By the end what came out was that health was dependent on all levels...the individual, family, community and government. Success in the strategy was to be across all levels in addition to S&T fixes. S&T came in as an enabler ...what is needed as an enabler to help the individual, the family, the community, versus what the experts do to you. It is not just the system, but what we do. There were some exotic things....regenerative medicine.

KQ: The complexity being variety....public health or individual health is a complex problem...many ways and actors to deal with the problem. We realized there were multiple options needed for success to sustainable health systems.

Health in relation to globalization....greater numbers, greater people, greater speed....with things piggy backing on them...like pathogens...infectious diseases, uneven standards in goods (melamine in food from China, counterfeit medicines to India); globalization has exposed us to some risks we didn't think about it.

KQ: The event helped to probe and pull in on how S&T can be a hand maiden to advancing public health. I think where it went to action was affordable technology that people can better manage their own health. We looked at the social determinants of health and how S&T can match those enablers.

If you know the trends driving public health, then what can you engineer in the traditional sense. I talked to some engineers and they were divorced from social trends.

The workshops broke down the silos of expertise to work on more complex problems together.

[Do you remember anything profound from either event? LS]

How to deal with mental illness....we need to tackle that ...that was a big challenge. From my background I see the mental health problems relating to violence like terrorist recruitment. I have seen that aging parents and deterioration of mental capabilities...the competencies of the elderly to take care of themselves. Can foresight help us deal with that? Women live out men...but she is not at home. There is more work to be done.

What is valuable of the will would won't model ...we tend to look at the average median, mode ...but we see that not one policy fits all. We need a variety of strategies. This was good to get some granularity but keeping it in manageable categories. You can't have 35 million health policies, but it made sense. By using different policy options you could less expensively remove bottle neck effects.

Public health, like climate change for Canada and the global west is one of the key challenges in our era. These are key challenges. Foresight thus is a good tool for public policy.

Now we can't do policy in silos or isolation. We need a variety of experts working together through these foresight activities. The successful statesmen is one who can harness expertise from these silos both for answers and community building.

There are some resistance to changing the system, but the S&T identified was good because it could enable the will and woulds to care better for themselves and remove them from the health system burden or reduce the burden.

PCO (Privy Council Office) has an intelligence learning program. I go there 4 times a year to give a presentation to 10-12 analysts (military) some are interested in criminal or military intelligence. We give them a sense how national security is derived from social (demographic, health, ...indirect indirect...a couple times removed from the security trend ,...i.e. where to recruit your commandos, etc...where will you get them if the young heros aren't fit to carry people out or carrying out larger people).

The findings highlighted a movement to individual centered systems and to do this we needed more diverse policy options to deal with the various cultures in our society.

Health will impact everyone. It will affect people now and future generations. We need more people contributing, more people need to decide on the trade-offs, these solutions has to be grown to the society. Foresight can be a process to engage broader numbers to have this societal discourse...for a participatory democracy. These fundamentals are important for security, productivity, reducing costs, all at the same time. We need to maintain the trust in the face of failures.

## Appendix IIII: Event Report Summaries

### a. Case Study 1 – AAFC – Agricultural Adaptation to Climate Change

#### **Event 1: Scenario Development Event – March 11-13, 2009 in Calgary, Alberta**

Objective and Parameters of this Event:

Over 60 participants from the agriculture sector and tertiary sectors (education, public safety, health, wildlife, and other areas) attended this event. The goal of the event was to study changing trends and drivers and use this information to create four plausible future scenarios for the purpose of testing the robustness of existing policy instruments and exploring new policies, investments, actions, and behaviours that might be required to address future opportunities and challenges. The event was three days long in Calgary and was facilitated by a company proficient in scenario development.

The process of developing the scenarios involved 5 steps:

- 1) **Focal Question:** Identified major strategic issue to be addressed.
- 2) **Driving Forces:** Identified major forces driving future change.
- 3) **Critical Uncertainties:** Identified critical uncertainties climate change impacts and adaptation in agriculture 2030.
- 4) **Scenario Framework:** Developed logical framework identifying four different and challenging scenarios.
- 5) **Characteristics & Storylines:** Fleshed out key characteristics and scenario logics to create stimulating stories about the future to 2030.

The Focal Question: ***By 2030, what will a world challenged by climate change require of the Canadian agricultural system to assure resiliency, sustainability and adaptability?***

A visual summary of the driving forces is shown in Figure 1 below.

Figure A.1. Climate Change Driving Forces



Critical Uncertainties: Two critical uncertainties shaping the future of climate change and agricultural adaptation are: **climate change impacts** and **geopolitics**.

**Climate Change Impacts** focuses on the timing, extent and severity of changing climate conditions on agriculture. Will climate change impacts be gradual and fall within our expectations (e.g., IPCC) or will climate change impacts be abrupt and disruptive falling outside our expectations?

**Geopolitics** focuses on the level of stability and cooperation in the global political and economic system. Will geopolitics function in a fragmented, chaotic manner or will geopolitics function in an integrated, orderly manner?

These critical uncertainties will affect the resiliency, sustainability and adaptability of Canadian agriculture over the next two decades.

Figure A.2. Climate Change Scenarios

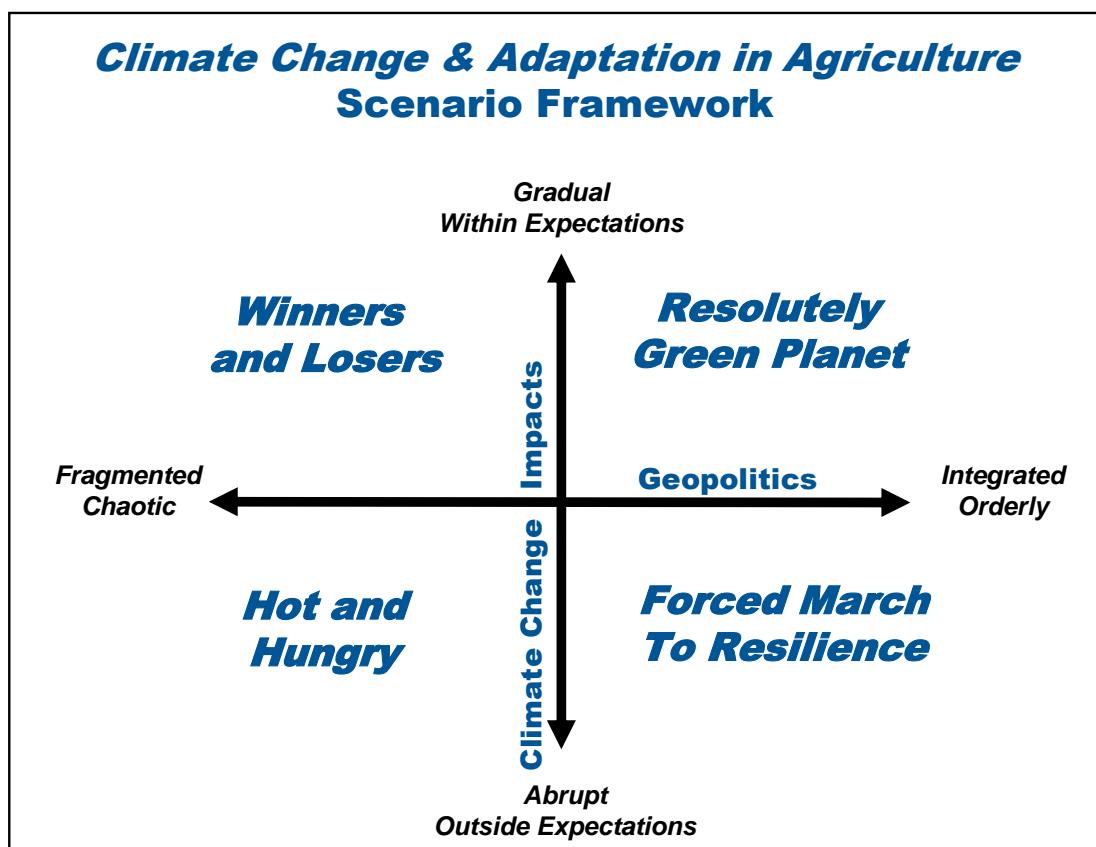


Table A.1. Summary of Key Characteristics in Each Climate Change Scenario

<p><b>Winners and Losers</b></p> <ul style="list-style-type: none"> <li>▪ Geopolitical disorder impacts trade and fragments climate change responses</li> <li>▪ Few winners and many losers both within Canada and globally</li> <li>▪ Food supply struggles to meet demand - Canadian farmers adapt with regional variations</li> <li>▪ Rising global population, dietary affluence and severe weather events strain food supplies</li> <li>▪ Markets ration demand with price and cost spikes</li> <li>▪ Canadian farmers focus on an inwardly focused North America and a few large friends (China &amp; India)</li> <li>▪ Impacts on sovereignty</li> <li>▪ Burgeoning ranks of losers - the winners are much harder to find</li> </ul>	<p><b>Resolutely Green Planet</b></p> <ul style="list-style-type: none"> <li>▪ Shifting societal values – new consciousness</li> <li>▪ Spirit of mutual sustainability in addressing climate change</li> <li>▪ Financial crisis provides a lesson in coordination</li> <li>▪ Shift in societal values &amp; behaviours</li> <li>▪ Trade coordination to reduce non-tariff environmental barriers and diffusion of advances in technology</li> <li>▪ Policies support waste for biofuels and carbon credits for agriculture</li> <li>▪ Canadian agriculture prospers from global, national and local demand</li> <li>▪ High consumer expectations: food safety, quality and variety</li> <li>▪ Small high-value and large low-cost farms benefit from horizontal integration</li> </ul>
<p><b>Hot and Hungry</b></p> <ul style="list-style-type: none"> <li>▪ Economic and security issues dominate ahead of climate change or other environmental concerns</li> <li>▪ Series of climate events deplete global food stocks; raise safety issues; human health stresses</li> <li>▪ Food shortages reinforce nationalism; border clashes; security fears</li> <li>▪ Autocratic governments order stockpiling and export restrictions</li> <li>▪ Canada initially benefits from higher prices until inability to pay undermines markets</li> <li>▪ Canada not immune to global events</li> <li>▪ Canada under increased pressure from refugees, aid requests, droughts, water allocation issues and US pressure for water exports</li> <li>▪ Cnd focus on food supply mgmt</li> <li>▪ Low technology investment</li> <li>▪ Kitchen gardens, expanded local markets and production</li> <li>▪ Industry divides: Small subsistence farms and very large, highly efficient operations</li> </ul>	<p><b>Forced March to Resilience</b></p> <ul style="list-style-type: none"> <li>▪ Series of crises beyond past experience - learning by doing</li> <li>▪ Variability and volatility in food supply, demand and prices</li> <li>▪ Numerous adaptive responses:             <ol style="list-style-type: none"> <li>1. Cap and trade system (global)</li> <li>2. Strategic food reserves (national)</li> <li>3. Land &amp; water rights (institutional)</li> <li>4. Markets (regional)</li> <li>5. Technology focused on new varieties and farm practices</li> </ol> </li> <li>▪ High consumer expectations</li> <li>▪ Low trust in science and technology</li> <li>▪ Governments impose rules, regulations and restrictions (e.g., restrictions on agricultural land and on water rights and allocation)</li> <li>▪ Agricultural industry divides into three segments:             <ol style="list-style-type: none"> <li>1. Intensive, high-value operations (horticulture)</li> <li>2. Extensive, low-cost operations (cereal crops)</li> <li>3. Low-input farms (sustainable)</li> </ol> </li> </ul>

Table A.2. Summary of Each Climate Change Scenario Characteristics

<b>Characteristics</b>	<b>Winners and Losers</b>	<b>Resolutely Green Planet</b>	<b>Forced March to Resilience</b>	<b>Hot and Hungry</b>
<b>Main Themes</b>	<ul style="list-style-type: none"> <li>-Geopolitical disorder impacts global trade and fragments responses to climate change</li> <li>-Few winners and many losers within Canada &amp; globally</li> <li>-Food supply struggles to meet demand</li> <li>-Canadian farmers largely able to adapt with regional variation</li> <li>-Green concerns and green R&amp;D ebb</li> </ul>	<ul style="list-style-type: none"> <li>-Shifting societal values – new consciousness</li> <li>-Mutual sustainability</li> <li>-Financial crisis teaches value of global coordination</li> <li>-Reduced trade barriers</li> <li>-Systems thinking</li> <li>-Waste reduction</li> <li>-Numerous technology advances</li> <li>-High societal and consumer expectations</li> <li>-Strong government leadership</li> </ul>	<ul style="list-style-type: none"> <li>-Series of crises</li> <li>-Learning by doing mentality</li> <li>-Global, national and farm adaptation</li> <li>-Volatile markets - crises induced</li> <li>-Interventionist governments impose rules and regulations (e.g., land &amp; water conflicts)</li> <li>-Industry adapts into 1) small, high-value 2) large, low-cost and 3) low-input sustainable farms</li> </ul>	<ul style="list-style-type: none"> <li>-Extended economic recession and CC events impact global economy</li> <li>-Declining food stock, higher prices</li> <li>-National policies (trade &amp; security) distort markets</li> <li>-Pressure on food supply, safety &amp; distribution systems</li> <li>-Reactive govts struggle to address declining economic, environmental, social &amp; human health outcomes</li> </ul>
<b>Climate Change Impacts &amp; Management</b>	<ul style="list-style-type: none"> <li>-CC gradual and within expectations - increased extremes</li> <li>-Rising impacts over time</li> <li>-No coherent CC response; no consensus on targets</li> <li>-Rising developing country emissions</li> </ul>	<ul style="list-style-type: none"> <li>-CC gradual and within expectations</li> <li>-Global agreement success or we all fail</li> <li>-Multiple international environmental impacts</li> <li>-Agriculture carbon credits, taxes and incentives</li> </ul>	<ul style="list-style-type: none"> <li>-CC changes abrupt and beyond expectations</li> <li>-Increased complexity</li> <li>-Extremes beyond experience</li> <li>-Global cap and trade system</li> <li>-Rising emissions</li> <li>-Lack of trust in CC science or govts</li> </ul>	<ul style="list-style-type: none"> <li>-CC changes abrupt and beyond expectations</li> <li>-Viewed as short term anomaly, not structural change</li> <li>-Falling emissions as economy slows</li> <li>-Physical and human impacts; heat &amp; drought stresses on sensitive pop'n's</li> </ul>
<b>Geopolitics</b>	-Continued conflict, barriers stifle trade	-Multilateral relationships	-Orderly but fragile	-Fragmented

<b>Characteristics</b>	<b>Winners and Losers</b>	<b>Resolutely Green Planet</b>	<b>Forced March to Resilience</b>	<b>Hot and Hungry</b>
	-Inefficiencies make it difficult for food supply to meet demand -Fortress North America mentality	Strong policy coordination competency -built from financial crisis experience	-Policy coordination in response to CC	-Nationalistic govts focused on security -Rising border pressures, refugees -Maintain order ahead of rights
<b>Trade &amp; Economy</b>	-Moderate, uneven global growth -Shift away from multilateralism to fewer, bilateral trade relationships -Trade linked to security concerns -Fortress NA with selected others	-Strong trade and economic growth -Broader definition of progress, GDP redefined -Multilateral and bilateral trade agreements	-Strong but volatile economic growth -Multilateral trade agreements	-Slow economic growth -Increased nationalism -Rising tensions and barriers distort markets and impact trade -Global trade declines
<b>Demography</b>	-Rising global population -Rising demand for food and protein	-Rising global population -Rising food demand	-Rising global population -Rising food demand -Diets shifting to animal protein	-Rising global pop'n & demand for basic food -Increased hunger & famine events
<b>Food Supply / Demand</b>	-Rising food demand -Rising food supply challenges -Supply-demand balancing act -Rising food prices	-Rising food production means adequate global supplies -Focus on safety, quality and sustainable farming practices	-Variable – prone to crises -International Strategic Food Reserve -Adequate supplies with fluctuating prices	-Falling food stocks; shortages; safety & standards issues -Rising demand for food aid -National stockpiling & export restrictions Kitchen gardens; own food
<b>Societal Expectations</b>	-Divisions on CC & environment within Canada -Economic concerns dominate	-Strong environmental & quality of life concerns -“Highest” social <u>and</u> economic use of resources	-Changing expectations of agriculture: low carbon footprint, environmental services, stewardship	-Focus on individual survival -Food and income security -Sustainability a “luxury”

<b>Characteristics</b>	<b>Winners and Losers</b>	<b>Resolutely Green Planet</b>	<b>Forced March to Resilience</b>	<b>Hot and Hungry</b>
	-Environmental concerns ebb		-Strong environmental concerns	-Rising social disparity and social tensions
<b>Consumer Expectations</b>	-Higher quality -Grudging acceptance of higher prices	-Demands for sust. practices including animal welfare -Demands for safety, quality and value -Expanded “needs” drive niche products	-High expectations & low trust -Frustration with variations in prices and quality	-Reduced expectations -Basic calories -Basic food quality and safety -Little concern with farm practices
<b>Technology</b>	-R&D focused on new revenues or lowering costs -Resistance to sharing technology between countries	-Innovative technology investment on both crops and farming practices -Rapid diffusion of technology – globally & nationally -Energy advances	-Government investment and incentives -Major advances in biotech, GMO, etc. -Diffusion irregular – low trust -Gaps in expertise at farm level	-Investment in technology dries up -Slow down in development
<b>Government Policy</b>	-Farm support programs to manage risk, assist adaptation -Little support for new technology to assist adaptation -Sovereignty concerns	-Proactive and reinforcing government policy -R&D and technology incentives -Biofuels from waste -Emphasis on food processing and value added	-Interventionist -Income supports -Changes in property rights (e.g., land preservation, water markets) -Global coordination in emergency management	-Economic and security issues dominate -Reactive governments lurch from crisis to crisis -Focus on supply management structures
<b>Agricultural Inputs &amp; Practices</b>	-Agriculture increasingly a pawn for security-focused national governments -Farmers adapt to CC with advanced practices (e.g., multiple crops, zero tillage)	-Moderate energy costs -Opportunities for alternative energy from biomass -“Sustainable” farming practices -Market for ecological services	-Volatile costs (e.g., frost, hail, drought, energy, fertilizer) -Stranded assets -Traditional property rights rescinded -Leads to legal challenges – water & land	-Moderate energy costs -Increased water shortages -Conflicts & mismanagement -Low land and labour costs -Capital scarce

<b>Characteristics</b>	<b><i>Winners and Losers</i></b>	<b><i>Resolutely Green Planet</i></b>	<b><i>Forced March to Resilience</i></b>	<b><i>Hot and Hungry</i></b>
			<ul style="list-style-type: none"> <li>-Preservation of agricultural land</li> <li>-Diversification</li> </ul>	Credit too risky due to inability to pay
<b>Industry Structure</b>	<ul style="list-style-type: none"> <li>-Increase in value-added; market-specific customized products</li> <li>-Large capital-intensive producers focused on NA and large Asian market</li> <li>-Small local suppliers surviving by meeting local demand</li> </ul>	<ul style="list-style-type: none"> <li>-Growing local and growing global markets</li> <li>-Small intense local farms</li> <li>-Large-scale, low-input “sustainable” farms</li> <li>-Horizontal integration</li> </ul>	<ul style="list-style-type: none"> <li>Globalization and global companies</li> <li>-Increased vertical and horizontal integration</li> <li>-Love-hate relationship farmers &amp; government</li> <li>-Less individual control</li> <li>-Own food, urban agriculture growth</li> </ul>	<ul style="list-style-type: none"> <li>-Increased divergence in farm operations</li> <li>-Very-large, highly efficient, often-subsidized farms,</li> <li>-Very small farms operating at subsistence levels</li> <li>-“Back to the land”</li> <li>-Shifts in land use, inefficient transition</li> </ul>

Upon review of the document, here is a list of the elements found to correspond with the research selection criteria on action.  
AD1P6

Table A.3. Climate Change Statements of Action

<b>New Concepts to the Collective (group of participants)</b>	<b>Concepts that the Collective stated that needed to change</b>	<b>Statements of Commitments or Actions</b>	<b>Notes</b>
-The severity of climate change impacts to agriculture were unknown.	-Need greater awareness and understanding.	-Need better monitoring and sharing of information.	-The reports focused on collective understanding and did not capture the specific views of individuals. The facilitator used "Chatham House" rules of no attribution to foster free speech without ramifications.
-The ability of local, national, and international governments to collaborate and do the right long term things was uncertain.	-Need to be pro-active; look at the big picture. Climate change has moral hazard (if one country acts, it may be insufficient if others don't)		-Feeling that people and institutions respond to a crisis, but the group was unsure on how nations could collaborate without a crisis.
-There may be more winners than losers globally. Ethics on how to deal with this issue was surfaced.	-Need to understand our values and how Canada would make decisions given these situations.	-Need flexible and diverse policy instruments (one area may deal with drought while another with too much water). Need to produce cheap food and also be conscious of food safety.	-Need less prescription and more tools depending on the region. No longer is the case that one tool fits all. Success is having many tools to all people.
-Regional and global food shortages or variability in production had security and sovereignty implications.	-Need to understand our values and how Canada would make decisions given these situations.		

-Increased consciousness of impacts to the environment, our ability to produce food, social implications. Large potential for regional and international conflict.	-Need a shift in values and behaviours to the environment, society, and ethical parameters.	-Need market mechanisms like carbon credits, EG&S, policies that support energy and product development that are renewable.	-Climate could have human health impacts (not just a lack of food, but clean water, heat stress, cold or heat on the poor, infectious disease transmission). Need to coordinate with many sectors.
-Likely for Canada to have increasing global pressure on food, water, refugees, security breaches.	-Need policies to conserve (food, water, and other resources for the "just in case" moments.	-Need better and more land and water use, ownership, and pricing frameworks.	-Not just an economic focus, but implications to social welfare, border security, etc..
-There is a need for large farms (highly efficient big scale) but these farms tend to be more mono-culture. Climate variations would warrant small scale diversity as well to ensure bio-diversity to pests, water tolerance, heat tolerance.	-Need policies for large scale and small scale diverse farms.	-Need research on agronomy, systems management, research, and research on market instruments to enable resilience in the agriculture sector.	Need research in market tracking and traceability to make these new markets realizable.
-A focus solely on economics could deplete the land and increase pest activity.	-Need policies to integrate environmental, economic, and social elements.	-Need market instruments that are inclusive of the "triple bottom line".	-Opportunities for new revenue streams for agriculture (carbon, water, renewable).
-Potential in changing diseases, cropping patterns, cropping cycles.	-Need to study, research, and prepare for these changes.	-Need diverse and new investments in agriculture research.	

## **Event 2: Policy Implications Event – June, 2009 in Calgary, Alberta**

### Objective and Parameters of this Event:

In March, 60 individuals from the agriculture sector, academia and government developed 4 scenarios for the future of climate change and adaptation in agriculture to 2030. In the current workshop a group of 30 participants explored the policy and market implications of the scenarios.

### **Workshop Objectives**

The objectives of the Policy Issues Workshop were to identify:

- 1) The new “burning” policy and market issues that agriculture may face to 2030;
- 2) The effectiveness of existing policy and market instruments to deal with the issues; and
- 3) New policy and market instruments that the sector may need to consider in increasing its adaptive capacity to climate change impacts.

Two speakers opened the event with their views on climate change implications on agriculture. Then the group reviewed the four scenarios and highlighted the policy implications in each of the scenarios. Following that deep scenario analysis, the group extracted the common themes across all or most of the scenarios and the divergent trends.

Table A.4. Summary of Key Policy Implications in Each Scenario

<b>Winners and Losers</b> <b>New Policy Issues</b> <ul style="list-style-type: none"><li>▪ A winner with rising losers</li><li>▪ Regulation &amp; deregulation</li><li>▪ Fewer trade alliances</li><li>▪ Mgmt Protects resources</li><li>▪ Accessing knowledge, S&amp;T</li><li>▪ Thinking in an integrated way</li><li>▪ Strategic relationships</li><li>▪ Promoting food security</li><li>▪ Role of technology, GMOs</li><li>▪ Clash of ethics/policy choices</li><li>▪ Big winners and gaining power</li></ul> <b>New Policy and Market Instruments</b> <ul style="list-style-type: none"><li>▪ Integrated resource mgmnt</li><li>▪ Security/science/envirn/trade</li><li>▪ Articulate value choices</li><li>▪ Ag intel to secure resources</li><li>▪ Integrated ag-health policy</li><li>▪ Policy systems approach</li><li>▪ Increased research support with innovation chain</li></ul>	<b>Resolutely Green Planet</b> <b>New Policy Issues</b> <ul style="list-style-type: none"><li>▪ Internalization of externalities</li><li>▪ Government from regulator to facilitator</li><li>▪ Responsive regulatory mechanisms</li><li>▪ Society monitors of green practices</li><li>▪ Coercion by government</li><li>▪ Global food security</li><li>▪ Productivity growth</li><li>▪ Market quality &gt; regulation</li><li>▪ Multifunctional benefit streams</li><li>▪ Internal trade barriers/ IP</li><li>▪ Return through the value chain</li><li>▪ Rules controlling market power</li></ul> <b>New Policy and Market Instruments</b> <ul style="list-style-type: none"><li>▪ Improved food traceability &amp; labeling</li><li>▪ National “green accounting” by busns</li><li>▪ Price on carbon and nitrogen</li><li>▪ Collaborative/integrated governance</li><li>▪ Policy integration / system view</li><li>▪ Water allocation mechanisms</li><li>▪ Enabling multifunctional use of land</li><li>▪ New decision-making metrics</li><li>▪ Responsive policy system</li><li>▪ Direct recognition of EGS</li></ul>
<b>Hot and Hungry</b>	<b>Forced March to Resilience</b>

<p><b>New Policy Issues</b></p> <ul style="list-style-type: none"> <li>▪ Dire straits motivate planning</li> <li>▪ Environmental degradation</li> <li>▪ Water use extremes</li> <li>▪ Resource Ownership/protection</li> <li>▪ “Race to the bottom” in environ</li> <li>▪ Tendency to over-regulate</li> <li>▪ Increase in population (immigratn/labor)</li> <li>▪ Livestock conversion factors</li> <li>▪ Land use/ownership, property rights</li> </ul> <p><b>New Policy and Market Instruments</b></p> <ul style="list-style-type: none"> <li>▪ Land use policies</li> <li>▪ EG&amp;S Policy</li> <li>▪ Sustainability Risk metrics</li> <li>▪ Water pricing/property rights</li> <li>▪ More market instruments</li> <li>▪ Strategic Bilateral relations</li> <li>▪ Carbon market incentives</li> <li>▪ Pollution limits</li> <li>▪ Smart regs with cross compliant</li> <li>▪ Rural dev policy to takes pressure off cities</li> <li>▪ Canadian Diet is health policy</li> <li>▪ New model: food=health</li> </ul>	<p><b>New Policy Issues</b></p> <ul style="list-style-type: none"> <li>▪ Collective vs individual rights balancing</li> <li>▪ New relationships bus/stakeholders/gov</li> <li>▪ Peer pressure to behave</li> <li>▪ Government picks winners and losers</li> <li>▪ Public reporting by agr sector on CO2</li> <li>▪ Better information and transparency</li> <li>▪ New risk management strategies</li> <li>▪ Consensus constrained by consumer</li> </ul> <p><b>New Policy and Market Instruments</b></p> <ul style="list-style-type: none"> <li>▪ Mandatory post-secondary ed for ag</li> <li>▪ Sustainable production protocols (environmental index) with measurement, monitoring and reporting</li> <li>▪ Government brokers producers to consumers with info (standards, labeling, stewardship practices)</li> <li>▪ Integrated food, health &amp; environment</li> <li>▪ System-level policy frameworks</li> <li>▪ Incentives to diversify product base</li> <li>▪ Renewable energy/bio-industrial ag policy</li> <li>▪ City governments are at the policy table</li> <li>▪ Regional governance (regional watersheds)</li> <li>▪ Incentives to recycle nutrients</li> <li>▪ Marketing based on health &amp; environmental benefits</li> </ul>
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### Common Themes

- Governance – Is governance exacerbated by climate change? cross-government / ministries, shared information, collaboration and issues of today that don't fit the new questions emerging.
- Risks – Need to explore risks more energetically including BRM.
- R&D – Part of the solution set includes interdisciplinary R&D and collaboration between public and private. Increased production variability also drives an increase in R&D.
- Incrementalism – References to policy and market instruments focus mostly on tweaks to the system, not radical change. . Need to set bold, aspirational goals.
- Values – Values will be different under each scenario. We need to frame our values as Canadians that underpin our choices
- Rights – Collective vs. private / individual rights is a key challenge. Rights include property, water and land use rights.
- Sustainability – Broader sustainability monitoring (e.g., water / CO2 footprint) to factor in externalities. Sustainability of production is important. Education is important.
- Strategic and Adaptive – We need to be more strategic and adaptive. We do a poor job of strategic analysis and have a poor sense of a national strategic direction on climate change, let alone having defined tactics. Need to position agriculture more strategically to be prepared for the future. Challenge: how do we set a strategy in the face of great uncertainty? Perhaps a strategy to increase adaptability is one way to move forward.

- Time – We are running out of time (e.g., peak oil, peak food, peak water, peak fish, peak minerals)
- New Perspectives – Need to redefine / rethink the “farm” and “farmer”. Need to shift focus from agriculture and rural economic development to food.
- Policy Scope – Need to explore a broader policy scope: more integrated across policy, markets, instruments, population, production, pollution, etc. Need to integrate policy and science.
- Traceability – Traceability and food labelling to ensure integrity to meet consumer expectations
- Services – Farming shift from goods production to services, especially ecological goods and services.
- Structural changes – Need to internalize structural changes presented by climate change.
- Complacency – Comfort breeds complacency (we aren’t hungry) – crisis will drive action. Need to understand that the world is hungry and getting more so.
- Roles – The role of individuals and governments in making choices varies under different scenarios.
- Security – Cheap food in the short term; food security in the long term.
- Consumers – Need to increase focus on consumer expectations and consumer health.
- Multifunctional – Multiple land uses and multiple products (e.g., biofuel, wind, solar as well as food) and services such as EGS.
- Tensions – There are numerous complex and competing issues and pressures: tensions between short term and long term; individual vs. collective; differing views on the impact of climate change; ecology challenges across jurisdictional boundaries.
- Externalities – Pricing of externalities at individual level may forge individual resolve / shift values as a way of moving forward.
- Food Production – Need to consider play between traditional food production and manufactured food. Represents convergence of technology, climate change and genomics. Big challenge to produce 50% more food (population increase from 6 to 9 billion) on declining arable lands.
- Food Prices – Not sure how system will respond to significantly increased real prices.
- GHG – Role of agriculture (and forestry) in meeting green house gas targets; sequestering carbon.

### **Radical Ideas**

- Intellectual Property & Knowledge – As a small player who is behind but possessing social capital (albeit depleting), pay farmers for their intellectual property & knowledge.
- Intelligence – Get into the business of finding out (corporate intelligence; “rob and develop”)
- Leadership – See sooner, farther and before others – good foresight is the key.
- Externalities – Internalize key externalities such as water, CO<sub>2</sub>, and nitrogen.
- Change – Get a “committed band of fanatics” to get climate change on the screen.
- Incentive-based Education – Provide incentives for education in agriculture.
- Agriculture’s central role – Agriculture is at the crossroads of food, fuel, feed, fisheries, fat (obesity), forestry and pharmaceuticals ( 7 “f’s)

## **Comparison of New and Existing Instruments**

What are the differences between existing and new policy and market instruments?

- Instruments integrate systems approach reflecting consideration of complex systems.
- New are more strategic, focused and flexible.
- New are outcome focused, e.g., sustainability.
- New emphasizes information and knowledge.
- Decision making integrating externalities sorts short-term thinking & long-term results.
- Need long-term commitment to informed, deliberate, decision-making at many levels.
- New require adaptive management, i.e., learn as you go.
- New engages industry in decisions and collaboration.
- New focuses on carrots, and sticks (e.g., incentives for education).
- New are proactive, not reactive (proactive strategy is a driver).
- New focuses on innovation & adaptive policy with explicit talk of values and beliefs.
- New seeks to find common interests (within and outside the agriculture sector).
- Social choice where society identifies options to advance the “common good”.
  - Agricultural policy rooted in broader public policy.
  - New focused on value chains
  - New focused on what needs to get regulated - more selective.
  - New has reliance on innovation, science, R&D from discovery to commercialization.
  - New may be more time intensive and costly.
  - New requires a fundamentally new approach to policy development.
  - New must involve participation from all levels of government.
  - New involves collaborative governance models.
  - New will need to reconcile individual rights and collective / common good.
  - New instruments imply a valuation of natural capital, fitting with sustainable ag.
  - Need effective leadership & story telling (comms) articulating the value of agriculture.
  - Individuals address externalities, (tradable CO2, N) to reframe the cost paradigm.

Upon review of the document, here is a list of the elements found to correspond with the research selection criteria on action.

Table A.5. Statements of Action

New Concepts to the Collective	Concepts that the Collective stated that needed to change	Statements of Commitments or Actions	Notes
Less free trade; more strategic relationships.	Understand future challenges & opportunities.		Perspectives were of a collective nature versus individual learnings and ideas.
Greater volatility and variability in production, pricing, supply, and demand.	New market mechanisms /supply chains/local and global. Need both new tech and sustainable production systems for resilience. Research in the value chain.	Need responsive regulations- deregulate/regulate at the same time. Need to know where inputs, resources are to have flexible ways to meet demand; no waste. Integrated, whole system approaches (ag/health/environment)	Key observation was that the old policy paradigm was “one policy fits all” as it showed equity. Understanding different contexts plus democratized decision making enables outcome based approaches.
Canada will be better off though more losers than winners. There may be more conflict, security issues, and war.	Review of values and behaviours to support decision making in this environment. Better dialogue, learning, understanding, and action for all.	Need a systems view. Climate impacting ag creates environmental, economic refugees & security issues. Need integration; less silos. Integrate externalities, new markets i.e. carbon counting, trading. Proactive vs reactive.	Implications of climate change and agriculture could impact human health, the environment, economics, security, and geo-politics really came to light.
Consumers have power.	Information democracy, transparency to support diverse decision making.	Requirements for information versus regulation.	System approaches, integration of social, economic, and environmental considerations was highlighted as the next framework.

### Event 3: Science Implications Event – June, 2009

Objective and Parameters of this Event:

In March, 60 individuals from the agriculture sector, academia and government developed four scenarios for the future of climate change and adaptation in agriculture to 2030. As a follow-up to the scenario development process, separate groups explored the insights surfaced by the scenarios from a science and policy perspective. About 40 participants attended the Science Implications Workshop.

The objectives of the Science Implications Workshop were to identify the new “burning” science issues that agriculture may face to 2030 and to assess the effectiveness of existing science and innovation technologies and new science and innovation technologies to increase the adaptive capacity of the Canadian agricultural sector in response to climate change impacts.

After presentations by two speakers, the participants broke into groups to explore the science implications inherent in each scenario, addressing questions such as:

1. From the perspective of agriculture, what challenges and opportunities are surfaced?
2. What existing science may be useful in addressing the challenges or the opportunities?
3. In what new science could we invest in that may be useful in addressing the challenges or opportunities?

Table A.6. Summary of Key Policy Implications in Each Scenario

Winners and Losers Challenges	Resolutely Green Planet Challenges
<ul style="list-style-type: none"><li>▪ Maintaining control of water</li><li>▪ Fractured agricultural sector</li><li>▪ R&amp;D \$ to build adaptive capacity</li></ul>	<ul style="list-style-type: none"><li>▪ Responding to extreme events</li><li>▪ Managing through shorter tech cycles</li><li>▪ Managing water</li><li>▪ Invasive diseases, pests raising regs</li><li>▪ Meet consumer traceability expectations</li></ul>
<b>Opportunities</b> <ul style="list-style-type: none"><li>▪ Increase ag production</li><li>▪ Diversify ag production</li><li>▪ Increase food exports</li></ul>	<b>Opportunities</b> <ul style="list-style-type: none"><li>▪ Higher value crops exports</li><li>▪ New diverse products and markets</li><li>▪ Improved growing conditions in areas</li><li>▪ Environmental goods and services</li><li>▪ Utilize waste streams</li></ul>
<b>Existing Science Options</b> <ul style="list-style-type: none"><li>▪ Soil conservation</li><li>▪ Surveillance systems to inform decisions</li><li>▪ Science reduces resource inputs</li></ul>	<b>Existing Science Options</b> <ul style="list-style-type: none"><li>▪ Remote sensing crop and climate data</li><li>▪ Understanding the water supply</li><li>▪ Crop &amp; animal breeding</li><li>▪ Bio-energy &amp; bio products</li><li>▪ Genomics and GMO R&amp;D</li></ul>
<b>New Existing Science Options</b> <ul style="list-style-type: none"><li>▪ New crops R&amp;D R&amp;D on ag sustainable systems</li><li>▪ Energy efficiency and energy balance of production systems</li></ul>	<b>New Existing Science Options</b> <ul style="list-style-type: none"><li>▪ New agricultural systems: crop &amp; animal</li><li>▪ Business risk management &amp; transition</li><li>▪ Crop suitability mapping</li><li>▪ Water management strategy</li></ul>
R&D <ul style="list-style-type: none"><li>▪ <i>Tri-Omics</i> R&amp;D (genomics, proteomics and metabolomics)</li></ul>	

<p><b>Hot and Hungry Challenges</b></p> <ul style="list-style-type: none"> <li>▪ Production in a hot/hungry world</li> <li>▪ Reactive vs proactive</li> <li>▪ Water mgmt/efficiency/use</li> <li>▪ Ag sector relationships dissolve</li> <li>▪ Extreme uncertainty</li> </ul> <p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>▪ More water/energy/pest mgmt</li> <li>▪ Remove investment policy barriers</li> <li>▪ Increase production</li> </ul> <p><b>Existing Science Options</b></p> <ul style="list-style-type: none"> <li>▪ Monitor/data/modeling</li> <li>▪ Pest/production breeding mgmt</li> </ul> <p><b>New Existing Science Options</b></p> <ul style="list-style-type: none"> <li>▪ Decision support integrating</li> <li>▪ Web based problem solving</li> <li>▪ Nanotech, biotech, low-input</li> <li>▪ Drought/heat/pest tolerance</li> <li>▪ Systems approaches-silo to VCs</li> <li>▪ Connect consumers/producers</li> </ul>	<p><b>Forced March to Resilience Challenges</b></p> <ul style="list-style-type: none"> <li>▪ Low carbon footprint – low input agriculture</li> <li>▪ Efficient/equitable food distribution systems</li> <li>▪ Need for short and long-term S&amp;T</li> </ul> <p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>▪ Science knowledge build organic matter</li> <li>▪ Innovative energy sources for agriculture</li> <li>▪ Producers need adapt quickly to new crops/products to new market needs</li> </ul> <p><b>Existing Science Options</b></p> <ul style="list-style-type: none"> <li>▪ Pest / disease monitoring/management</li> <li>▪ Knowledge base for manufacturing food</li> <li>▪ Soil science to maximize productivity / sustainability of agricultural systems</li> </ul> <p><b>New Existing Science Options</b></p> <ul style="list-style-type: none"> <li>▪ Soil organic matter enhancement</li> <li>▪ Aquaculture</li> <li>▪ Intelligent plants responsive to environmental and climatic conditions</li> </ul>
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The common themes identified were as follows:

- Productivity work is under duress (e.g., crops, breeding, pest management).
- There is a need for policy that approaches adaptive management.
- Other nations are already working on the same science we will need to adapt.
- We have high natural capital relative to our population - we have an advantage.
- Need to focus on basic plant and livestock breeding.
- Science intersects business and other important domains.
- More agronomic work and basic research is important.
- Need science integration, decision-making & change management in government.
- Business risk management and dissemination of information is important
- Must increase our focus on production systems that address water, energy, heat/ drought tolerance to regionally focused production systems & not just ag practices.
- Complex systems management drives enhanced monitoring, data & modelling.
- Increased focus on new food systems beyond not traditional agriculture.
- There is value in learning from outsiders –new ideas from other scientists & futurists.
- Innovation is key at all levels to put R&D to good use.
- There is a strong linkage between trust and food.
- Manufactured food threatens traditional ag (as food productn & new tech converge)
- It is a challenge to build a sense of urgency in a complacent environment.
- Agriculture is behind in finding new ideas.

- We may need to shift our thinking from production-centric to consumer-centric.
- The Canadian agricultural system will be affected by multiple drivers.
- Communication is both a problem and an opportunity.
- Renew focus on eco-economics = a low-input, high-output, low-waste ag system.
- Breeding is still required.
- Systems approaches help decision making when based on good monitoring & data.
- Government is generally expected to lead.
- Public engagement and education will be important to underpin action.
- Agriculture is and needs to become more of an adaptive high-tech sector.
- Operators have been, and have been forced to be adaptive to survive.
- S&T is moving and involves complex, relationship-based global networks.
- We need to think through barriers to innovation.
- There may be a strong opportunity to leverage a green Canadian brand.

### **A Perspective on Science**

Prior to the review of science options, an AAFC science representative provided the following perspectives on the role of science in assisting the Canadian agricultural sector in adapting to climate change:

- We need to be less reductionist and think more about innovation in the context of the entire system (e.g., a narrow focus on nitrogen fixing to increase yield has had other unintended impacts on water and air).
- Need to integrate local, regional, national and global perspectives.
- Need to evolve from short-term (e.g., 5 year) to longer term approaches.
- Innovation needs to be about more than just getting “more” – we need to focus on sustainable agricultural development, recognizing economic, environmental and social impacts, within a highly complex yet adaptive system.
- Investment in science capacity will be key to long-term success.

Workshop participants made the following closing observation:

- The future challenges facing the Canadian agricultural system are both large and complex and a wide range of important science and policy options will be needed to address this complexity.
- There is a larger question of the relative priority of agriculture in society (e.g., versus healthcare, education and other priorities).
- There is an opportunity to place traditional perceptions about agricultural into larger contexts such as high technology, economics, Canadian competitiveness, environmental concerns and impacts, human health and societal welfare.
- Success in adapting to climate change will depend on an integrated approach involving operators, industry, government and others.
- We need to develop an integrated vision that appreciates and seeks to addresses the interrelatedness and complexity of the issues and options at hand.

Upon review of the document, here is a list of the elements found to correspond with the research selection criteria on action. AD3P3-28.

Table A.7. Statements of Commitment to Action

New Concepts to the Collective	Concepts that the Collective stated that needed to change	Statements of Commitments or Actions	Notes
Research resources are declining yet we need new resources for the new crops, new pests, new cropping cycles, and sustainable cropping cycles.	Move from efficiency mode to resiliency mode in science. Need more types of options for flexible platforms of adaptation and response...moving from competitive advantage to broad based knowledge. Need monitoring, data collection, and link to proactive, responsive actions at all levels.	Need R&D on systems sustainability platforms to manage extreme events. Changing regs for new diseases, pests. Productivity research under duress. Intelligent plant design (drought & heat). Systems to meet consumer expectations (cheap, safe, speciality food, water/carbon foot printing). EG&S. Use/recycle waste streams.	Responses are from the collective vs the individual.
More water issues requires strategic management.	Think about water systems, how to manage them, how to negotiate with other countries.		How to conduct more diversity in research with less resources?
Full plant use (food, fuel, fibre).			Need ag research in data, monitoring, decision support for consumer expectations.
Increases in production will be necessary under diverse adverse conditions.	Need data to support better and responsive decision making...not just for government but for farmers.	Big democratized data. Systems to manage diverse and increasingly common risks (are our business risk management systems sufficient	Multiple use research is required (food, water, fuel, fibre) leading to a movement of resilience vs economic short-term investments.

		for this variability and volatility?)	
Canada may be able to export more but to more needy and desperate countries.	Need frameworks to deal with the social consequences of climate change - some winners and more losers.		There are ethical frameworks & system implications locally / globally. We can profit while others are more desperate.
Need science at the molecular level (tri-omics)	Need further investment in the – omics to meet many consumer and productivity demands.	Shift from producer centric to consumer centric research. Consumers trust food, but we are vulnerable. Need societal discourse to develop understanding of the system, the trade-offs, the dangers, so people make informed decisions.	Water use and energy are important, with societal trade-offs (e.g. ag needs more but populations need water to survive). Need to inform decision making - think of health, security, right to clean water.
Ag impacted by energy availability.	Consider how crops systems use or produce energy.		Need bus risk mgmt systems to address complexity & volatility.

#### Event 4: Systems Mapping Event-October 27-28, 2015 Edmonton, Alberta

Objective and Parameters of this Event:

This workshop on Systems Mapping focuses on the present – on the current Agricultural system in Canada. This present, high-level, focus helps identify the primary processes that make up the Canadian Agricultural System (CAS). These primary processes are then used to create a ‘cognitive map’ of the current CAS. Together with a set of *systems requirements* generated largely from the scenario work, the current agricultural system is assessed for its capacity to respond to potential climate conditions. This workshop is designed to generate a set of *Strategic Options* – paths forward for increasing the adaptive capacity of the current agricultural system to address future climate conditions.

This workshop will, in turn, feed into the next (fifth) stage that will generate a variety of solution sets to identify some present and near future initiatives that can be taken. In this manner these workshops contribute insights to develop an understanding of how Canadian agriculture can approach complex issues like climate change and inspire collaborative action to go forward.

After a presentation by speaker Gwyne Dyer to provoke thinking, the group identified 12 elements of the Canadian Agriculture System and define the relationships of influence and power amongst those elements. Relationships and their impacts were defined as strong, moderate, or weak. The group then reviewed the four scenarios previously produced and identified common challenges and opportunities amongst them. Then the group identified the five most critical system requirements to address those challenges and opportunities. The group then identified what would have to change in the system to improve the system to deal with the scenario derived challenges and opportunities.

Key challenges identified were:

1. Getting geo-political collaboration
2. Producing enough food for everyone
3. Complexity misaligned incentives
4. We would need many adaptive responses
5. Loss of land and water as key resources to everything
6. Other priorities would draw resources away from agriculture
7. Need to talk action on multiple levels
8. Need to have both short and long term objectives
9. Need to change social values to align with the earth's capacity

New system requirements were identified as:

1. Need to build in resiliency with redundancy to prepare for the future
2. Need to foster innovation at all levels....a type of redundancy.
3. Need strong leadership to foster a discourse, learning, and influence to focus on system requirements for the present and future.
4. Need cross cutting market instruments (social, environmental, and economic).

To do these things, you need:

1. Access to data, the ability to overlay many types of data, and access to all in order to foster learning, adaptive capacity, and action/redundancy at all levels.
2. Need a systems approach...implications of food shortages, climate stress to health, security, immigration, labour, social welfare, education.
3. Sometimes solutions will be to help other countries help themselves to reduce the security issues, immigration, and infectious disease issues.
4. Greater social discourse to understand these issues, indirect consequences, reasons for actions different than the short term response. If you don't open the discourse and learning, the public will always expect the short term response.
5. Shared systems and decision making can foster a collaborative adaptive response.
6. Less policies of equity (same for everyone); movement to guiding principles...we want safe food...put information out there and people make choices rather than government. This is flexible and adaptive policy with many possible tools or solutions. This is different than how we operate today.
7. Network of everything enables system sharing and movements; market options conveys signals to businesses and individuals. This creates an

innovation atmosphere...you can reach consumers quickly. However, value system needs to be clarified. If the values are the same or shared, then this can help make sense of complexity.

Table A.8. Statements of Commitment to Action

New Concepts to the Collective	Concepts that the Collective stated that needed to change	Statements of Commitments or Actions	Notes
Geopolitical disorder will be a big issue as everyone will have to act to make a difference and countries that don't take action may benefit when others take action.	Strong dialogue and leadership to do the right thing in the long run. But how to deal with strong short term interests? Need social learning, increasing adaptive capacity of all to take action when they can.	Transparency of information so consumers make the choices. Create incentives at multiple levels. Have different tools to adapt and respond. Rethink "lean" systems; need redundant systems.	Report highlights collective views versus individual views.
Inability of the world to feed itself leads to winners, losers, conflict, health issues, environmental and human losses.	Need technology. Need low cost, low energy sustainable systems.	Need systems view; integrated thinking and policy. Need strong leadership. Need cross cutting market instruments.	Traditional structures (government) fails to rationalize short and long.
Protect land and water; global interests; regional interests (with the US); interprovincial.	Need new governance mechanisms to do so.	Need better communications, values review, incentives to align behavioural change.	Requires consumers to know and dictate changes.
Need to increase productivity.	Need technology and low tech solutions.	Need heightened adaptive capacity of all. More innovation everywhere. Market incentives.	

## **Event 5: Innovation Solution Sets Event-November 5-6, 2010 Edmonton, Alberta**

Objective and Parameters of this Event:

Approximately 20 participants attended the workshop. They represented various disciplines and regions of Canada. Participants were chosen based on their unique perspectives and comfort with innovative approaches. The objective of this workshop was to leverage the agricultural intellectual capital of this group to arrive at effective, low-cost climate change adaptation solution in a Canadian context.

A speaker opened the event with his perspective on climate change. Participants reviewed the scenarios and identified what they felt were positive outcomes common to all the scenarios which were:

- **Regionalization.** There are highly localized and regional responses to adapt to the impacts of climate change. This includes increased regional self-sufficiency with respect to food, water and energy.
- **Equality.** The gap between the “have’s” and “have not’s” is minimized.
- **Markets.** There are special trade agreements which are beneficial to Canada’s economic situation.
- **Research and Technology.** There is a strong R&D capacity both in the private and public sectors and sound use of technology.
- **Geopolitical Relationships.** Canada is leveraging its diplomatic position to establish strong working relationships with other governments and demonstrate leadership.
- **Social Values.** There is a strong shift in social values towards health and the environment. This is pressuring governments and corporations to make better informed decisions.
- **Management of Resources.** There is better management of resources including land, energy, water and waste leading to a reduction in carbon emissions.

Participants considered the four scenarios separately to identify innovative solutions that would help address the impacts of climate change on agriculture in Canada. The discussions were guided using an experimental technique based on a simplification of the Russian algorithm for innovation (TRIZ), which considers the contradictions within the system as a catalyst for innovation. During this exercise, it was apparent that each scenario presented unique ways of understanding the potential impacts of climate change and how these might be best addressed.

Many of the solutions identified were based on policy changes, technology improvements, market changes and social value changes. The following were identified as emerging properties from the solutions sets for all four scenarios.

- Change in production
- Change in demand
- Shift in current view of democracy
- Governance using new metrics

- Shift in values (i.e. vision and ethics)
- Incentives and disincentives (i.e. price on water, carbon tax)
- Business and financial models
- Ability to make trade-offs
- Shared knowledge of ecological principles
- Intensive research and development and new technology
- Strategic leadership with systems thinking
- Education and awareness
- New institutions and political relationships
- Shortage of water
- Resource constraints

Each of these outcomes should exhibit the following emergent properties to the system:

- **Investment.** Achievable within investment constraints;
- **Timeliness.** Implementable in the near-term to avert future consequences;
- **Applicability.** Applicable to many of the foresight scenarios;
- **Regional Breadth.** Applicable to climate change adaptation and food production in many regions; and
- **Stakeholder Impact.** Beneficial to many stakeholders.

*Establishing new goals for the economy* emerged as the top solution. Participants discussed what each stakeholders of the Canadian agricultural system could do to support the implementation of the proposed solution. After conducting this exercise, it became evident that the successful implementation of the proposed solution would require strong integration among the various stakeholders. In fact, many of the proposed solutions are so closely linked together that a broader solution could be envisioned.

Then the group conducted a stakeholder analysis to identify the stakeholders and their perspectives and needs. Stakeholders were identified as farmers, processors, citizens, government(s), universities, distributors, and input suppliers.

Then the TRIZ methodology was applied. Contradictions were identified in each scenario. Then the group had to propose solutions enabling both contradictions to be true. The solutions proposed included:

1. Government's role changes from implementer to facilitator of debate, discussion, decision-making.
2. Focusing solely on wealth increasing causes other system complications; i.e. minimizing the gap between rich and poor becomes important
3. There is a demand for cheap food, but also animal welfare, tracking and traceability. These things cost money and take resources.
4. There are economic and environmental concerns but on the other side, also survival and security concerns which we aren't really considering
5. We must prepare for opportunities but also for the worst at the same time.

In reviewing the solutions that were identified for all four scenarios, the group identified the following as emerging common solution elements.

- Change in production

- Change in demand
- Shift in current view of democracy
- Governance using new metrics
- Shift in values (i.e. vision and ethics)
- Incentives and disincentives (i.e. price on water, carbon tax)
- Business and financial models
- Ability to make trade-offs
- Shared knowledge of ecological principles
- Intensive research and development and new technology
- Strategic leadership with systems thinking
- Education and awareness
- New institutions and political relationships
- Shortage of water
- Resource constraints

Stakeholder groups reflected on what they could do to address these changes. They saw they had to:

1. Citizens need to be involved, clarify values, and take responsibility and action to these issues.
2. Governments needed to change their modus operandi from implementer to facilitator.
3. Universities and colleges had to work more interdisciplinary.
4. Businesses need to report on their environmental impacts and be respectful to be profitable. They need to consider social benefits and impacts as well.
5. Farmers need to consider the environment, know how to track and trace like businesses, and have a holistic picture to align environment, food, health, water, and energy.

The session ended and each person was asked to comment on the event. This is the first capture of individual perspectives but these comments are not attributable to the exact participant. The comments are as follows:

- *I gained a better appreciation of the scenarios. The outcomes of this session need to be translated into messages that will be useful to the policy community. I need to take what is coming out of here and translate them into quantitative economic outcomes.*
- *I learned a new way of looking at problems that generated surprisingly broad solutions. We need to ensure that these solutions are not lost. As a writer, I will think more about this and tell somebody.*
- *It is good to see how many people came together. It will be interesting to see where this will go.*
- *We have learned about the value of interacting with a broader community. The pictures that were generated by the graphic facilitator provided interesting value to me. What needs to happen next is drilling down into these solutions. I could have told you yesterday that this is what we needed. These are almost boiler-plate ideas, but they are good nuggets. All this must be wrapped up and given to a minister as a visual and not just words. Since my son wants to start farming, I will encourage him to start developing a carbon and water budget.*

- This was a meeting of the great minds. We came up with solutions. On the surface, it is nothing too surprising. There are some lessons we can take. What can we do next? Individually, we must take small steps and not wait for someone else to get the information into the hands of ministers and deputy ministers. After seeing all this, there are lots to learn from the agriculture system. I used to feel that because I was not a farmer that there was not a direct link in terms of how I can prevent the impacts of climate change. Now, I can identify how I can help as an employee of the Government of Canada and as an individual.
- I interfaced with people who are far from my normal sphere of influence. This has helped me greatly with thinking of new ideas. I wish we could finish the exercise for the other solutions that were identified. I am concerned that this context will leave these great minds and be left as incomplete work. This will go into the hands of people who do not have all the information we had in our minds during this workshop. We need to complete our thoughts today. I can see the nuggets and can embrace them. I want to push for curriculum changes in the universities to increase the level of understanding of social and environmental changes associated with climate change.
- I thoroughly enjoyed the dialogue; it was open and brought perspectives I did not have before. I love talking about adaptation. I will encourage that adaptation processes similar to this one are done in other places to build on the dialogue and ensure that others appreciate what individuals with different perspectives can bring to the table.
- We got a chance to explore a really nifty thinking tool which enabled us to take complex problems and come up with solutions that reflect multi-disciplinary activities. This is extremely valuable. We need to ensure that we complete this exercise; we are almost there. We need to finish it off and embed it in the rest of climate change strategies. I will go back to the shop and continue on this process. A final report will be created that will embrace the ideas shared during this workshop.
- It was an amazing group, and an amazing conversation. People shared their own points which were similar to mine and different from mine. My brain is going crazy. I see how I am going to relate this to business. I see the link between this and water. I will educate my community.
- This is a condensed learning curve. We will bring this information back home. What we need to do next is have an action plan and make sure it gets somewhere. We all believe in this and we all agree on common things. This must go to those who are responsible for representing our points of views.
- I learned about a new process. I appreciate coming out of meeting with actions plans and would like to suggest the following as next steps: (1) Engage more diverse stakeholder groups in this discussion, (2) Determine how to share what is happening at AAFC. Going back to my organization, I could publish outcomes from this workshop in our publications which reach 8 000 readers. I will tell my colleagues that climate change will affect what we do.
- To me, this workshop was an exposure to a tool that I have never seen before. This tool allows us to not think linearly but we still get to conclusions that make sense. There was a good prioritization model used. This got me out of my box. It was a lot of fun and I really enjoyed it. I am an idealist and realist; which puts me in conflict. This gives me hope, but I never seem to get anything done. I have seen great documents that sit on the shelf and then people recreate them again without knowing that the other document exists. We need a plan to keep it going

*and continue building on this as opposed to creating a document that will not accomplish anything. The tool influenced how I perceive the problem and how they may affect animal health.*

- *Building on what others have said, I could have told you at the beginning of the session that those were the right solutions. I agree with this, however, the main difference now is that more people have acquired a new understanding of the complexity that undermines the setting of new goals. We have acquired new skills on how to communicate our different perspectives and hopefully form our own renewed perspectives. My embedded assumptions have been challenged. There are more things about this that I know I don't know. What we should do next? The work is not done. These are still too broadly stated to be actionable. This is an investment of time and money. What I will do with this is provide advice on innovation opportunities to invest in these futures.*
- *Practice. Seed. Play. We need to learn how to do this. I will try to see what I have learned from here so it can be cascaded down. For example, these are the seeds in the future. I will link to living examples that I can attach to these experiments. I will continue to play with these. We need to show other organizations how we can move through this transition zone.*
- *The first thing we did is laugh a lot. This is a time of great angst. This is part of the way we will do this. In East Africa, people would laugh, because it helps to cope with serious challenges. What could and should we do next is make our thinking familiar. What are the tools and techniques for making our thinking familiar? We need to have more people go through this. For me, my clients who are in Houston, Texas are not on the same page. I will introduce this technique to them.*
- *What happened here is very similar to what happens in schools. There was thinking, learning, listening, and figuring out what is common and different. What we should do next? How about starting to act now? I will take back the methodology to Alberta Education to see what kind of ideas come out based on our education, critical thinking capabilities and conflict resolution.*

Table A.9. Statements of Commitment to Action

New Concepts to the Collective	Concepts that the Collective stated that needed to change	Statements of Commitments or Actions	Notes
Responses and action are local and regional.	Decentralization of decision making; access to shared information for decision making at multiple levels.		Most of the report focused on collective comments, but the end section did have comments of learning from each individual.
It is not just economics, but environment, social, and survival.	Need integration and whole systems perspectives.	Need research in the value chain to count carbon, water, foot printing. New business models like EG&S. Balance the numbers from social, environmental, and economics.	Learn from each other-New way to look at problems/ derive solutions. Realizing the urgency and individually inspiring action Working in the broader system. Learn from scenarios Using visuals to convey complexity.
Increasing contact and understanding between producers and consumers.	Need societal discourse. Need consumer input and listening...expanding research beyond agronomy.	Research in crops, animal welfare, carbon tracking, in fair and equitable labour practices. Markets expect it.	Need webs of knowledge, sharing of perspectives, engagement, co-creation, yet individual action.
Movement from one equitable solution for all towards desired end outcomes and multiple approaches.	We have not done a lot of policy in that way. Means relinquishing control and decision making to others yet sharing information.	Need leadership that can understand and enable organizations to be able to achieve short and long term objectives.	Need education on complexity and leadership in complexity.
Need leadership to understand and enable.	Need training of leaders to achieve short and long run objectives. Need leaders to help innovators.	We need to change our training and have more foresight.	

## **Event 6: External Analysis of the AAFC Agriculture Adaptation to Climate Change Events – Ottawa, Ontario January, 2011**

Objective and Parameters of this Event:

The objective of this event was to review the findings of each of the previous five foresight events and surface overall insights for AAFC Policy and Research Branch. This two day event reviewed findings from each event and categorized high level insights. The assessment process uncovered the following key insights about climate change and how society should address it:

- 1. Adaptability requires a focus on outcomes over outputs.** How we plan, not what we plan, is what must change.
- 2. The relationship between science and society must evolve.** In order to build trust among stakeholders, including the public, science must better understand its capacities to both practice “climate change science” and inform society about its findings.
- 3. Governance of key stakeholder groups must become more integrated.** Science, policy-makers, academia, and industry must broaden their governance models to ensure that they are working in connection with one another to set in place the right kinds of capabilities to address climate change.
- 4. Science funding structures must evolve.** Because the forms and consequences of climate change are unknown, flexible, exploratory, and untargeted research models are likely to be more effective in uncovering tools to address climate change. Funding structures for science must increasingly support the acquisition of new knowledge, multidisciplinary research, and teamwork.
- 5. Policy must be scalable and adaptable.** Policy should do more than react to present problems: it should proactively build systems that give us the capacity to cope with future challenges. Scalable, flexible policy will require more bilateral policy-making formats.
- 6. Decision-making systems and practices must become more adaptable.** One of today’s most pressing issues is to identify a source for coherent and cohesive decision-making around climate change in our increasingly distributed world.
- 7. Information must be structured and disseminated in ways that reflect and influence emerging social values.** Climate change is an indicator issue with the power to change how people look at the world. Stakeholders must work together to develop new climate change-related institutions, processes, and stories to replace those that are becoming outmoded.
- 8. Managing the complexity of climate change requires a cohesive systems-based problem-solving approach.** Those with the capacity to manage complex systems like climate change through technology and human capital will have the power to address and manage these systems. If we can build models around

climate change, we can address its challenges. To do this, we must integrate and coordinate the broader system of stakeholders, decisions, and issues related to climate change.

**9. Leadership must revolve around outcomes and values.** We know that command-and-control leadership models probably cannot drive a Resolutely Green Planet. Instead, leadership will manifest as long-term, open, direction-setting; that is, effective leaders will focus on identifying the actions and values that will allow us to deal effectively with unpredictable results.

### **Current Paradigms Meet Emerging Patterns**

The dominant patterns, behaviours, belief systems, and values of any given society are constantly evolving. In general, our society is shifting towards paradigmatic models and values that are less centralized, more systemic, outcome-oriented, and flexible. The behavioural changes required to build resilience in the face of climate change will follow from these paradigm shifts. We must learn to be effective and productive in the face of uncertainty, find ways to increase flexibility in formerly rigid institutions and practices, think in the longer term, embrace the models of teamwork and networking, and open our minds and processes to the realities of the other “nodes” in our network.

### **Stakeholder Actions**

Stakeholders must increase society’s awareness of climate change issues in a more comprehensive, cross-sectoral way. They must also broaden their own perspective on these issues and anticipate, articulate, and respond to the counter-arguments for those who deny that climate change is real.

### **Communication Considerations**

Communication models must favour multi-lateral, multi-directional communications. For this reason, the traditional *communications plan*, which defines messaging sent by one messenger to one or more receivers, should be replaced by an *engagement plan* that considers not only message and audience, but who the most appropriate messenger is for a given message. Communications tools must support the networked nature of stakeholder relationships and quickly and engagingly educate audiences about the outcomes, causes, and effects of climate change.

### **Conclusion**

By “closing the loop” on the Foresight process, participants were able to identify the foundational insights uncovered by the significant body of work developed through this process. These foundational insights offer a starting point for government, industry, science, the public, and other key stakeholders to identify new ways of organizing and integrating their knowledge and efforts in order to meet the coming challenges of climate change with greater flexibility and resilience.

Table A.10. Statements of Commitment to Action

New Concepts to the Collective	Concepts that the Collective stated that needed to change	Statements of Commitments or Actions	Notes
Outcome based with many potential solutions seems to be the way to go.	Government and governance needs to change to enable. Information sharing and building the capacity to adapt is essential. Need adaptable policy vs set in stone and forever.		Comments reflect the collective vs that of specific individuals.
The social contract with science is up for revision.	Silos, elitism, and other behaviours need to change. Shared perspectives, learnings, and actions are needed.		We are in a period of shift paradigms. We are discovering the new paradigm and in a bit of a transition to a paradigm we are yet discovering. There is change, confusion, complexity.
Need integration of many disciplines and systems.	Need cross-over sciences, governance mechanisms to enable, strong leadership to nurture. Need a systems based approach.		We need more communication...among stakeholders to learn from each other, sharing perspectives and knowledge and understand the implications of actions/inactions on others.
Societal discourse is required.	Need to understand many perspectives, determine values, align action to values both of individuals and the collective.		

b. Case Study 2 – Health Canada – Developing a Sustainable Health System

**Event 1: Scenario Development Event – August 24-25, 2010 in Ottawa, Ontario**

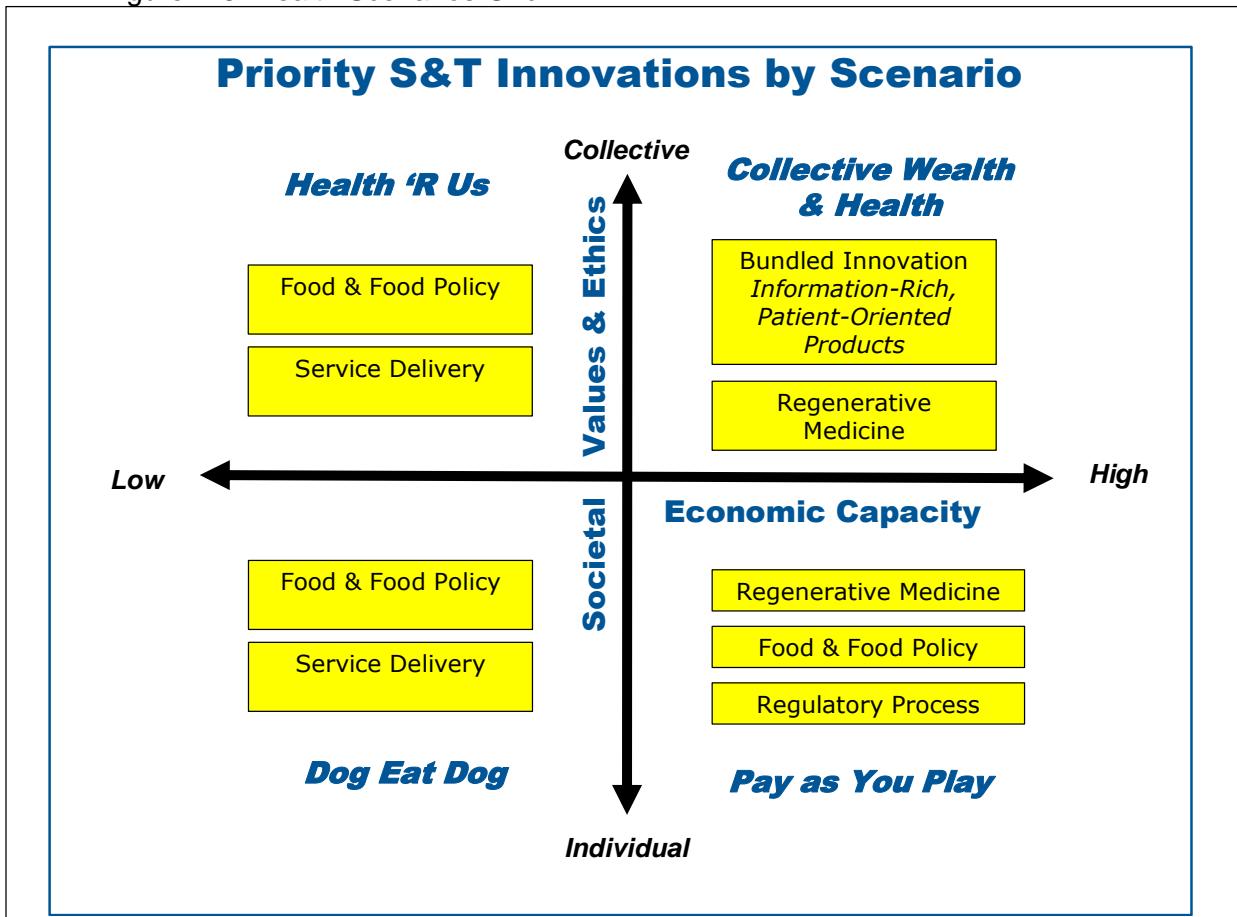
Objective and Parameters of this Event:

In an earlier event, Health Canada evaluated trends and drafted four basic scenarios. These trends and scenarios were reviewed and updated. Then the participants “wind tunneled” the scenarios, identifying weaknesses in the current approach and changes required to survive and thrive in those scenarios. The group identified the challenges in each scenario, the innovation priorities to address the challenges, and the types of actions that would be required to implement. Following this exercise another consultant lead an activity to identify common technologies that could be developed across all/most of the scenarios that would improve the health outcomes of Canadians while reducing budgetary and/or transaction costs in the system. The group identified twelve technologies that would improve the health of Canadians and reduce economic, human resource, and transactional burdens on the existing system.

Here is a summary of the findings in each scenario:

1. Health ‘R Us: Government doesn’t have the resources it used to, care resides with communities, and economic forms of group prevention. Lower skilled professionals pick up more work and scope to assist the system.
2. Collective Wealth & Health: Government have the resources and are able to invest in big data to develop more technologically advanced therapies from genomics and provide unique solutions like regenerative medicine.
3. Dog Eat Dog: Government has few resources and people are trying to survive on their own. Individual prevention, more deskilled solutions such as family knowledge or connections exist.
4. Pay as You Play: People and government have resources but solutions are focused on the individual. There are preventative approaches provided by government, greater unique patient solutions if you can pay for it, and regulations exist to give information to people make their own choices on solutions.

Figure A.3. Health Scenarios Grid



The group analyzed common elements across all scenarios which included:

- Inequities are prevalent across all four scenarios
- Changing consumer behaviour is difficult in all four scenarios
- Food policy is a cross-cutting S&T innovation
- Service delivery is the most “cross-cutting” innovation and is easily bundled with other important S&T innovations (e.g., health cards), a priority S&T innovation
- There is a strong fit between the use of information technology and the advancement of community service delivery
- We need to understand how social networking really works and how social networks can be leveraged in both institutional and community settings
- Investing in information is a basic foundation for so many other S&T innovations
- The current regulatory framework is likely insufficiently nimble to meet the demands of the future - a shift in regulatory philosophy from prescriptive to outcomes-based is needed
- International regulatory equivalency is important
- Innovative health systems will require a shift in skill sets from licensed professionals to the right people with the right education and training working together
- Education of health professionals is an improvement opportunity in the area of support systems

- It may be valuable to explore deskilling and how best to deliver multidisciplinary collaboration and teamwork across the care continuum
- Regenerative medicine appears in most scenarios but the focus is different – not one size or solution fits all

The group then reflected on how the system would have to behave different.

Observations included:

1. Science had to be more integrated including soft sciences (psychology, neuroscience);
2. Stakeholders particularly citizens need to be involved in the science agenda as they take up what they understand;
3. Need to use networks, peer groups, etc. which can be very effective to incite change;
4. Need to empower and engage people of different groups, share their knowledge, empower their ability to know more and make better choices for themselves. Government is becoming less powerful or influential to tell for force people what to do;
5. Ethics and values will be a bigger part of decision making, not necessarily the prolongation of life, but a focus on quality of life (i.e. right to die, right to alternative treatment, right to stop treatment, right to a life style);
6. We are likely to see variable health outcomes (changing the bar over time, learning to live with conditions as some conditions are not totally fixable).

In order to address the above insights, the group identified 12 technologies that would be useful to address most of the challenges and behavioral change requirements needed to have a more sustainable health system. These technologies are summarized as:

1. Ubiquitous sensing: sensing everything/decision support tools at home/remotely;
2. Food and food policy: food choices can prevent or improve conditions;
3. Electronic health card: patient carries full health information with them at all times to enable anyone to help them;
4. Regulatory modernization: more choices for people, transparency of information so people choose;
5. Service delivery: ubiquitous sensing and communication tools promotes remote services;
6. Regenerative medicine: learning what works from the population can speed up individual solutions;
7. Health Impact Assessment: tools to help individuals and institutions assess the cost benefit of various treatments;
8. Solution based open innovation: putting your condition out there and hear if anyone has tried anything; giving you more options for consideration;
9. Existing technology to support the elderly: monitoring patient movement; using Skype like technologies to converse with patients; monitoring blood work from home, etc.
10. Standards for medical information: in a format that everyone can read and use;
11. Publicizing the cost of all medical transactions: so people understand costs and benefits, can reflect on their own behaviour (i.e. I overeat and the cost to Canadians is x);
12. Integrated information and surveillance systems: doctors can monitor my heart while I am on vacation; alarms can trigger impending problem (changes in body chemistry prior to a stroke).

Table A.11. Statements of Commitment to Action

New Concepts to the Collective	Concepts that the Collective stated that needed to change	Statements of Commitments or Actions	Notes
Current health care paradigm is unsustainable given trends of aging population and a decreasing tax base.	How to deal with this crisis? Adjusting our expectations.	Focus on prevention, medical diagnostics & monitoring tech, support systems (enable care givers, schools)	The report stated collective perspectives versus individual perspectives.
Focus on health care has been on more hospitals, more doctors, less wait time, but 50% of issues are chronic disease related and require different care.	Need to lose weight, exercise, access good food, monitor conditions yourself better (diabetes), heart. Need prevention type support but who pays?	Doctors will boycott. Who will pay for new services? Will these funds be diverted from acute care? Concern that the system has such a vested interest & won't change.	Technology could be a liberalizer of a rigid path dependent system. (Internet provides understanding, options, sensors, small tech that helps me manage)
Internet has made people more accessible to health information, options, and choices.	Govt has maintained the liability of services, choices. Can people choose?	Internet is working faster than health info highway. Digital data is there but how to access it and build on it?	Re info highway changes have been incremental rather than disruptive resulting in costs but no change in usage
Often we see an expensive health care professional (many times we need services not of a doctor)	Increase scope of service for nurses, nutrition, diabetes specialists but doctors don't want to allow? Who pays for other services?	Outside the "health system" services are emerging (Dr. Bernstein, life coach, elderly services).	Health tourism is emerging. Naturopathy and holistic medicine practices are expanding.
Patients bound by doctors and institutions by data; told not	We are path dependent on the doctor as expert vs being directive in our	Dr. Oz provides knowledge without stating it is a sure thing, promotes healthy living, most	Talking about patient centered approach but unclear how to do this (besides putting labs, doctors, and

to question the doctor.	own care, options, and responsibilities.	focused on prevention and chronic care management.	professionals in the same building).
System fixes you, not as much reliance on the patient to do their best.	Who will pay for prevention or maintenance services?	Dr. Oz, sensor technology, internet, patient chat rooms, provide other services to increase self-efficacy.	Growing ethics discussion on quality of life, right to die, patient choice of treatment.

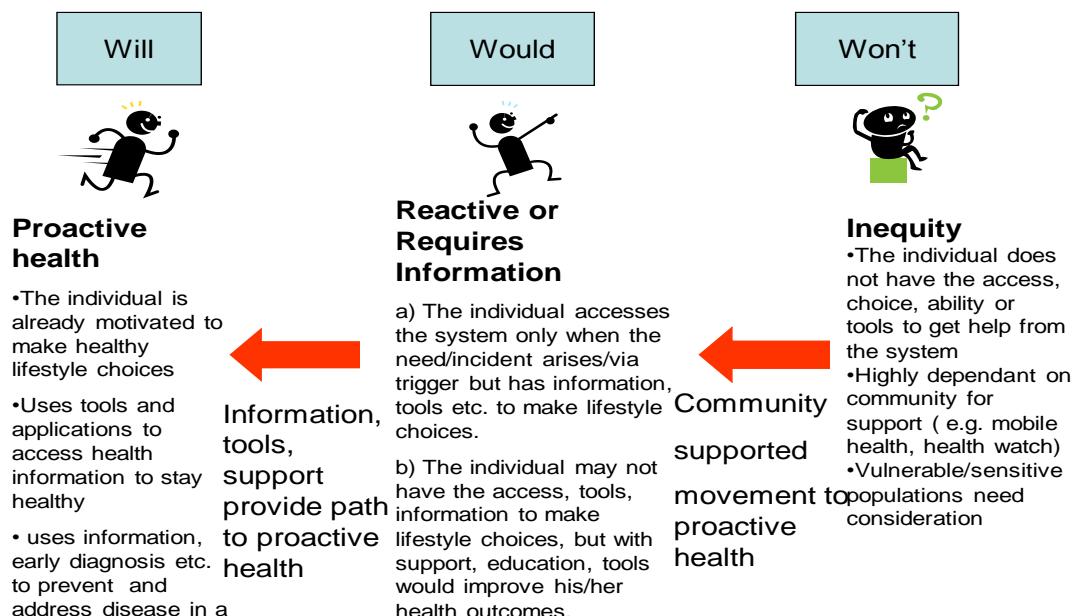
### Event 2: Policy Implications Event-October 28, 2011 Ottawa, Ontario

Given the previous event that reviewed trends and drivers, created four scenarios, and identified 12 technologies that could improve outcomes across the scenarios, this event examined the policy requirements to deliver on the earlier identified solutions.

Approximately 25 participants reviewed previous materials. There was a discussion on the overwhelming nature of the complexity of the health system. The group then discussed "who" is a member of the health system. The discussion revealed that there are people who WILL take care of themselves, WOULD if they have information and tools, and WON'T or CAN'T because they are incapacitated, don't have resources, don't understand the system, etc.

Figure A.4. Market Segmentation in the Health System

## Real/Practical Construct of the System



The group then discussed the type of approach that would be needed to address these different groups. The group recommended the following:

### **From a Reductionist to a Complex Adaptive Management Approach**

The adoption of a Demand-Side management of Wellness opportunities model (as an overall aim for policy making) predicates, according to the Workshop Participants<sup>3</sup>, the adoption of a **Complex Adaptive Management** approach to design, implement and monitor an “adaptive thus sustainable” policy making compact.

### **Complex= a “networked system” approach as opposed to an “independent” approach**

A **system** approach tries to include/understand ALL aspects/influencing factors/consequences to not only better manage in the present but to also reduce future downstream consequences. A **networked** system approach acknowledges the presence of numerous stakeholders whose individual influences on potential outcomes are cumulative. An **independent** approach tackles the ISSUE(s) as they unfold, often from one stakeholder perspective at a time.

### **ADAPTATIVE= An open ended approach as opposed to a determinist approach**

As *complex* means also “shifting/unknown/unclear”, the actions and policy making called for need to be **flexible** enough to allow for **change** of orientations and supporting tools /mechanisms over time (as the unclear becomes clearer and the unknown gets elucidated) and change in the nature and relative influence of stakeholders in the system.

The group then discussed the policy mechanisms that may have to change or be employed.

Table A.12. Policy Mechanisms and Options Identified

<b>Policy Mechanisms</b>	<b>Specific Options</b>
<b>Map the system:</b> identify the nature, role and potential influence of various stakeholders (private and public) on community and individual health and wellness outcomes. 1) Understanding/adopting a system view: - The role of convenor - The shift from disease to wellness 2) Understanding the potential for the autonomy of the individuals to have and act upon choices	Support joint R&D (CIHR, SSHRC) on social systems dynamics and behaviours and on social entrepreneurship; enlarge S&T scope for HC support; Understand Complex Adaptive System approach as it applies to Health and Wellness in Canada (including Healthy community research) Redefine what constitutes a mandate and responsibility within a networked system Review and implement mapping, monitor actions and dynamics in the system
<b>HC as the “Convenor”</b> of the Canadian Health and Wellness system <i>“As long as the ability to continuously convene remains, ...the system survives”</i>	HC becomes the catalyst and start convening stakeholders to implement the solutions. HC establish initial conditions and parameters: “What they (stakeholders) agree to as a set of principles” then stakeholders go and implement the same principles in their own

<sup>3</sup> Including participants at all previous Foresight Initiatives initiated by the HC S&T Foresight Unit

Policy Mechanisms	Specific Options
<p><i>"If the system is active, you can address lots of peoples' needs"</i></p>	
<p><b>Use a multi-pronged approach to engage the community</b>            "Link health/wellness to corporate social responsibility"            "Engage the three levels of government from different standpoints"</p>	<p>Government engages "Industry much earlier" in the process of change. There a need for simultaneous actions to get all levels moving to create social demand            National Strategy/programming on working with municipalities/provinces policy.</p>
<p><b>Work at supporting "adaptive Capacity" development at each stakeholder level and at the interface of stakeholder categories</b></p>	<p>Leadership training to enable CAM (universities, governments, private sector)            Integrate schools programs to community services; Support workplace programs/volunteering/gov employees to go to and help where it is needed</p>
<p><b>Mobilize stakeholders through proposing key systems problems to resolve and support "pilot projects" defined by stakeholders as community responses to key problems.</b></p>	<p>Test through pilots or demos, solutions or options designed by and mobilizing different stakeholders. Assess pilots and provide adequate conduits for transfer in others "jurisdictions".</p>

**What do we need to get the information/allow access to information to help individuals decide along their wellness lifecycle? I.e. what do I have to do in the system to enable the “Individual”?**

Table A.13. Policy Mechanisms and Options Identified

Policy Mechanisms	Specific Options
<b>Community Health Watch</b>	- could be organized with the support of the dentist, doctors, friends etc. - might not require more funding as it is using an existing “network”
<b>Plan for Development of a Life Style Management Program Tool Kit:</b>	school programs; individuals; applications (simulation games).
<b>Program of Public Health Testing</b>	\$1,000 / every 10 years / person
<b>Emotional / Mental Health Support</b>	individuals, reduce stigma, access to options
<b>Information is Cheap</b>	use of social media
<b>Convert Information into Practices</b>	Dr. Oz
<b>Cheap Diagnostics</b>	more choice, multparameters mobile/micro diagnostics devices, more access, using IT in surveillance and monitoring
<b>“Me Health” Policy:</b>	doctors to send results to me and/or a person of my choice, issue a card that would have all the info/results, have the option to take the results to other practitioners of choice.
<b>M.S. Wellness:</b>	share best practices with CIDA (input to web sites, CD's etc.), give away information and get information, accept science uptake
<b>Gaming and Simulation Tools:</b>	to increase participation

Table A.14. Statements of Commitment to Action

New Concepts to the Collective	Concepts that the Collective stated that needed to change	Statements of Commitments or Actions	Notes
Climate change, aging populations, sedentary lifestyles, cheap unhealthy food, social determinants impact human health.	Systems approach is required. Transportation, education, work systems that foster activity healthy living.		This report captures the collective perspective versus individual points of view.
Trends with decreasing government resources and reductionist approach makes the health care system unsustainable.			Trends decrease in sustainability of health system. Frustration that the system was rigid, hard to change the system.
Moving from health to wellness; from living long to living well; from quantity of life to quality of life. Different expectations and outcomes under different times of life and conditions.	Type, scope, nature of health practitioners must change. Can't have one solution for all. Same equitable health care may not be the same in the future. Need different kind of tools for different ages.	Must integrate the physiology and psychology. Becoming healthier (heart health is a psychological issue to start exercising, then exercising is physiological); same for overeating and being addicted to food.	Participants viewed change as happening from outside the health system; S&T to help people learn about health and be healthier. It helps people who can help themselves along.
WOULDs take care of themselves if they knew what to do. WON'Ts won't for various reasons. Enable those who WILL to experiment and share learning with others and the system. Build selfadapting/learning.	What do the WILLS, WOULDs, and WON'Ts need to advance? This means a flexible policy and network systems approach. Complex adaptive mgmt where the patient has info and is directive. HC is convenor vs control	Policies need to provide for the categories, help them graduate and improve, and catch them if they slip backwards...getting back where they were. Goal is to keep each person as far up on the treadmill as possible.	Information and transparency can enable self-efficacy. With chronic disease issues (which are more likely to be preventable) maybe this will reduce the bottlenecks in the acute system.
Build learning and adaptive capacity.	Access to information, options, simulations to change behaviour.	Can be applied to lower skilled medical practitioners.	Societal discourse want scope and billing by other professions.

### **Event 3: S&T Innovation Event-December 14-15, 2010 Ottawa, Ontario**

Objectives and Parameters of this Event:

Approximately 20 participants came together to review the foresight materials to develop some synthesis and conclusions with respect to how to increase the sustainability of Canada's health system.

The workshop began with information levelling; to determining a common vocabulary and a common analysis framework, particularly as several of the participants were completely new to the process (both Foresight and complexity analysis). Logical models that were built and extended included:

- The Won't → Would → Will continuum of individual action towards greater health and wellness; this model was extended to include the Can't → Could → Can continuum – denoting that there are elements both of choice (individual willingness) and capacity (individual capability: an infant cannot "choose" a healthier lifestyle, for example).
- The Prevention – Acute Care – Management triad of health providers was developed and tested, and many inferences drawn.

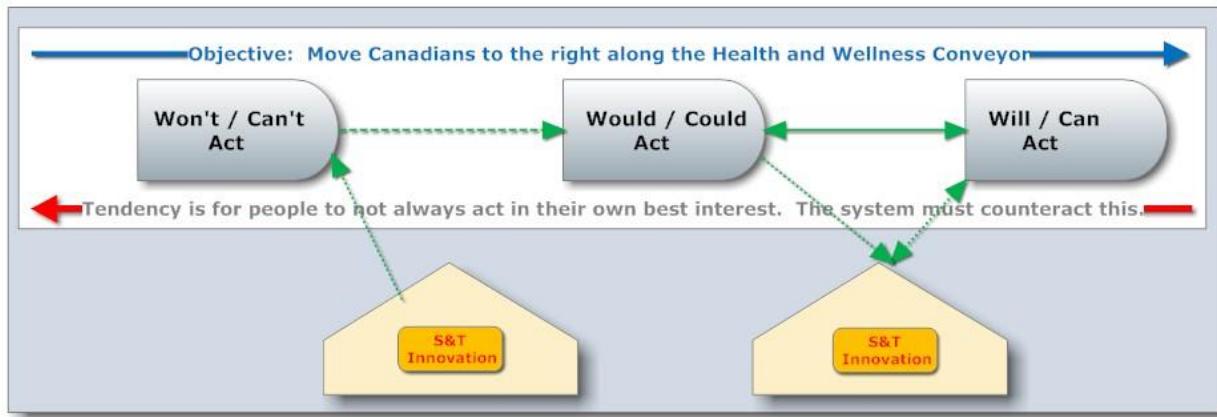
The next day the team dove deeper into the Prevention/Acute Care/Management service delivery areas, assessing how a shift in focus and investment in one might alleviate expenditures in another. Of key concern was the current heavy reliance on the Acute Care function. Acute Care is primarily funded by the public sector, whereas individuals often cover extensive costs in the prevention and management marketplaces. As studies have shown that dollars invested in Wellness decrease the need for acute care dollars, the team assessed different plans for shifting the current structure of health care in Canada to one with a greater emphasis on prevention and which supported greater responsibility by individuals to manage their own health. Later the team assessed five key health issues: Obesity, Cancer, Aging and Death, Infectious Diseases and Mental Health.

The concept of a "Health Conveyor" was used as a model to look at how the Health system impacts an individual in terms of both their **willingness and their ability** to make informed choices and to take action to sustain or improve their Health. The model acknowledges that:

- Some individuals simply will not or cannot take action for whatever reason;
- Some individuals would or could act if they had access to the right information, resources or circumstances that would motivate and inform such behaviour; and
- Some individuals are pro-active and have the ability and the willingness to take appropriate actions as long as they know that such action is appropriate.

The idea of the Health Conveyor is that the Health system has a whole should provide the means and the motivations for individuals to move "to the right" or to towards a greater propensity to take appropriate action to sustain or improve their Health. The concept also recognizes that in the absence of appropriate information, resources or circumstances individuals when viewed as a whole tend to not act in their own best interest. The tendency if for individuals to slide "to the left", therefore the Health system should act continuously to avoid this tendency.

Figure A.5. Health Conveyor



**Strategic Action Framework.** As can be seen by the above diagram the Health Conveyor concept also helps to illustrate that when considering the impact of S&T Innovation on the Health System it is by creating means for individuals to shift "to the right" that innovation will have the greatest impact. It was determined that:

- Community-based, Informal or Extended Family types of interventions are most needed to assist individuals to move from Won't/Can't to Would/Could; whereas,
- Innovation in terms of high value information and direct-support resources may be most useful to move individuals from Would/Could to Will/Can.

The S&T innovations identified to keep people on the conveyor and moving to the right included:

Areas for S&T Innovation:

1. Better understanding of the health environment (disease causes, aging, mental health)
2. Better understanding and response to how the human body and its systems actually work.
3. Community, informal and extended family interventions to WON'Ts to improve their health.
4. Provide information/direct-support for individuals to self-manage health & well-being.
5. The provision of accessible & integrated prevention & wellness services to reduce sickness.
6. Provide a "dispatcher" function so individuals can access resources effectively / efficiently. Freeing GP's from this function so that they can offer higher value medical services.
7. The provision of disease management services outside of the acute care system.
8. Medical sensors, early diagnosis & treatment of conditions using skilled acute care.
9. New business models enable private sector and social business solutions to health care that relieve the public sector of the burden or providing the broader suite of services.
10. Development of tools/methods for inter-disciplinary collaboration and complex change management capabilities to support transition towards a new model for health & wellness.

Table A.15. Statements of Commitment to Action

New Concepts to the Collective	Concepts that the Collective stated that needed to change	Statements of Commitments or Actions	Notes
Some people WILL, WOULD, and WON'T take care of themselves. This can change over time and under different conditions.	Keep people on the health conveyor, graduating them to the next level; catching if they fall. Requires shared information, divesting control, but yet fail safes for the most vulnerable.	Requires giving autonomy to the WILLS, further tools for the WON'T; expanding the number of caregivers (informal) for WON'Ts.	The responses in this report reflect the collective tendencies versus individual opinions.
There are strong assumptions / path dependencies built into the existing system (i.e. doctor billing, scope of work, scared to take \$ away from hospitals).	S&T sharing information, self-monitoring/self-efficacy dvlpt remote monitor, early warning systems that can enable WILLS and WOULDs.	S&T tools enable the system to change from the periphery. Clothing with sensors, Bayer diabetes monitoring, ubiquitous sensing useful to WILLS / WOULDs.	Path dependencies inhibit innovation. S&T affordable to individuals empower WILLS and WOULDs vs changing the system.
Change assumptions that government/institutions are better decision makers than the individuals, that sharing info, peer patient groups.	Internet increases access to info, language makes info more accessible, gets opinions / options from others. Info equalizes expert/nonexpert.	We can't control all the information on the web. How to ensure that the information is accurate? There is no sure thing.	Change in the nature of expert/decision maker. Need centralized support for WON'Ts but WILLS / WOULDs care for selves.
Living longer, with conditions; quality of life vs quantity of life; health vs well-being; wellness while having chronic illnesses.	Change policies of one size fits all (euthanasia under directive of the patient vs everyone lives to the max).	Change to patient centered; from doctor/institution; decides to inform the patient and the patient decides.	Changes in health system assumptions; self-directed living/dying; living with conditions, having control on health.

Many blockages as all information and referrals go through the doctor.	Patient choice, increased scope of nurses, direct referrals can reduce backlogs.	To help patients make decisions may need a health system liaison vs dr.	Give up control to decrease bottlenecks; hard for government.
Greater choice of treatment options and alternatives or no treatments.	Patient has the right to decide. Decision is moved from doctor or hospital to patient &/or family.	Accept sub-optimal choices; assign more risks to others; who pays for bad decisions	Blurring lines (way of life, treatment, shorter life but quality of life).
Many chronic issues are preventable (50% budget) but system built for acute	People come to ER for prescriptions. Need community based support & virtual services.	Community health teams. EHR owned by patient. Who pays for more?	Data, info enable WILLs/WOULDs giving info on population treatments
Data access & provision help prevention.	Requires changes to ownership of data, access to data, and privacy.	People are willing to share info if service is improved.	Will share health info to get better therapies.