A curricula guide for

innovation education

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A Curricula Guide for Innovation Education

This document provides an executive summary of the insights and models on innovation education uncovered through this research and guides educators to put these concepts and tools to use.

What is innovation? How do we define innovation, its outputs and processes, and what are the skills and competencies necessary to practice and excel in innovation?

Many strategies and policies, both federal and provincial, have attempted to improve Canada's innovation capacity in the last few decades. Rarely, however, is the role of education mentioned in creating a nation of innovators. This is counterintuitive: education is an obvious mechanism with which to develop the knowledge and abilities of a population. Yet we lack a holistic understanding of what it takes to practice innovation, let alone the kinds of curricula that might provide those skills and competencies. Moreover, we are inconsistent in the definitions and language we use to define innovation–often obsessing over technology and commercialization. We tend to assume innovation comes from research and development processes, and that innovators are simply highly skilled people.

This document is the result of an intensive review of reports, strategies, policy, and theory on innovation in the Canadian context. This literature was scanned and coded–inspired by the ethnographic methods of grounded field theory–in order to synthesize a holistic theory of innovation. This theory includes a universal definition of the innovation process, a recasting of different focuses of innovation as innovation orientations, a comprehensive model of the innovation process, and a synthesis of innovation skills and competencies into 13 learning domains, 47 learning constructs, and 227 learning outcomes. These tools provide utility for policymakers and educators in pursuit of understanding and improving innovation capacity. In particular, the model of innovation education is the most comprehensive of its kind, providing an extensive set of concepts with which to understand education gaps and build curricula.

Perhaps the most important contribution of this research, however, is the recognition that our conversations about innovation strategies and education reform must be aligned. How exactly do people learn to be innovative, and how are our education systems currently facilitating that process? With this study we have begun to seek answers to these questions, but there is much more work to do. If you use these ideas and learn something from your experience, or if you have thoughts on how to improve them, don't hesitate to make suggestions and to share your work.

Below, I describe in detail the definitions and models of innovation developed through this research and how these concepts may be applied in innovation education programming.

How to Use This Guide

This guide discusses several pieces of a holistic theory of innovation:

- a universal definition of innovation;
- a discussion of the needs of an innovative environment;
- the innovation process;
- innovation orientations; and
- innovation skill and competency domains.

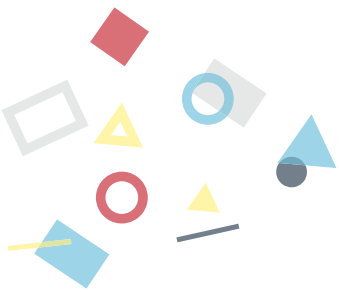
The definition of innovation and the components of the innovation environment provide a grounding for the educator, framing their approach and providing context for the models offered here.

Second, the model of the innovation process allows educators and their students to understand the phases and steps of innovation activity. Should a particular phase or step be particularly important for program outcomes, the model allows the educator to focus on the most appropriate skill and competency domains.

Third, the innovation orientations show how different approaches to innovation emphasize different outcomes, different parts of the innovation process, and different skills and competencies. For the educator focused on a particular orientation, these models highlight the components of the process and the skill/competencies domains they should focus on in their programs, allowing them to build curricula dedicated to those orientations. Otherwise, understanding the different orientations helps students link different types of innovation outputs to the relevant components of the process and the skills involved.

Finally, the in-depth discussions of innovation learning domains provide educators with a deep understanding of the skills and competencies practiced in innovation – including where and how in the innovation process and innovation orientations these skills are put to use. The learning constructs and outcomes connected to these domains in turn provide quick and accessible inspiration for curriculum development.

With these frameworks and models, educators can easily build general, holistic programs; specific curricula focused on particular components of the innovation process; or simply introduce innovation learning into existing programming. Thus, little stands in the way of innovation education.



Definition of Innovation

An innovation is a change that creates new value or improves the delivery or capture of value.

Innovations exist in many forms, from product to social movement; at many scales, from new-to-you to new-to-the-world; and in many degrees, from radical to incremental. The success of one innovation often requires the success of others in parallel.

Innovation often results in new knowledge, relationships, and spin-off innovations.

The Innovation Environment

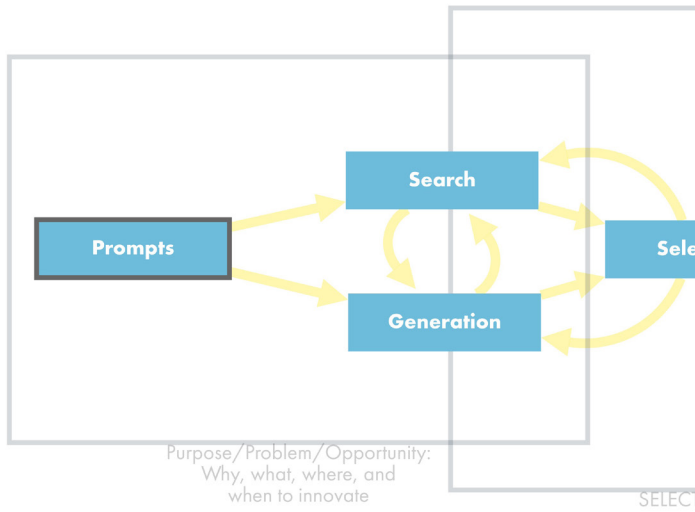
The review of innovation perspectives also unearthed three environmental conditions that contribute to success in innovation. Networks and relationships, openness and trust in those networks and relationships, and readily available financial, knowledge, and human capital are each important aspects of the innovation environment.

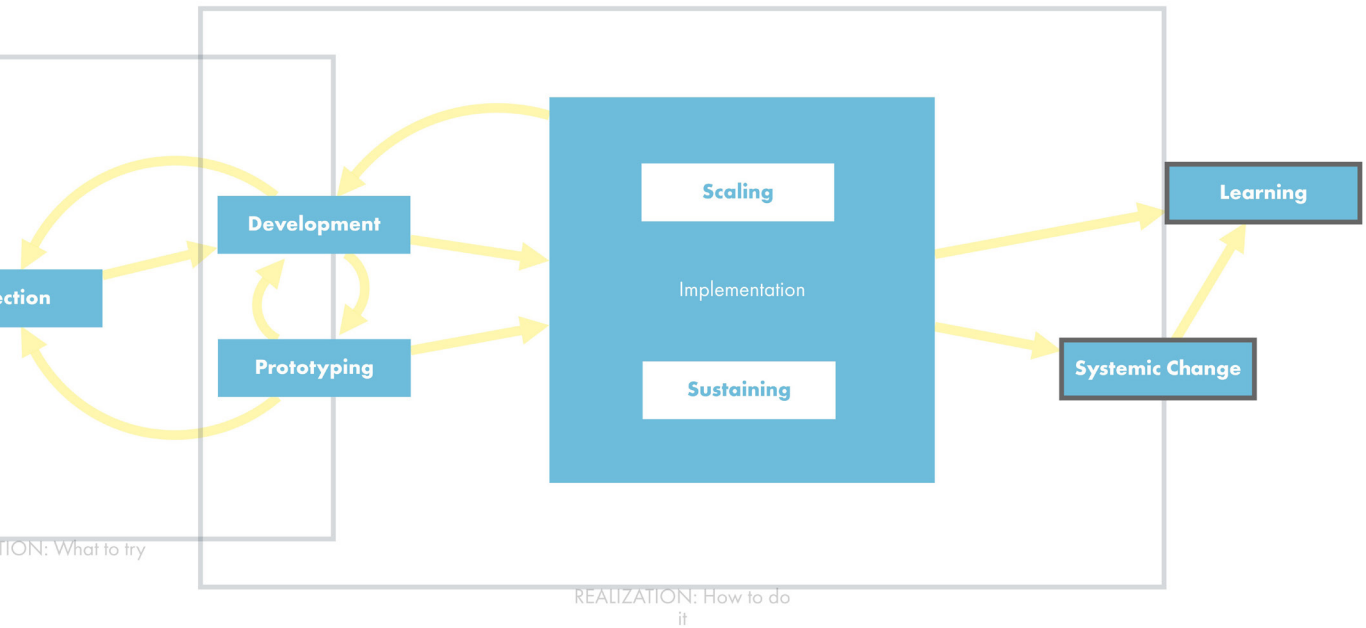
The Innovation Process

I consolidated the steps and phases of innovation I observed across perspectives and orientations into a universal model of the innovation process. This process is not drastically different from those previously defined in the literature. Crucially, however, it is universal: it can be followed regardless of the orientation an innovator has adopted. Moreover, this model provides an explicit basis with which to explore the skills and competencies practiced by innovators throughout the process.

The process is non-linear and cyclical: an innovator who runs into trouble at one stage will often need to double-back in order to continue the process at an earlier stage. It is also fractal. The success of one innovation often requires the dovetailing success of others, and thus the innovator will actually end up pursuing parallel innovation processes for different interlocking innovations simultaneously.

The innovation process consists of nine stages across three overlapping phases. The phases are purpose, problem, and/or opportunity realization: why, what, where, and when to innovate, selection: what to try, and implementation: how to do it. In the purpose, problem, and/or opportunity realization phase, an innovator experiences or finds Prompts, in which they identify a purpose to innovate (e.g., a problem to solve); they Search for existing ideas and inventions to innovate with; and they Generate new ideas. Search and Generate are also a component of the selection phase, where innovators Select which innovations to pursue throughout the rest of the process. They then Develop and Prototype these innovations. Finally, Development and Prototyping overlap with the realization phase, in which the innovator finds ways to Scale and Sustain their innovations in the real world. Implementation can potentially lead to Systemic Change and Learning, the final two stages of the process.

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Development
Prototyping
Scaling
Implementation
Sustaining
Learning
Systemic Change
TION: What to try
REALIZATION: How to do it

Innovation Orientations

Conversations about innovation often take place in disparate silos based on at least three orientations: **Technology & Science, Social & Sustainability**, and **Commercial & Entrepreneurial**. These orientations are rooted in the same processes and skills, but emphasize different components in the interest of achieving different outputs. Nonetheless, many approaches to innovation policy either conflate them or separate them entirely. This disorganization has grim potential: if policymakers fail to see these orientations and the holistic ways in which they intersect, or if they are too myopic and focus only on one (and its outputs), they might fail to see root-cause problems and high-leverage interventions deeply embedded in our innovation systems.

For instance, innovation policy focused only on improving our technological outputs may seek solutions in patent reform and R&D activity. Likewise, policymakers preoccupied with entrepreneurial innovation may only focus on the investment environment. Both of these approaches, however, will miss policy shifts that can help more people be inventive and entrepreneurial. These approaches to improving innovation also risk ignoring the issues of inclusivity and sustainability. Instead, I advocate for a holistic approach, recognizing the shared foundation on which these orientations to innovation are built.

Innovation Learning Domains

Thirteen different domains of innovation skills and competencies were identified:

- literacies and domain expertise;
- collaboration, communication, and network building;
- design;
- foresight and scanning;
- vision and purpose;
- initiative and learning;
- ethics and responsibility;
- adaptability and resilience;
- risk and uncertainty;
- empathy;
- management;
- business and financial acumen; and
- R&D.

These domains form a holistic model for innovation education, with literacies and domain expertise at the core. For the remaining twelve domains, I used data, coded from the literature review, in a conceptual mapping and synthesis process to identify learning constructs. With reference to instructional design frameworks, these constructs were further broken down into 223 pragmatic learning outcomes for innovation education. These outcomes provide both a set of curricular goals for innovation learners and a framework with which an educator may build teaching and learning activities and methods of assessment.

This model of innovation learning has been interactively visualized at https://kumu.io/systemicdesign/innovation-learning-model. There, the reader can explore these concepts at their leisure, using on-screen controls to filter and showcase different components of the model in order to understand how these domains relate to and intersect with the innovation process. Below, the domains are explained in more detail and the learning constructs and outcomes of each domain are outlined in full.

Literacies and domain expertise

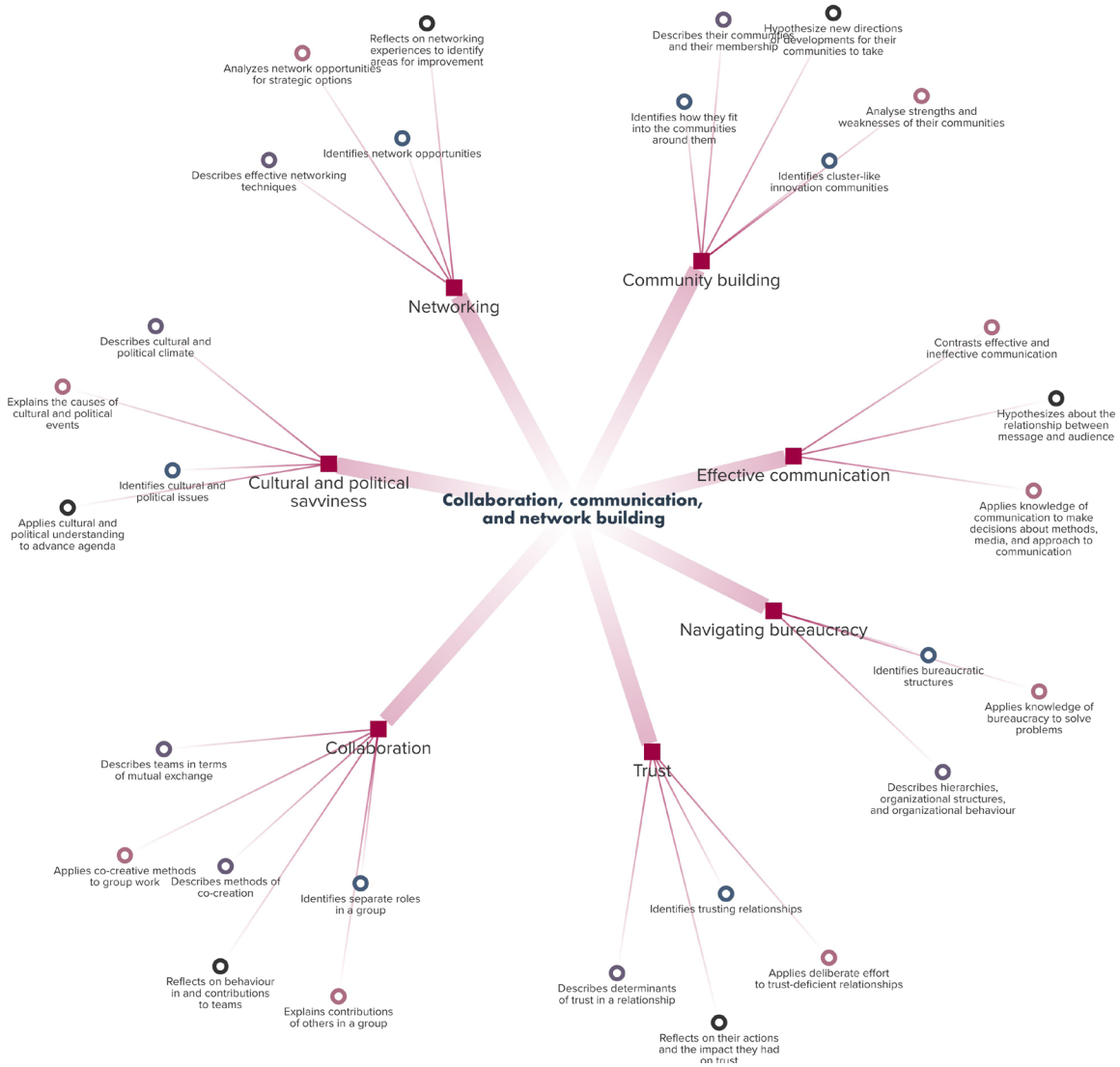
This domain is the most basic. It captures the core competencies necessary to develop and use the other 12 domains – from basic reading and writing to academic skills to digital literacies. It also encompasses knowledge and ability appropriate to the context, signifying the importance of expertise in any given innovation arena. Concrete learning constructs and outcomes are not defined for this domain as these details are both too general and too specific to be easily used in the development of programs and curricula.

Collaboration, communication, and network building

Many of the steps of the innovation process involve working with others, presenting and sharing ideas, and building and maintaining relationships across disciplines, cultures, and challenges. These capacities are collapsed into the Collaboration, communication, and network building learning domain, essential throughout the innovation process and in all of the innovation orientations.

Collaboration

- Identifies separate roles in a group (Unistructural)
- Describes methods of co-creation (Multistructural)
- Describes teams in terms of mutual exchange (Multistructural)
- Applies co-creative methods to group work (Relational)
- Explains contributions of others in a group (Relational)



- Reflects on behaviour in and contributions to teams (Extended abstract)

Trust

- Identifies trusting relationships (Unistructural)
- Describes determinants of trust in a relationship (Multistructural)
- Applies deliberate effort to trust-deficient relationships (Relational)
- Reflects on their actions and the impact they had on trust (Extended abstract)

Navigating bureaucracy

- Identifies bureaucratic structures (Unistructural)
- Describes hierarchies, organizational structures, and organizational behaviour (Multistructural)
- Applies knowledge of bureaucracy to solve problems (Relational)

Effective communication

- Applies knowledge of communication to make decisions about methods, media, and approach to communication (Relational)
- Contrasts effective and ineffective communication (Relational)
- Hypothesizes about the relationship between message and audience (Extended abstract)

Cultural and political savviness

- Identifies cultural and political issues (Unistructural)
- Describes cultural and political climate (Multistructural)
- Explains the causes of cultural and political events (Relational)
- Applies cultural and political understanding to advance agenda (Extended abstract)

Community building

- Identifies how they fit into the communities around them (Unistructural)
- Identifies cluster-like innovation communities (Unistructural)
- Describes their communities and their membership (Multistructural)
- Analyse strengths and weaknesses of their communities (Relational)
- Hypothesize new directions or developments for their communities to take (Extended abstract)

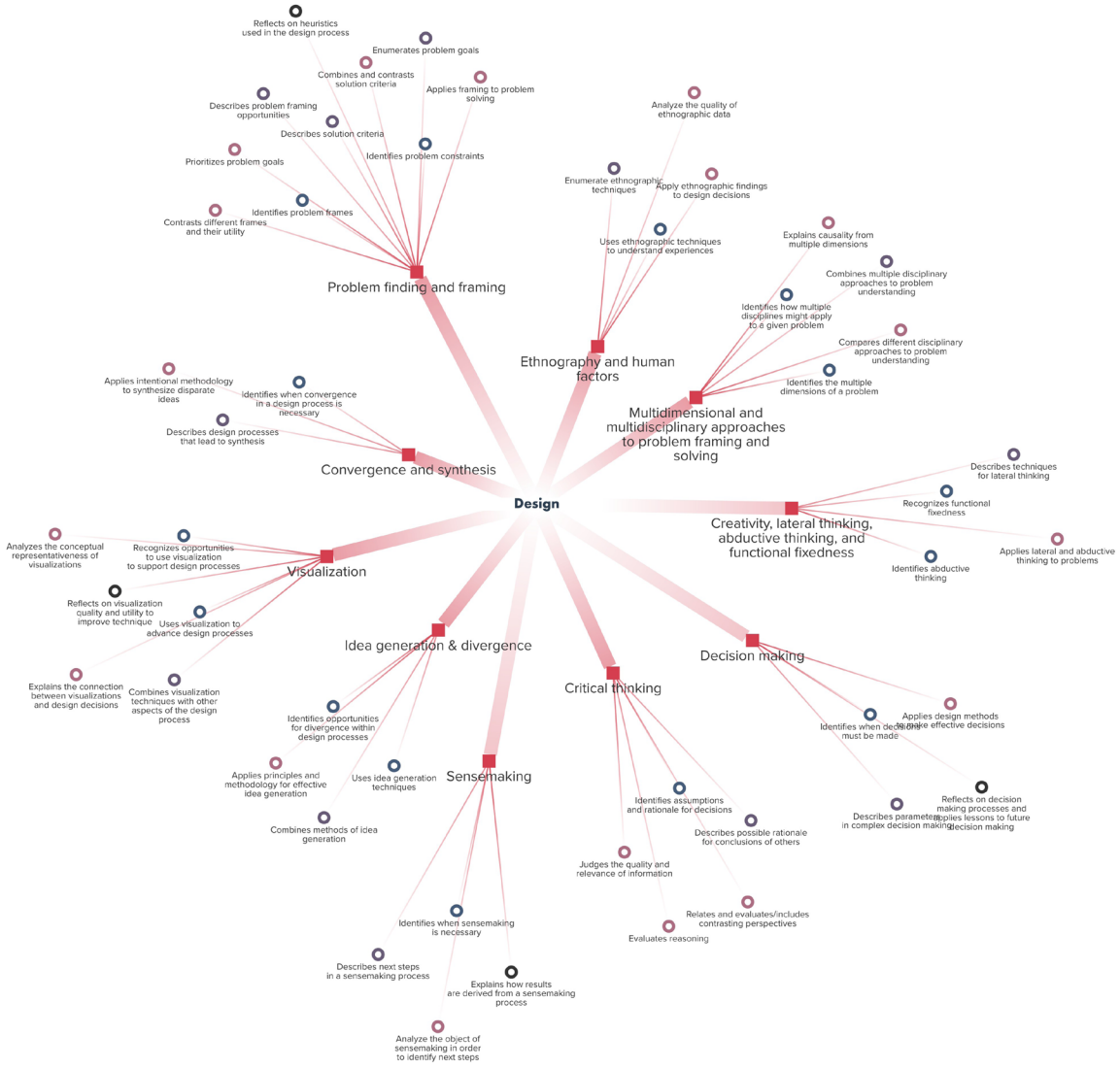
Networking

- Identifies network opportunities (Unistructural)
- Describes effective networking techniques (Multistructural)
- Analyzes network opportunities for strategic options (Relational)
- Reflects on networking experiences to identify areas for improvement (Extended abstract)

Design

Design is the discipline of decision making. In the use of design, the innovator leverages abilities that help make sense of the complex, abstract, and uncertain. This means employing multiple disciplines and perspectives in order to make sense of the problem, generating divergent possibilities in problem frames and in solutions, and converging on the best option of these creative choices for the context.

Design is used across all innovation process steps and orientations, but is perhaps most effective in the cycles of the Problem/Purpose phase as opportunities are connected to the potential for innovation and as the innovation itself is conceptualized.



Ethnography and human factors

- Uses ethnographic techniques to understand experiences (Unistructural)
- Enumerate ethnographic techniques (Multistructural)
- Analyze the quality of ethnographic data (Relational)
- Apply ethnographic findings to design decisions (Relational)

Problem finding and framing

- Identifies problem constraints (Unistructural)
- Identifies problem frames (Unistructural)
- Enumerates problem goals (Multistructural)
- Describes solution criteria (Multistructural)
- Describes problem framing opportunities (Multistructural)
- Contrasts different frames and their utility (Relational)
- Applies framing to problem solving (Relational)
- Prioritizes problem goals (Relational)
- Combines and contrasts solution criteria (Relational)
- Reflects on heuristics used in the design process (Extended abstract)

Sensemaking

- Identifies when sensemaking is necessary (Unistructural)
- Describes next steps in a sensemaking process (Multistructural)
- Analyze the object of sensemaking in order to identify next steps (Relational)
- Explains how results are derived from a sensemaking process (Extended abstract)

Convergence and synthesis

- Identifies when convergence in a design process is necessary (Unistructural)
- Describes design processes that lead to synthesis (Multistructural)
- Applies intentional methodology to synthesize disparate ideas (Relational)

Visualization

- Recognizes opportunities to use visualization to support design processes (Unistructural)
- Uses visualization to advance design processes (Unistructural)
- Combines visualization techniques with other aspects of the design process (Multistructural)
- Analyzes the conceptual representativeness of visualizations (Relational)
- Explains the connection between visualizations and design decisions (Relational)
- Reflects on visualization quality and utility to improve technique (Extended abstract)

Idea generation and divergence

- Uses idea generation techniques (Unistructural)
- Identifies opportunities for divergence within design processes (Unistructural)
- Combines methods of idea generation (Multistructural)
- Applies principles and methodology for effective idea generation (Relational)

Decision making

- Identifies when decisions must be made (Unistructural)
- Describes parameters in complex decision making (Multistructural)

- Applies design methods to make effective decisions (Relational)
- Reflects on decision making processes and applies lessons to future decision making (Extended abstract)

Multidimensional and multidisciplinary approaches to problem framing and solving

- Identifies the multiple dimensions of a problem (Unistructural)
- Identifies how multiple disciplines might apply to a given problem (Unistructural)
- Combines multiple disciplinary approaches to problem understanding (Multistructural)
- Explains causality from multiple dimensions (Relational)
- Compares different disciplinary approaches to problem understanding (Relational)

Critical thinking

- Identifies assumptions and rationale for decisions (Unistructural)
- Describes possible rationale for conclusions of others (Multistructural)
- Judges the quality and relevance of information (Relational)
- Relates and evaluates/includes contrasting perspectives (Relational)
- Evaluates reasoning (Relational)

Creativity, lateral thinking, abductive thinking, and functional fixedness

- Recognizes functional fixedness (Unistructural)
- Identifies abductive thinking (Unistructural)
- Describes techniques for lateral thinking (Multistructural)
- Applies lateral and abductive thinking to problems (Relational)

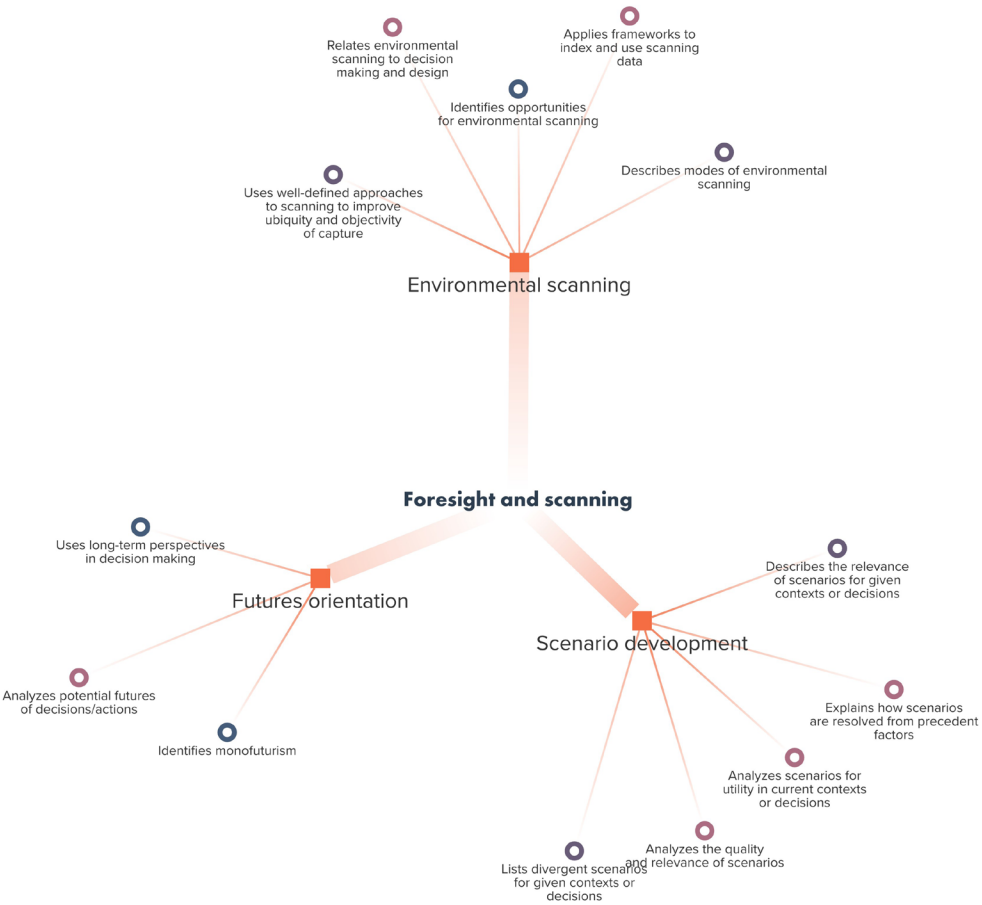
Foresight and scanning

Futures thinking involves recognizing the ingredients of the future found in the present. Through identifying these signals, trends, and drivers of change, we can describe the potential futures ahead of us, incorporating these scenarios into strategy and planning.

While Foresight and scanning skills are useful across orientations, they are most emphasized by the front- and back-ends of the innovation process. At the front-end, embarking on the innovation process means attempting to solve a need, cause, or problem. Foresight skills help the innovator identify important outputs with these in mind. Likewise, the use of futures thinking and scanning helps the innovator to determine proto-innovations with the greatest potential and the smallest barriers to implementation in the Prompts, Search, and Selection steps. At the back-end of the innovation process, Foresight and scanning skills to anticipate the systemic change that will come from the innovation's impact.

Futures orientation

- Identifies monofuturism (Unistructural)
- Uses long-term perspectives in decision making (Unistructural)
- Analyzes potential futures of decisions/ actions (Relational)



Environmental scanning

- Identifies opportunities for environmental scanning (Unistructural)
- Describes modes of environmental scanning (Multistructural)
- Uses well-defined approaches to scanning to improve ubiquity and objectivity of capture (Multistructural)
- Applies frameworks to index and use scanning data (Relational)
- Relates environmental scanning to decision making and design (Relational)

Scenario development

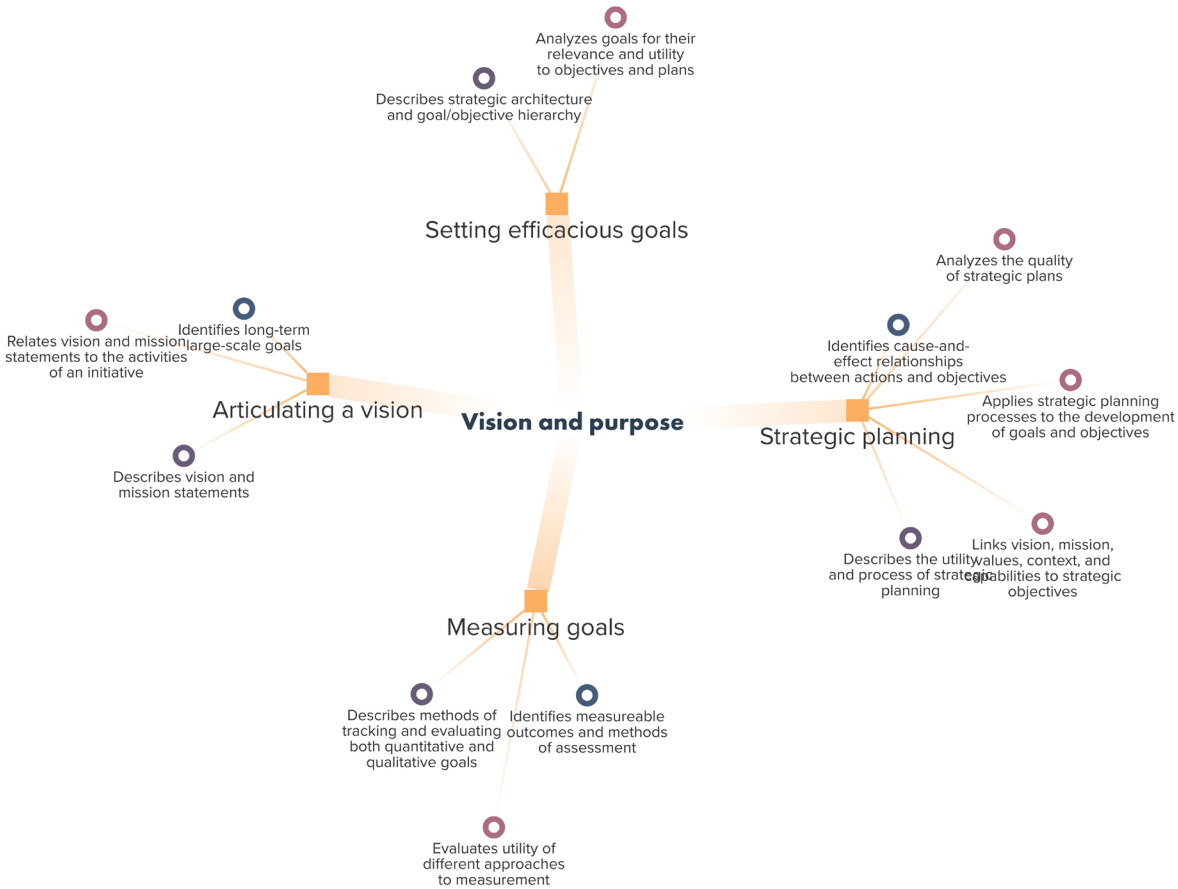
- Lists divergent scenarios for given contexts or decisions (Multistructural
- Describes the relevance of scenarios for given contexts or decisions (Multistructural)
- Explains how scenarios are resolved from precedent factors (Relational)
- Analyzes scenarios for utility in current contexts or decisions (Relational)
- Analyzes the quality and relevance of scenarios (Relational)

Vision and purpose

The Vision and purpose domain includes strategic thinking and long-term visioning. Developing the abilities of this domain will help an innovator recognize and articulate their long-term goals in meaningful, useful ways.

The Vision and purpose domain is most emphasized in the Social and Sustainability and Technology and Science orientations, through their focus on solving particular problems or advancing specific initiatives. Commercialization and Entrepreneurship-oriented innovators are still liable to use vision and purpose, however–but key to success in many business endeavours is the ability to pivot, leveraging existing resources and competencies in new, more valuable ways.

Likewise, Vision and Purpose skills and competencies is best used in the earliest step of the innovation process: Prompts. Developing a well-defined concept of the purpose of the innovation is key to success in later stages. Vision and Purpose skills are also heavily used in the Selection step as the innovator chooses among alternatives, evaluating each choice's later impact on the overall goal. Finally, the Systemic Change step involves Vision and Purpose as the innovator attempts to build (or change) systems around their innovation in order to achieve propagating and emergent impact.



Strategic planning

- Identifies cause-and-effect relationships between actions and objectives (Unistructural)
- Describes the utility and process of strategic planning (Multistructural)
- Links vision, mission, values, context, and capabilities to strategic objectives (Relational)
- Applies strategic planning processes to the development of goals and objectives (Relational)
- Analyzes the quality of strategic plans (Relational)

Setting efficacious goals

- Describes strategic architecture and goal/objective hierarchy (Multistructural)
- Analyzes goals for their relevance and utility to objectives and plans (Relational)

Measuring goals

- Identifies measureable outcomes and methods of assessment (Unistructural)
- Describes methods of tracking and evaluating both quantitative and qualitative goals (Multistructural)
- Evaluates utility of different approaches to measurement (Relational)

Articulating a vision

- Identifies long-term large-scale goals (Unistructural)
- Describes vision and mission statements (Multistructural)
- Relates vision and mission statements to the activities of an initiative (Relational)

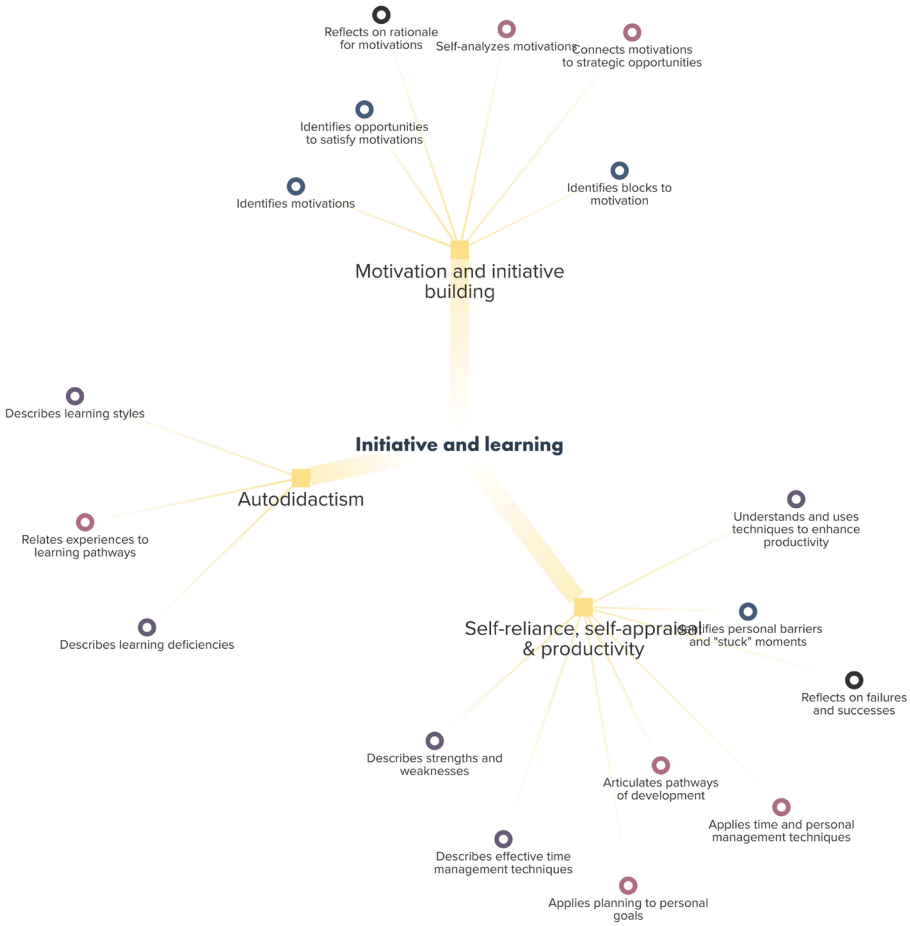
Initiative and learning

Initiative and learning captures the capacity for self-direction. The skills and competencies involved in this domain connect an innovator's desires and goals to their activities, including the ability to evaluate progress and identify gaps and barriers in development toward these aims.

Initiative and learning is an important skill for most innovators and across the innovation process, but it is particularly important in the Social and in the Technology and science orientations. The discovery of innovation Prompts are often self-directed exercises; likewise, Learning from the process and impact of an innovation requires self-direction. These steps are particularly important to these two orientations, hence the focus.

Motivation and initiative building

- Identifies opportunities to satisfy motivations (Unistructural)
- Identifies blocks to motivation (Unistructural)
- Identifies motivations (Unistructural)
- Self-analyzes motivations (Relational)
- Connects motivations to strategic opportunities (Relational)
- Reflects on rationale for motivations (Extended abstract)



Self-reliance, self-appraisal & productivity

- Identifies personal barriers and "stuck" moments (Unistructural)
- Describes strengths and weaknesses (Multistructural)
- Describes effective time management techniques (Multistructural)
- Understands and uses techniques to enhance productivity (Multistructural)
- Applies time and personal management techniques (Relational)
- Articulates pathways of development (Relational)
- Applies planning to personal goals (Relational)
- Reflects on failures and successes (Extended abstract)

Autodidactism

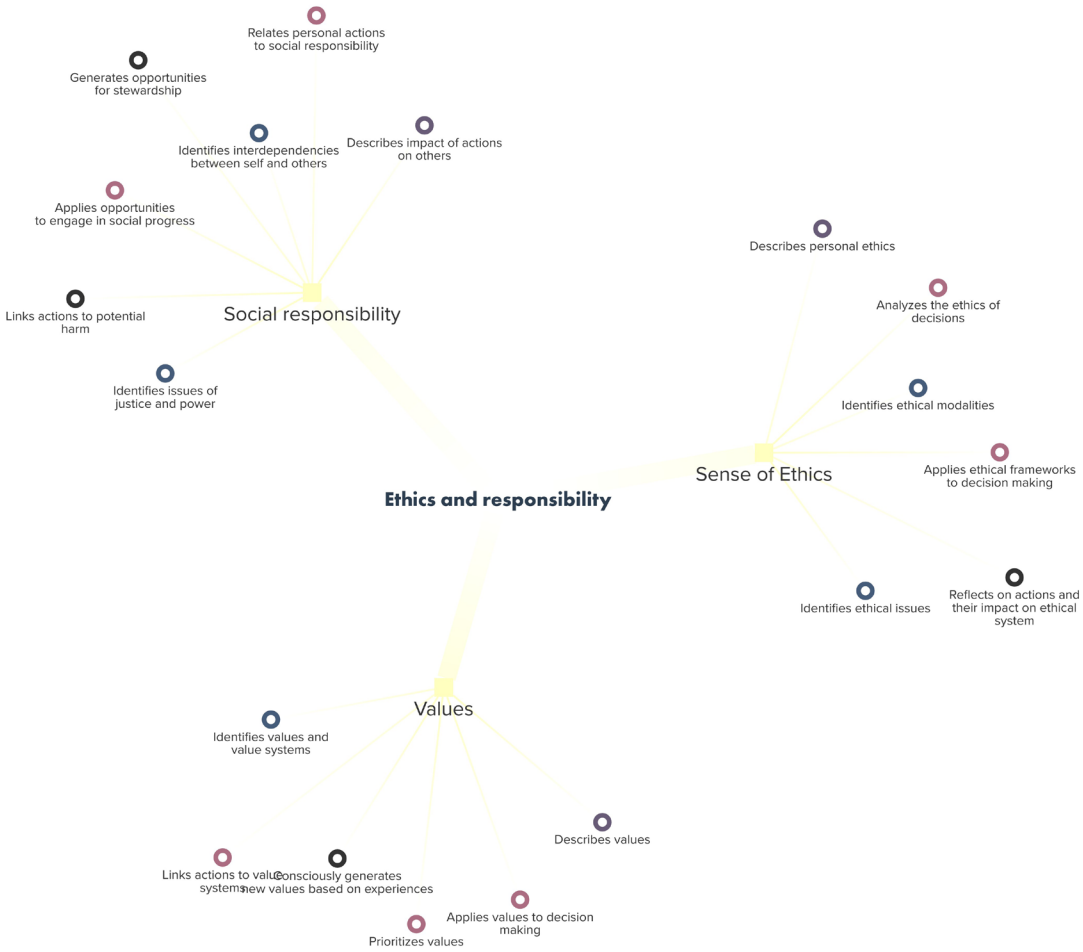
- Describes learning styles (Multistructural)
- Describes learning deficiencies (Multistructural)
- Relates experiences to learning pathways (Relational)

Ethics and responsibility

What are the values and ethics of the innovator? How do they assess their responsibility for the world around them? These questions are answered by the Ethics and responsibility domain, with which the innovator develops their sense of rights, justice, and social responsibility. These competencies include developing and reflecting on the innovator's systems of ethics and values, connecting the innovators' actions to ethics and to consequences.

Ethics and responsibility is a learning domain particularly important to the Social innovation orientation. This is intuitive: an innovation intended to accrue social benefit requires the ability to take responsibility and to have a sense of ethics about the social problem at hand. Though these skills are required for Social innovation, they are important across the orientations: any innovation developed without these skills may have harmful social side-effects.

Ethics and responsibility capacity is particularly important to the Realization stage: as innovations become Scaled and Sustained (and as they begin to have Systemic effects), the knock-on ramifications become scaled and sustained as well. It is at this time that any issues of ethics or responsibility become intractably embedded



within the innovation. For this reason, Ethics and responsibility skills are critical in the Selection step such that the innovator makes responsible decisions about the innovations they choose to scale. Another step in the process relevant to Ethics and responsibility skills is the Prompts step, when it is the innovator's capacity for this domain is likely to attune them to the kinds of causes and problems that act as prompts.

Values

- Identifies values and value systems (Unistructural)
- Describes values (Multistructural)
- Prioritizes values (Relational)
- Applies values to decision making (Relational)
- Links actions to value systems (Relational)
- Consciously generates new values based on experiences (Extended abstract)

Social responsibility

- Identifies issues of justice and power (Unistructural)
- Identifies interdependencies between self and others (Unistructural)
- Describes impact of actions on others (Multistructural)
- Relates personal actions to social responsibility (Relational)
- Applies opportunities to engage in social progress (Relational)
- Links actions to potential harm (Extended abstract)
- Generates opportunities for stewardship (Extended abstract)

Sense of Ethics

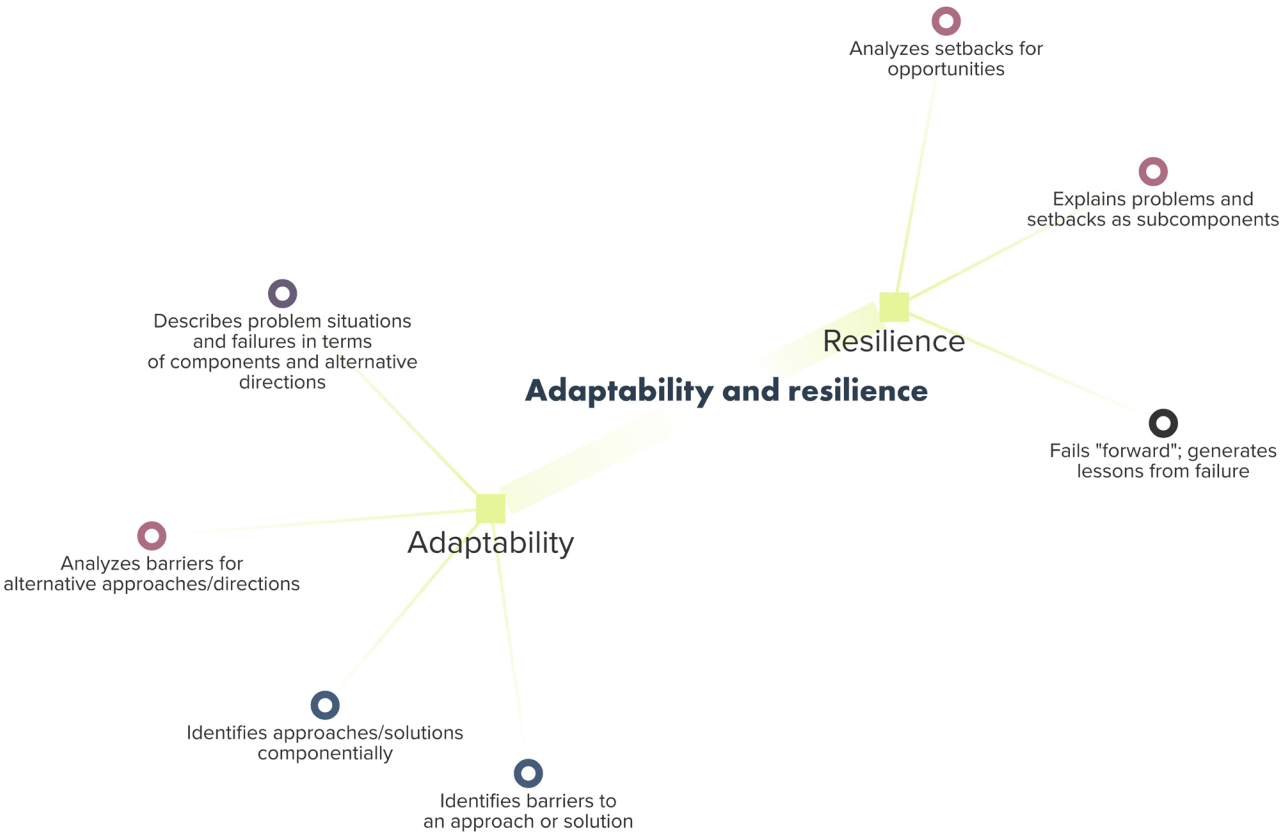
- Identifies ethical modalities (Unistructural)
- Identifies ethical issues (Unistructural)
- Describes personal ethics (Multistructural)
- Applies ethical frameworks to decision making (Relational)
- Analyzes the ethics of decisions (Relational)
- Reflects on actions and their impact on ethical system (Extended abstract)

Adaptability and resilience

The components of Adaptability and resilience define how the innovator deals with challenges as they design, develop, and realize their innovations. One component, Adaptability, captures the innovator's ability to pivot or change their approach in order to succeed. The other, Resilience, examines the innovator's ability to withstand setbacks–and how they internalize these setbacks.

The skills and competencies of Adaptability and resilience are critically important in the Realization phase. This is when unexpected setbacks are most likely to occur throughout the cycles of the Selection, Development, Prototyping, Scaling, and Sustaining steps. Realization (and getting set back) is important to all innovation orientations–thus, so are the skills of Adaptability and resilience.

Likewise, Systemic change requires extensive Adaptability and resilience capacity–systemic change is complex and arduous, emerging in unpredictable (and often slow) ways.



Adaptability

- Identifies approaches/solutions componentially (Unistructural)
- Identifies barriers to an approach or solution (Unistructural)
- Describes problem situations and failures in terms of components and alternative directions (Multistructural)
- Analyzes barriers for alternative approaches/directions (Relational)

Resilience

- Explains problems and setbacks as subcomponents (Relational)
- Analyzes setbacks for opportunities (Relational)
- Fails "forward"; generates lessons from failure (Extended abstract)

Risk and uncertainty

Innovation is an uncertain process. Decisions, actions, and environment often have uncertain outcomes on outputs, on the innovation process, and on the innovator themselves. Risk and uncertainty defines how the innovator approaches the risks of innovation. How the innovator understands these risks, assesses their probability, and acts regardless is defined by the skills and competencies of this domain.

The ability of the innovator to grapple with Risk and uncertainty is most important in the Selection, Prototyping, Implementation, and Systemic Change steps of the innovation process.

The orientations that most depend on this capacity, however, are Social and Sustainability and Commercial and Entrepreneurial. The experimental, methodological approaches often used in Technology & Science innovation encapsulate the uncertainty of the process by default.

Risk assessment

- Identifies issues of risk (Unistructural)
- Assesses and describes risks associated with given actions or circumstances (Relational)
- Analyzes risks for their potentiality and consequence (Relational)

Risk taking

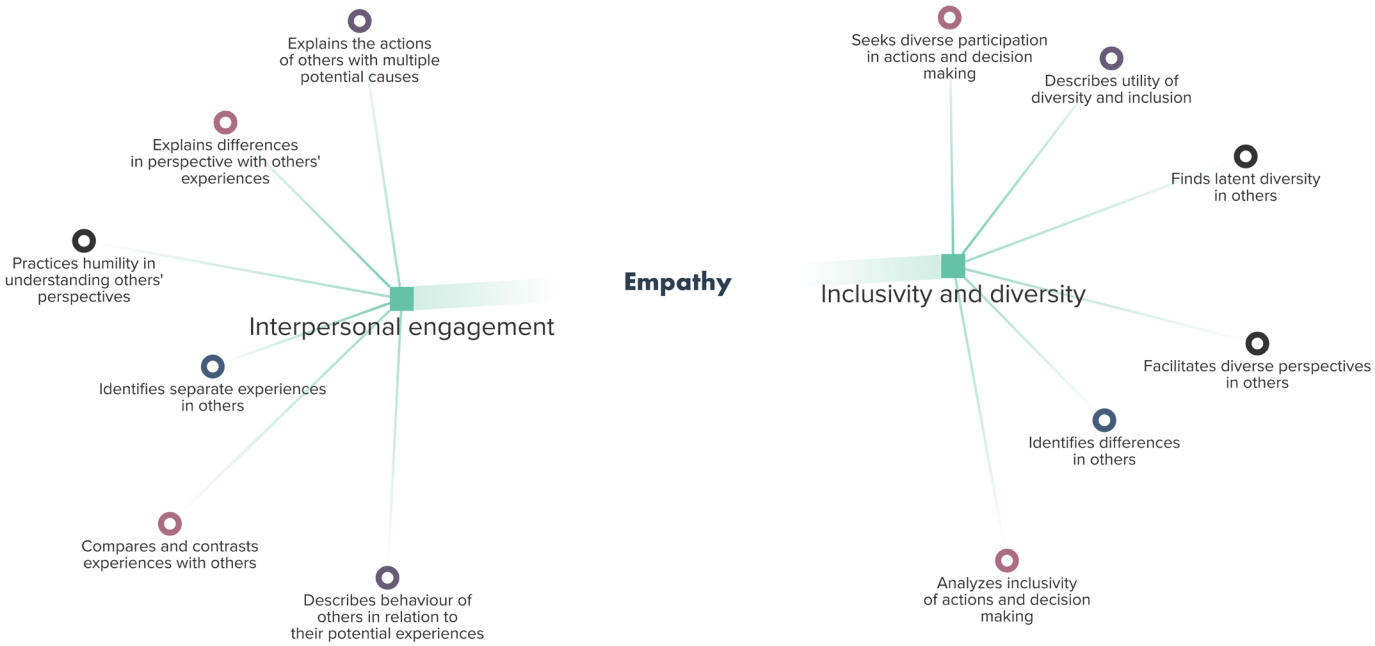
- Identifies alternative options in the face of uncertainty (Unistructural)
- Compares different approaches to a risky situation to evaluate the best strategy (Relational)
- Balances caution and a bias towards action in the face of uncertainty (Relational)
- Analyzes opportunities for learning from prototypical action before taking action (Relational)

Empathy

The ability to relate with and understand other people is requisite for many activities of innovation. This ability is captured by the Empathy innovation learning domain. The constructs and outcomes of this domain define how an innovator perceives and understands the similarities and differences between themselves and others, and how these differences might manifest in different experiences and perspectives.

Empathy is emphasized by two of the orientations in different ways. Social & Sustainability innovators must empathize with the stakeholders they aim to serve in order to understand their problems and values. With their perspectives, the outputs of innovation are more likely to be real solutions with minimal side effects on the oft vulnerable and volatile stakeholders. Commercial & Entrepreneurial innovators use empathy to understand their markets, the problems those markets have, and the value of solving those problems.

The skills and competencies of Empathy are used in the Purpose/Problem phase. During the Prompts step, an innovator's empathetic ability allows them to perceive opportunity through the eyes of others. During Search and Generation, an empathetic innovator is better able to build revolutionary ideas through engaging the diversity of those they are working with. Empathy also becomes useful in the Prototyping step, helping the innovator to understand how the tests of their ideas engage with the world. Finally, the domain of Empathy is necessary for Systemic Change and for Learning. In the former case, successful systemic change is often



predicated on the ability to get diverse systems to concur with the innovation at hand. In the latter case, the innovator must empathize with the process, everyone involved, those influenced by the outputs, and even themselves in order to fully learn and adapt their innovative ability to future applications.

Inclusivity and diversity

- Identifies differences in others (Unistructural)
- Describes utility of diversity and inclusion (Multistructural)
- Seeks diverse participation in actions and decision making (Relational)
- Analyzes inclusivity of actions and decision making (Relational)
- Facilitates diverse perspectives in others (Extended abstract)
- Finds latent diversity in others (Extended abstract)

Interpersonal engagement

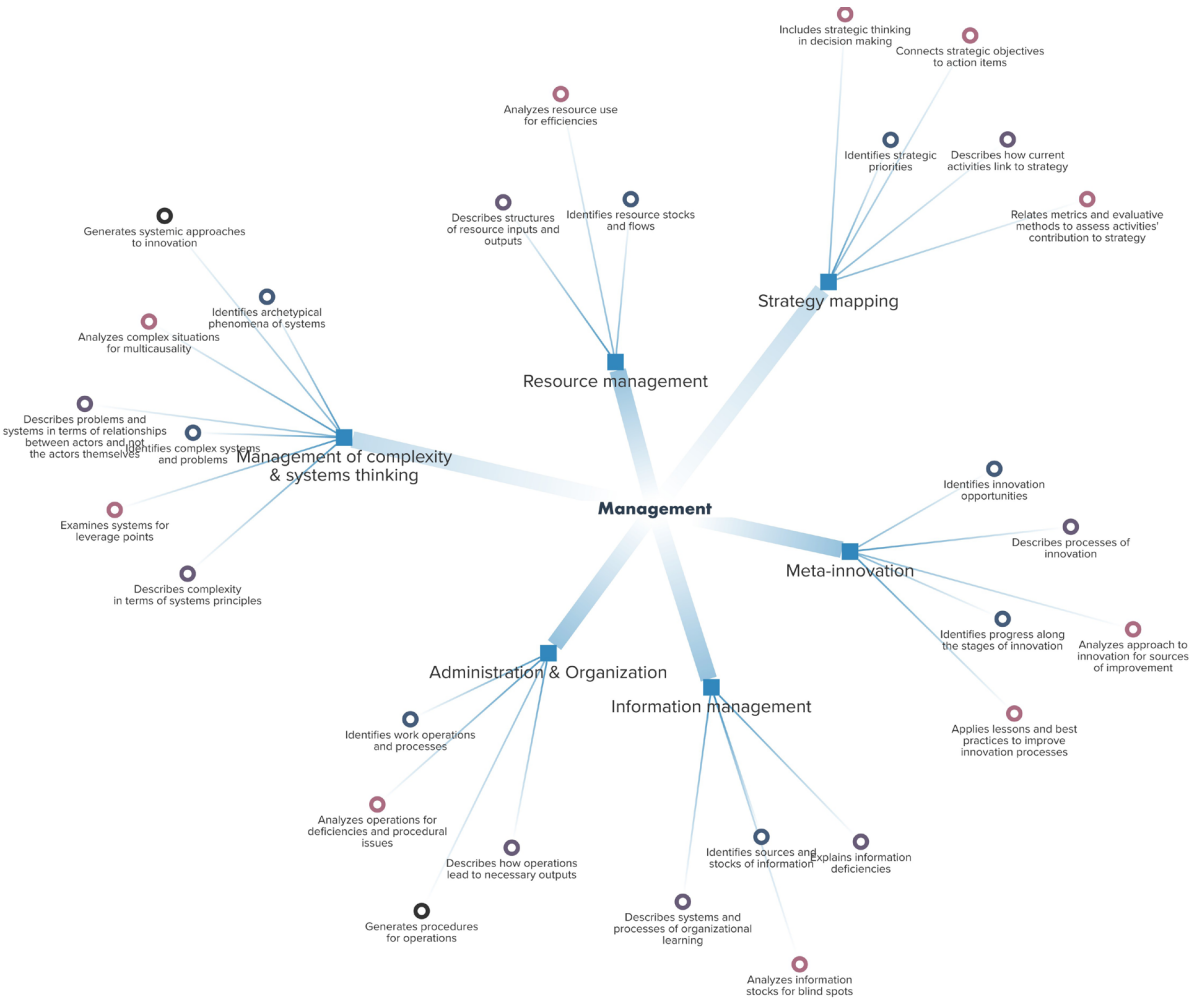
- Identifies separate experiences in others (Unistructural)
- Describes behaviour of others in relation to their potential experiences (Multistructural)
- Explains the actions of others with multiple potential causes (Multistructural)
- Explains differences in perspective with others' experiences (Relational)
- Compares and contrasts experiences with others (Relational)
- Practices humility in understanding others' perspectives (Extended abstract)

Management

Organized planning and action involve intensive Management capacity. The constructs and outcomes of this learning domain include how an innovator relates process to output. This allows them to execute on strategy, deal with complexity, develop efficient workflows, and maintain their information and resources. The capacity to manage is therefore an influential ability, critical to every step in the innovation process save Prompts and Generation and important to each of the innovation orientations.

Management of complexity & systems thinking

- Identifies complex systems and problems (Unistructural)
- Identifies archetypical phenomena of systems (Unistructural)
- Describes problems and systems in terms of relationships between actors and not the actors themselves (Multistructural)
- Describes complexity in terms of systems principles (Multistructural)
- Analyzes complex situations for multicausality (Relational)
- Examines systems for leverage points (Relational)



- Generates systemic approaches to innovation (Extended abstract)

Administration & Organization

- Identifies work operations and processes (Unistructural)
- Describes how operations lead to necessary outputs (Multistructural)
- Analyzes operations for deficiencies and procedural issues (Relational)
- Generates procedures for operations (Extended abstract)

Strategy mapping

- Identifies strategic priorities (Unistructural)
- Describes how current activities link to strategy (Multistructural)
- Relates metrics and evaluative methods to assess activities' contribution to strategy (Relational)
- Includes strategic thinking in decision making (Relational)
- Connects strategic objectives to action items (Relational)

Information management

- Identifies sources and stocks of information (Unistructural)
- Describes systems and processes of organizational learning (Multistructural)
- Explains information deficiencies (Multistructural)
- Analyzes information stocks for blind spots (Relational)

Meta-innovation

- Identifies innovation opportunities (Unistructural)
- Identifies progress along the stages of innovation (Unistructural)
- Describes processes of innovation (Multistructural)
- Applies lessons and best practices to improve innovation processes (Relational)
- Analyzes approach to innovation for sources of improvement (Relational)

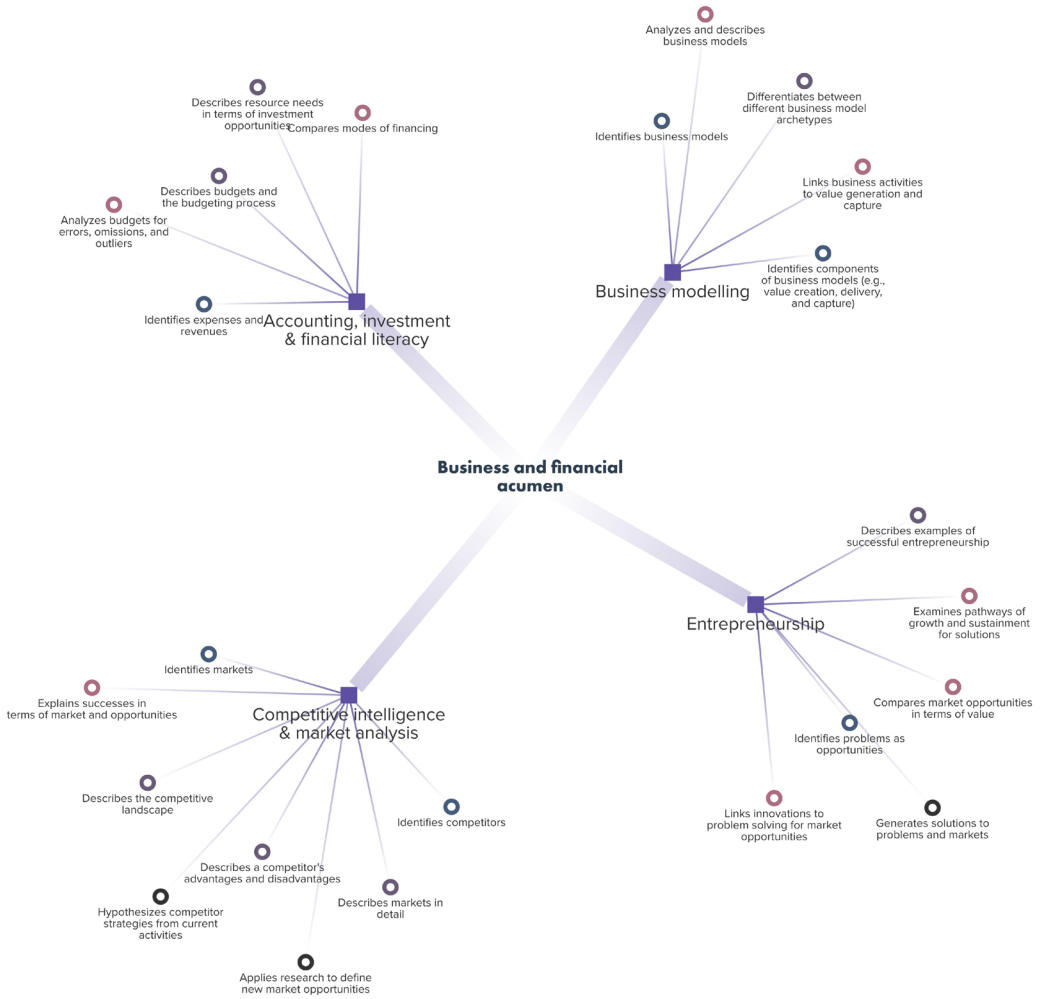
Resource management

- Identifies resource stocks and flows (Unistructural)
- Describes structures of resource inputs and outputs (Multistructural)
- Analyzes resource use for efficiencies (Relational)

Business and financial acumen

What problems does the innovation solve–and for whom? What other solutions exist? How does it create, deliver, or capture value–and use that value to sustain itself? These questions are answered through the skills of the Business and financial acumen domain. With the skills of this domain, the innovator connects innovation to value creation, identifies how this innovation connects with its audience and fits with other "competing" innovations, and understands the costs and revenues associated with its development and implementation.

Perhaps intuitively, this domain is crucial to the Commercial & Entrepreneurial orientation. As well, these skills and competencies are especially crucial to the Selection, Development, and Implementation process steps. Through these steps, Business and financial acumen skills and competencies are used to align the outputs of innovation with market needs, build financial sustainability, and grow the innovation's exposure to customers and stakeholders.



Entrepreneurship

- Identifies problems as opportunities (Unistructural)
- Describes examples of successful entrepreneurship (Multistructural)
- Links innovations to problem solving for market opportunities (Relational)
- Examines pathways of growth and sustainment for solutions (Relational)
- Compares market opportunities in terms of value (Relational)
- Generates solutions to problems and markets (Extended abstract)

Competitive intelligence & market analysis

- Identifies markets (Unistructural)
- Identifies competitors (Unistructural)
- Describes markets in detail (Multistructural)
- Describes the competitive landscape (Multistructural)
- Describes a competitor's advantages and disadvantages (Multistructural)
- Explains successes in terms of market and opportunities (Relational)
- Applies research to define new market opportunities (Extended abstract)
- Hypothesizes competitor strategies from current activities (Extended abstract)

Business modelling

- Identifies business models (Unistructural)
- Identifies components of business models (e.g., value creation, delivery, and capture) (Unistructural)
- Differentiates between different business model archetypes (Multistructural)
- Links business activities to value generation and capture (Relational)
- Analyzes and describes business models (Relational)

Accounting, investment & financial literacy

- Identifies expenses and revenues (Unistructural)
- Describes budgets and the budgeting process (Multistructural)
- Describes resource needs in terms of investment opportunities (Multistructural)
- Analyzes budgets for errors, omissions, and outliers (Relational)
- Compares modes of financing (Relational)

R&D

Advancing through the innovation process–particularly in the Selection and Realization phases–often requires solving specific problems through investigation and experimentation. The R&D (research and development) domain identifies the skills used in these inquiries. Does a solution to the challenge at hand already exist? What data is needed to answer the question? How might that data be obtained–and in what fidelity? An innovator experienced in R&D will be able to answer these questions easily.

The Search step depends on R&D skills and competencies in the seeking out and evaluation of potential answers to whatever call started the innovation process. Later in the process, Development and Implementation use the R&D domain to overcome limitations and obstacles as the innovation is realized. Finally, the Learning step depends on this domain in order to analyze, comprehend, and crystallize lessons learned from the innovation process and outputs.

Both Technology & Science- and Commercial & Entrepreneurial-oriented innovators would suffer without the domain of R&D. These capacities are crucial to the methodologies of the former and the intellectual property development of the latter.

Research & development

- Identifies opportunities for problem solving through research and development (Unistructural)
- Describes experimental procedures and prototyping (Multistructural)
- Examines existing technology and approaches in problem solving (Relational)
- Evaluates the quality of data and research (Relational)
- Combines concepts in developing solutions (Relational)