Overview for Social Sector Leaders

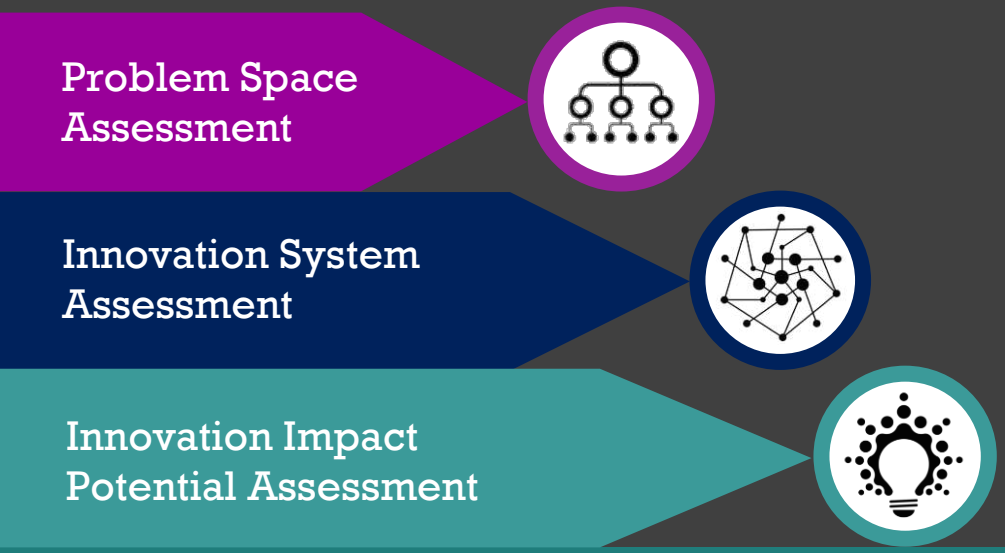
Assessing Innovation Potential for Social Impact

April 2016

GLOBAL KNOWLEDGE INITIATIVE

"Business and human endeavors are systems... we tend to focus on snapshots of isolated parts of the system. And wonder why our deepest problems never get solved."

- Peter M. Senge



An Introduction to the Assessing Innovation Impact Potential Toolset

Our Objective

We aim to provide decision makers with greater insight and confidence into the process of assessing innovation impact potential. Rather than considering the role innovation plays after an investment is made, or based on historic evaluations of how innovation has or has not delivered solutions to a problem, this approach is forward-looking. This customizable toolset assesses the future impact that innovation can deliver in a system to tackle particularly complex problems.

The Backstory

Despite strides in assessing the innovation capacity of nations and firms, our collective understanding of the potential for impact through innovation remains nascent. Moreover, few efforts have been made to translate emerging research in innovation systems into user-friendly tools to fill this gap. For too long practitioners have side-stepped seemingly unanswerable questions that could entirely change program design and evaluation: *Can innovations that worked to solve a problem in one context deliver the same impact in a different context? Will the solutions we pursue today result in impact tomorrow given changes in policy, preferences, culture, institutions, etc.? What sets of innovative solutions will elicit the most impact on this problem?*

With a rich tradition of supporting innovation to tackle complex challenges affecting the lives of poor and vulnerable people, The Rockefeller Foundation was among many funders asking these questions. To develop answers, a joint team of researchers from the Global Knowledge Initiative (GKI) and the Georgia Tech Research Institute (GTRI) created an analytical framework and toolset that decision makers can use to assess the impact potential of innovation areas (i.e., sets of innovations, such as water filtration technologies) aimed at problem spaces of interest (e.g., water insecurity, post harvest food loss, youth unemployment, etc.). We call this framework and toolset the Assessing Innovation Impact Potential (AIIP) toolset.

> "You cannot meddle with one part of a complex system from the outside without the almost certain risk of setting off disastrous events that you hadn't counted on in other, remote parts. If you want to fix something you are first obliged to understand...the whole system."
>
> --Lewis Thomas (biologist and essayist), quoted in *Business Dynamics*, J. Sterman, 2000.

Across the globe, great variation exists in regions' abilities to both create and absorb innovative solutions such that their potential to deliver economic and social value is fully realized. These contextual variations shape how innovations—product or process-based—are adapted, disseminated, used, and bundled. Contextual dimensions that matter for a region's absorptive capacity include the political context that either enables or stifles uptake, and various actors' incentive and influence to drive innovation, among others. Differences in terms of how decision makers (e.g., government officials, civil society leaders, donors) frame innovation opportunities, evaluate trade-offs, and devise strategy also bear on whether solutions prove transformative or not. With so many factors at play, many possibly game-changing innovations have failed to reach significant adoption because decision makers cannot effectively assess the systems in which innovation is meant to trigger impact. Absent this clarity, the promise of innovation too often fails to translate into impact.

Correctly assessing the potential impact of innovation therefore requires analyzing systems as well as the innovations meant to transform a problem occurring within them.

Taking a Systems Approach

Today we often associate "innovation" with "technological innovation." In truth, innovation constitutes a combination of social factors, processes, governance and management issues, and sometimes technologies that, when integrated, offer new value or utility. Transformative social change occurs when a series of disruptive innovations (e.g., products, processes) are diffused and gain adoption across a system such that the system is wholly changed over time. These innovations, however, do not offer value in isolation of context. Rather, it is often the system in which innovation is deployed together with the system from which innovation arises that determines whether an innovation is absorbed, adopted, and ultimately appreciated as a catalyst of broader social change. Using a systems perspective allows for these many important features to be considered.

So, how do we define a system? A system is defined by a set of interacting components and relationships that form a coherent whole, perform a specific function, and have a boundary that sets it apart from the rest of the world. Reconciling the notion of innovation in a systems context, the Assessing Innovation Impact Potential work is distinct in that it appreciates the roles played by three systems. The AIIP toolset allows users to deepen their insights into these three distinct, yet related systems.

- ***System #1: The Problem Space*** First, the toolset clarifies the system features that define the problem space (or the system in which the problem occurs) for which innovative solutions are sought. A problem space could be malaria in Sub-Saharan Africa, poor emergency medical care in Uganda, or homelessness within the United States. Beyond the description of a problem, a problem space includes the stakeholders, policy drivers, institutions, and other features that define the system in which the problem occurs.
- ***System #2: The Innovation System*** Next, the toolset facilitates an examination of the innovation system. The innovation system is the system from which innovation is being sourced. Innovation occurs in a dynamic system shaped by complex interactions between research, industry, community, government and a host of other innovation system actors. According to organizational theorist Bengt-Ake Lundvall, the innovation systems perspective is necessary for a robust innovation analysis because "the whole is more than the sum of its parts" (Lundvall 2007). Innovation systems can be national, sub-national, regional, or sectoral.
- ***System #3: The Context*** Third, the toolset helps users appreciate a broader system—the context in which the problem space and distinct innovation system can overlap and relate. This could be Tanzania, the whole of South America, or a specific set of Districts. Context is the geography in which the problem is meant to be addressed.

Most research considers problem spaces and innovation systems to be separate, or "uncoupled." Worse, many practitioners avoid the complexity of systems all together when designing an intervention or evaluating a project's feasibility. The AIIP toolset provides a different, yet complementary approach to systems analysis that supports the "coupling" (or integrated analysis) of these systems to one another, providing a powerful step forward in the field of systems of systems engineering and complex adaptive systems. When the toolset is taken in its entirety, the distinction and relationships between these systems offer an unparalleled vantage point from which to gauge the potential for innovation-fueled impact.

Additionally, given the emphasis on "potential," the toolset looks beyond the current state of these systems and assesses the likelihood of systems' features to change in a positive way over time. From weathermen to financial analysts, countless professionals rely on making educated inferences and forecasts about what the future entails. Particularly when assessing potential (of a product, process, etc.) to trigger change, one must contend with the future and how it will differ from the present. While the future can be overwhelming in its uncertainty, prohibiting very narrow or precise predictions about future occurrences, data analysis is used to identify trends and correlations that can make general forecasts more accurate than ever before. It is with this forward-leaning, anticipatory perspective on systems evaluation that the GKI-GTRI team set about researching and designing a process for Assessing Innovation Impact Potential.

In sum, assessing the potential impact of innovation marries analysis of a context, a problem space, and an innovation system. Using a suite of systems analysis, strategic foresight, and data integration tools, the Assessing Innovation Impact Potential toolset helps decision makers to do this by better visualizing these complex systems' relation to one other and clarifying some, if not all, of the interacting forces at play. Taking this "systems approach" enables decision makers to gain confidence in determining which innovation areas merit investment and how best a problem space might be transformed.

The Journey

The Rockefeller Foundation prompted this work with its understanding that the potential for innovation to address pressing needs and deliver positive social impact constitutes an important consideration in determining which problem spaces merit investment. The problem spaces of interest to The Rockefeller Foundation and others in the social sector represent a high degree of interdependence that require more adaptable, creative solutions than those offered through status quo approaches. Without innovation, incremental, and usually unsatisfactory, progress often remains the norm. Assessing innovation potential, therefore, serves to test whether there is sufficient opportunity to promote innovative solutions at an earlier stage in the decision making process.

Beginning in 2014, the team worked with The Rockefeller Foundation staff to clarify the foundation's internal decision making processes that could be fortified with a toolset. We also explored the broader social sector's need for support assessing innovation impact potential. Seeking to leverage best in class research available, the team also undertook an extensive literature review across a multitude of disciplines (foresight, systems of systems, complexity science, data science, innovation systems studies, etc.). The aim was to identify the most cutting edge theories and approaches that might be integrated into this work. Our team of eight researchers analyzed over 130 books and papers. This exhaustive review was further augmented in 2016 with an additional 50 scholarly articles. Each week of the research phase was guided by a set of questions that allowed for an informed analysis of relevant research. An example of the questions used while researching one aspect of the inquiry—the systems context framework—follows:

> **Guiding Question**: When considering a dynamic and changing context of interest to a decision maker, what system features, patterns, and attributes bear most on assessing innovation potential?
> **Sub-Question:** What is the full range of enabling environment features one should consider when assessing innovation potential in a systems context?
> **Sub-Question:** What are the most reputable, rigorous, useful approaches for gauging ongoing innovation activity in a system? What insights can be drawn about the format of the approach versus the analytic orientation of the insights the approach delivers?
> **Sub-Question:** What are the most insightful approaches for gauging the extent of cross-sectoral (private-public-university-civil society) collaboration in a system?

Guided by these and many other questions, our team drew connections across several research fields, constructing a mind map—used to "map" insights as pertinent to toolset design—and an annotated bibliography that catalogued various research threads for the design process.

Fortified with this understanding, the team defined the specific functions an effective toolset would need to perform. The joint GKI-GTRI team model allowed us to take on research questions with GTRI academic experts that, when coupled with GKI's significant field experience facilitating network design and innovation processes, could be distilled in a way that was comprehensible and useful on the ground, not just in theory.

Based on the research and project planning conducted in Phase One, we developed an initial three-systems framework for assessing innovation impact potential. To test its robustness, we convened a high-level meeting at The Rockefeller Foundation on December 15, 2014, at which we demonstrated the first four of our tools. Next, we prototyped the entire inter-connected set of unique tools, and built various user support materials, including a journey map that guides users in how to use the tools; an archetypal user—Julie—whose fictionalized journey through the toolset helps users understand the toolset; and a slide deck and set of demonstration materials. Informed by further expert feedback from a second high-level meeting held on March 16, 2015, at GKI's Washington, D.C. headquarters, the GKI-GTRI team polished the toolset for submission to the Foundation. Participants at the second workshop whose feedback helped the team finesse the toolset before submission included those from USAID, Ashoka, The Annie E. Casey Foundation, Monitor Deloitte, and more. Their invaluable input, gathered both in person and through feedback forms, helped us improve and revise the toolset. The first completed prototype of the Assessing Innovation Impact Potential toolset was delivered to The Rockefeller Foundation on April 1, 2015.

Pilots

Excited by the prospect of testing the prototype toolset for decision making at the Foundation, in the summer of 2015 The Rockefeller Foundation enlisted GKI and a team of content researchers to explore the potential of innovation to address two problem areas: economic exclusion in cities in high-income countries, and emergency medical care in least-developed countries. The two pilots were run in parallel in just 8 weeks. GKI provided guidance to two contract research teams that partnered with foundation staff to source the data and apply the toolset.

For the issue of economic exclusion, the research team's analysis revealed that poor job quality was one of the most significant problem aspects affecting economically excluded groups. Arriving at that conclusion was facilitated by completion of the toolset. Among the other key insights unearthed during the assessment, the team developed a list of stakeholders instrumental to the OECD innovation system. The diverse list of actors included stakeholders from national and local governments, financial institutions, public service providers, tech entrepreneurs, and more. After assigning each stakeholder an innovation system influence and incentive score, the team discovered that national governments, research institutions, and multinational corporations are the stakeholders with the greatest system influence on innovative activity addressing economic exclusion in cities, while the urban labor force and local governments

possessed the greatest incentive to see that innovative activity occur. In terms of systems drivers that support or thwart innovative activity carried out by those key stakeholder groups, the team identified regional partnerships and clusters, as well as active peer learning among key stakeholders, as enablers conducive to innovation. Critical barriers for innovation included ongoing political gridlock and significant inter-city competition for jobs. The results revealed a future trend of lessening barriers and strengthening enablers to innovation, suggesting that a focus on addressing job quality for economically excluded populations may be an area of interest for foundations and other actors interested in addressing this particular challenge.

Beyond the specific insights pertinent to economic exclusion, however, the foundation's executive team was able to quickly grasp key features of the systems relevant to this topic. Hungry to have more systems awareness and fresh thinking on innovation areas ripe for intervention, the team successfully applied the toolset to improve the number of out-of-the-box innovative solutions to consider. Further, the toolset empowered the team to map those systems features that could improve the likelihood that selected solutions render impact.

Refinement

After completion of the two simultaneous pilots of the AIIP tools with The Rockefeller Foundation, the GKI team conducted rigorous post-test analysis to determine how to best refine the tools for maximum accuracy and usability. Beyond tweaking individual tools, the GKI team also prototyped a number of additional "user journeys" that specify distinct combinations and sequences of tools for use in different scenarios and for different intended outcomes. Four of these user journeys are further detailed on pages 7 and 8.

Another vehicle for refinement sought by the team was peer review. The toolset was accepted into a peer-reviewed conference hosted at Georgia Tech in September 2015 — the Atlanta Conference on Science and Innovation Policy. GKI's COO and the project's Principal Investigator Sara Farley presented the work to an audience of global innovation strategists, academicians, and analysts. Keen to understand how the work advances the application of innovation system research and systems of systems engineering, attendees endorsed the contribution that the toolset is making to the global community and encouraged efforts to broaden adoption. Supported by The Rockefeller Foundation, GKI organized an April 2016 workshop and simulation of the tools for 20 participants from civil society organizations active in agriculture, health, oceans, youth, and other issue areas. This daylong workshop provided another opportunity to amplify the dialogue regarding further enhancement and use.

Beyond tool and toolset enhancements, the GKI team conducted additional in-depth research into systems tools through its work in a USAID-funded consortium called SPACES (Strategic Program for Analyzing Complexity and Evaluating Systems). Like The Rockefeller Foundation, USAID recognizes that without an understanding of system dynamics, interventions are often unsustainable, resulting in multiple secondary, tertiary, and reverberating effects that are difficult to measure. Demonstrating its commitment to enhance systems and complexity tool use within the agency, USAID created a group called MERLIN (Monitoring, Evaluation, Research, and Learning Innovations Program) within its Global Development Lab. MERLIN issued a Broad Agency Announcement to source new tools to better understand and address systems relevant to international development. Through a competitive process, the SPACES consortium (composed of GKI, Johns Hopkins University Global Obesity Prevention Center, LINC, and Resilient Africa Network) responded to this call by offering insight and advice to the agency and its array of global implementing partners. In early 2016, we produced a White Paper landscape analysis of systems and complexity tools. Moreover, the SPACES consortium has begun planning pilot tests of these tools with select USAID missions and bureaus. GKI's hope is that continued research, testing, and refinement will only further enhance the ways in which the Assessing Innovation Impact Potential toolset meets the needs of international development professionals who aspire to harness innovation to tackle problems within complex systems.

What's Unique About AIIP?

As our research reveals, there is no dearth of systems tools. The challenge for many is locating and making sense of existing tools and discerning which offer maximum value. Having done the legwork to distinguish value-added tools from those that offer little despite their time- or resource-intensity, we see four unique aspects of our toolset that render it worthwhile:

- **Stakeholder-Centered:** The toolset places a premium on understanding and ranking stakeholder points of view. Because stakeholders in the problem space can be completely disconnected from stakeholders in the innovation system, two different but related tools collect and rank stakeholders according to the manner in which they feature in their respective systems. Tools that source information from stakeholder discourse offer the benefit of highlighting attitudes, beliefs, biases, and shared knowledge. These stakeholder-centered system elements may allow for the examination of the emotions behind them, an often-neglected consideration in more data-driven approaches to systems research. Furthermore, an abundance of systems researchers, including Checkland and McDermott, note the necessity of using these more stakeholder-centered approaches to express problems, issues, and opportunities that are poorly understood by more data-driven systems tools such as computational modeling.
- **Coupled Systems:** Innovation impact potential lives at the intersection of three analytical lenses: the problem space of focus, the innovation system, and the context into which innovation is diffused. The entire innovation impact potential inquiry is problem focused; the delineation of root and intermediate causes provides a focused target against which innovation impact potential is weighed. It is by gauging the potential impact of innovation through three lenses — problem space, innovation system, and context — that one begins to see a robust representation of interactions, tradeoffs, and possibilities.

- **Future-oriented:** The word "potential" compels us to consider not only what is happening now, but also what may be possible given changes experienced within the problem space, innovation system, and context of focus. Innovation impact potential should not be considered as a snapshot view, but as a trajectory that moves over time. For this reason, gauging innovation potential invites us to consider both where we are now, and where we might be given signals of change we may pick up. Too few tools to date integrate this futures-focus.
- **Flexible and Adaptive:** The toolset is made up of 9 tools and can be run in portions or in its entirety, such that it is tailored specifically to the users' needs and timeline. Users can choose the set of tools appropriate for their time, resource, and rigor specifications. The journey options on pages 7 and 8 as well as the inputs / outputs grid on page 9 offers a glimpse into the toolset's flexibility.

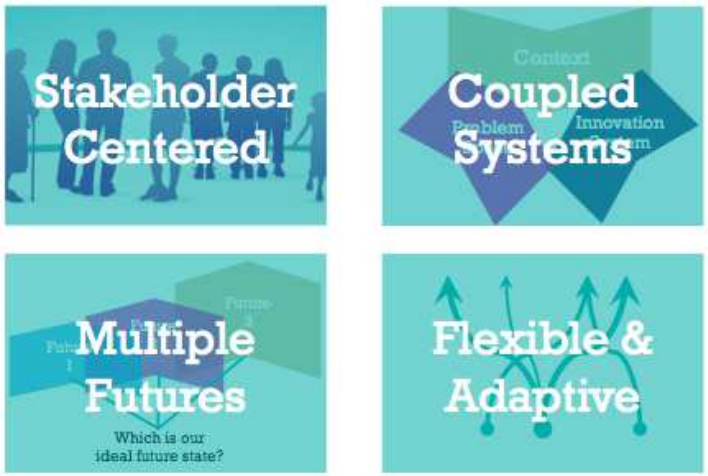
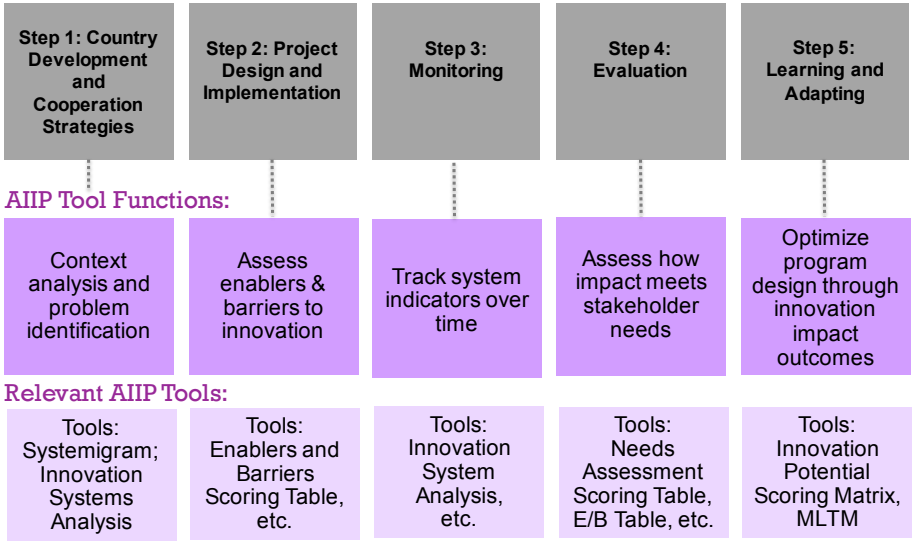


Image: What is unique about the AIIP toolset?

How to Use the AIIP Toolset

Given the many ways the tools can be adapted to the user's needs, the AIIP toolset lends itself to use across multiple phases in a given program or project cycle. For example, mapped to the USAID program cycle (shown in the diagram to the right), one can see that in early stages of project planning, the tools can precipitate better understanding of the problem of focus and the context in which it exists. Furthermore, the tools assess enablers and barriers to innovation such that the user can determine areas most ripe for impact. Once a project is underway, the AIIP toolset can track system change over time to determine how specific interventions meet key stakeholders' needs. As systems change and teams learn, iterative use of these tools provides additional insight and clarity. Finally, the AIIP toolset serves to assess the impact of a program ex post facto. This assessment can inform future program design and optimization to maximize the potential for social impact through innovation.



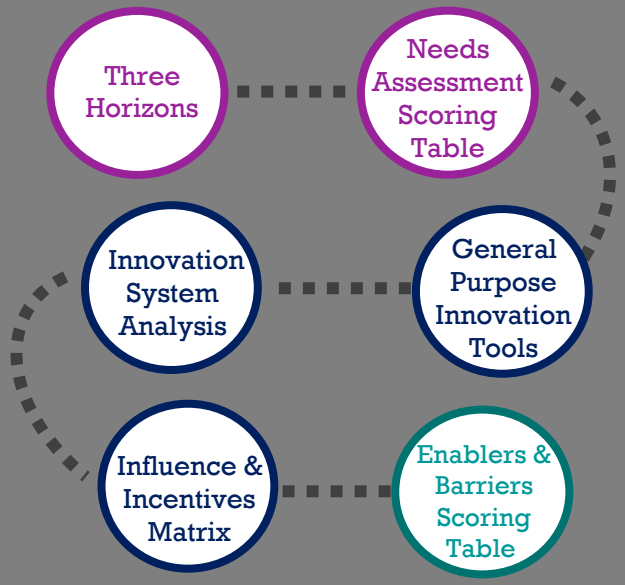
Looking to the Future

For too long, the work of innovation strategists, funders, and portfolio managers has situated analysis of innovation in a narrative locked to present day conceptions of institutions, users, and even systems. Historically, the best predictor of innovation strategies is the strategy that exists today. Upending old notions of innovation organized around prevailing conditions, the toolset issues an audacious invitation to users: find signals of the future in the present moment. Explore the many possible futures. Choose (based on analysis, inspiration, and values) what future you are innovating toward. With this perspective, which is articulated in the first tool in our toolset (Three Horizons), the user experience is a dance between the present and the future, turning forward and stepping back with each tool. By the time the user reaches the toolset's end, the ability to synthesize and give meaning to enablers and barriers across time and systems is possible. And, most importantly, converting these many rich insights into simple visuals to support decision making translates the complexity of systems into easy-to-interpret instruments.

Building this toolset, we found tremendous wealth in the areas of systems analysis, strategic foresight, complexity, network science, and data integration. During this effort we found tools that worked, but that needed fine-tuning to enhance the ease of use. We found willingness to experiment, adapt, and play. We found theory that had yet to be converted into something practical and concrete for practitioners in the field to adopt. When fused together, the concepts and constructs we've embraced and piloted during the last two years offer value to funders, policymakers, and managers of innovation portfolios. While the roots of this work are old, we believe the ability to assess innovation impact potential is new, affording a powerful opportunity to those interested in taking it. We are excited by the idea of exploring how and where it might be used and taking steps together to sharpen and amplify its utility.

Journey Option 1:

Futures On-Ramp



Beginning with a focus on imagining many possible ideal futures, this option then uses an assessment of stakeholder needs to ground the Problem Space Assessment. Next, shifting to a robust Innovation System Assessment, this option runs the full suite of tools necessary to assess innovation impact potential.

Best for Scenarios in Which the User:

- Already has a deep understanding of the problem at hand
- Knows the major problem aspects, or pieces of the challenge
- Does not have extreme time constraints
- Could benefit from developing a shared vision for the team

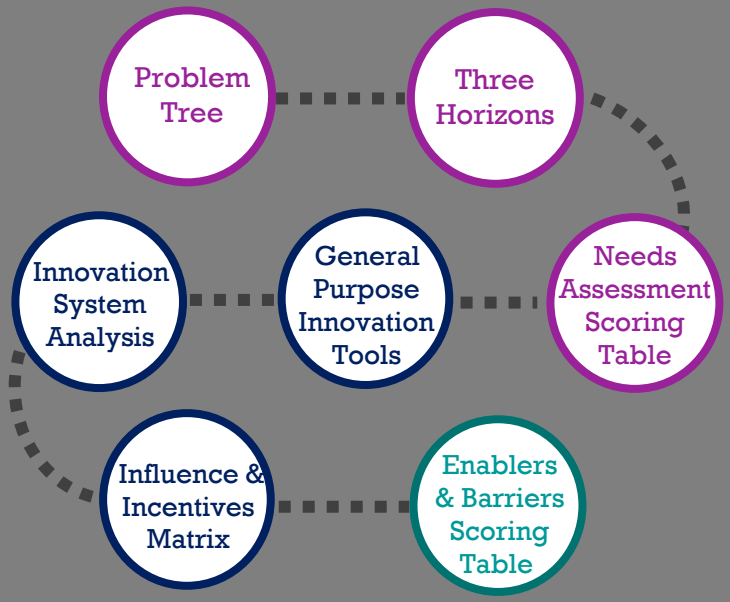
Critical Resources Needed:

- Facilitators
- Workshops
- Literature Reviews
- Stakeholder Interviews

Estimated Timeline: Approximately 10 weeks

Journey Option 2:

The Full Picture



This journey option delivers the full suite of AIIP tools for users who benefit from running both a complete Problem Space Assessment and the full set of tools required to assess innovation impact potential. While this journey option requires more time, the resulting assessment of the key system features reveals to what degree innovation will deliver impact on a problem of interest.

Best for Scenarios in Which the User:

- Wants to benefit from the full AIIP experience
- Has not fully unpacked the major problem aspects, or pieces of the challenge
- Does not have extreme time constraints

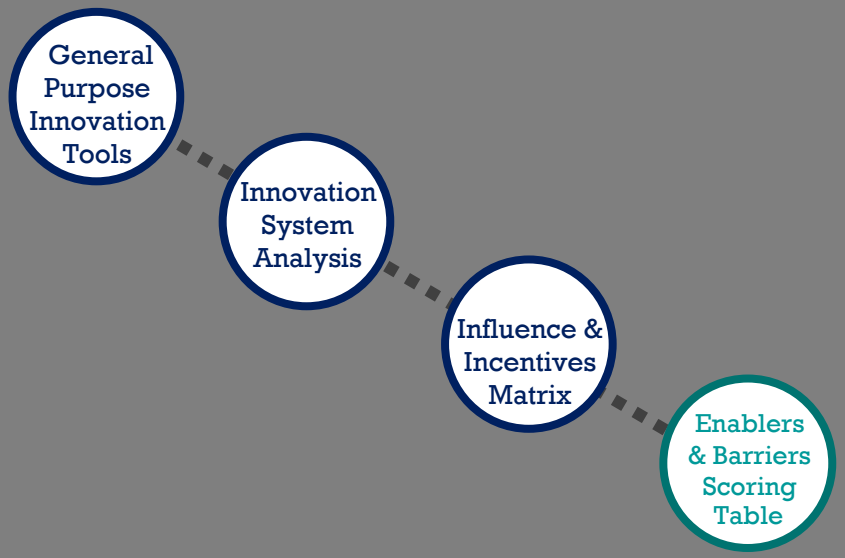
Critical Resources Needed:

- Facilitators
- Workshops
- Literature Reviews
- Stakeholder Interviews

Estimated Timeline: Approximately 10-12 weeks

Journey Option 3:

Innovation Spotlight



Solely focused on the Innovation System Assessment, this journey is ideal for those users who have already completed a thorough assessment of their problem space, but want to further explore the innovation system that could deliver innovative solutions to that problem. With a full run of the innovation system tools, this journey ends with an assessment of innovation impact potential.

Best for Scenarios in Which the User:

- Has already conducted a thorough analysis of the problem space
- Is interested in generating new solution sets and finding new sources of inspiration for innovative solutions
- Does not have extreme time constraints

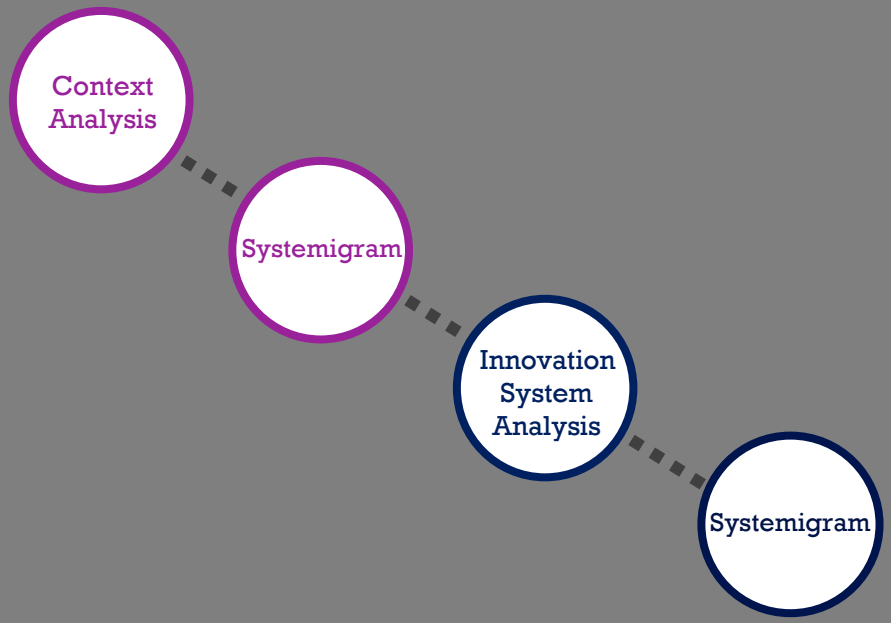
Critical Resources Needed:

- Literature Reviews
- Stakeholder Interviews

Estimated Timeline: Approximately 8-10 weeks

Journey Option 4:

Systems Centric



This journey option is built around two sets of system-wide analyses followed by in-depth system mapping through the Systemigram tool. For users who want to better understand the many moving and interconnected pieces of complex systems, this journey provides the tools to deliver such an integrated analysis.

Best for Scenarios in Which the User:

- Wants to focus solely on understanding and mapping out the problem space and innovation system
- Is more time-constrained
- Does not need to assess innovation impact potential
- Does not want to compare various problem aspects or innovations to determine which is best poised for investment

Critical Resources Needed:

- Facilitators
- Workshops
- Literature Reviews
- Stakeholder Interviews

Estimated Timeline: Approximately 6 weeks

Question: What amount of inputs & time is required to run each individual tool and what value results?

Tool	Inputs				Time			Value				
	Facilitator 	Workshop 	Desk Research 	Stakeholder Interviews 	Minimal < 1 week 	Moderate 1 to 4 weeks 	Significant > 4 weeks 	Insights into Problem Space 	Insights into Innovation System 	Insights into Innovation Potential 	Prioritization of key ideas 	Insights into Innovation Opportunities 
Three Horizons	X	X	X			X		X			X	X
Values Map	X	X			X						X	
Problem Tree			X			X		X			X	
Systemigram			X	X		X		X				
Needs Assessment Scoring Table			X	X	X			X		X	X	X
General Purpose Innovation Tools	X	X	X			X					X	X
Innovation System Analysis			X	X			X		X			
Influence and Incentives Matrix			X	X		X			X		X	
Enablers and Barriers Scoring Table			X	X		X			X	X	X	X

Acknowledgments

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GKI would like to also thank our content partners in our toolset pilot with The Rockefeller Foundation. The following organizations helped pilot this toolset on the problem spaces of "economic exclusion in cities in high-income countries" and "emergency medical care in developing countries," respectively: The Urban Institute and Results4Development.

Finally, GKI further acknowledges the following organizations for the opportunity to further refine and pilot our tools on the global stage through the SPACES (Strategic Program for Analyzing Complexity and Evaluating Systems) consortium: USAID Global Development Lab, John Hopkins University Global Obesity Prevention Center, LINC, and the Resilient Africa Network. Additionally we extend thanks for their valuable insights, questions, and feedback to the USAID Local Systems Community of Practice lead by Tjip Walker.

Section 2

Tool Overviews

Three Horizons

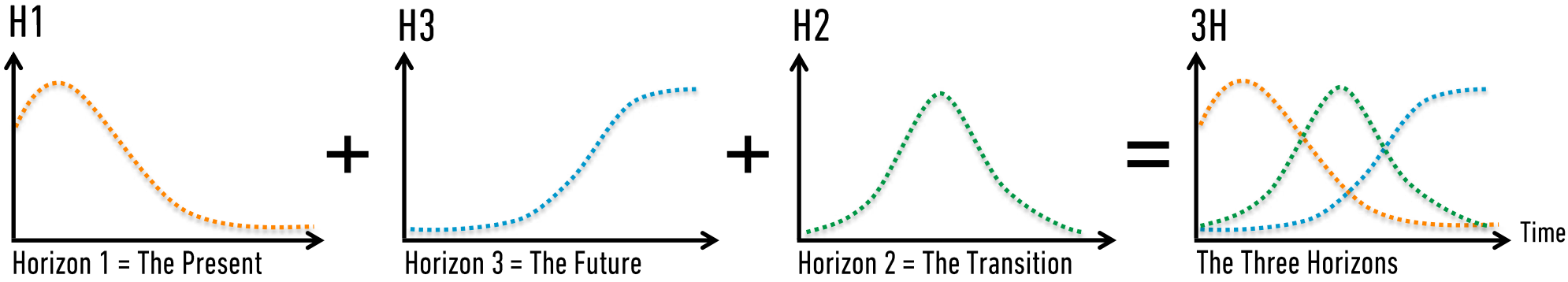
What future do we hope to achieve and what are the pathways that might take us there?

GLOBAL KNOWLEDGE INITIATIVE

Problem Space

Innovation System

Innovation Potential



Horizon 1 = The Present

Guiding Question: What is the current state of the problem you are focused on?

Assumption: Systems evolve and the current system will eventually decline.

Horizon 3 = The Future

Guiding Question: How will your problem of focus ideally look in the future?

Assumption: Current signals indicate the possibility of many possible futures.

Horizon 2 = The Transition

Guiding Question: What innovations could help transition us from the present to the ideal future?

Assumption: Innovation can help us achieve our ideal vision of the future.

The Three Horizons

What is it?

Three Horizons encourages people with varying backgrounds, expertise, and perspectives to better understand the current state of a given problem and to arrive at a shared vision of the ideal future. The tool helps users ideate innovative pathways that might serve as the transition between the present state, or a given problem, and the ideal future. Chief among its strengths, Three Horizons helps users (1) grapple with the current state of their problem of focus; (2) develop their vision of the ideal future; and (3) ideate the many innovative pathways that could take us there.

Through a facilitated process, users create a Three Horizons Landscape Map (see example on next page) to show change over time, moving from the present (Horizon 1) to the future (Horizon 3) by way of a transition pathway (Horizon 2). The development of the map occurs through a co-creation process that brings together a wide range of innovators, stakeholders, and practitioners. At the end, users have a visual roadmap that not only clarifies the many possible futures, but also offers possible innovations that can usher in those future states.

When to use it?

At the outset of project or program design Three Horizons offers immense value. Alternatively, once a team has progressed through problem analysis and is considering possible innovations, Three Horizons can provide a template in which to explore how various innovations connect to alternative futures. An interactive tool, Three Horizons is best used in a facilitated workshop setting supported by research and interviews.

Three Horizons

How to use it

Step 1: To begin, conduct research about the problem, challenge, or "theme" of interest. Research can include both literature reviews and stakeholder interviews. This research will offer insights that will be helpful in identifying relevant patterns and trends surrounding the given problem.

Step 2: Based on your research and group discussion, begin by building the Horizon 1 (H1), or the present state of the problem. Brainstorm answers to the following prompts, recording your answers on sticky notes. Then, place your sticky notes on the map, in the section labeled H1.

- What is your concern at the moment?
- What are society's well-established ways of dealing with the problem of focus?
- What are the signals that the current model or status quo is failing?

Step 3: Next, shift your focus to Horizon Three (H3), with the aim of clarifying your picture of the future. Remember that there can be multiple future states, because there are many possible ways the future might unfold. Use the following questions to guide your brainstorming session. Then, write your answers on sticky notes and place them on the map, in the section labeled H3.

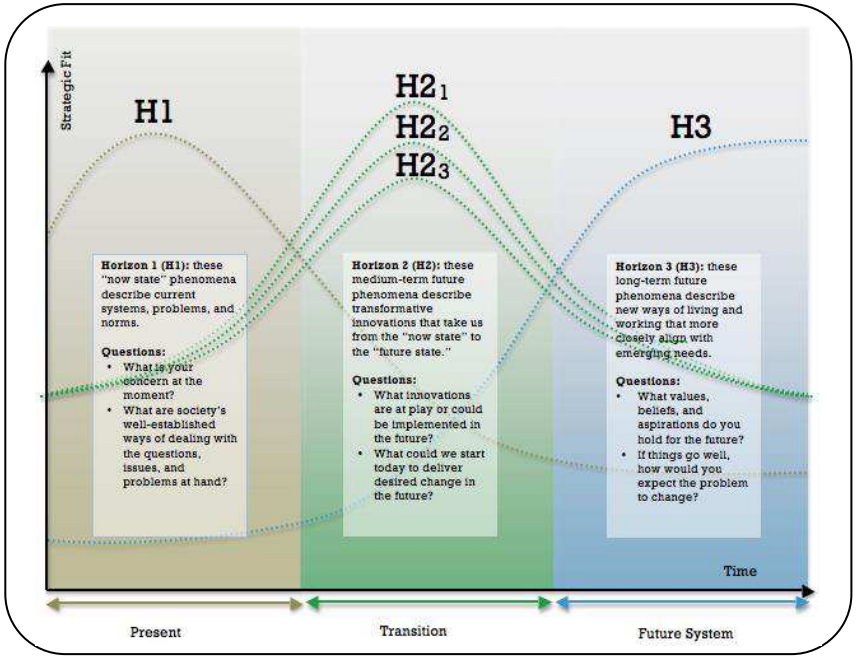
- If things go well, how would you expect the problem to change?
- What values, beliefs, and aspirations do you hold for the future?
- How might new systems of governance, commerce, education, and technology support solutions to this problem?

Step 4: Finally, develop transition pathways that will take you from H1 to H3. This is the zone of innovation, where new ways of doing things bring us from the present to the ideal future. Use the following questions to guide your brainstorming. Then, write your answers on sticky notes and place them on the map, in the section labeled H2.

- What aspects of the ideal future are occurring right now? What might disrupt the status quo, or current norms?
- What could we start today to deliver desired change in the future?
- How might we use innovation to tackle old problems in new ways?

Step 5: With the journeys constructed, teams consider the trade-offs between them. In instances in which disagreement about optimal futures occurs, the Values Map Tool can help teams measure the degree to which specific futures resonate best with their stated values.

Example Three Horizons



Use Case

Atlanta 2040: A Case Study of Three Horizons for City Planning

A longtime GKI research and thought partner, the Georgia Tech Research Institute (GTRI) pioneered the use of futures foresight tools to enhance the capabilities of policy and decision makers in the private and public sectors. On June 9, 2015, GTRI's Foresightful Modeling Initiative, a Georgia Tech research program for understanding the systemic effects of innovation and disruption in the spaces of policy, urban planning, and design, led a workshop to explore potential pathways in which highly connected information infrastructures, such as wireless connectivity and data analytics, might impact Atlanta's existing urban transportation infrastructure over time. GTRI facilitators brought together a "virtual think tank" of leading sector practitioners to assess how urban transportation networks are evolving in Atlanta and how the Internet of Things (connecting and sharing data between everyday objects) may shape their development over the next 25 years. The workshop offered an in-depth picture of the challenges and changes facing Atlanta's transportation systems, as well as different visions of transportation to spur economic growth in line with trends and changes in technology, innovation, and urbanization.

Values Map

What futures best align with our values?

	Consequences of One Alternative Future	Value 1 Improved livelihoods for poor and vulnerable people	Value 2 Environmental sustainability and planetary well-being	Value 3 Economic empowerment
Alternative Future 1: Smallholder farmers are absorbed into other sectors	Improved lives of poor and vulnerable people	(Numeric score = low 0- High 4) 4: Opportunity for smallholders to integrate into value chains is tremendous	2: Enhanced economic well-being often translates to more resource use per capita	4: Enhanced value chain integration leads directly to enhanced economic well-being for smallholders
	Smallholders without training for non-farm labor may be unemployed	1: Given high rates of unemployment and weak training systems, difficult to reskill smallholders	N/A: Link between unemployment and environmental value unclear	0: Unemployed farmers who can no longer farm are not economically empowered
	Decreased volume of agricultural products sourced from smallholder farmers	1: For smallholders who source to large buyers, the improvement is substantial, but for those who aren't connected to large buyers, they would remain poor	2: If large buyers succumb to consumer pressure to reduce environmental footprint, environmental toll could be lessened	1: For smallholder farmers who buyers don't engage, their economic position declines

Note: Multiple alternative futures are derived using the Three Horizons, another tool in The Global Knowledge Initiative's Assessing Innovation Impact Potential toolset.

What is it?

How do the values we hold render some futures more ideal than others? A Values Map allows users to explore the alignment between possible futures and their organizational values. In examining how well a system is attuned to innovate on a problem, a user must explore both the present and the future – in fact, many alternative futures. How to reconcile alternative futures with strategic fit – the manner in which an idea, initiative, innovation, or entire future aligns with the values and broad strategic objectives of its organization – is the function performed by The Values Map.

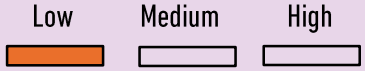
The Values Map performs this role by looking at the consequences that may result from each specific future coming to pass. Teams assess the alignment between specific values and specific consequences in a scoreboard. This supports a team's ability to compare between possible futures that may result from their intervention aimed at seeing a particular problem solved. The future with the best alignment between each "consequence-value pair" represents the future state that best aligns with the values of the organization. Thus, this tool helps teams decide which future to work toward as well as prompts development of development of new ideas that better align with their values.

When to use it?

When approaching a new project, team members often have distinct values that inform their vision of the "ideal future." At the inception of project design, the Values Map can help teams align their values against possible futures. The tool also may be used when evaluating project design options to explore how they uphold organizational values.

Level of Complexity

This tool requires completion of the Three Horizons tool to identify alternative ideal futures. Assuming the organization's or team's core values are defined and agreed upon, the tool can be completed in a short, in-house workshop setting.



Time Required

This tool requires a short workshop involving members of the sponsoring organization.

Resources Required

This tool requires a list of distinct possible futures, as defined in the Three Horizons tool. Also requires the users' stated core values and strategy.


Facilitator


Workshop(s)

Values Map

How to use it

Step 1: If not already available, decide as a team on your organizational mission, vision, and strategic values through group discussion. For example, a strategic value could be "improved livelihoods for poor and vulnerable people." Determining your strategic values allows your team to identify key stakeholders, benchmarks, and biases you may wish to support. Place each of the strategic values into the top of your Values Map grid.

Step 2: Next, for each future you identified in the Three Horizons tool, consider consequences of that future from the perspectives of key stakeholders. These stakeholders can be beneficiaries, donors, decision makers, and more. For example, look at the future of "increased large industrial agriculture and high absorption of smallholder farmers into other sectors." For smallholder farmers, a possible consequence of this future may be unemployment. Identifying these consequences enables you to consider the practical impact of the futures you identified. Place these possible consequences on the right-hand side of your Values Map grid, organized according to their associated future.

Step 3: Now consider how the consequences of a specific future align with your strategic values. Take this process consequence by consequence, value by value. Doing so allows you to examine how closely a possible future aligns with your strategic values. For example, the consequence of unemployment amongst smallholder farmers without non-agriculture training aligns poorly with the strategic value of "improved livelihoods for poor and vulnerable people."

Step 4: Engage in a discussion about the tradeoffs between each future, focusing on how distinct values fully, partially, or inadequately show up within them. The team completing the Values Map on the previous page, for instance, would find that the possible future "increased large industrial agriculture and high absorption of smallholder farmers into other sectors" is a future the organization may not wish to work toward, as it aligns poorly with their mission of "improved livelihoods for poor and vulnerable people."

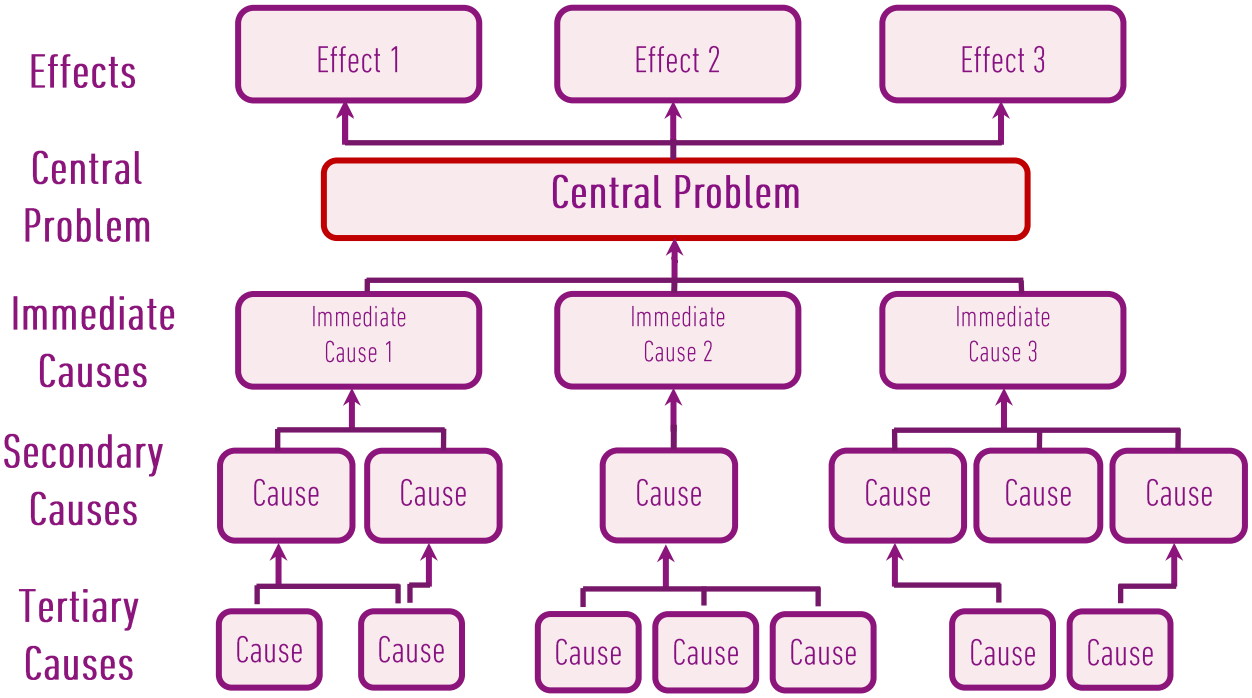
Step 5: To help decide which strategic values are most relevant to the chosen problem space, identify the implicit and/or explicit institutional and personal biases that bear on your key strategic values. Refinement of contents in the map may follow this discussion. Completion of the full Assessing Innovation Impact Potential toolset will center around the future with the best alignment to your strategic values.

Use Case

The Center for Nation Reconstruction and Capacity Development at the United States Military Academy (USMA) used a form of Values Mapping to organize objectives for values-focused thinking and research associated with operations in Southern Sudan. The mapping allowed the authors to relate U.S. military and diplomatic objectives to values held in the region, including the prevention of civil war or inter-regional conflict. The team mapped these values against various factors that could contribute to the possibility of such conflict, including security, social cohesion, economic state, and governance. While the project is still ongoing, the team was able to map these "consequences" to their strategic values to see how possible situations could affect the possibility of civil war and inter-regional conflict.

Problem Tree

What are the root causes of the central problem?



What is it?

When approaching a complex problem, it is important to understand the cause and effect relationships that underpin the problem and cause it to persist. Doing so helps the user unpack the interrelated aspects of the problem and grasp underlying dynamics. This ultimately helps the user determine the essential factors that contribute to the problem—an insight necessary to target interventions aimed at solving it.

A Problem Tree is a commonly used planning tool that plots the essential issues contributing to a problem. Organized around a central problem, the tree establishes a hierarchy of causes and effects, with direct causes being placed immediately beneath their associated effects. Essentially, the tool breaks down the central problem, helping the user to identify its root causes. The exercise offers preliminary insight into how these factors might be addressed.

When to use it?

The Problem Tree is best completed at the beginning of project design and is the first tool in GKI's Assessing Innovation Impact Potential Toolset. Essential for project planning, the Problem Tree helps teams break down complex problems into more manageable segments.

Level of Complexity

This tool should be completed by users who are familiar with the problem at hand. Completion requires thoughtful discussion of the central problem and its many, interconnected causes and effects.

Low Medium High

Time Required

This tool can take up to two weeks to complete.

Resources Required

Desk research can further supplement the Problem Tree.

Desk Research

Problem Space

Innovation System

Innovation Potential

Problem Tree

How to use it

Step 1: To focus possible intervention/investment decisions effectively, it is critical that the project team zeroes in on the central problem to be addressed. This core problem represents the trunk of a tree from which branches and roots protrude. The more specific the central problem, the better. Broad problems will likely yield too many disparate causes to enable effective intervention.

Step 2: Identify the consequences that result from the central problem. These effects represent the tree branches. To do so, consider the question:

- What effects does this problem have?

The effect of the problem represents why you are hoping to address the core problem, shedding light on who you want to benefit or how you want the world to change.

Step 3: Continue to identify the causes of the central problem. These causes represent the tree roots. To do so, consider the question:

- Why does this problem occur?

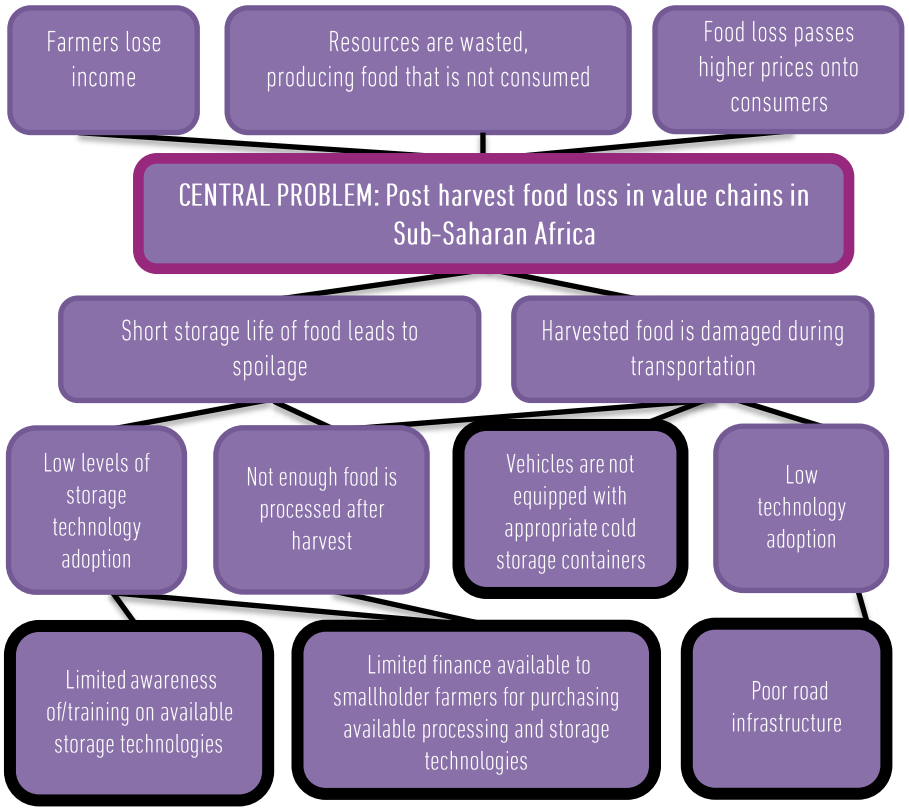
Identifying these causes can point teams toward possible opportunities for intervention.

Step 4: The answers to the question "Why does this problem occur?" are immediate causes, but not necessarily root causes. To identify root causes, apply the same question to each of the previously identified immediate causes. The secondary causes should fall immediately below the primary causes, as shown in the diagram on the previous page. Continue this process until there appear to be no discernable answers to the question of what is causing the core problem.

Step 5: Single out root causes. When you arrive at a cause that yields no discernable answers to the question of what causes that problem, the root cause has likely been identified. Clearly label root causes in the problem tree. These root causes represent barriers that must be overcome in order to address the core problem. In the example to the right, you'll see the root causes circled in black.

Step 6: The root causes you identify will be used as your problem aspects throughout the remainder of the toolset. They are the focal points used to explore how the system is primed and ready to undertake innovation aimed at specific aspects—the root causes—of the problem.

Example Problem Tree

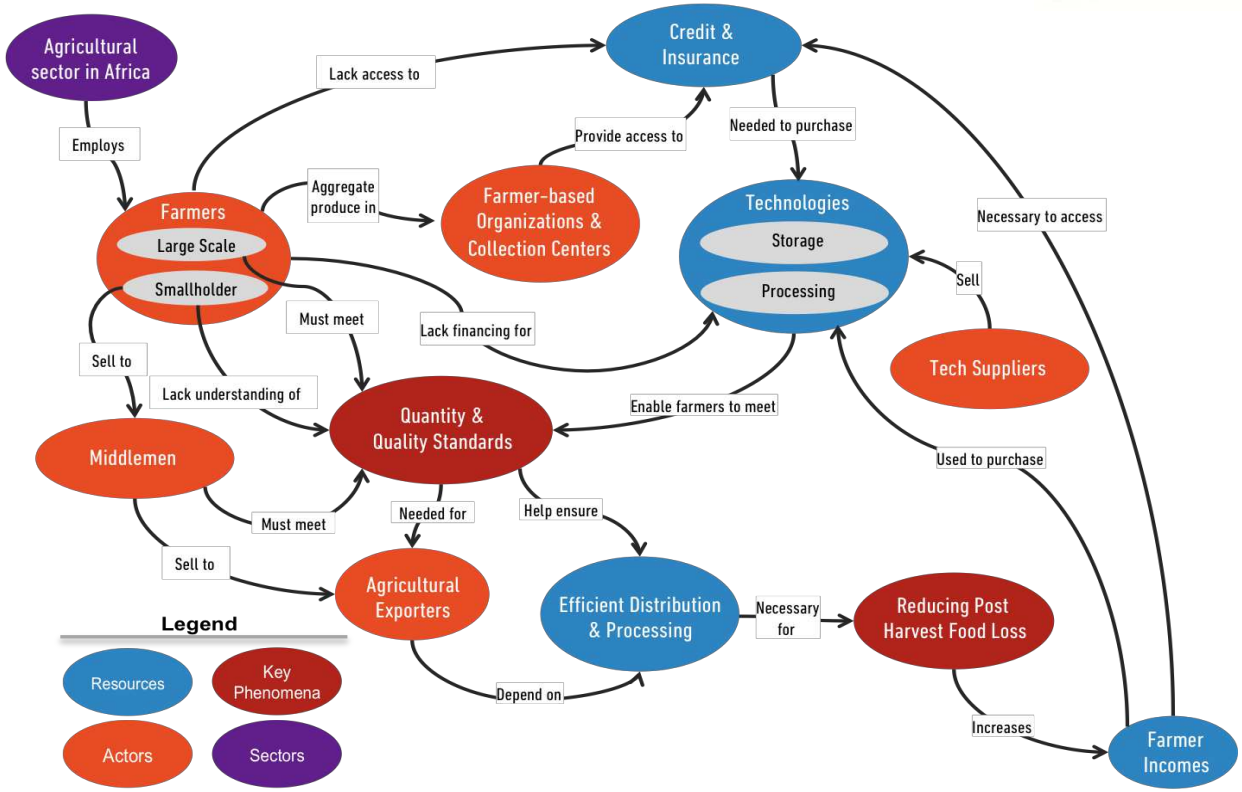


Use Case

A design team from the United Kingdom's Department for International Development (DFID) decided to conduct a Problem Tree analysis, recognizing the need for a deeper understanding of the HIV/AIDS epidemic in Kenya before designing a program. The team conducted interviews with potential beneficiaries and other stakeholders, which revealed the core causes and effects of the epidemic. The design team identified the challenge of protecting HIV-positive clients' confidentiality as a root cause of their central problem. This cause-and-effect analysis highlighted key areas for intervention. Specifically, it elicited from the design team ideas around counselling and testing services to better protect client confidentiality.

Systemigram

What elements, actors, and interactions exist in a system?



What is it?

The term Systemigram is derived from the phrase "systemic diagram." Systemigrams offer visual representations of a system and its context. Usually accompanied by a narrative, Systemigrams are a type of "soft systems analysis," which seeks to explore complex situations through the perspective of those embedded in the system or those who are affected by a specific challenge occurring within the system. Systemigram begins with a collaborative process to create a narrative that describes a dynamic system. Working from that text, users develop a 1-page diagram that models the narrative as a set of visual nodes and links. The resultant diagram provides insight into a system's architecture, its boundaries, actors, relationships, and feedback loops.

Production of Systemigrams is not a one-time feature of a problem assessment. Rather, this tool can be used multiple times to elaborate features of various systems. The more a team learns, the more their Systemigrams can and should change to reflect deeper insights.

When to use it?

Systemigrams are generally employed in the early stages of problem formulation, as stakeholders and analysts begin to conceptualize the system or problem under consideration. The tool begins with a narrative, or multiple narratives, describing in rich detail the many pieces of the problem space: actors and interactions, feedback loops, bottlenecks, and dependencies that are attributable to the problem of focus. This text is then converted into a visual map that captures the complex relationships and interactions that shape the system. The tool can also be used during monitoring and evaluation to examine system changes against the baseline systemigrams produced. Finally, the tool can be used when considering the viability of various solutions within distinct systems or contexts.

Level of Complexity

This tool might require engagement with stakeholders in order to develop narratives. Dedicate ample time for background research, interviews, and other fact-finding activities. Should be revisited by users over the course of their project.

Low Medium High

Time Required

This tool requires 2-3 weeks to complete tool, and more if you take into account iteration.

Resources Required

This tool requires primary and secondary research, as well as group work to complete the tool.

Desk Research Interviews

Problem Space

Innovation System

Innovation Potential

Systemigram

How to use it

Step 1: The first step in developing any visualization of a system is to conduct research on the system or problem of interest. Interviews, site visits (if relevant to the problem) and desk research will provide the needed information to describe the system, the relevant stakeholders, their levels of interactions, and the norms, rules, behaviors, and relationships that shape the system. Remember, the goal of Systemigram is to help users better visualize and understand the many moving pieces of a complex system.

Step 2: Once the initial research is finalized, construct narratives that capture the views of key system stakeholders. Without trying to predict the future, these narratives describe the current state of the system, as well as changes and factors that are emerging within the system. Overall, a narrative should capture a system's unique actors, and offer sparing but insightful analysis of the key relationships and interactions that connect those actors and their actions. These can include dependencies, supply and demand, supply chains, feedback loops, etc.

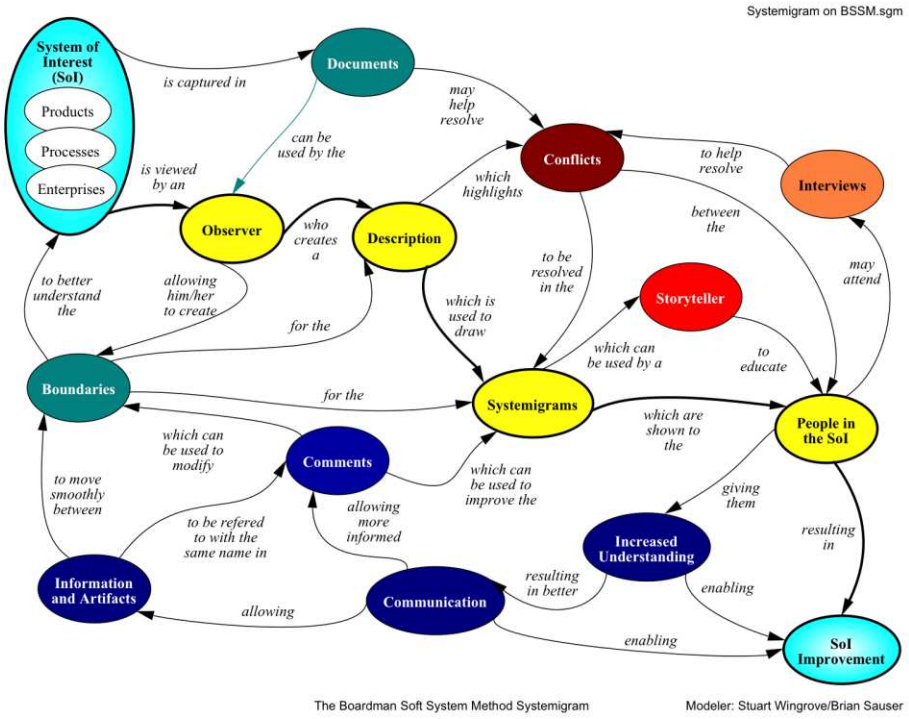
Step 3: When constructing a Systemigram it is important to follow a few basic rules. Namely:

- The diagram should fit on one page.
- There is a beginning and an end; the main flow of the story is from upper left to lower right.
- The diagram should express the "why," "what," and "how" of the system's components.

Step 4: To construct the diagram, first identify key actors, interactions, and processes that shape the system. Begin by creating a few nodes (resembling bubbles in the diagram), as shown in the graphic to the right. Nodes may contain other nodes, wherein they can be grouped. The use of node color can further distinguish roles and structure in the system.

Step 5: When the preliminary Systemigrams are completed, read the diagram and narrative in parallel to inspect the degree to which both accurately tell the same story. One of Systemigram's greatest strengths is the manner in which it fuels debate, discussion, and learning within the team and among critical stakeholders regarding the changing nature of the systems in which the problem and opportunity for innovation exist.

Example Systemigram



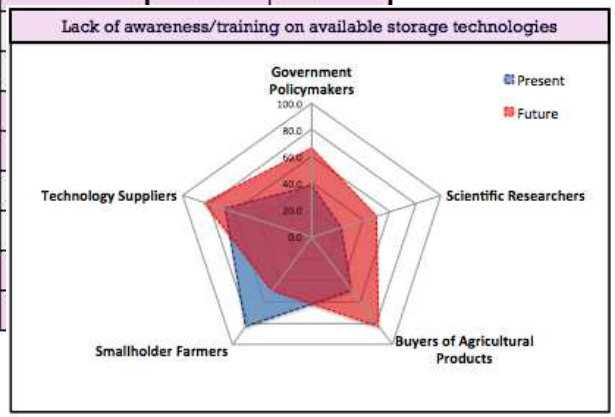
Use Case

A GKI partner in the creation of the Assessing Innovation Impact Potential toolset, the Georgia Tech Research Institute (GTRI) used the Systemigram tool to depict and thus better understand the complex adaptive system of global energy markets under the impact of the United States shale gas boom. The global energy market is too complex for any individual or organization to understand in its entirety, especially given substantial changes due to natural gas' emergence as a focal point of global energy supply and demand. Given these challenges, GTRI used Systemigram to model four distinct regional market scenarios related to natural gas, with a fifth scenario describing the general system of natural gas enterprises. The resultant narratives and accompanying visual diagrams "captured the relationships and interactions of large complex enterprises, enabling a better understanding of the changing natural gas landscape" (McDermott, Nadolski and Sheppard, 2015).

Needs Assessment Scoring Table

What are the most important needs key beneficiaries have and which needs should be prioritized to maximize impact?

Beneficiary		Lack of awareness/training on available storage technologies			
		Need Breadth	Need Significance	Sum	Magnitude
Government Policymakers	Present Score	1	6	7	38.9
	Future Score	3	9	12	66.7
Scientific Researchers	Present Score	1			
	Future Score	3			
Buyers of Agricultural Products	Present Score	3			
	Future Score	6			
Smallholder Farmers	Present Score	9			
	Future Score	3			
Technology Suppliers	Present Score	3			
	Future Score	6			



What is it?

The Assessing Innovation Impact Potential toolset helps users understand how innovation around a chosen problem may benefit target stakeholders. To measure this benefit, the Needs Assessment Scoring Table guides users in evaluating the need, or benefit from the resolution of a problem, of the stakeholders most affected by a central problem. Using this tool, users determine which needs are most significant in the problem space and which needs should be met to achieve the greatest impact on the largest number of beneficiaries.

The Needs Assessment Scoring Table breaks down impact by looking at need around specific problem aspects, measuring both how many beneficiaries share this need as well as how significant the need is to them. The tool does this for two distinct time horizons. It provides a score of beneficiary needs in the present day, as well as an expected score in the medium-term future (5-10 years from present) based on observed signals and trends. This unique analysis across two time horizons provides users with a glimpse of how beneficiary needs might change over time and how those needs will influence overall program impact.

When to use it?

Best used during project design, the Needs Assessment Scoring Table is a useful tool for teams with a strong understanding of their challenge and its context. The tool offers utility when evaluating intervention options as it helps decision makers assess beneficiary needs as they pertain to distinct aspects of the problem. Optimally, use of this tool follows completion of the Problem Tree tool, which allows the user to identify the key problem aspects.

Level of Complexity

The tool requires users to conduct stakeholder research, which may be done through interviews. The tool requires thoughtful consideration of the needs of different stakeholders to develop scores.

Low Medium High

Time Required

Once stakeholder interviews have been conducted, tool can be completed in a week.

Resources Required

This tool requires desk research and stakeholder interviews.

Desk Research Interviews

Problem Space

Innovation System

Innovation Potential

Needs Assessment Scoring Table

How to use it

Step 1: This tool begins by specifying beneficiaries. For each problem aspect, consider any and all people who are affected by the problem aspect directly or indirectly - also known as "stakeholders." After developing this list of stakeholders, draw out only those stakeholders who stand to benefit if that problem aspect were resolved. These stakeholders are the "beneficiaries."

Step 2: For each problem aspect, narrow the list of beneficiaries to include only those beneficiaries your team seeks to impact. To do so, draw from the ideal futures developed in the Three Horizons tool, as well as your team's Values Map. When making key investment decisions to achieve social impact, it is simply not possible to address the greatest needs of every beneficiary adequately and equivalently. Thus, it is important to prioritize key beneficiaries.

Step 3: Before scoring beneficiary needs, it is essential to eliminate any overlap between stakeholder groups to isolate each variable in the data. For example, consider the two beneficiary groups of (1) women, and (2) smallholder farmers. Both of these beneficiary groups can include some of the same individuals. In other words, many smallholder farmers are also women. Looking at your list of beneficiary groups, examine groups that are likely to have some overlap and separate them into smaller, more specific beneficiary groups that have no overlap (e.g., female smallholder farmers and male smallholder farmers). To do so, consider the following questions:

- What are the boundaries of my beneficiary groups? Which individuals cross these boundaries?
- What is a feature unique to these overlapping individuals (e.g., race, gender, occupation, income)?
- How can I make the boundaries of my beneficiary groups non-overlapping?

Revisit your list of beneficiary groups and make sure no groups have overlapping members.

Step 4: Research and conduct interviews with members of your selected beneficiary groups to gather data on how the different problem aspects impact their needs. For each beneficiary group, you will assign a score for **breadth** and **significance.** Not all beneficiaries have the same needs. To best quantify how much a particular need matters to different beneficiaries, take into account (1) how many stakeholders within the group share this need, which we will refer to as "breadth," and (2) the degree to which beneficiaries count this as an important need, referred to as "significance."

Step 5: Next, assign breadth and significance scores for each beneficiary group for their perceived need in the future. Assigning scores for the future allows us to see how beneficiary need around a given problem aspect may change over time. The breadth and significance scores will be used to calculate a "Needs Magnitude Score" in both the present and the future. The ultimate purpose of this score is to determine how much a beneficiary stands to gain by resolving the problem.

Step 6: Once a "Needs Magnitude Score" for each beneficiary of a given problem aspect is entered, the tool automatically creates a spider diagram for each problem aspect. These simple spider diagrams can be used to compare total beneficiary need across problem aspects, both in the present and in the future. This comparison provides unique insight into gaps between the current state and the desired future, highlighting which beneficiaries will benefit most from the resolution of a given problem aspect, and which problem aspects should be addressed to most greatly impact a target beneficiary group.

Use Case

In 2015, as part of its process for sourcing and assessing new opportunities for impact, The Rockefeller Foundation called on the Global Knowledge Initiative to work with subject matter experts to assess the potential for innovation impact on the challenge of economic exclusion in cities (EEC) in high-income countries. The innovation system of focus was the OECD innovation system. After completing a problem and context analysis, the team developed a list of stakeholders who would benefit from the resolution of four problem aspects: (1) access to labor force, (2) good jobs, (3) economic resilience, and (4) inclusive communities. The team whittled down their list of beneficiaries to the top five, which included lower-income people of color, ethnic minorities, lower-income single parents, lower-income youth, and undocumented immigrants. After assigning each beneficiary a need score for each problem aspect, the team was able to compare beneficiary need across the four problem aspects. The team's analysis revealed two problem aspects whose resolution would have the greatest impact on beneficiary needs: "lack of good jobs" and "lack of access to the labor force.'

Innovation System Analysis

What factors exist at the various levels of an innovation system that promote or hinder innovation activity?

GLOBAL KNOWLEDGE INITIATIVE

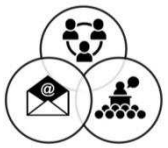
The Innovation System Analysis is a diagnostic tool that categorizes resources and phenomena into 5 categories: (1) **T**echnologies, (2) **H**uman Resources, (3) **I**nstitutions / Infrastructure, (4) **C**ommunication / Collaboration, and (5) **K**nowledge. Together, these form the acronym THICK.

Technology

Tools that individuals and organizations use, along with the knowledge to use them.

Human Resources

The people who can solve problems and the opportunities to build their capacity.



Collaboration & Communication Resources

Resources that allow researchers, customers, innovators, and others to exchange ideas & interact.

Institutions & Infrastructure

The policies, structures, and infrastructure that make innovation possible.

Knowledge-based Resources

The information, data, and indigenous knowledge that actors within an innovation system use, produce, or convey when undertaking innovative activity.

What is it?

The Innovation System Analysis tool is a research template that takes stock of three key aspects of an innovation system: the actors (e.g., firms, government agencies, etc.), their interactions (e.g., knowledge flows between universities and firms), and the phenomena that exist within the system (e.g., increasing foreign direct investment in high-technology sectors, etc.). These system components are essential to understanding how innovation is generated, diffused, and used in a given system.

This tool looks at an innovation system through the lens of five resource and phenomena categories relevant to innovation. These five categories are abbreviated with the acronym THICK: (1) Technologies, (2) Human Resources, (3) Institutional/Infrastructure Resources, (4) Communication/Collaboration/Linkages, and (5) Knowledge Resources. THICK can be explored at the micro (e.g., laborers, businesses, public service providers, etc.) and macro (e.g., legal framework, financing mechanisms, etc.) layers within a system. Examining a system through these layers helps shed light on how resources move through the system.

Once the Innovation System Analysis is complete, users are able to see which key resources, actors, and phenomena impact innovation within a system. Moreover, understanding the innovation system's many actors and interactions allows users to begin thinking about how to best enable innovation to address their chosen problem.

When to use it?

The Innovation System Analysis tool is best used by teams seeking to better understand the state of a defined innovation system. Drawing from research and interviews, the tool helps users in both the design phase of a project and during evaluation by identifying key innovation actors and phenomena through the lens of the five THICK categories. Insights gathered from the Innovation System Analysis fortify stakeholder analysis and deepen insights into an innovation system's enabling environment.

Problem Space

Innovation System

Innovation Potential

Level of Complexity

This is a complex tool that requires users to conduct in-depth research to inform the selection of relevant actors, institutions, and phenomena. Users should be very familiar with the chosen innovation system and have access to data about it.

Low Medium High

Time Required

This tool requires time for research, analysis, and discussion. Tool can be completed in 4-6 weeks depending upon data availability.

Resources Required

Completion requires desk research, as well as stakeholder interviews and direct engagement with users prior to administering the tool.

Desk Research Interviews

Innovation System Analysis

How to use it

Step 1: Before diving into an Innovation System Analysis, it is essential to define which innovation system you want to examine. Placing a boundary around the innovation system provides focus and clarity when determining which actors or phenomena are relevant. This boundary can be national, sub-national, sectoral, or even regional.

Step 2: Next, collect observations and data on the actors, resources, and phenomena in the innovation system that support or hinder innovation geared toward solving your chosen problem. Working through the five THICK resource categories, consider phenomena involved in one or more of the seven types of innovation activity: (1) generation/research, (2) adaptation, (3) diffusion, (4) funding, (5) regulation, (6) management, and (7) usage. Ask yourself the following questions:

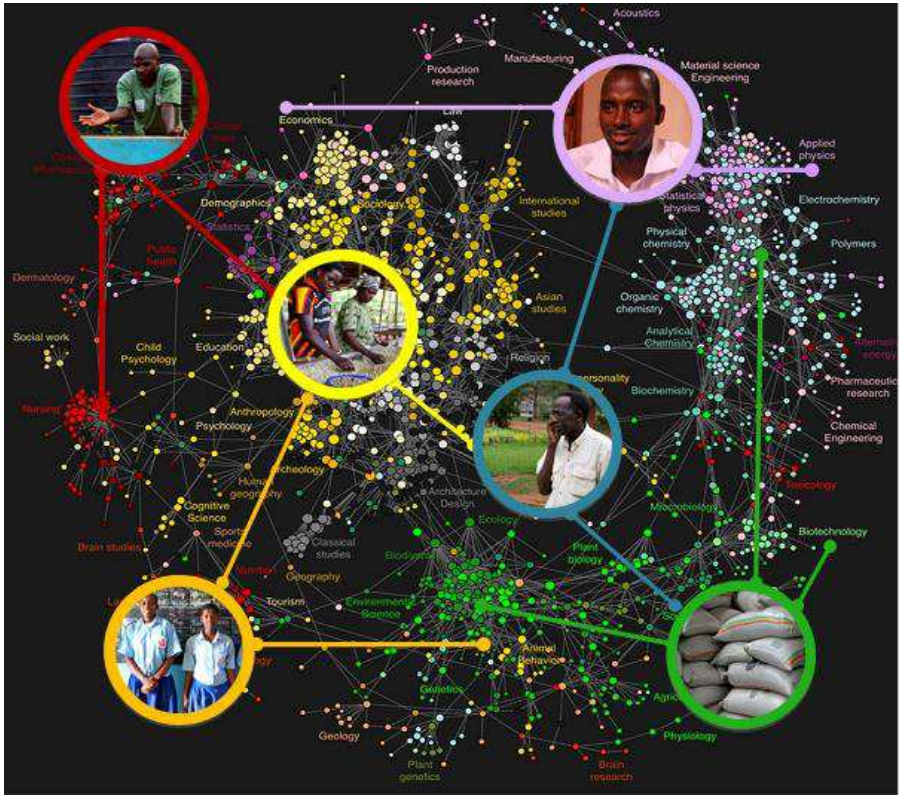
- How do the various phenomena in the innovation system relate to one another? How do they relate to the challenge?
- What behaviors or phenomena might signal the occurrence of innovation activity within the system?
- What behaviors or phenomena are indicative of barriers to innovation?

Step 3: Identify at which level phenomena and resources occur: micro or macro. The micro level includes distinct actors that interact directly with each other and are influenced by the macro level. The macro level includes policies, strategies, and legal frameworks that affect actors at the micro level.

Example Micro Layer Phenomena for an African Innovation System: "There is a very small number of 'top researchers' (i.e., published 40 or more papers in the indexed articles clearinghouse, Scopus) in Sub-Saharan African countries beyond South Africa and Kenya."

Example Macro Layer Phenomena: "There is a lack of up-to-date, reliable data and indicators on the current status of science and technology in Sub-Saharan Africa."

Step 4: As more observations are collected and placed into the THICK pillars, it will become increasingly difficult to choose which resources and phenomena belong in which categories. Instead, think broadly; create as diverse and complete a picture of the innovation system as possible. This "flare" strategy produces a more comprehensive look at the state of the innovation system aimed at your chosen problem. The resultant analysis provides data used in the subsequent tools in the toolset, including the Influence and Incentives Matrix and the Enablers and Barriers Scoring Table.

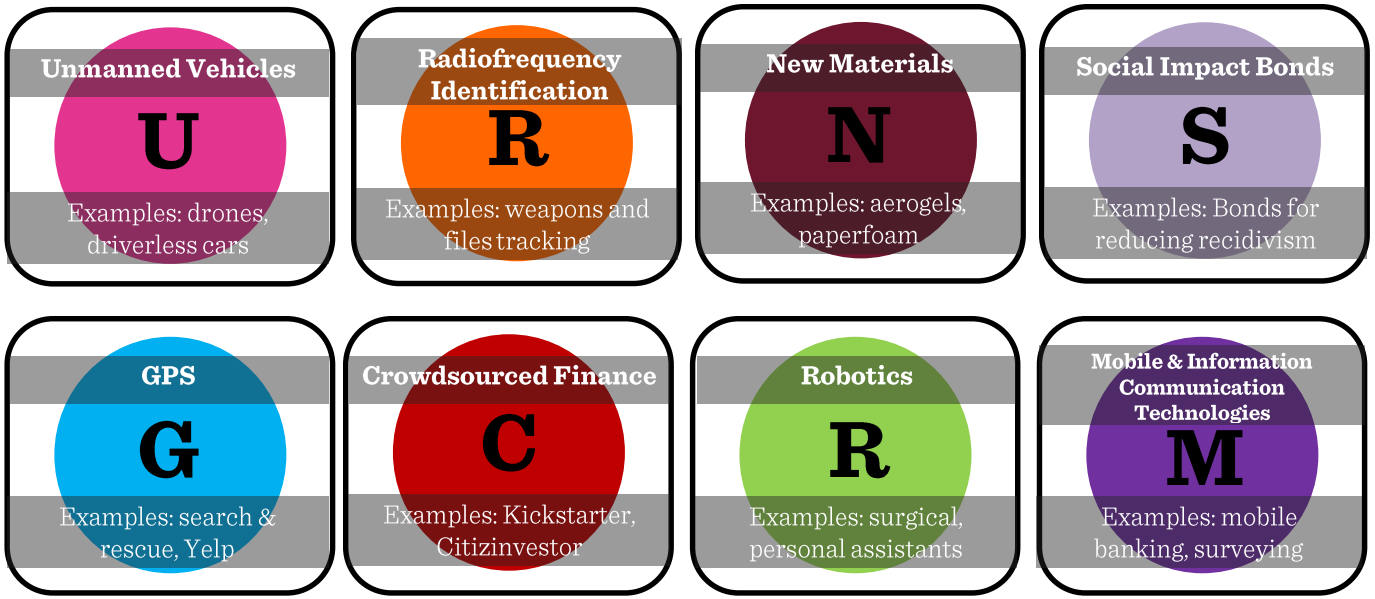


Use Case

In 2012, GKI worked with a team of researchers from the University of Rwanda, led by Dr. Rukazambuga, then Dean of the Faculty of Agriculture, to rid Rwandan specialty coffee of a taste defect known as "potato taste." This taste defect severely jeopardized one of Rwanda's most profitable industries: coffee. The team introduced the novel THICK methodology to guide analysis of two prevailing innovation systems: the national innovation system of Rwanda and the country's agricultural innovation system. Supported by more than 25 stakeholder interviews, the THICK analysis served as a tool not only for Rwandan stakeholders, but for foreign partners interested in playing a supportive role in a burgeoning problem-solving network. Focused on identifying opportunities for collaboration with key system stakeholders, the analysis revealed critical innovation system bottlenecks that partners would need to address if the coffee challenge were to be solved. Further, the research identified new and existing resources which offered the local research team a clearer picture of how to engage potential partners. The insights revealed what those partners could bring to a collaborative effort to rid Rwandan specialty coffee of the potato taste defect.

General Purpose Innovation Tools

How might we identify innovations that address the various aspects of the problem we seek to solve?



A General Purpose Innovation (GPI) is a technology or other innovation that can be applied across different sectors. Thus, GPIs have a high potential for transformative impact. Sensors, information communication technology, and nanotechnology are examples of technology-based GPIs. However, GPIs are not limited to technologies; they also include organizational, process, and social innovations such as crowd-sourced financing.

When determining how innovation might help solve a given problem, it is important to draw from a diverse set of sources to find inspiration. As entrepreneur Frans Johansson explains, "When you step into an intersection of fields, disciplines, or cultures, you can combine existing concepts into a large number of extraordinary new ideas" (Johansson 2004). This approach to innovation is known as the "Medici Effect." One example of the Medici Effect in action comes from a group of engineers trying to safely and efficiently de-ice power lines during ice storms. One engineer presented a jar of honey, which inspired his rather outrageous idea to put honey on top of the telephone poles to attract bears. The engineer hypothesized that large bears would climb up the poles, shaking the ice off the wires in the process. At first glance, the suggestion might seem preposterous. However, it was the crazy "honey bear" idea that led the engineers to think about vibration as a key attribute of a potential innovation. Serving as a launching pad for brainstorming bold ideas, the "honey bear" idea ultimately led them to use helicopters hovering over the power lines as a means to shake off the ice via the vibrations caused by the propellers.

GKI's approach to using GPIs consists of three steps aimed at helping users find wild "honey bears" and, ultimately, arrive at the sought-after "helicopters:"

1. **Innovation Attribute Ranking Tables** allows users to identify the distinct pieces of their problem as well as those attributes that any viable solution would need to express.
2. **GPI Application Generator** prompts users to imagine how GPIs can be applied to address specific parts of their chosen problem.
3. **Innovation Attribute Matrix** prioritizes innovations according to the degree to which they best express users' top-rated attributes.

When to use it?

These tools are best used during the design phase of a project. Once your team has selected a challenge on which to focus, the General Purpose Innovation Tools can be used to determine what potential solutions to your challenge might look like. The tools cater to out-of-the-box thinkers, comfortable with intersectional thinking in which diverse areas of innovation are combined with a problem already analyzed.

Problem Space

Innovation System

Innovation Potential

Level of Complexity

The GPI Tools require in-depth understanding of the Problem Space and context prior to engaging with the tools. The tool demands time for background research and other fact-finding activities.

Time Required

The tool can be completed in 1-2 weeks, inclusive of research and workshop planning.

Resources Required

The tool is best completed in a workshop setting and should be revisited by users over the course of the project.

General Purpose Innovations Tools

How to use them

Step 1: Consider the various aspects of your challenge. For each problem aspect you identified, brainstorm what attributes a potential innovation would need to help address that problem aspect. To define innovation attributes, complete this sentence: "For a solution to be successful, it must…" These might be such attributes as affordable to smallholder farmers, accessible to pregnant women, reliable, etc. Narrow down to a list of 10 attributes that are most essential to addressing each aspect of your chosen problem.

Step 2: Rank the list of attributes from highest (most important for addressing the problem aspect) to lowest (least important for addressing the problem aspect). Organize these ranked attributes for each problem aspect in a set of Attribute Ranking Tables, as shown to the right.

Step 3: Using a deck of GPI cards (as pictured on page 1), facilitated group work helps participants to imagine how various GPIs could address the aspects of the problem you seek to solve. Generating these GPI applications requires finding interesting, out-of-the-box intersections between GPIs and the specific problem aspects. For example, using honey to attract bears to climb the poles was a seemingly outrageous application of a product innovation—honey—to a chosen problem that inspired a more applicable innovation. Groups brainstorm as many applications of each GPI to the problem aspects as possible. If groups' discussions identify any new essential innovation attributes, add them to the Attribute Ranking Tables for each problem aspect and re-rank accordingly. For example, consider the "honey bear" story. The engineer realized that vibration could be used to shake ice off the wires. Thus, "uses vibration" became a promising attribute of a potential innovation.

Step 4: Using the highest ranked attributes for each problem aspect, search for innovative solutions and existing applications that include these attributes. Look to existing applications in the chosen Problem Space, as well as similar applications in other sectors.

Step 5: As innovations are identified, judge how well they uphold the attributes identified and refined within the Innovation Attribute Ranking Tables and the GPI Application Generator. Score each of the innovations selected across all of the attributes on a 5-point scale to reveal the highest-scoring innovations as pictured to the right. These innovations will be prioritized in the remaining tools.

Example General Purpose Innovations Tools

Problem Aspect #3:

Problem Aspect #2:

Problem Aspect #1: Short shelf-life causes food to spoil during storage	
Attribute 1:	Afforable to smallholder farmers
Attribute 2:	Light weight
Attribute 3:	Easy to transport
Attribute 4:	etc.
Attribute 5:	etc.
Attribute 6:	
Attribute 7:	
Attribute 8:	
Attribute 9:	
Attribute 10:	

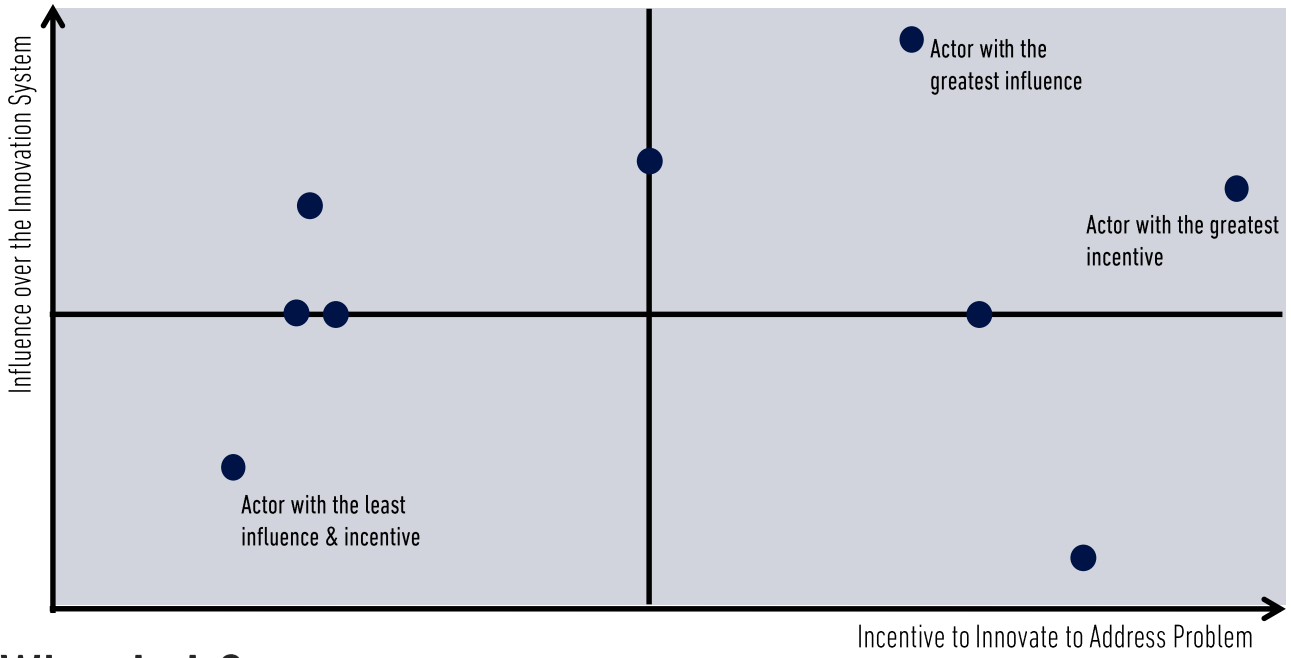
Innovations: Problem Aspect #1					
	Innovation 1	Innovation 2	Innovation 3	Innovation 4	Innovation 5
Attribute 1	4	2	1	0	5
Attribute 2	0	1	1	2	2
Attribute 3	0	0	2	3	0
Attribute 4	2	5	0	1	0
Attribute 5	4	1	0	0	4
Attribute 6	0	5	5	3	0
Attribute 7	3	5	1	1	1
Attribute 8	4	1	2	4	4
Attribute 9	2	4	4	2	0
Attribute 10	5	1	3	3	0
Total Score	24	25	19	19	16

Use Case

In 2015, The Rockefeller Foundation enlisted GKI to help source and assess new opportunities for impact. GKI brought together diverse minds to explore innovative solutions around a particularly pressing problem: economic exclusion in cities in high-income countries. Through a facilitated workshop, GKI introduced the Foundation and subject-matter experts to its General Purpose Innovations tool suite. Throughout the GPI Workshop, GKI encouraged the participants to think outside the box and come up with as many "honey bear" ideas as possible, using the General Purpose Innovation cards as an opportunity to explore ideas outside of their comfort zone. They would later probe these ideas further to fuel innovative, yet actionable, solutions. The workshop revealed new ideas the Foundation had never before considered. These served as key inputs that The Rockefeller Foundation's leadership considered to help address economic exclusion. Examples of three interesting, innovative ideas that emerged from the workshop are: (1) Early warning systems to predict when shocks are coming to a community to provide resources in advance; (2) Automated data systems that could unearth subconscious discrimination in lending or other financial practices; and (3) An app or public service announcements on public transportation that show users/riders the type and number of jobs available at different stops along transport corridors.

Influence & Incentives Matrix

Which actors in the innovation system wield the greatest amount of influence over innovation activities? Which actors have the greatest incentive to promote or engage in innovation?



What is it?

The Influence and Incentives Matrix helps users identify, categorize, and prioritize key actors within an innovation system. The matrix organizes these actors according to their respective influence over the innovation system and their incentives to take innovative action aimed at addressing a particular problem. Innovative activity can include research/development, adaptation, diffusion, funding, regulation, management, or usage. Those actors carrying out one or more of these vital innovative activities are the innovation system stakeholders. The Influence and Incentives Matrix helps a user:

1. Recognize key actors with the incentive to either support or undermine innovative activity aimed at solving the given problem. These actors may represent future partners or collaborators, for instance.
2. Understand which actors wield the greatest power to facilitate or execute innovation-related activities applied to a specific aspect of the problem.

The results of the Influence and Incentives Matrix bear directly on the use of subsequent tools within this toolset (e.g., Enablers and Barriers Scoring Table).

When to use it?

The Influence and Incentives Matrix is a useful tool during project design or evaluation. By revealing the stakeholders most able and willing to undertake innovation aimed at a specific problem, the tool helps inform project planning and implementation strategies. Further, this tool offers value when constructing a partnering strategy as it distinguishes among the many actors within an innovation system that should be cultivated as allies given their influence within the system.

Level of Complexity

This tool requires background research on the innovation system in question and a completed Innovation System Analysis. Stakeholder interviews can add additional insight.

Low Medium High

Time Required

With access to the required input data and stakeholder interviews, the tool can be completed within 1 to 2 weeks.

Resources Required

This tool requires some beneficiary interviews prior to administering the tool.

Desk Research Interviews

Problem Space

Innovation System

Innovation Potential

Influence & Incentives Matrix

How to use it

Step 1: List the major pieces of the problem—or "problem aspects"—that offer discrete opportunities for innovation. These can be developed using the Problem Tree tool.

Step 2: Return to the completed Innovation System Analysis and lift from it all relevant innovation system actors for each specific problem aspect. To do so, consider the seven types of "innovation activity" that an innovation system actor might perform: (1) research/ development, (2) adaptation, (3) diffusion, (4) funding, (5) regulation, (6) management, and (7) usage.

Step 3: To calculate the influence score, consider the following question:

- To what degree does this actor have power over each of the seven innovation activities?

Scoring is based on a scale of 1 (low) to 3 (high). Give the actor an influence score for each of the seven innovation activities. These seven scores are averaged to determine the influence score.

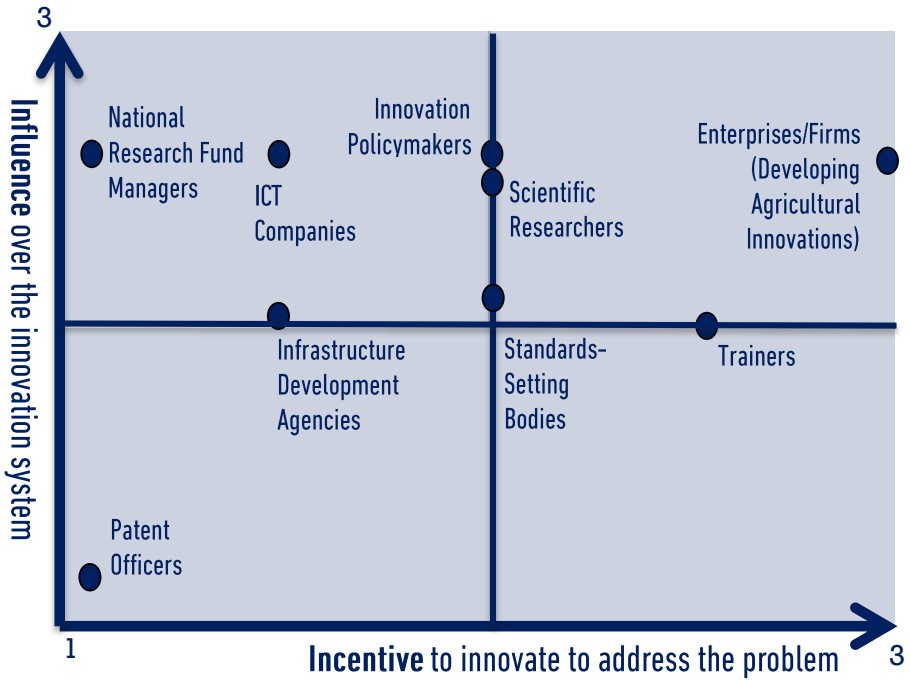
Step 4: To calculate the incentive scores, consider the following question:

- What incentive does this actor have to undertake a given innovation activity with the goal of addressing the problem of focus?

Scoring is based on a scale of 1 to 3, with 1 meaning low incentive and 3 meaning high incentive.

Step 5: Once all influence and incentive scores for all actors are calculated, plot the actors on a set of matrices, one matrix per problem aspect. The actors with the greatest amount of influence and incentive are represented in the top right quadrant. Meanwhile, the actors with the least amount of influence and incentive are represented in the lower left quadrant. With influence represented on the y-axis and incentive represented on the x-axis, the top innovation system stakeholders become clearly visible.

Example Influence & Incentive Matrix



Use Case

Recognizing the complex, multidimensional nature of urban inequality, The Rockefeller Foundation called on the Global Knowledge Initiative to work with researchers from the Urban Institute to assess the potential for innovation impact on the challenge of economic exclusion in cities in high-income countries. The innovation system of focus was the Organization for Economic Cooperation and Development – an economic organization of 34 countries. After completing the Innovation System Analysis guided by this toolset, the team developed a list of actors instrumental to the innovation system. The diverse list of actors included stakeholders from national and local governments, financial institutions, public service providers, tech entrepreneurs, and more. The team assembled four Influence and Incentive Matrices for four different problem aspects. Those actors with the greatest influence on innovative activity on addressing economic exclusion in cities included national governments, research institutions, and multinational corporations. Those actors with the greatest incentive to see innovative activity occur included the urban labor force and local governments.

Enablers and Barriers Scoring Table

What factors most significantly enable or thwart stakeholders' ability to innovate within a system on a specific problem?

Barrier #1:Weak Distribution of Technology and Other Needed Inputs

	Top 5 Innovation System Stakeholders for Problem Aspect #1	Activity 1: Generation				
		Influence + Incentive	Time	Score	Total	Average Across Stakeholders
1	Drone Manufacturers	6	Present	-3	-18	Present Enablers
			Future (5-10 years)	-2	-12	
2	University Researchers	4	Present	-1	-4	-9
			Future (5-10 years)	-3	-12	
3	Ministry of Agriculture	3	Present	-3	-9	
			Future (5-10 years)	-1	-3	Future Enablers
4	Universities	4	Present	-3	-12	
			Future (5-10 years)	-1	-4	-6
5	Agro Dealers	0	Present	-3	0	
			Future (5-10 years)	-2	0	

What is it?

Drawing from the Influence and Incentives Matrix tool, the Enablers and Barriers Scoring Table uses the top identified innovation system stakeholders as the focal points for considering enablers and barriers to innovation within a system. Why? Enablers – actors and phenomena that support innovation - and barriers - actors and phenomena that thwart innovation - do not affect whole systems generally. Rather, they affect the ability of specific system actors to undertake one or more of seven innovation-based activities (generation/research, adaptation, diffusion/distribution, funding, regulation, management, and usage), as described in previous tools.

The Enablers and Barriers Scoring Table invites users to methodically explore how individual enablers and barriers to innovation matter from the perspective of key innovation system stakeholders. This tool asks users to perform this analysis multiple times – each time focusing on the innovation system stakeholders associated with innovation aimed at one problem aspect. Additionally, the tool requires users to consider how enablers and barriers may change in the future, revealing opportunities for future intervention. As a result, the tool aggregates comparisons of enablers and barriers to innovation within a system across multiple dimensions. Once completed, decision makers can use the tables to clearly see the differences in innovation impact potential exhibited by different innovations. This innovation impact potential is measured as the difference between a system's net enabling effect on innovation geared at particular aspects of the problem in the future as compared to the present.

When to use it?

The Enablers and Barriers Scoring Table is a useful tool for teams seeking to take action on a given problem in their chosen innovation system. The tool is best used when needing to provide decision makers with a clear picture of how the innovation system may change over time, revealing opportunities for investment or intervention. It does so by integrating both analyses of the innovation system and stakeholders to measure the potential for innovation to deliver impact on a specific problem.

Level of Complexity

This is a highly complex tool that requires in-depth understanding of trends that point toward the future. The tool requires careful consideration of scores for individual enablers and barriers.

Low Medium High

Time Required

This tool demands time for background research, interviews, and other fact-finding activities. Completion of the tool takes one week.

Resources Required

This tool requires some interviews with stakeholders and desk research.

Desk Research Interviews

Enablers & Barriers Scoring Table

How to use it

Step 1: Using the previously generated Influence and Incentives Matrix, select the top five stakeholders for each problem aspect with the highest influence and incentive scores.

Step 2: For each problem aspect, generate a list of no fewer than five enablers and five barriers, pulled from the Innovation System Analysis, or drawn from additional primary or secondary research.

Step 3: Using a set of Enabler and Barrier Scoring Tables included in the tool, assess each enabler according to the degree to which it affects each stakeholder listed. Assign values for each innovation activity and the degree to which the enabler supports it, using a simple 1 (limited) to 3 (strong) scale.

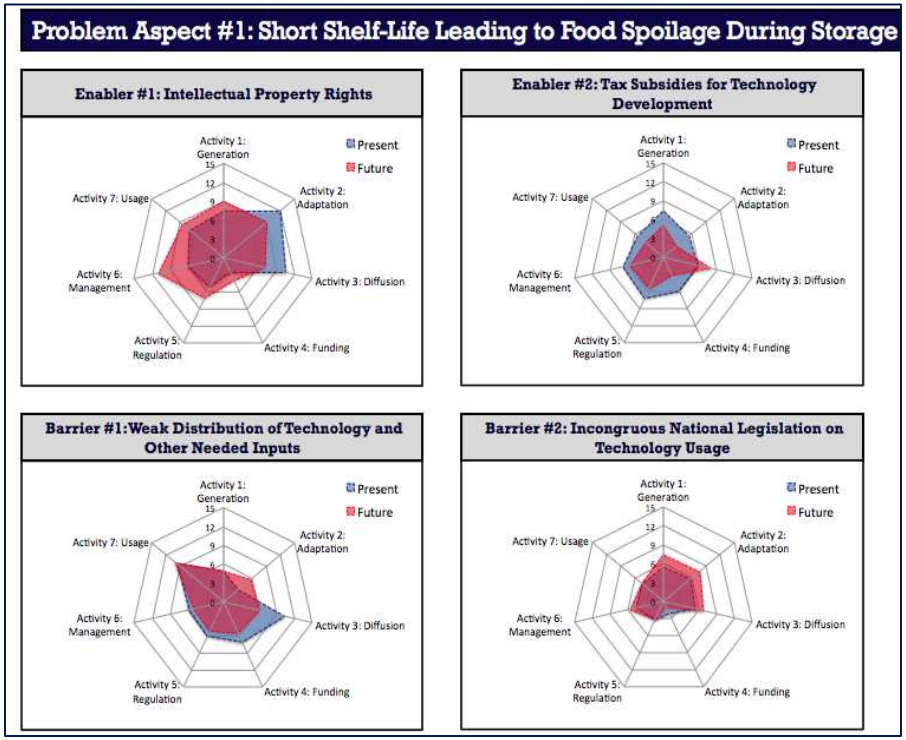
Step 4: Each enabler is scored a second time by considering its effect on each stakeholder at a set point in the future (e.g., in five years). The timeframe of the future selected must remain constant while running the tool for all problem aspects.

When assigning future scores, consider glimpses of the future you can see in the present. These glimpses can be found in current trends (e.g., shrinking number of smallholder farms) and shifts in phenomena (e.g., a shift in policy priorities).

Step 5: For each innovation activity, assign a value measuring the degree to which the barrier thwarts that stakeholder, using a -1 (limited) to -3 (strong) scale. Each barrier is also scored a second time according to its effect on each stakeholder at a set point in the future (e.g., in five years).

Step 6: Compare the changes in the net effect of enablers and barriers from the present to the future for each problem aspect. Observing these trends can shed light on whether the innovation system will become more or less amenable to innovation on your given problem aspect in the future. If the system has a growing net enabler effect, it has high innovation impact potential.

Example Enablers & Barriers Scoring Table



Use Case

In 2015, The Rockefeller Foundation enlisted GKI and a team of researchers to explore the potential of innovation to address economic exclusion in cities in high-income countries. The research team's analysis revealed that poor job quality was one of the most significant problem aspects affecting economically excluded groups. Using GKI's Enablers and Barriers Scoring Table, the research team assessed the extent to which specific enablers and barriers support or thwart innovation activity carried out by stakeholder groups, including national governments, labor unions, large firms, and small- and medium- enterprises. The team identified regional partnerships and clusters, as well as active peer learning among key stakeholders as enablers conducive to innovation. Critical barriers to innovation included ongoing political gridlock and significant inter-city competition for jobs. The results revealed a future trend of lessening barriers and strengthening enablers to innovation. This suggests a system conducive to innovation on the issue of job quality for economically excluded populations.

About the Global Knowledge Initiative

The complex, interconnected nature of today's global problems—food insecurity, diminishing biodiversity, emerging infectious disease—demands a sophisticated understanding of the problem space and the potential solutions that can be pursued to deliver transformative impact. Moreover, solving these and other problems demands that the global community create bold new ways of organizing people and resources that cut across traditional sectoral, disciplinary, and geographic divides. Collaborative innovation networks offer a way to align resources and partnerships toward shared goals. Building and supporting such networks represents a cornerstone of the Global Knowledge Initiative's (GKI) work. Guided by our partners' challenges, we help researchers, entrepreneurs, policymakers, and others **locate** resources critical for problem solving; **enable** effective collaboration by building skills and designing shared agendas; **connect** resources and partners to form durable networks; and **amplify** impact by measuring network effectiveness and innovation potential—all to solve development challenges pertinent to science, technology, and innovation. To date, GKI has engaged problem solvers from 60 countries, with particular emphasis in East and Southern Africa and Southeast Asia, building their capacity to collaborate, innovate and solve problems through networks.

The Global Knowledge Initiative (GKI) originated from the 2008 Higher Education Summit for Global Development convened by the US Secretaries of State and Education and the Administrator of the US Agency for International Development. Attended by more than 200 university presidents, heads of technology firms, and philanthropists, the Summit identified the need for a "clearinghouse for resources and information to help build knowledge partnerships that can tackle development challenges." Chief Operating Officer Sara Farley together with Chairman Sam Pitroda and Advisory Board Co-Chair Nina Fedoroff established GKI as a response to this call. In the years since, we have become a place for experimentation, human-centered design, and constant innovation, building GKI into a global leader in Collaborative Innovation.

Our vision for impact:

Empowering diverse stakeholders to create **bold, integrated solutions** to complex challenges affecting the world's poorest and most vulnerable people. We do this by engaging diverse actors in a structured innovation design process that enables them to envision creative solutions and build the partnerships needed to create lasting change.

Everything we do at The Global Knowledge Initiative is aimed at delivering innovative solutions to the world's most pressing challenges through purpose-driven networks. We thrive on creating the enabling environment, the mindset, and the tools that make Collaborative Innovation possible. We serve all types of problem solvers—individuals, institutions, and networks—aspiring to journey from idea to impact. Beyond our systems research and evaluation work in which the AIIP toolset is featured, our programs include: Network Facilitation and Design; our Social Innovation Lab; Collaborative Innovation Capacity Building; and our Innovation Policy and Strategy practice. Check out our website to learn more.