Responsive Ecosystems for Change:
A Practical Guide for Change Makers

Ecosystems Designed for Change: An Evaluation Framework for Innovators & Leaders

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Series: Responsive Ecosystems for Change

The world in which we live and work is fundamentally interconnected in ways both visible and invisible. These connections can strengthen our grand efforts and serve as individual measures of our collective power to change that which cannot move but for our shared force. We think about this potential when we consider some of our most challenging problems – creating the fundamental conditions for driving large-scale innovation, entrepreneurship, and mobility, and moving deeply entrenched equity, health, and well-being outcomes in our communities. We think about what is possible in an ever-changing world in the spaces where people meet, interact, and connect to make change happen. We then take this potential and create the will to act.

What do we mean by ***Responsive Ecosystems for Change***? Briefly, we envision a dynamic and adaptable ecosystem composed of diverse, interconnected actors that can evolve and support change. An **ecosystem** is a network or system of interconnected elements (such as organizations, individuals, resources, and policies) that work together in a variety of contexts, including social and civic environments, areas of innovation, industry, entrepreneurship, or sustainable human endeavors and natural resources. These ecosystems are **responsive** because they can react quickly and appropriately to new challenges, opportunities, or shifts. And finally, these ecosystems are oriented toward **change** by facilitating or supporting transformation, innovation, or progress that is equitable and sustainable.

Driving systems-level change is universally challenging. Those focused on building entrepreneurial networks run into the same barriers as inclusive innovation ecosystem builders or community health professionals. This is simply because, while these and other communities and ecosystems may look different, they are all fundamentally dynamic networks. They all evolve as actors move in and out of them, gain and lose influence, and modify their roles. But how can we understand this dynamic process? And better yet, how can we evaluate and measure the dynamic ecosystem over time and use that understanding to drive evolution for maximum impact?

In this series, ***Responsive Ecosystems for Change***, we explore concepts, methodologies, and applied practices designed to help ecosystem leaders, community champions, and invested practitioners understand the landscape in **ecosystem science**.

How Do We Know We're Making Enduring Change at Scale?

A question like this often comes up at some of the toughest moments in leadership and systems change. It's usually after a major setback or challenge in a large, complex undertaking. Building and leading ***responsive ecosystems for change*** involves aligning all elements of such an undertaking, including diverse people, organizations, perspectives, and values, in the service of large-scale equitable change. The investment of time, resources, and social capital needed to bring together a network of people and organizations in the service of something bigger is extensive. Validating that it was worth it requires outcomes and impact. After all that effort, how do you know that you are making headway?

Evaluating ecosystems can provide evidence that the effort by all parts of the network matters. For example, in innovation ecosystems, a good deal of that effort is spent using research as a key driver of shared value and as an avenue for turning insights into practice or commercial application[1]. In other ecosystems, research may occur more organically when an organization searches for a new way of doing something. Alternatively, a person may create change by calling upon previous experience or cultural knowledge to anticipate, react, and evaluate a new effort. In isolation, the change created by these individual research efforts is limited, but the impact may be amplified when shared across the entire ecosystem.

When leaders and partners leverage and apply formal ***evaluation, research design, and statistical modeling*** in their ecosystems, they can maximize and amplify each technique in service of their greater goals.

Designing Evaluations in an Ecosystem Context

The terms *research* and *evaluation* are often used interchangeably to describe ways of understanding the world, but they each have distinct features and purposes. They can be viewed as well-established tools used to systematically test ideas and actions to identify what causes a specific event or outcome (**research**) or to assess and describe how effective or efficient an action or intervention is at achieving its intended impact (**evaluation**). Research and evaluation each use data, tools, and methods in distinct ways that can inform critical decisions and pivots during large-scale ecosystem change efforts. In our work, we blend these two approaches of testing and understanding change. We distinguish between them here to illustrate their differences and the complementary way they offer greater precision and value to the science of ecosystem design.

In general, **research methodology** and **statistical analyses** are used in ways that advance knowledge and test theory. Research is the cornerstone of many disciplines and accompanies the development of theory, testing of interventions, designing experimental studies, and analyzing causal relationships. The kinds of statistical analyses available to researchers and evaluators for testing the significance of change resulting from an intervention (cause) on an outcome (effect) are many. Aligning research design, data collection, measurement, validity, and the type of statistical analysis is critical. Applied or use-inspired research takes these methodologies out of the lab and focuses on solving practical methods, just as in an innovative ecosystem. The foundational tenets of research and its methods are translatable and applicable to systems change and ecosystem evaluation.

What about **evaluation**? Evaluation is a vital tool for assessing how effective a set of activities or interventions are and whether they are bringing about the change they intend. Evaluation differs from research because it applies knowledge gained from research or the field to determine the success or value of specific initiatives. Research is designed to minimize bias and maximize generalizability, while evaluation methods provide actionable insights for stakeholders, even if that means sacrificing some control or precision. The real world is complex and many of the conditions are beyond the kind of control available in a lab setting. We believe, however, that the right evaluation framework, building on some of the methods, design, and statistical analyses of applied research, can allow us to bring rigor to what can be controlled and how precisely we are able to assess effectiveness and impact.

Evaluating Complex Ecosystems in the Real World

Building and sustaining an ecosystem requires a significant investment of time and resources. We believe that it is necessary to invest just as much into understanding where the activities have been successful and where changes need to be made. This is especially important when **equity** is front and center. Information gleaned from ongoing evaluation activities can feed into iterative pilots and activities that reinforce ecosystem-building activities centered on equitable and diverse opportunities and efforts. In this way, the evaluation activities become the flywheel that reinforces momentum in a more **inclusive ecosystem**[2,3].

The evaluation of a complex ecosystem in real-world conditions may seem daunting. The breadth and depth of what constitutes an ecosystem and its many complex layers of related activities performed by different people or organizations is vast. This is further complicated by the element of time, as change occurs at different speeds and scales in an ecosystem, impacting results as it progresses. This dynamic complexity means that **evaluating an ecosystem requires diverse methods, solid analysis, and reasonable measurement to do it well in context and meaningfully in practice**.

To address this complexity, we have created an evaluation framework for those working in ecosystems that are intentionally built to drive change. While delving deeply into the details of methods, analyses, or measures is beyond the scope of this paper, we will address the general evaluation concepts that underlie our rationale for designing this ecosystem evaluation framework.

We offer this as a guide for those who ask ***"How do we know we're making enduring change at scale?"*** and for those who want actionable answers to inform their work. In this way, our **ecosystem evaluation** approach mirrors **applied research**. We expect meaningful information produced by the evaluation to be fed back into the ecosystem and used to improve ongoing processes, using iterative feedback loops. From this, we anticipate and plan for changes to occur in the ecosystem as a result of insights gained through evaluation - pivots in activities, new interventions, or additional actions that continuously occur in a dynamic ecosystem. **This helps leaders begin to future-proof, or proactively reinforce, effective strategies and interventions optimized for change.**

An Evaluation Framework for Responsive Ecosystems for Change

We have developed an evaluation framework to guide practitioners and ecosystem leaders toward a comprehensive approach to assessing and optimizing the effectiveness and impact of their collective work.

In our framework, we recognize that ecosystems of all kinds operate and act on different scales - from the individual actor to inter-organizational coordination onward. Regardless of scale, each ecosystem works toward whole-scale system change initiatives. Our goal is to introduce an evaluation approach that maximizes actionable information back into the ecosystem while also objectively assessing what works or does not across complex strategies and activities involving many actors.

Our ***Responsive Ecosystems for Change Evaluation Framework*** aligns an ecosystem initiative and its specific reinforcing activities in what is typically called a **Logic Model.** This outlines the overarching goals and system-level activities of an initiative and their intended effects. In our framework, we capture multi-level efforts that occur at different scales. That is, we plan for strategies, interventions, or activities that can impact outcomes for people, projects, programs, and the ecosystem as a whole. Activities at different levels in the ecosystem require different metrics and analysis approaches to measure effects.

In an ecosystem, many different elements are interacting across different levels of the initiative. Because these elements do not operate in a vacuum but instead are often intentionally interrelated, we treat them as such in our evaluation. We do this by recognizing - and more importantly, measuring - their influence on other activities and outcomes that occur vertically and horizontally within the ecosystem. Our evaluation framework presents a new way of **infusing evaluation methodologies with the science behind complex ecosystems and the analytical power to detect the most effective strategies for driving large-scale change over time.**

Built for Results

Our evaluation framework is designed to do three complementary things:

1. Assess the ***effectiveness*** of a complex set of reinforcing activities in achieving their intended goals across the ecosystem

2. Measure the ***impact*** that ecosystem activities have on each other, on the ecosystem itself, and on multi-level outcomes

3. Test the ***power*** of the ecosystem as a whole to drive and sustain change and equity at scale over time

As a result, our evaluation tells us which part of the ecosystem is optimized for effectiveness or requires additional action or strengthening at any given time. It also allows us to measure the effect of the initiative's ecosystem as a whole on moving large-scale system outcomes that no one activity is able to influence on its own. Together, this gives comprehensive insights throughout the development and activity of the ecosystem, building in sustainability and resilience to the future.

This framework serves as our evaluation plan's **north star**, guiding how we design our evaluation methods to assess and test ecosystem effectiveness and impact. In other words, we should consider responsive ecosystems to be multifaceted engines of change in which the individual parts have their own impact and when assembled, can accelerate change for outcomes up and down the system as a whole. **Understanding how the whole and the sum of the ecosystem's parts interact and influence each other captures its dynamic ability to drive change.**

The Science of Ecosystem Evaluations

Here, we present a bit more detail on how we bring together the concepts of a dynamic and complex ecosystem with the science behind understanding effectiveness and impact. We will keep it at a high level while highlighting how we seek to push the field and ecosystem leaders toward incorporating more sophisticated methods to produce actionable insights into their work.

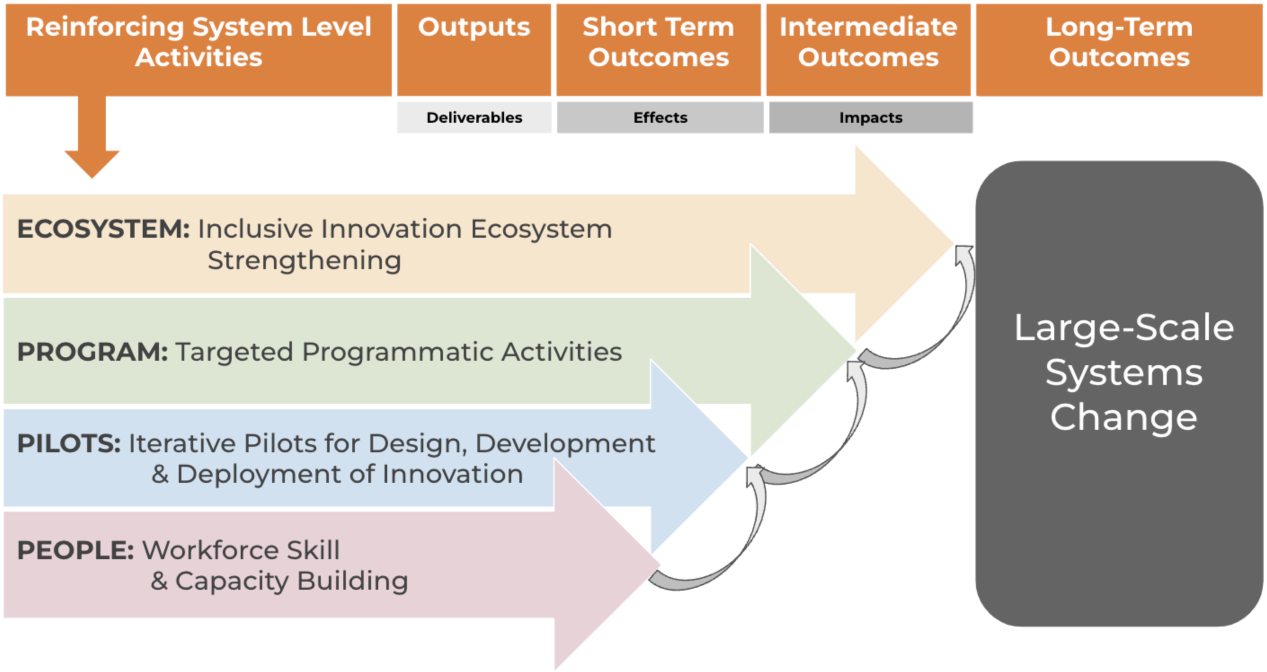
Traditional evaluations often seek to describe more linear processes or discrete activities. They detail how they were implemented and then assess how effective or efficient they may be at their given purpose. For example, a group of partners may develop a new workforce training program aimed at increasing knowledge acquisition and improving the talent pipeline to be more diverse. An evaluation of this activity - the training program - would be conducted by describing the program components, monitoring recruitment and participation rates each time the program was offered, assessing how effective it was at increasing a participant's knowledge of the program's material before and after receiving training, and then perhaps following participants over time as they progress in their position or employment opportunities. This type of approach provides very specific insights into a well-defined, discrete activity and certainly provides value. It can even be used to test whether access to the training program itself is equitable for all and if its intended outcomes benefit some or all of the participants. It looks something like this:

Traditional Linear Evaluation

Activities		Outputs	Short Term Outcomes	Intermediate Outcomes	Long-Term Outcomes
Discrete Intervention	**Implementation**	**Deliverables**	**Effects**	**Impacts**	**Consequences**
Workforce Training Program	Components Content Delivery Recruitment Completion Refinements	# participants # sessions # recruited #completed	Pre-post content knowledge tests	Change in participants' employment status, position, salary	Broader pool of qualified workforce talent in region

We think there is more to be gained by viewing each activity as not only a discrete linear set of actions and outcomes but also as a **reinforcing lever of change**. This would be an activity that occurs in one part of the ecosystem that has the potential to indirectly influence the rest of the ecosystem: **a ripple effect**. Measuring that potential - statistically - increases our ability to know how the complex system interacts together to drive change across many actors, activities, interventions, and outcomes. **Our approach leverages the power of concurrent impact and interacting forces**, allowing us to gain a more comprehensive and nuanced understanding of how activities contribute to ecosystem-wide change. Our ecosystem evaluation framework is shown below.

Responsive Ecosystem Evaluation Framework



Traditional evaluation approaches for measuring 'systems change' often fall short in taking into account - methodologically or statistically - the multiple scales at which change occurs and the interdependence of the factors driving those changes. Through our evaluation design, methods, and analyses, we can better understand both the **direct effects** that each system-level component has on intended outcomes and the **indirect effects** of successive components on the system as a whole. We can even understand **how different ecosystem activities interact with each other** to influence outcomes. This is the additive power and nature of a complex dynamic ecosystem. To address this, we advocate for **an intentional integration of linear evaluation methods with statistically robust analyses** to model the non-linear dynamics of complex systems.

Complex Analyses for Complex Ecosystems

In our evaluation framework, **we take into account that ecosystem strategies, interventions, and activities at each level can have a measurable effect on outcomes** over time. We treat the entire ecosystem as a multilevel model consisting of independent and dependent variables that exhibit correlations or covariances at various levels and time points.

Specifically, our approach is designed to use a ***cross-level interaction analysis***[4] which allows us to specify - and test - the effects of lower-level predictors on higher-order variables. This is a robust analysis method that is aligned with, and supportive of, our ecosystem framework. It gives us the tools to understand how different parts of the ecosystem - from person-level on up to the ecosystem as a whole - operate and interact in a complex system. It allows us to **quantify elements of equity** (e.g., error variances or effect sizes based on group differences) in statistical terms and use it in our analyses to better understand its influence within the ecosystem. These kinds of analyses are often used across disciplines - such as education, organizational behavior, and public health - to measure change over time when there are many variables or factors that can interact to influence outcomes.

Read More About Cross-Level Interaction Analyses Here[5]

Thus, in our evaluation framework, we merge mixed-method evaluation approaches with complex and robust statistical analysis to gain a more nuanced and innovative understanding of the ecosystem's effectiveness and influence. Multi-level mathematical or statistical modeling can enhance our understanding of the individual components and the overall effectiveness of an ecosystem. This matters because it gives us a more powerful tool to measure change and impact over time in a dynamic ecosystem.

Example: Evaluating an Innovation Ecosystem

To make our evaluation framework more concrete, we will illustrate it through the lens of a large-scale innovation and economic development ecosystem. The specific strategies and activities may vary from ecosystem initiative to initiative, but the key to this framework is that it is **designed to evaluate effectiveness and impact at multiple levels**.

We start with the background of an **innovation and economic development ecosystem.** To drive large-scale change such as economic growth or global competitiveness, a cohesive strategy for coordinated cross-sector partnerships is essential. Research shows that these ecosystems can be vehicles to spur innovation, drive mobility, and support entrepreneurship if they are optimized and strengthened[5]. Doing so creates more effective multi-sector initiatives to develop, build, and accelerate innovation, R&D, talent, and economic opportunities.

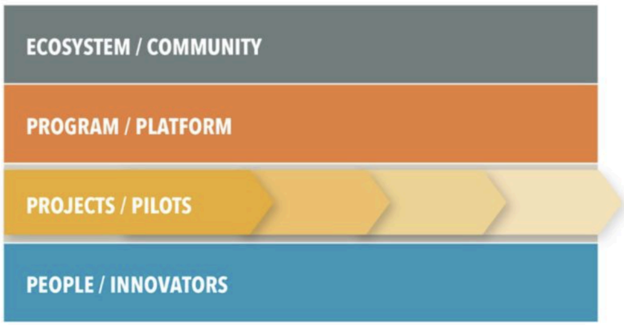
How do we know if we have an optimal ecosystem built for change? We evaluate it as a complex and interconnected set of activities occurring at different scales throughout the ecosystem over time. We assess whether and how those activities influence changes to the ecosystem itself and to the outcomes they are strategically designed to address. Ultimately, our framework guides a rigorous analysis of whether an ecosystem is an effective engine to drive large-scale change and how that engine performs at its many specialized tasks.

Aligning the Innovation Stack for Evaluation

In our innovation ecosystem example, we tailor the framework to evaluate what we call the ***Innovation Stack***[6]. This is a scaffold of innovation activities concurrently operating at different levels or scales in the ecosystem. These components should be treated as interrelated and interdependent in an evaluation rather than discrete one-off actions.

In our example, the ***Innovation Stack*** is evaluated not as individual programs or pilots or activities, but as a coordinated and dynamic system that operates at multiple levels.

The **theory of ecosystem change** looks like this:



The Innovation Stack © Orange Sparkle Ball, 2023

- *Innovators develop skills to design and run successful pilots* in order to:

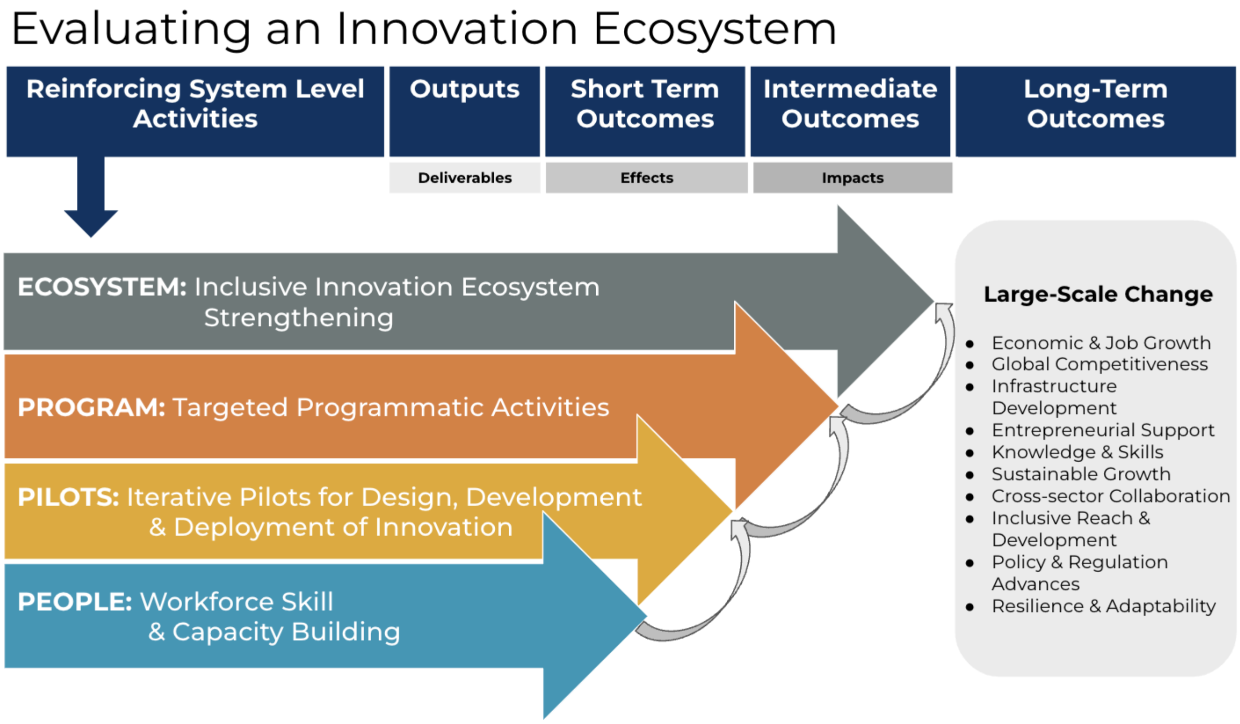
➔ *Iteratively test and refine innovation products, processes, and programs* in order to:

➔ *Build and scale a platform of value-based innovations for the market* in order to:

➔ *Allow communities to participate in/receive benefit from the innovation ecosystem*

Applying the Responsive Ecosystem Evaluation Framework

Here is our evaluation framework tailored to a large-scale innovation initiative.



We then build out the comprehensive evaluation plan using the framework - identifying specific methods and analyses, data sources, and resulting indicators of change. This is where we rely on traditional linear evaluation methods to measure the effectiveness of each level of activities - people, pilots, programs, ecosystems - on the short-term outcomes associated with those activities. We also know that our ecosystem initiative is likely occurring over a longer period of time - months or years - and change over time is important.

For example, our data collection and methods seek to address whether a workforce training program is effective at increasing knowledge or skills of individual participants and subsequent socio-economic status (**People**). We evaluate whether the pilots we run change consumer behavior or efficiency in delivery (**Pilots**). We evaluate whether our regionally-based innovation hub development programs are effective at producing more patents or additional investments (**Program**). We evaluate whether our quarterly all-ecosystem demonstration events increase collaboration or interactions between community members, public sector, private industry, and academic institutions (**Ecosystem**).

Typically, traditional evaluations stop here, a report is written, and insights are gained about the effectiveness of each activity. This generates actionable information on whether to invest in more training, how to refine the products or processes that were piloted based on the results, which innovation development hubs were better at generating patents, or how private industry is reluctant to collaborate with each other but more receptive to academic partnerships. This is what we would expect to learn from a large-scale and comprehensive evaluation.

But How Do We Know We Are Making Enduring Change?

What remains unanswered is whether this initiative as a whole is capable of having an impact on long-term outcomes of scale. Does this innovation ecosystem improve job growth and gross domestic product indicators? Does it increase wages and salaries, decrease poverty levels, improve educational attainment, decrease unemployment, or increase the socioeconomic well-being of a community? Is the ecosystem strong enough to sustain lasting change over time?

This is where we introduce our statistical techniques to use data from our traditional evaluation to build our model of change over time on outcomes at different levels in our ecosystem. Depending upon our data collection methods, we can use raw measures (e.g. individual income, consumer behavior, new patents, ecosystem strength), grouping variables (e.g. building, neighborhood, city, region), or time indicators (e.g., 2022, 2023, 2024) as predictor variables in our analysis. Predictor variables are those thought to influence or cause change in outcomes. We use these variables to define the levels in our model – from People to Pilot to Program to Ecosystem – that we believe will have an impact on systems-level outcomes

What we are interested in is whether our entire ecosystem is effective in driving change in system-level outcomes such as job growth, gross domestic product, equitable wages and salaries, socioeconomic status, and so on. Our statistical models allow us to test the direct effects of each level of our system on outcomes – i.e. does a workforce training program alone predict higher wages in our region? We know that it is unlikely that a training program has the power to increase a community's wages from one year to the next or that one place-based innovation hub will move the needle on GDP in a region.

We do think, however, that the **combination of all of our efforts** as an innovation ecosystem will have an impact. This is where our statistical model allows us to test whether the interaction of all components of our ecosystem predicts changes in our systems-level outcomes over time. It helps us understand the relative effectiveness of our ecosystem-wide efforts, such as which combinations of activities are better (or not) at influencing different types of outcomes. This is where the value of our evaluation approach combined with solid research design and analytics is maximized.

This level of specificity helps innovation leaders map out their next strategies, amplify what works, dampen efforts that may be ineffectual, or invest in new partnerships or processes that are supported by evidence, data, results, and impact. From an innovation ecosystem perspective, everyone is working within a larger system on different aspects of change that are interconnected but not entirely visible to all. **We can begin to connect the dots on effective and sustainable systems change.** We will know if new skill development for a workforce is prepared to test and innovate new products or services; Whether new startups, markets, and accelerator programs emerge from piloting and prototyping; if new research-development hubs and investments begin to grow across the region; and increased interactions and how collaborations across a larger network of people, organizations, and sectors spur the spread of new ideas and efforts. Ultimately, our framework allows us to map out and make visible the entire innovation ecosystem and to understand exactly whether and how it functions as a resilient and sustainable engine of large-scale change.

Bottom Line for Evaluating Ecosystems Designed for Change

As our example shows, this is the value of an ecosystem and its potential to be optimized for maximum impact. We think our evaluation framework and approach produce valuable data-driven insights on how to future-proof sustainable change at scale. It is our north star that makes visible the many ways in which a complex ecosystem interacts with and changes the world around us. We offer this to the field of systems change as a way forward in evaluating and measuring the impact of complex dynamic ecosystems. We also offer this to ecosystem leaders and participants who need to know whether or not they are making enduring change at scale. We can and should provide those answers with the tools and methods we have.

Our ***Responsive Ecosystems for Change Evaluation Framework*** is a call to action to bring the best methods and tools we have available to validate and quantify impact at scale.

KU | Social Innovation Lab

The University of Kansas Social Innovation Lab is a multidisciplinary research and innovation hub that explores the dynamic connections between people, places, and things within complex social systems. We work as a university bridge between public, non-profit, and private sectors. The Lab focuses on four main portfolio services: 1) Designing Meaningful Research; 2) Harnessing the Power of Community and Ecosystems; 3) Creating Transformative Technology; and 4) Developing Dynamic Governance Models. Grounded in over 25 years of experience working with cross-sector partners and communities across the country, we understand how to design, implement, and evaluate at scale from foundational theory advancement to individual programs or services, systems change, and complex ecosystems. Visit our website

ORANGE SPARKLE BALL

Orange Sparkle Ball is an innovation and impact accelerator, activating change through research, technology, and human-centered design. We measure the ecosystem, create innovation programs and initiatives supported by robust communication strategies, design and implement data-driven pilots, and evaluate progress toward outcomes. Our experience with government, industry, technology startups, public/private partnerships, and academia allows us to provide a full ecosystem approach to solutions. With an approach designed to consistently consider the ecosystem, the initiative or platform, pilots or projects, and the people who are championing change, we drive inclusive ecosystem growth. Visit our website

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References

1. Touliou, Katerina, and Evangelos Bekiaris. "Building an inclusive ecosystem for developers and users: the role of value propositions." In Advances in Ergonomics Modeling, Usability & Special Populations: Proceedings of the AHFE 2016 International Conference on Ergonomics Modeling, Usability & Special Populations, July 27-31, 2016, Walt Disney World®, Florida, USA, pp. 339-346. Springer International Publishing, 2017

2. Duarte Alonso, Abel, Seng Kiat Kok, Seamus O'Brien, and Michelle O'Shea. "The significance of grassroots and inclusive innovation in harnessing social entrepreneurship and urban regeneration." European Business Review 32, no. 4 (2020): 667-686.

3. Mitchell, Jess, and Jutta Treviranus. Chapter 4 - Inclusive Design in Ecosystems. In: Vimarlund V, editor. E-Health Two-Sided Markets [Internet]. Academic Press; 2017 [cited 2024 Jul 5]. p. 43–61. Available from: https://www.sciencedirect.com/science/article/pii/B978012805250100006X

4. Aguinis, Herman, Ryan K. Gottfredson, and Steven Andrew Culpepper. "Best-Practice Recommendations for Estimating Cross-Level Interaction Effects Using Multilevel Modeling." *Journal of Management* 39, no. 6 (September 1, 2013): 1490–1528. https://doi.org/10.1177/0149206313478188.

5. Sommet, Nicolas, and Davide Morselli. "Keep calm and learn multilevel logistic modeling: A simplified three-step procedure using Stata, R, Mplus, and SPSS." *International Review of Social Psychology* 30 (2017): 203-218.

6. Guevara, Tom, Alexander Kersten, and Srishti Khemka. "Inclusive Innovation for U.S. Economic Growth and Resiliency," May 30, 2023. https://www.csis.org/analysis/inclusive-innovation-us-economic-growth-and-resiliency.

7. Orange Sparkle Ball. "The Innovation Stack"; 2023. https://www.orangesparkleball.com/how-we-do-it