Embracing uncertainty: foundations of a learning system for food systems transformation

Kai Mausch\textsuperscript{1}, Andy Hall\textsuperscript{2}, Caroline Hambloch\textsuperscript{3}, Costanza Conti\textsuperscript{4}, Michael Hauser\textsuperscript{5}, Salina Abraham\textsuperscript{6}, Philippa Hammond\textsuperscript{7}, Enayat A. Moallemi\textsuperscript{8}

\textsuperscript{1} The Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF), Nairobi, Kenya and Bonn, Germany, ORCID: 0000-0002-2962-7646. \texttt{K.Mausch@cifor-icraf.org}
\textsuperscript{2} The Commonwealth Scientific and Industrial Research Organisation (CSIRO), Canberra, Australia. ORCID: 0000-0002-8580-6569
\textsuperscript{3} The Humboldt University of Berlin, Berlin, Germany. ORCID: 0000-0003-2450-1742
\textsuperscript{4} Stockholm Resilience Centre, Stockholm, Sweden. ORCID: 0000-0002-6138-1543
\textsuperscript{5} University of Natural Resources and Life Sciences, Gregor Mendel Strasse 33, A-1180, Vienna, Austria; The Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF), Nairobi, Kenya. ORCID: 0000-0003-3816-9218
\textsuperscript{6} The Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF), Nairobi, Kenya.
\textsuperscript{7} The Commonwealth Scientific and Industrial Research Organisation (CSIRO), Canberra, Australia. ORCID: 0000-0001-8238-9790
\textsuperscript{8} The Commonwealth Scientific and Industrial Research Organisation (CSIRO), Canberra, Australia. ORCID: 0000-0001-8346-4043

Abstract

We propose a transformative learning system based on a review of uncertainty emerging from system complexity. The framework is built on locally led action and embedded in a learning system that aiming at transforming the food systems. It is widely agreed that food systems need transformative change to meet societal goals. However, despite this agreement, the implementation of a systems transformation agenda appears to have stalled. We argue that the reason for this failure can be attributed to the complexity of the task and the inherent uncertainty. Based on a review of uncertainty and complexity in change processes, we outline a transformative learning system that has the capacity to achieve the intended transformation. This system requires shifts in roles and modes of operation to facilitate change and to learn about system responses to localized disruptive change. Focusing on the core functions of the new system, we discuss who and how this change can be triggered and how this, in turn, will change the operational modalities of people, the process of change, and the structures and institutions involved in the process. We argue that the foundations of uncertainty and the focus on learning inherent in the new system will facilitate a more agile process. This will allow actors to learn from decentrally pursued food systems reforms and thereby the organic emergence of heterogeneous pathways.

Keywords: Complex systems; Sustainability; Equity; Localization; Tropentag 2023
1. Introduction

The need for transformations in our food systems is widely acknowledged, highlighting a pressing global issue (Fanzo et al., 2020; IPES-Food & ETC Group, 2021). Currently, these systems are failing to achieve desired societal outcomes (Ruggeri Laderchi et al., 2024; Rockström et al., 2023) and are causing significant negative impacts on people, climate, and the environment (Béné, 2022; Fanzo et al., 2021; Thornton, 2023). The lack of institutional capacity to respond effectively to uncertainties such as disruptions and external challenges exacerbates these effects. While the food systems related problems manifest in different ways around the globe, they are present everywhere and the urgency to tackle them is growing. Despite the global consensus on the need for change, recent years have seen insufficient progress in reforming food systems, resulting in a regression in achieving food and nutrition security goals. This situation prompts a critical question: why, despite widespread agreement on the need for systemic transformation, has there been so little advancement in effecting this change?

We argue that the theories of systems transformation provide insufficient guidance on how to put food systems transformation into practice and lack agreement on the types of pathways to catalyze such transformation (Hubeau et al., 2017; Leach et al., 2020; Feola, 2015; Scoones et al., 2020). Furthermore, the connections and feedback loops between local action to national, regional, and global connections are often overlooked (Douthwaite and Hoffecker, 2017; Mayne et al., 2017). This detaches local action from the global transformation agenda that they could valuably contribute to. However, a major challenge is the overwhelming scale of the task implied by transformation (Stirling, 2014), which can make practical action to support it seem daunting at the local level. As a result, local initiatives may focus on smaller, more manageable, and isolatable problems within their sphere of control, which may appear insignificant in the context of the larger food system.

In this paper, we argue that to effect real change in our food systems, we must adopt a new approach that embraces uncertainty in how change is governed and planned. We therefore propose a new transformative learning system to effect the food systems change that is needed. Food systems policies and interventions have mistakenly focused on seeking the transformation ingredients in project-scale designs, planning methods, and impact assessment techniques that are informed by a simple, linear impact logic. However, these ingredients insufficiently manage uncertainties. Consequently, our proposed approach is based on the idea that change is unpredictable and requires flexible thinking and methods from systems science. This also requires awareness of complex food systems interactions across scales that enable or inhibit change. Thus, we suggest that what is required to progress food systems transformation is to advance capacities for localized but systems focused learning and adaptation during change processes with inherently uncertain outcomes. To accomplish this, we propose the idea of a transformative learning system as a way of thinking about how different capacities to learn and adapt can be utilized and be developed in an integrated way. This idea builds on the existing concepts and tools from systems sciences, change management, and complexity-aware approaches.

We will outline how the roles of everyone involved in food systems reforms will have to change. The focus will be on locally framed and implemented initiatives as the source of disruption and inspiration within a cross-scale learning framework. This framework connects
experimentation and ensures systemic learning across scales. The proposed framework responds to the deep uncertainty associated with challenges such as food systems transformation. It is more practical to navigate the situation, i.e. *muddling through*\(^1\), rather than believing that we can engineer pathways to a better future.

To provide the conceptual logic of this transformative learning system, we review foundational concepts addressing uncertainty and complexity. We begin by defining uncertainty as a property of complex systems and explain why learning is critical to managing it. Global development debates and practices are increasingly beginning to grapple with uncertainty in complex systems as a key characteristic of pressing challenges such as sustainability, food and nutrition security, and socially inclusive growth. After introducing the theory and growing practice of dealing with uncertainty, we use this as a way to explain how the food systems transformation agenda is one that needs to be approached with uncertainty in mind. This foundation for the transformative learning system framework introduced above is then further described in section 3. The implications for food systems transformation are then discussed in section 4. Here we argue how a transformative learning system shift might be initiated and what changes are needed in mindsets and practices, institutions and systems, and financing mechanisms. We point to tools and approaches already in use that can be adapted to the functions of the transformative learning system. We conclude with a reflection on the larger changes and different ways of approaching global change.

2. Uncertainty, complexity and transformative change – a brief review

The topic of uncertainty is receiving renewed attention in research tackling, among other problems, global food systems challenges (e.g. Scoones and Stirling, 2020; DeMartino et al., 2024). Unlike risk where different known outcomes have known probabilities of materializing, uncertainty lacks calculable probabilities of certain outcomes (Scoones and Stirling, 2020). Since the 1960s, development economists have advocated for embracing uncertainty and more broadly system complexity (Hirschman and Lindblom, 1971; DeMartino et al., 2024). However, DeMartino et al. (2024) argue that ideas around uncertainty have been marginalized in development economics and therefore call for a revitalization of heterodox approaches that explicitly account for uncertainty. This paper builds from DeMartino et al. (2024) to argue that, like many societal challenges, the transformation of food systems needs to be understood as a complex systems problem and embrace uncertainty.

Uncertainty in food systems means that the future evolution, including the nature of shocks, drivers, and outcomes, is unknown or unknowable. Although there is a growing consensus that future food systems should be sustainable, inclusive, and just, it is uncertain which pathways, processes, and mechanisms are necessary to achieve this. The rising occurrences of climate-related disasters, pandemics, conflicts, and political and economic turmoil intensify uncertainties in food systems (Moore et al., 2023).

The implications for transformations, such as development practice, are that the approaches to and destinations of change pathways “remain deeply uncertain” (Scoones and Stirling, 2020). However, current economic approaches are still dominated by attempts to control

---

\(^1\) The term ‘muddling through’ draws from Lindblom (1959) and Hirschman and Lindblom (1971), who understand muddling through as incremental learning from changes in uncertain environments. Here, we think about muddling through as responding to and adapting to uncertainties in the implementation of interventions.
uncertainties (DeMartino et al., 2024). The expansion of indicators aims to transform uncertainties into quantifiable risks, disregarding the actual experiences of uncertainty and the current mechanisms that deal with its consequences (Scoones, 1994; DeMartino et al., 2024). For instance, early warning systems for famines in the drylands of Eastern Africa are intrinsically fraught with uncertainties related to weather forecasting and conflicts, which increases the likelihood of underestimating the impacts on food insecurity (Krishnamurthy et al., 2020). Simultaneously, many people in the global south, particularly those in fragile environments, frequently confront uncertainties as a fundamental aspect of their daily lives (see e.g. Scoones 1994). For example, pastoralists in Kenya adopt diverse practices in response to droughts, including sharing livestock, dividing herds, and negotiating land access (Mohamed and Scoones, 2023).

Complex systems theory provides a useful framework for understanding uncertainties inherent in food systems transformations. According to this theory, emergent properties and uncertain behaviors and consequences arise as change unfolds. Uncertainty is deeply intertwined with the characteristics of complex systems which imply uncertain outcomes. It is widely recognized that food systems must be understood and engaged with through the framing of complex systems (Hall and Clark, 2010; Kampelmann et al., 2018). This enables an understanding of the complex and interconnected web of actors, drivers, and interactions at different physical and temporal scales in the production, processing, distribution, consumption, and disposal of foods, generating non-linear and uncertain (and hence unpredictable) pathways of food systems transformations (IPES-Food, 2015).

Understanding food systems as complex systems requires an awareness that solving complex systems problems, such as food insecurity, cannot be achieved by simply analyzing the component parts of the system (Hambloch et al., 2023). Nonlinear cause-effects are inherent properties of the system itself (Conti et al., 2023; Hambloch et al., 2023). When attempting to improve food systems outcomes, the complexity and uncertainty of food systems can manifest in various and often contradictory ways. Clear interactions exist between different global targets, such as the SDGs, including synergies, trade-offs, and feedback loops. (Herrero et al., 2021). For example, achieving success in one area, such as increasing food availability through improved farm productivity, may unintentionally result in the exclusion of smallholder producers due to falling food prices, incomes, and profitability (Mausch et al., 2020). Similarly, relying solely on smallholder farmers to address food production and income shortfalls is unlikely to be effective unless more fundamental systemic issues are also addressed. This is because returns to farming are marginal on small land parcels (Gassner et al., 2019). Therefore, it is essential to address the material consequences that arise as uncertainty unfolds, such as food price increases and food supply disruptions.

The implications of uncertainty are part of daily lives especially for smallholder farmers, operating farms with marginal returns, the implications of uncertain outcomes are core part of decision-making process (Bacon et al., 2017; Molla et al., 2020). Furthermore, the complexity and uncertainty of food systems are often exacerbated by power dynamics and the political influence of dominant actors (Clapp, 2021). This can lead to unintended

---

2 This broad field of theory-informed practice (praxis) draws on a number of earlier ideas and fields of practice, including soft systems thinking which involves an action-oriented process to analyze and address perceived problematic social issues (Checkland and Poulter, 2010).
consequences, such as perpetuating poverty and malnutrition, despite well-intentioned development efforts (Leach et al., 2020). For instance, efforts to enhance diets and address nutritional security may face obstacles due to the interests and incentives of influential actors in food value chains who are seeking new sources of revenue (Hambloch et al., 2023; for a case study, see Ansari et al., 2018). In addition, it is important to note that powerful actors and their interests can greatly influence the way problems and solutions are presented. In situations where the outcomes and pathways for transforming food systems are highly uncertain, power and politics may restrict the range of possible pathways (Stirling, 2008; Scoones and Stirling, 2020).

Research on food systems and complex systems theory highlights the significance of managing uncertainty in practical-oriented transformation research (Thompson et al., 2007; De Martino et al., 2024). Programs and projects operating in complex systems will inevitably have unpredictable outcomes, making them highly uncertain. To address uncertainties, it is critical to adapt to emerging dynamics and processes through iterative, experimental cycles of testing, learning, and readjustment. This helps change the course of system adaptation (Thompson et al., 2007; Foran et al., 2014). To transform food systems successfully, it is essential to acknowledge that the process is complex and uncertain. This requires a fundamentally different approach to intervention and transformation.

3. A coordinated autonomous learning system for transformation

3.1. Learning needs to be centered on locally led action.

Based on our review, transforming food systems requires adapting to complex system dynamics and uncertain future outcomes. However, it is unclear how actors should embrace this complexity and uncertainty. When outcomes and impacts are inherently unknowable, actions and interventions should follow principles\(^3\) to ensure that common visions of inclusive, just, and sustainable food systems are achieved.

A transformation paradigm framed by uncertainty, it is argued, must be characterized by experimentation, learning and adaptation in a particular setting to create a new capacity to act (Bossyns and Verle, 2016). An increasing uncertainty-orientation underlines that food systems transformation is necessarily a locally rooted process as emerging uncertainties are highly context specific (Sayer et al., 2008). Consequently, this requires acquiring tacit knowledge which in itself is a type of knowledge that is not gained in a plannable approach but reveals itself through practice and the acquisition is therefore deeply uncertain in nature. Coupled with the insight that, at the local level, people have long been dealing with uncertainties and have deep insights how they unfold, fundamentally reframes the role of interventions to one of supporting autonomous experimentation.

To ensure people-focused, local innovation and leadership during food systems transformations, new approaches and lines of support should align with the diverse visions and needs of the people projects engage with (Mausch et al., 2021). It is important to consider how current and future technologies could support diverse and multiple pathways defined

---

\(^3\) While there is a multitude of elaborations of principles in existence, we do not see fundamental disagreements among them, so we do not dive into a review but broadly refer to them as principles of inclusivity, justice and sustainability.
and led by the people (Mausch et al., 2021a). This shift in focus raises different questions that
are at the heart of learning needs. The process would provide insights and directions on
current pathways and their inherent diversity, with the participants' vision at the core. This
would allow for a transformative reshaping of operational modalities and focus of support
mechanisms, democratizing the innovation process.

When local conditions are diverse and individual visions for the future are heterogeneous, a
localized and decolonized approach to interventions becomes critically important. Both can
also be understood as ways to embrace uncertainty more directly, even if they are not
explicitly stated as such. This challenges top-down defined solutions and pathways and
emphasizes the agency of the people in the process. To promote diversity and alternative
pathways, it is necessary to prioritize inclusivity, cultural sensitivity, capability enhancement,
adaptivity, and evidence-based approaches. This requires a significant shift in finance
mechanisms, with more financial resources allocated to local actors who are involved in the
local context and may be part of social movements that oppose unjust practices.

We argue that uncertainty and the resulting need to connect locally led processes of
experimentation with a broader food systems transformation agenda requires a fundamental
shift in roles across people and structures within the system. Actions and ideas will be shaped
locally by those people and communities that are affected. Simultaneously, organizations
overseeing projects and broader structures and institutional arrangements must directly
support these local processes, as well as connect localized actions towards learning across
time and scale at the meta-level. Figure 1 summarizes the changes in roles within an
integrated learning system and the resulting benefits.

---

4 Localization of development has recently regained significant traction and appears to be mainstream now
among development agencies (Bilsky et al., 2021; North and Longhurst, 2013; Reddy, 2016). Localization of
development refers to the shift towards increased access for local actors to funding streams, decision-making
spaces, capacity development, local leadership, and policy influence (Robillard et al. 2021). Fundamentally, it
recognizes that local actors are often better positioned to contextualize uncertainty and respond to it.
Localization became formally part of mainstream humanitarian development after the 2016 World Humanitarian
Summit. For the currently wide endorsement, see for example the widely signed and endorsed (Charter for
Change, 2024)

5 “Decolonizing development means disrupting the deeply-rooted hierarchies, asymmetric power structures, the
universalization of Western knowledge, the privileging of whiteness, and the taken-for-granted Othering of the
majority world.” (Sultana 2019, p. 34). This involves addressing power inequalities in development finance and
implementation, respecting, and including diverse forms of knowledge, and promoting a diversity of
transformation pathways in food systems (Nelson and Edwards, 2020). Despite also being a political project,
decolonizing development implies the redefinition of goals where personal life goals become the focus and
multiple pathways are therefore supported independently from outside agendas or priorities (Domptail et al.,
2023; Herring et al., 2020).
Rather than attempting to control unknowable processes and outcomes, we argue that the emerging learning focused approach must recognize and embrace uncertainties. The emphasis should be on providing a framework to guide investments and actions that will facilitate local actions learning and connect these across scales within the system during the transformation process. The intersection of this learning system and shift in focus to localized leadership and action is critically important. This intersection is where new insights, forms of knowledge, and insights about system dynamics will emerge.

### 3.2. The mechanics of the learning system

The combination of a locally centered approach of experimentation enabling transformative change and the embeddedness into a system of learning to leverage broader systemic insights and facilitate adaptations calls for three critical capacities to embrace uncertainty needed at multiple scales for food systems transformation.

**Capacity for local action within systems.** When new roles are introduced in a learning system, it is necessary to develop additional capacities and skills. It is important to strengthen the capabilities and skills of individuals, projects, and organizations involved in the transformation process. This will enable them to make sense of unfolding system-level events and outcomes through learning, evaluation, planning, and replanning processes (Cronkleton et al. 2022). There is ample evidence of the way many communities living under conditions of uncertainty have developed a repertoire of coping strategies to handle unpredictable events such as droughts or commodity price crashes (Scoones, 1994; Mohamed and Scoones, 2023). The food systems transformation agenda suggests that communities across the world will need to deal with a more profound degree of uncertainty that will require a series of adaptations at local, national, and global scales. People, communities, organizations that have been dealing with the uncertainties that affect them are arguably in the best position to also drive change within
the transformation process and test new ideas and responses. What needs support is the strategic learning on their way through the uncertainty of unfolding events will thus be more important than ever.

**Capacity for coordinated action and collaborative sensemaking across actions.** With a focus on system transformation that is emerging from local disruption and inspiration, a need for a much greater degree of coordination across local initiatives emerges. This involves synergizing efforts, avoiding duplication, and building coalitions of interest. It also entails supporting broader learning efforts to strengthen the collective muddling through process that uncertainty demands. Another part of this form of collaboration across local efforts is to gain sight of negative consequences and trade-offs that may be affecting people in other geographies. Again, strengthening the learning and evaluation capability of people and organizations will contribute to better coordination across geographies. However, this process also requires a broader range of methods to consider other forms of knowledge and insights, allowing tacit knowledge to emerge.

**Capacity for distributed governance and trust.** New governance arrangements are necessary for integrating local knowledge and learnings across scales towards larger system transformation. These governance arrangements need to be based on full local leadership and agency to engage in transformation within the lived realities of people. Specifically, governance arrangements that form the basis for legitimacy and resulting forms of leadership are required to set a broader and more democratic global agenda. Put more simply, local ownership of transformation involves not only ownership of local agendas, actions, and outcomes, but also ensures a role in influencing national and global agendas that inevitably set the framework conditions for local action through regulation, incentives, and market mechanisms. The necessary glue in such arrangements are forms of trust that build on the transparency of arrangements to collect information on transformation outcomes and lessons rooted in the values of people and organizations.

To transform the food system, it is necessary to embed capacities to embrace uncertainty in a system of learning functions. This will allow individuals within the system and the system itself to learn during the change process (see the inner circle of Figure 1). The combination of these capacities and functions, embedded within new roles, will form the framework of our proposed integrated transformative learning system (see Figure 2).
We propose 5 key learning functions within this learning focused framework to harness the capacities to embrace uncertainty for transformative change:

1. **Learning for continuous improvement of local action**: Focuses on framing the problem locally and strengthening the learning and evaluation capacity of people and organizations to understand and manage their own transformation journey within the system. Provides the means to experiment with action and impact logics against aspirations to change parts of food systems performance, and to develop lessons about what works and where broader system blockages or lock-ins occur.

2. **Learning across localized action**: Focuses on continuous, incremental, and adaptive peer-to-peer learning. Provides the means to generate lessons from transformation experiences in different contexts of uncertainty and across scales (people, organization, countries, ...).

3. **Practice to policy learning**: Focuses on locally embedded practice-to-policy learning. Provides the means to communicate lessons from local practice to policy and decision makers in governments, development agencies and funders. Provides information and lessons on the need for further policy and institutional reforms to achieve food systems performance goals.

4. **Learning about how systems change is tracking towards intended goals**: Focuses on collaboratively developing the means to track progress and directionality across different contexts and using multiple means to extend performance insights.

5. **Generating information to inform governance at multiple scales**: Focuses on generating information on governance, outcomes and impacts. Provides the means to generate information to transparently inform different stakeholders about the progress of ongoing transformation processes towards food systems performance goals, highlighting trade-offs and perverse consequences, especially for marginalized groups. Provides politically powerful metrics to catalyze continued investment.
The role of the framework is twofold. It will help conceptualize the organization of an integrated set of learning processes needed to support engagement with the uncertainties of the food systems transformation agenda. Perhaps more importantly, it will serve as a framework for guiding investment in food systems transformation toward the capabilities and institutional arrangements and sources of change needed to enable these learning functions. We refer to this as a transformative learning system because it is transformative in two senses. It is transformative in the sense that it provides a way of supporting local action and learning to disrupt and direct efforts in the wider food systems to experiment through the transformation, while keeping sight on the systemic changes unfolding and reflecting on principles against the emerging outcomes. In this way, the learning dynamic between local and systems scales is enabled through virtuous learning cycles. It is also transformative in the sense that it disrupts and transforms the way societies engage with uncertainty challenges by providing a different way to imagine and organize the learning arrangement required in such circumstances. The transformation of food systems is one example, but there are many equally pressing challenges of this kind.

Our purpose here is to highlight the emerging outcomes of a transformative learning system and not to unpack the sorts of tools that could support these learning functions. Supporting people and organizations to muddle through by strengthening learning and evaluation capacity is in itself not a new idea and is core to the established field of complex systems practice. Nor could it be argued that strengthening learning and evaluation capability alone is sufficient to transform food systems. There is an existing suite of tools and approaches to operationalize the kinds of learning that these functions imply. Instead, our goal is to highlight a different way that actors from the local to system scale can engage differently and meaningfully in the food systems transformation agenda.

The new actions that emerge from new roles will be different. Changes in funding mechanisms, investments in R&D, infrastructure and mindsets will be required along the way. More importantly, the argument here is that without a more integrated set of learning and evaluation capacities are locally rooted and reach across scales, choices, and priorities in different areas of investment and public debate will be blind to and unprepared for the uncertainty of realities that will characterize food systems transformation.

4. Steps towards putting a transformative learning system into practice - a discussion

4.1. Triggering change

The implementation of the proposed transformative learning system needs to be a process of experimentation and testing under uncertainty, accompanied by research. It requires major changes at all levels and among all stakeholders. At times, the magnitude of change required may seem daunting and may lead to a reversion to the old habit of addressing problems in isolation within the process. However, the shift to a learning system for transformative change could begin gradually and in a decentralized manner.

In fact, many tools already in use today (e.g. multi-stakeholder platforms, theories of change, MEL systems) will remain relevant for the new learning system (see Table 1). They will need to be deployed in different modes and for a set of adjusted goals. For individuals in the sector,
organizations in the sector, and the sector as a whole, this implies short-term adjustments with longer-term changes in sight.

Table 1 summarizes the new roles emerging from the previous section and provides some examples of existing tools that can be deployed in different ways to address these new roles.
<table>
<thead>
<tr>
<th>Function</th>
<th>People</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Leading and managing locally</strong></td>
<td><strong>New role</strong></td>
<td><strong>Tools</strong></td>
</tr>
<tr>
<td></td>
<td>Primary source of knowledge, problem framing, solution identification, project leadership</td>
<td>Design-thinking toolbox, Community engagement workshops, leadership training</td>
</tr>
<tr>
<td></td>
<td><strong>Tools</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Capacity development for systemic thinking, accepting higher risk for innovation</td>
<td>Experimental approaches, grant schemes, challenge programs</td>
</tr>
<tr>
<td><strong>Learning across localized action</strong></td>
<td><strong>New role</strong></td>
<td><strong>Tools</strong></td>
</tr>
<tr>
<td></td>
<td>Facilitate emancipatory learning, challenge status quo networks, communities of practice</td>
<td>Utilize existing capabilities, learning-oriented approach, sustainable financing</td>
</tr>
<tr>
<td></td>
<td><strong>Tools</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Practice to policy interface</strong></td>
<td><strong>New role</strong></td>
<td><strong>Tools</strong></td>
</tr>
<tr>
<td></td>
<td>Generate and disseminate disruptive lessons and information</td>
<td>Stock-taking exercises</td>
</tr>
<tr>
<td></td>
<td><strong>Tools</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Tracking how systems change/Transform</strong></td>
<td><strong>New role</strong></td>
<td><strong>Tools</strong></td>
</tr>
<tr>
<td></td>
<td>Provide localized insights, manage trade-offs</td>
<td>Mapping exercises, local case studies</td>
</tr>
<tr>
<td></td>
<td><strong>Tools</strong></td>
<td></td>
</tr>
<tr>
<td><strong>New knowledge about systems</strong></td>
<td><strong>New role</strong></td>
<td><strong>Tools</strong></td>
</tr>
<tr>
<td></td>
<td>Integrate diverse knowledge sources</td>
<td>Collaborative research platforms, knowledge sharing forums</td>
</tr>
<tr>
<td></td>
<td><strong>Tools</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Table 1: Practical steps towards the transformative learning system: changing roles and corresponding tools for people and system.*
We are already seeing glimpses of things moving in directions that are consistent with what the transformative learning system would look like - for example, the need for localization is widely recognized. This is the starting point connecting and implementing the learning elements across locations and levels.

### 4.2. Shifting mindsets and doing things differently

The foundation of the new system is a shift in mindsets and ways of thinking. For social conventions, we know that it takes a relatively small minority of about 25% of a group to change in order to reach tipping points (Centola et al., 2018). This can start with thinking about different questions, adding new dimensions to the discussion, and doing things differently. From there, it is a matter of building strategic alliances within and across all levels and building momentum. Similarly, at the organizational level, food systems actors should form strategic alliances with groups that are challenging current system practices, such as social movements, labor unions, and farmers’ organizations, to enable transformative change from the grassroots level, rather than trying to engineer it from the top-down (Behar, 2022). This is where mutual learning occurs, and local and global agendas intersect to facilitate transformative change.

For individuals, the beginning of the change process is simple, yet challenging. Adopt a learning perspective and reflect on current projects with a systems transformation perspective. This involves adopting an adaptive and reflexive approach that allows for a different set of questions to be asked. It should involve adding new and different types of metrics to monitoring indicators that focus more on the process of change, taking a hard look at the assumptions in theories of change, or having a different conversation with people engaged in or affected by the project. Embracing the uncertainty that is already part of daily operations and using it as an element of reflection could already provide a new perspective on the process and lead to new insights. These are the first steps that can be incorporated into current project mechanisms at little or no additional cost while generating valuable insights for systems transformation processes.

However, the project environment itself requires a different setup. Beyond these tweaks in the current project environment, which are helpful to start the process of adding new perspectives, they are not sufficient to transform the sector. For the learning system to start functioning, the focus must be on the new sources of disruption to the current system and new perspectives for generating insights into the system responses. This will need to be accompanied by new types of project governance. Engagement processes will have to take different forms. Most radically, it would take the opposite form of today’s standard operations and start from the local population that engages an agency to support their muddling process, rather than agencies implementing solutions in a location.

This new arrangement will result in project participants and local organizations playing a very different role in the process. Projects will be led locally and institutions will play a supporting role providing feedback into the process and offering learning frameworks and strategies. The tools currently in use are already able to accommodate these changes and remain relevant, although they will need to be deployed in different ways and forms. One example is Theories of Change (ToCs). On a practical level, this means a slightly more complex set-up where locally led projects and corresponding ToCs need to be embedded in a higher-level learning structure that is able to facilitate learning and progress assessment. For the system-level learnings, ToCs will also need to be broadened to incorporate more elements that reflect the complexity of food systems dynamics that are beyond the control of localized actions, but highly relevant as
they influence the local environment. Therefore, clear assumptions of these interactions should be made and then focus on learning about their validity.

Projects need to be learning oriented. They need to acknowledge the scarcity of system capacity, be trust-based, build on local innovation and knowledge (Liverpool-Tasie et al., 2020), and embrace adaptive, responsive management approaches and reflexive learning. Over time, this will allow a deeper understanding of system responses to local changes and facilitate the transformation process through adjusted sets of local actions that trigger system changes in the right direction. This broader learning needs to be cascaded, reflecting, and linking local learning. A multi-way coordination and communication process, designed to allow different intersecting learnings, will support these shifts and insights, and trigger a new set of changes within the already changing local parts of the system. Uncertainty at all levels is a key feature of the process, and rather than shying away from or attempting to control these uncertainties, they should be recognized as key aspects that facilitate the learning journey towards understanding system change.

4.3. Implications for systemic change

For these localized lessons and insights to be harnessed effectively, evaluation methods that can handle complexity must be deployed. The necessary tools already exist; reframing them will improve the process. Evaluation also needs to be conducted in a more distributed format, ensuring participation at all levels to allow for interpretations from all perspectives. There is likely to be a need to shift the focus to more argumentative and formative types of evaluation, with a stronger orientation towards processes rather than outcomes. Reflexive learning by participants rather than external assessment and control will help to overcome biases and shed light on previously blind spots.

As it is recognized that transformative change in food systems takes time (almost certainly longer than standard project timeframes), newly established process indicators as well as impact and outcome indicators, need to be embedded at the institutional level rather than at the project level for more medium- to long-term timeframes. One example of this can be found in UNDP’s portfolio approach (UNDP, 2023) which aims to improve understanding of how transformation takes place. UNDP also offers some guidance on tools and their application (Haldrup, 2024), such as ToCs and corresponding MEL systems which need to put more emphasis on explicitly exploring and learning about causal processes and mechanisms rather than narrowly focusing on outcome and impact components.

Pathways for change will inevitably be highly diverse. Rethinking scaling from the perspective of a process of change rather than a solution and starting from the people to be supported rather than the technology, would be one of the new types of questions to be asked, leading to new knowledge about systems change. This is not to say that we should look for local initiatives that work and scale them - on the contrary, scaling would look at principles and value-based outcomes and scale approaches, processes and enabling systems rather than approaches or technologies. This diversity of pathways and focus on highly localized or even individual goals and resulting processes will ultimately highlight a new system of changes that lead to overall systems change.

Importantly for international development practice, a focus on strengthening a transformative learning system opens up a new avenue for interventions that focus on the institutional developments needed to strengthen the functioning of these systems at all levels and scales.
4.4. Funding for new roles and functions

While there is scope to start the process within current mechanisms, new financing mechanisms and approaches have the power to accelerate the process and effect deeper changes. In a facilitative role, financing mechanisms and conditions should avoid glossing over inherent uncertainties. The new functions of the transformative learning system will need to accommodate two basic elements: 1. Institutional funding to allow learning functions to perform beyond projects, 2. Funding for autonomous localized action in the absence of predefined outputs and outcomes - this can be done directly or indirectly through other institutional arrangements.

Opening up spaces for experimentation and localized muddling with a larger vision for food systems transformation has the potential to accelerate the changes we desperately need. The Think Tank Initiative, for example, highlighted that core funding, committed for 10 years, enabled organizations to learn and implement strategic shifts (Christoplos et al. 2019). Along with closer vertical and horizontal coordination, and a focus on the comparative advantages of both donor agencies and grantee organizations at all levels, a learning system could quickly gain traction and effect change.

Conclusions

In order to effectively transform food systems, it is essential to navigate ever-increasing uncertainties. Transforming complex food systems must be a process of adapting to these systems and stimulating innovation to achieve new properties such as sustainability, equity, and justice. This approach supports alternative pathways and outcomes that may not yet be known. While the tasks may be urgent and daunting, the knowledge and capabilities of the entire system of actors are broad and powerful.

This shift is redefining our notions of success and failure and broadening the range of actors driving change and the skills they need to effectively navigate uncertainty. There is little disagreement about the norms and principles that should accompany these changes, but there has been little acknowledgement of uncertainty. Using the emerging mechanisms of localization and decolonization as a starting point, we proposed a new learning system that can facilitate a democratic approach to transformation and limit the risks of derailment by vested interests.

We believe that any intervention, regardless of its size, can contribute to learning and system transformation during implementation. Each initiative should serve as systems probe that delivers local progress and, more importantly, improves our understanding of the system itself, its reactions to the probe, and the underlying dynamisms. The focus should not be on the degree to which the system has changed, but rather on how it has changed. Through this process we can learn how the entire system reacts to certain shifts and how these changes translate to different outcomes.

Small tweaks and shifts in focus may be insignificant in isolation, but when embedded in a larger learning system that spans all levels, they can become transformative. The argument presented is that we should not strive for perfection in innovation, but rather for perfection in learning. Food systems actors should embrace muddling as a new and valid approach that serves a learning purpose - purposeful muddling. For those funding the transformation, it will require a shift in approaches and mechanisms that involve a higher degree of uncertainty in outcomes and an increased focus on the process. If food systems actors can achieve this and
demonstrate how to manage this complex agenda in practice, it can set a new standard far beyond the food systems arena and have a positive effect on other complex systems facing similar needs for transformative approaches and seemingly intractable challenges.

Statements and Declarations

The authors declared that they have no conflict of interest.

References


Charter for Change (2024). https://charter4change.org


