



D2.6 Update of the Guidelines

Version 1.3

Submission date:

Dissemination Level: Consortium

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873112

Version log

Version	Issue Date	Authors	Notes
1.0	07/01/2022	Santtu Lehtinen (VTT)	Document creation and writing the structure
1.1	11/16/2022	Emad Yaghmaei (TUD)	Review
1.2	11/22/2022	Martijn Wiarda (TUD)	Review
1.3	11/30/2022	Santtu Lehtinen	Integrating comments and general revision

EXECUTIVE SUMMARY

This document represents an update of the initial guidelines and the transformative capacity framework outlined in deliverable 2.1 (Wagner and Wilhelmer 2020). As a specific outcome of this deliverable 2.6, the guidelines are integrated with insights gathered during the project through various means such as discussions and literature reviews.

The deliverable is based on the idea that implementing RRI practices through the transformative capacity framework in a complex, volatile, and turbulent world requires complementary approaches to organizational and institutional change. Therefore, we analyzed four different perspectives that take these factors into account, namely: ***institutional entrepreneurship, transition management, resilience studies and systems thinking***. A novel framework was created on the basis of the similarities between these four perspectives and the relevant lessons learnt. The principles of the framework derived from the literature were structured as follows:

- **Develop understanding on how a system functions:** contextual dynamics and institutional logics of an organization need to be analyzed and understood to implement systemic and transformative change.
- **Create pockets of change such as transition arenas:** Foster the development of safe spaces for change agents, frontrunners, and institutional entrepreneurs to interact and experiment with novel practices.
- **Create shared visions and narratives for transformative change:** Visions help to stimulate the mobilization of advocacy coalitions and guide the development of niche alternatives for the existing regime.
- **Enable systems thinking and adaptive resilience:** complex and turbulent operating environment requires the fostering of diverse mental models, interaction patterns, and heterogenous sense-making approaches.

According to the insights gathered from these novel perspectives, the implementation of RRI practices and transformative change requires ***shared visions and narratives; change agents such as institutional entrepreneurs; and the mobilization of advocacy coalitions***. Moreover, following the relevant literature, we emphasize that even small initial changes can lead to substantial system wide impacts. In terms of implementing RRI practices and principles this means that ***even a small group can achieve institutional change if there's enough skill and resources to conduct a systematic transition towards a new institutional regime***. In particular, ***the implementation of RRI practices through transformative capacities requires understanding on pre-existing institutional logics***.

To summarize, the four perspectives of institutional entrepreneurship, transition management, resilience studies and systems thinking can help to better understand and implement the existing transformative capacity framework.

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1-INTRODUCTION

This document represents an update of the initial Co-Change guidelines and the transformative capacity framework outlined in D2.1 (Wagner and Wilhelmer, 2020). During the project, the transformative capacities outlined in the deliverable have been implemented in the project in various formats such as Co-Change Labs and Forums to assist in the process of implementing institutional change. We are particularly interested in the utilization of collective power for path-deviant institutional change.

The result of this deliverable is a refined and revisited version of the Co-Change guidelines. The update of the guidelines is based on theoretical and practical learnings gathered during the project. Specifically, **we utilize four different perspectives, or lenses, for the update of the existing transformative capacity framework:**

- 1. *Institutional entrepreneurship literature***
- 2. *Transition management studies***
- 3. *Resilience studies***
- 4. *Systems thinking***

The central purpose of this deliverable is to provide new approaches and perspectives that can enhance the resilience of the organizational change processes in the Co-Change Labs. In our view, the approaches of **institutional entrepreneurship, transition management, resilient leadership** and **systems thinking** can help to foster adaptive capacity vis-à-vis changing environments.

In the next chapter, we present the existing Co-Change guidelines and the transformative capacity framework that were the starting point of this deliverable. The third chapter outlines a novel framework for the update of the guidelines by analyzing and integrating insights from the perspectives of institutional entrepreneurship, transition management, resilience studies and systems thinking. Fourth chapter updates each of the individual transformative capacities through the insights gathered from the four perspectives. Finally, the deliverable engages in a concluding discussion on the lessons learnt from the update process.

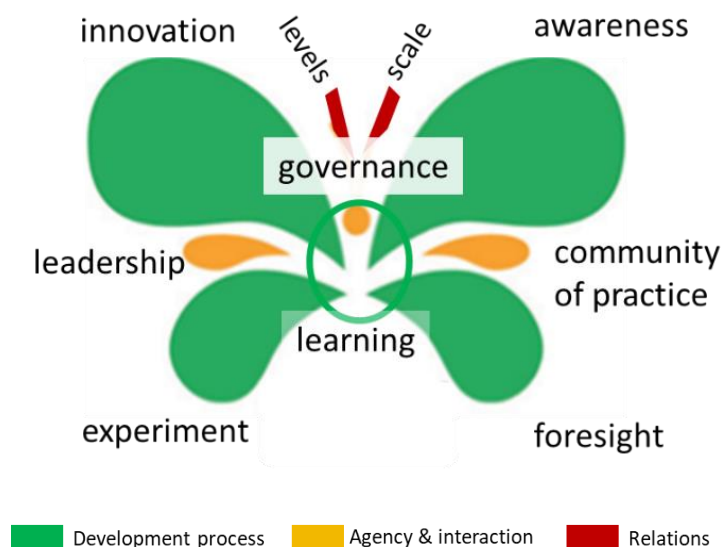
2-THE TRANSFORMATIVE CAPACITY FRAMEWORK

The issue of organizational change forms the core of the Co-Change project. The specific theoretical framework of the project resides in the concept of transformative change capacities (Wolfram 2016). According to Wolfram (2016, 126), **transformative capacity** “represents the power to change”, in essence a “collective ability” to “conceive of, prepare for, initiate and perform path-deviant change towards sustainability”, thus reflecting an “emergent property” of the relevant stakeholder context.

Wolfram argues that transformative capacity arises from “empowered actors” who have the power to enable and create change. Transformative capacities encompass “the collective ability to initiate and perform path-deviant change” towards sustainability. Moreover, transformative capacity is “an emergent property that reflects attributes of stakeholders, their interactions, and the context they are embedded in”. (Wolfram 2016, 126)

Figure 1 describes the interpretation of the TC framework into the Co-Change context in a visualized format.

Figure 1: The transformative capacity framework



The **Co-Change** project has aimed to function as a **platform for co-creation and mutual learning environment** in the field of implementing and institutionalizing RRI practices. Crucially, the project platform has been designed and implemented around the TC Framework. Following Wolfram (2016), the Co-Change project has identified the following total of 10 transformative capacities (abbreviated as “TC”):

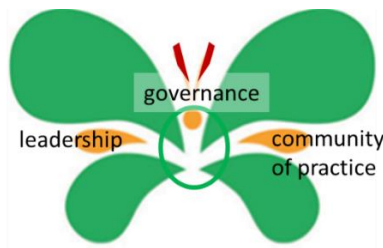
- ***Inclusive and multiform governance (TC1);***
- ***Transformative leadership (TC2);***
- ***Empowered and autonomous communities of practice (TC3);***

- **System(s) awareness and memory (TC4);**
- **Foresight (TC5);**
- **Diverse experimentation with disruptive solutions (TC6);**
- **Innovation embedding and coupling (TC7);**
- **Reflexivity and social learning (TC8);**
- **Working across agency levels (TC9);**
- **Working across political-administrative levels and geographical scales (TC10).**

These 10 transformative capacities can be divided into three main dimensions consisting of **Agency**, **Process** and **Relation**.

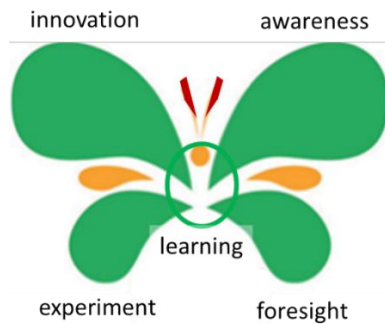
1. Agency: Agency and interaction are central elements of the Co-Change platform since the literature on Responsible Research and Innovation (RRI) related transformations emphasizes agency as a crucial component for initiating change and creating momentum (Owen et al. 2021). Similarly, agents are the crucial actors that can actually “exercise agency” (Jolly et al. 2020). The three transformative capacities related to agency are:

- **TC1 Inclusive and multiform governance**
- **TC2 Transformative leadership**
- **TC3 Empowered and autonomous communities of practice**



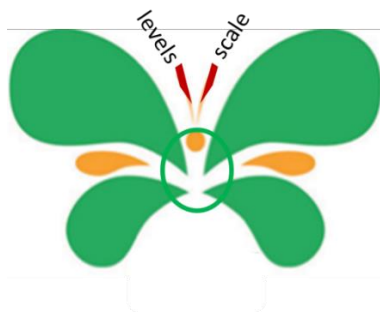
2. Process: The transformative capacities related to the Process are the steps that are needed to institutionalize agency. Processes are required to establish RRI practices as an integral part of the organization in terms of its identity, structure, and culture; without being overly reliant on specific change agents and their efforts (Steen et al. 2018). In the Co-Change project, the four Forums have focused on enabling and developing the core development processes related to the following five transformative capacities:

- **TC4 System(s) awareness**
- **TC5 Sustainability Foresight**
- **TC6 Diverse community-based experimentation**
- **TC7 Innovation embedding and coupling**
- **TC8 Reflexivity and social learning**



3. Relation: Finally, the Relational dimension of transformative change is spread out to all levels of human agency and across political administrative levels and geographical scales. The Co-Change platform aims to enable the establishment of diverse relationships across different levels, sectors, and geographical scales. The two relational transformative capacities are:

- **TC9 Working across human agency levels**
- **TC10 Working across political administrative levels and geographical scales**



The Co-Change Labs have utilized the Transformative capacity (TC) -framework as a guidance towards understanding the specific transformative capacities in their own context. The idea of transformative capacities is to bring together diverse groups of people to pursue shared goals within a wider coalition or network. This involves distributing capacities in the form of knowledge, skills, agency, and relationships across organizations, communities, and other stakeholder groups. The main goal of this effort is to enable systemic and sustainable change. The requirements for this type of changes are related to spaces for dialogue, deliberation, experimentation, collaborative inquiry, and learning. Specifically, transformative capacities are needed to achieve systemic and sustainable change. (Wagner and Wilhelmer, 2020; Wolfram 2016)

In the next chapter we will outline the process and the logic behind the update of the transformative capacity framework.

3- UPDATING THE TRANSFORMATIVE CHANGE FRAMEWORK

The focus of various change processes has traditionally been on consciously controlled decisions and actions through a linear sequence of events. However, in a complex world, change should be seen as an emergent, continuous, and non-linear process without a specific endpoint. Moreover, in a complex system, change in any part of the system can also lead to substantial impacts to the whole system. (Kangas 2019)

The conditions of complexity refer to the systemic interconnectedness and interdependence of the various factors that create the unpredictable nature of our operating environment (Kangas et al., 2019). These conditions are often described with the acronym **VUCA**, as in **Volatility, Uncertainty, Complexity, and Ambiguity** (Lawrence 2013). VUCA conditions originate from the growing interlinkages between economies, policies, and technology, which contribute to a process of global sociotechnical change (Nieminen and Hyytinen, 2015).

Crucially, besides substantial increases in wealth, welfare, and wellbeing, sociotechnical developments have exacerbated global challenges such as climate change, ecological degradation, and social injustices (Guston and Sarewitz, 2002). Indeed, complex sociotechnical involving various human and natural systems, has contributed to the emergence of **wicked problems** (Rittel and Webber, 1973), which refer to unstructured, complex, and persistent problems that cannot be solved with a single right answer, but rather only indefinitely managed.

As a result of these complex conditions and persistent problems, successful organizational change must be systemic in nature (Geels and Schott, 2007). Accordingly, we aim to complement the existing framework of transformative capacities with approaches, tools, and perspectives originating from **institutional entrepreneurship, transition management, resilience studies** and **systems thinking**.

3.1 Institutional Entrepreneurship

Our first perspective on systemic change is provided by institutional entrepreneurship, which focuses on how actors shape and transform institutions through visions of divergent change and by mobilizing allies to translate the vision of change into reality.

Institutional entrepreneurship as a concept originates from the broader social science debate on “**structure versus agency**”. Indeed, the term institutional entrepreneurship consists of the juxtaposition of two seemingly contradictory concepts **institutions** and **entrepreneurship**, which can be perceived as representing both sides of the debate: While research on institutions traditionally emphasizes the **structures** arising from institutional continuity and conformity, the literature on entrepreneurship has focused on novel change through creative **agency**. (Garud et al., 2007)

The literature on institutional entrepreneurship has sought to transcend this dichotomous debate between structure and agency by shedding light on the question of how novel practices become institutionalized (Garud et al., 2013). Instead of focusing on structural determinism and the role of exogenous shocks in institutional change, the emphasis in institutional entrepreneurship has been on the role of “embedded agency” (Garud et al., 2007). More specifically, the focus has been on the role of the so-called “institutional entrepreneurs”.

These institutional entrepreneurs can be defined as “change agents” who, explicitly or implicitly, help to enable, catalyze, and conduct divergent change in an institutional setting (Battilana et al. 2009). In doing so, these change agents often try to break “with existing rules and practices associated with the dominant institutional logic(s) and institutionalize the alternative rules, practices, or logics they are championing” (Garud et al. 2007, 962).

The concept of institutional entrepreneurship provides a dynamic perspective on the role of individuals as change agents. Since organizational practices are shaped by actions of individuals, pioneering actors can enact institutional changes (Leca et al., 2008). Accordingly, from the point of view of Co-Change, even one person promoting RRI practices within an organization may eventually lead to long-term organizational change. This was confirmed also by the insights from the modelling exercises conducted in the deliverable 4.1 (Lehtinen and Wiman 2022).

However, as Tiberius et al. (2020) note, more often the literature on institutional entrepreneurship emphasizes that the scope of agency is not limited to individual actors, but rather comprises of collective action in the form of various organizations, associations, and social movements (Hardy and Maguire 2008). Indeed, since the creation of new types of institutional arrangements requires substantial resources, institutional entrepreneurs need to be able to motivate and mobilize others to join their cause to succeed (Battilana et al., 2009).

Moreover, despite the central role of agency in institutional entrepreneurship, the change agents are also seen as a part of an institutional context, which both restricts and enables the possibility for entrepreneurial action (Leca et al. 2008). Therefore, agency is understood as “embedded agency”, or as a “distributed quality”, which means that institutional structures are not a mere constrain on agency, but rather serve as the “fabric” or a “platform” for entrepreneurial activities (Garud et al., 2013). Thus, institutional entrepreneurs are perceived as “embedded actors” (Battilana, 2006).

According to a recent interpretation (Hoogstraaten et al., 2020), Battilana et al. (2009) conceptualized three different factors that affect the potential for institutional entrepreneurship in any given context: **Field-level conditions; Actor characteristics; Strategies of institutional entrepreneurs.**

Field-level conditions refer to contextual circumstances such as the degree of heterogeneity (positive correlation on the potential for institutional entrepreneurship) or the maturity of an organizational field (negative correlation with the potential for institutional entrepreneurship).

Similarly, **Actor characteristics**, particularly the ones related to perceived legitimacy, such as social position or status, influence the tendency of an actor to become an institutional entrepreneur. For example, “peripheral”, “low status” actors are more likely to become institutional entrepreneurs because they have less to lose from the transformation of the existing order than “high status” actors.

In addition to the aforementioned “independent variables”, **Institutional entrepreneurship strategies** are an important factor in understanding how institutional entrepreneurs achieve institutional change. According to Battilana (2009), these entrepreneurial strategies can be analyzed in three stages: **the articulation of a vision; mobilizing of allies to support the vision; and motivating allies to sustain the vision.**

In conclusion, aspiring institutional entrepreneurs need the ability to imagine compelling visions of alternative futures, construct attractive narratives of change to secure the cooperation of others, and mobilize diverse stakeholders to support the planned institutional change (Garud et al. 2007, 962).

3.2 Transition Management

Our second approach to systemic change is **Transition management**, which offers a conceptual lens to the analysis of societal complexity and persistent problems. According to an influential definition, transition management “is a deliberative process to influence governance activities in such a way that they lead to accelerated change directed as sustainability ambitions” (Rotmans et al., 2007).

Transition management is related to a shift towards a more de-centralized decision-making. Traditional forms of centralized or market-led steering have proven to be inadequate in the face of the complex societal change and challenges we are facing. Transition management has emerged as one approach towards understanding and managing complex change (e.g. Kemp et al., 2007).

Transition management deals with the broader issue of “meta-governance”; the ways in which actors and their activities can be influenced and coordinated to challenge dominant actors, institutions, and practices. It seeks to create space for innovative, or niche, governance practices, which provide an alternative to the existing regime and its institutions. The conceptual tools in transition management include transition arenas, visions, agendas, and experimentations. (Rotmans et al., 2007)

Transition management is a part of broader literature of **transition studies**, which has integrated insights from complexity science, innovation studies and sociology to better understand and influence the trajectories of large-scale systemic change. Complexity science is particularly important source of insight for transition management because it sees societies as **complex, adaptive systems**. Complex, adaptive systems evolve constantly over time through non-linear interactions between agents who also adapt themselves to the actions of others and to changes in the system (Rotmans and Loorbach 2009).

Even though large-scale societal transitions are complex and contested processes, whose trajectories are impossible to fully predict, control or comprehend, the underlying idea of transition management is that by understanding the basic dynamics, patterns, and principles of complex, adaptive systems it is possible to anticipate and even partially steer the changes in these systems for the better (Loorbach and van Raak 2006). Indeed, according to Rotmans and Loorbach (2009), management is about “influencing the process of change of a complex, adaptive system from one state to another”.

According to complexity theory and the principle of emergency, even small-scale initial changes in the lower-level components of a system can create changes in the higher-level components, which can eventually lead to the transformation of the whole system. In terms of transition management this means that a group of frontrunners can build niches that can challenge and eventually transform the existing regime (Rotmans and Loorbach 2009).

Despite these ambitions, transition management acknowledges that dealing with the persistent wicked problems associated with complex adaptive systems requires tools and approaches that provide attention to social learning, interaction, and experimentation, since any implementation of a solution inevitably leads to novel changes in the whole system (Loorbach and van Raak 2006).

The principles for managing complex changes that follow from transition management include (Rotmans and Loorbach 2009):

- **Transition arenas:** The creation of a safe space to share ideas about novel visions, and practices that will help the transition to an alternative regime.
- **Frontrunners and institutional entrepreneurs:** Change agents enable the development of niches through creativity, strategy, and visions.
- **Variation and selection:** Diversity is an important part of complexity theory in that it helps to respond to changes in the environment.
- **Anticipation and adaptation:** Despite the non-linearity and unpredictability of change, there are generic patterns and dynamics of complex adaptive systems that can be anticipated.

In short, transition management is about creating space for coalitions of change agents and stimulating the development of niches through emergent properties at the grassroots level to transform the existing regime (Rotmans and Loorbach 2009).

3.3 Resilient Leadership in Complex Environments

Our third approach on systemic change focuses on the concept of **resilience**. In complex environments, resilience is best understood as the ability to self-organize according to the changing operating environment. This view emphasizes that organizations naturally go through developmental cycles that consist of stages of growth, stability, dissolution, and re-organization. According to the viewpoint of

complex, adaptive systems, since organizations are engaged in a constant interaction with their environments, organizations themselves can be understood as products of their internal and external interactions (e.g. Mitleton-Kelly 2007; Holland 1995).

In complexity science, these interactions, both internal and external, form the key factor for enabling resilience. According to this view, resilience “happens” through the interaction between individuals and groups of people in social settings. In this sense, social interaction creates the basis for self-organization and resilience. Crucially, leadership can help to enable self-organization and organizational learning, but it cannot control it in a linear top-down manner (Geels and Schott 2007).

The key concept in approaching resilience from the point of view of complexity is emergence. According to the concept of emergence, even small changes can create substantial impacts that affect the functioning of the whole system. Emergence also explains why it can be difficult to produce, lead and control change in a linear, top-down fashion. Instead, an emphasis on a bottom-up perspective focusing on dynamic self-organization and democratic participation can prove to be a more fruitful way of conducting the implementation of change processes. From this viewpoint, organizational change is based on self-organized learning and interactions. A more decentralized and democratized approach can enable the development of resilience and agility. (Nieminen 2017)

In order to enable the creation of organizational resilience, one must understand the principles of emergence, self-organization, and complexity. Moreover, focusing on the elements of organizational learning, communication, experimentation, and diversity can help to increase resilience. The emphasis in organizations should be placed on reviewing the interaction and communication patterns as well as organizational culture as a whole. In short, organizational resilience is the product of the quality and diversity of organizational interaction and communication patterns. (Nieminen 2017, 37)

3.4 Systems thinking as tool for Transformative Change

Finally, we look at the implementation of RRI practices through the lens of the Systems view (Meadows 2008). According to Donella Meadows (2008, 2) **systems thinking** is “a way of thinking that gives us the freedom to identify root causes of problems and see new opportunities”.

Systems thinking emphasizes the need to understand the functioning of a system to change it in a way that produces the desired results. A system, in short, consists of an interconnected set of coherently organized elements that serve a function (Meadows 2008, 11). However, the actual functioning of a system is often the unintended consequence of various feedback loops, which can lead to negatively perceived results (Meadows 2008, 25, 34). Therefore, systems thinking provides a holistic approach towards a better understanding of how a system functions, but it also enables the actual changing of the system towards the desired ends (Stroh 2015, 16).

The systems thinking -based approach presented in the deliverable 4.1 can help to create understanding on complex systems, catalyze collaboration and stimulate the practice of continuous learning. Participatory group-based modeling and the utilization

of causal loop diagrams can be a fruitful way of assessing and visualizing the dynamics behind the implementation of RRI practices. Moreover, the utilization of systems thinking approach as a tool for understanding and evaluating RRI implementation, can help to increase the capacity for organizational self-understanding, reflexivity, and social learning by contributing to the development and improvement of the contextual pre-conditions for organizational RRI implementation.

In short, systems thinking can help to mobilize collective intelligence by creating shared understanding through a better understanding of the various tacit assumptions and mental models present in an organization (Meadows 2008, 172).

The importance of a “theory of change” has been emphasized throughout the project. Theoretical know-how is required for the successful facilitation and implementation of RRI practices (Tabares Gutierrez et al., 2020, 27). Despite the importance of theoretical knowledge on organizational change, context-specific empirical knowledge is also needed to implement RRI practices. The implementation of change is always a “context-sensitive” phenomenon (Tabares Gutierrez et al., 13). The deliverable 4.1 provided an empirically oriented study into the implementation of RRI practices through the utilization of group model building exercises and causal loop diagrams (Lehtinen and Wiman 2022).

Since there are no off-the-shelf or one-size-fits-all solutions to RRI implementation, the empirical approach of participatory group modelling can be utilized to better understand the specific organizational and ecosystem context of each individual Change Lab (Lehtinen & Wiman 2022).

The utilization of a systems thinking framework can help to enable the creation of change agents by providing systemic understanding of the role that people themselves play in a system, both positive and negative. Systems thinking can also help to enable the collective intelligence and action by emphasizing the crucial role of the collective in the functioning of the systems around us. Finally, systems thinking can also be utilized for the purpose of continuous learning in organizations, which is the prerequisite for sustainable impact in complex systems. (Stroh 2015, 21-22)

In conclusion, the utilization of a systems thinking framework can help to unearth various change processes, dynamics and conditions that can result in a successful RRI institutionalization (Wiarda et al., 2021). Indeed, the key finding from the deliverable 4.1 is that “even smaller scale or informal initial attempts at RRI practices can generate the conditions for more large scale and formalized change” (Lehtinen and Wiman 2022).

3.5 Joint framework for the update of the guidelines

Based on the review of the four perspectives it is possible to state that in addition to complementing the transformative capacity framework, they also complement each other. For example, according to Hoogstraaten et al. (2021), both institutional entrepreneurship and transition management study the ways in which actors seek to change institutions by describing “the interplay between agency and structure”.

Both institutional entrepreneurship and transition management focus on processes of change in terms of regimes and institutions. The onus is on the ways in which various activities can challenge and transform existing practices through visions of divergent change. Moreover, both institutional entrepreneurship and transition management literature highlight how the dominant institutions and regimes tend to create inertia against change, since the most powerful actors benefit from the existing structures. Systemic and transformative change challenges these structures of power.

Similarly, institutional entrepreneurship and transition management as well as systems and resilience thinking all emphasize the point arising from complexity science that even small-scale changes may eventually result in broader changes at the system level.

Therefore, in conclusion, a common framework can be constructed from the similarities of these four perspectives. The framework is constructed on the following lessons learnt and principles extracted from the four perspectives:

- **Develop understanding on how a system functions** in terms of its contextual dynamics and institutional logics, in order to transform it through the institutionalization of RRI practices.
- **Create pockets of change such as transition arenas** that foster the experiments, interactions, and novel practices of niche change agents, frontrunners, and institutional entrepreneurs.
- **Create shared visions and narratives for transformative change**, which help to stimulate the mobilization of advocacy coalitions and guides the development of niche alternatives for the existing regime.
- **Enable systems thinking and adaptive resilience** vis-à-vis the turbulent operating environment by fostering a diversity of mental models, interaction patterns, and heterogenous sense-making approaches.

In the next chapter this novel framework of lessons learnt will be applied to the existing transformative capacity framework.

4- UPDATE OF THE INDIVIDUAL TRANSFORMATIVE CAPACITIES

In this chapter, we analyze and update each of the ten Transformative Capacities (TC) that were established through the transformative change theory (Wolfram 2016) and promoted in the deliverable 2.1 (Wagner and Wilhelmer 2020). The update is conducted with the help of the four perspectives outlined in the previous sections.

4.1 Inclusive and multiform governance (TC1)

According to Wagner and Wilhelmer (2020), governance is central issue in the transformative capacity framework. Therefore, the Co-Change Labs need diversified, flexible, and robust governance models, which take into account the issues of participation, inclusion, and diversity of stakeholders in addition to addressing issues of power relations. During the Co-change project activities these issues have been tackled through the nested governance approach and by considering the three levels of organizations, ecosystems and the wider society. Moreover, ecosystem stakeholder identification and mapping were conducted in the WP1 (Rilla et al., 2020)

The notion of diversified governance models is also confirmed by **transition management** literature, which also argues that increasing attention should be directed towards “meta-governance”, the ways in which governance activities can be influenced and coordinated towards desirable and sustainable societal change.

Moreover, various **systems thinking** methodologies such as participatory group model building can help to develop inclusive forms of governance, which are essential for any participatory RRI process. Indeed, as highlighted by (Wagner & Wilhelmer 2020), collective forms of group work with stakeholders can help to empower and include stakeholders. In short, participatory modelling contributes to participatory processes.

4.2 Transformative leadership (TC2)

According to Wagner and Wilhelmer (2020), transformative leadership “needs to be polycentric and socially embedded”. They also emphasize that transformative leadership focuses on the ability to articulate new visions and to translate these discourses across sectors, domains, and scales, while leveraging collective forces. In short, transformative leadership is essential for building legitimacy and trust for change processes.

The literature on **institutional entrepreneurship** emphasizes the view that agency, both individual and collective, is crucial for change to happen. Even one person with divergent visions can be the starting point for transformative change. For example, Owen et al. (2021) have highlighted how a small number of individuals at different levels with enough agency can build a forceful narrative.

Resilient leadership can also provide new perspectives on transformative leadership. According to Nieminen (2017), leadership in complex environments should consist of the principles of organizational learning, continuous interaction, self-organization, and democratic engagement. In this view, responsibilities should be distributed both hierarchically and horizontally to create a shared process of strategic leadership. Resilient leadership is based on the shared strategic understanding about the organization and its goals.

Indeed, from the point of view of **systems thinking**, our current challenges require **system leadership** (Senge et al., 2014) that can foster collective adaptability, instead of focusing on the model of an individual “heroic leader”. Moreover, system leadership emphasizes long-term value creation instead of short-term problem solving and that the success of an organization depends largely on the well-being of the broader system that they are a part of.

4.3 Empowered and autonomous communities of practice (TC3)

Wagner and Wilhelmer (2020) stress that networks and communities of practice that are built around common values and shared concerns are the key factor in formulating responses to societal challenges. These communities of practice, or in this case the Co-Change Labs, are built around shared experiences and through the formation of various coalitions. These joint concerns and experiences of the Labs have been shared in the Co-change project in the Labs, between the Labs as well as through the various interactions and exercises in Co-Changes Forums 1 to 4 with ecosystem stakeholders.

According to the insights from **systems thinking**, to better understand the formation of communities of practice, some simplifying tools can be useful. For example, the institute for Human System Dynamics¹ (HSD) has created various tools for complexity thinking, many of which are based on understanding the principle of self-organization. One key observation promoted by the HSD is that self-organization often manifests itself as patterns. These patterns can be understood as being formed by three main factors (96): **Containers** that hold the system together; the **Differences** between the system parts; and the **Exchanges** between these parts of the system that bind the parts together. In short, this is called the **CDE-model**².

In this simplified view of organizational action patterns, all the elements are ideally in balance, with enough Containing factors, but also Differences that help create diversity and resilience through Exchanges. The quality of interaction is an important factor that can help keep the balance between these three factors. From the point of view of the organization, the risk is that there is either too much heterogeneity or homogeneity. The importance of the notion of homogeneity and heterogeneity in terms of institutional conditions is also confirmed by the literature on **institutional entrepreneurship**, which emphasizes the importance of understanding the so-called **field-level conditions**. Too much institutional homogeneity and maturity can form a barrier for institutional changes such as the implementation of novel RRI practices. Similarly, a

¹ <https://www.hsdinstitute.org/>

² <https://www.hsdinstitute.org/resources/cde-model.html>

degree of heterogeneity in institutional practices can enable institutional entrepreneurs to introduce new institutional logics such as RRI practices.

4.4 System(s) awareness and memory (TC4)

According to Wagner and Wilhelmer (2020) “transformative change presupposes awareness and understanding of the system dynamics and path dependencies that undermine sustainability”. As a result, the implementation of RRI should be based on “institutional self-assessments” and “collective analysis capabilities” (ibid.). In the Co-Change project, this has been conducted through the ecosystem analysis in WP1 as well as the dialogue interviews (WP1) and the deliverable 4.1.

Indeed, **systems thinking** methodologies such as the participatory group modelling approach presented in deliverable 4.1, can help to perform an institutional or an organizational self-assessment through the utilization of group modeling and causal loop diagrams. Systems modelling contributes to the awareness of the dynamics, causalities and feedback loops related to the implementation of RRI.

4.5 Foresight (TC5)

According to Wagner and Wilhelmer (2020), “future pathways linked to sustainability raise diverse normative questions and feasibility issues that require clarification and negotiation among stakeholders in order to create actionable policies plans and projects”. A collective vision that outlines a radical departure or divergence from the current path can be created through alternative scenarios based on transdisciplinary cooperation. These future-oriented and forward-looking activities have been conducted in the Co-Change Labs through visions, roadmaps, and action plans (WP2) particularly in Forum 1.

From the point of view of **institutional entrepreneurship** and **transition management**, foresight is related to the RRI principle of anticipation, which includes collective visions that deviate from current, and often unsustainable paths. Moreover, even though foresight is different from forecasting, it should be noted that according to **transition management**, despite the non-linearity and unpredictability of change, there are generic patterns and dynamics of complex adaptive systems that can be anticipated.

We also argue that **systems thinking** can also help to create the preconditions anticipatory practices, which can lead to the development of collective visions, simulations, and alternative scenarios (Ruutu 2015, 31). Moreover, as noted by the relevant literature (Andersen & Andersen 2014), qualitative system modelling, related to TC4, should ideally be coupled with foresight and evaluation practices to better analyze the future impacts of planned change. Therefore, we argue that iterative tools such as **future oriented impact assessment** can be a useful tool for the practice of foresight in complex contexts.

4.6 Diverse experimentation with disruptive solutions (TC6)

According to Wagner and Wilhelmer (2020), “RRI is a creative and adaptive (social) learning process”, which requires a space for collective, path-deviant, experimentation (Wagner and Wilhelmer 2020). These experimentations have been conducted for example in the case clinics of WP2 in the Forum 3 as well as through the STIRRI method utilized in the Labs.

This idea can be complemented with insights from the **transition management** and **institutional entrepreneurship** literature. Indeed, experimentation is a key factor both in institutional entrepreneurship and transition management. Dealing with wicked and persistent problems requires experimentation with various solutions. On a conceptual level, **transition arenas** are meant to provide safe space for experimentation. This fits well with the argument from Wagner and Wilhelmer (2020), who state that “practical experimentation in R&I contexts offers a crucial mechanism to develop transformative knowledge and catalyze social learning”.

4.7 Innovation embedding and coupling (TC7)

According to Wagner and Wilhelmer (2020), the process of embedding RRI in research funding and performing “is dependent on combining top-down and bottom-up approaches in organization” as well as “inward and outward dialogue with the ecosystem actors” (Rilla et al., 2020). The process of innovation embedding has been conducted in the Co-Change project through institutional changes that are implemented, and embedded, into the Labs and institutions. Moreover, the story maps conducted in WP6 have also contributed to the process of innovation embedding.

Indeed, according to RRI principles and insights from **transition management**, systemic change requires engaging with the relevant stakeholders as early as possible. By integrating various interests and perspectives it is possible to create collective buy-in and utilize collective intelligence. This process of co-creation and collective dialogue can also be called “**societal embedding**”, which fits well with the basic logic of TC7.

4.8 Reflexivity and social learning (TC8)

Wagner and Wilhelmer (2020) emphasize that reflexivity is a key RRI component, which can be utilized for the purpose of questioning the existing visions for transformative change. Reflexivity should include all relevant actors in order to enable the formation of positive feedback loops. Application of reflective methods, to question and manage transformational knowledge was conducted through deep dialogue groups in Forums 2 and 3 for example. A practical learning from these exercises has been the emphasis on “triple loop learning”, which emphasizes the need for governance structures that support interorganizational communication and cooperation between actors (TC1); “learning champions” who can foster learning processes (TC2); and the use of adaptive designs for learning processes (TC8).

Accordingly, we argue that the **systems thinking** framework can be utilized to the process of creating reflexive capacity for understanding exactly how the complex systemic relationships, interactions and feedback loops affect the transformation process of an organization. For example, the systems thinking approach can assist in

the creation of “diverse formal and informal reflexivity formats” (Wagner and Wilhelmer 2020). Moreover, since internal reflection often differs from an external perspective (Rilla et al., 2020, 28), we also utilized the network of actors within the Co-Change for the purpose of “peer-learning”, assessment and validation of the models that were created through our systems thinking and group model building approach in task 4.1.

4.9 Working across agency levels (TC9) & working across political-administrative levels and geographical scales (TC10)

According to Wagner and Wilhelmer (2020), the crucial points of TC9 and TC10 involve the idea that “capacity development needs to occur at different agency levels simultaneously”. Similarly, according to **transition management** literature, changes, or transitions, often result from interactions between different sectors, levels, and scales. Moreover, transitions are influenced by the co-evolution of economic, cultural, and institutional developments at various levels and scales. As a result, transition management and its focus on the issue of meta-governance can provide insights for TC9 and TC10.

The cross-agency cooperation has been a design principle of the Labs and it has been conducted through interactions and exchanges between the Labs in the Forums and Lab coordination meetings, which has created important synergies (TC9). Similarly, external factors related to the cross-scale and multi-level issues of responsible innovation have had an impact at national and European levels, thus creating legitimacy for RRI within RPOs (TC10). This was also realized in the D4.1 analysis (Lehtinen and Wiman 2022). These external factors include **scientific and technological controversies; the development of impact narrative of “science with and for society”**; as well as broad **dialogue on visions, motivations, impact pathways of research**. These issues have been materialized in the Co-Change project as societal visions (Forum 1), impact narratives (Forum 2); and story maps, which are related to the big picture of responsible innovation.

5-DISCUSSION AND CONCLUSIONS

Our purpose in this deliverable was to update the existing Co-Change guidelines and the transformative capacity framework. This was done by analyzing insights from the four perspectives of institutional entrepreneurship, transition management, resilience studies and systems thinking. A novel framework was created on the basis of the similarities between these four perspectives and the relevant lessons learnt. The principles of the framework were structured as follows:

- **Develop understanding on how a system functions:** *contextual dynamics and institutional logics of an organization need to be analyzed and understood to implement systemic and transformative change.*
- **Create pockets of change such as transition arenas:** *Foster the development of safe spaces for change agents, frontrunners, and institutional entrepreneurs to interact and experiment with novel practices.*
- **Create shared visions and narratives for transformative change:** *Visions help to stimulate the mobilization of advocacy coalitions and guide the development of niche alternatives for the existing regime.*
- **Enable systems thinking and adaptive resilience** *vis-à-vis the turbulent operating environment by fostering a diversity of mental models, interaction patterns, and heterogenous sense-making approaches.*

Following the approach of System Leadership (Senge et al. 2014), we aimed to **provide future-oriented and anticipatory perspectives for resilient leadership geared towards organizational and institutional change**. This includes the process of creating shared visions and narratives which help the mobilization of advocacy coalitions consisting of a diverse array of change agents and institutional entrepreneurs with intrinsic motivation.

Another central idea that we emphasized is the notion arising from complexity science, according to which **even small initial changes can lead to substantial system wide impacts**. This notion was also confirmed in the qualitative modelling exercises conducted in the Deliverable 4.1 (Lehtinen and Wiman 2022). Indeed, the implementation of change is often best initiated by creating smaller pockets of change or transition arenas that foster institutional entrepreneurship and provide room for experimentation with niche alternatives for divergent change.

We acknowledge that the particular challenges involved in each of the Co-Change Labs are context-sensitive and cannot be easily generalized. Nonetheless, the operational environment of the Labs is partially shared. For one, because of the complexity of our operating environment, there exists a general factor of limited ability for top-down planning, which means that **collective intelligence is needed to develop the resilience of the Labs and their respective organizations**. As a result, the transformative capacities should be geared towards supporting collaboration and the inclusion of various actors and diverse perspectives into the change processes.

Similarly, in terms of shared features of the Co-Change Labs, Owen et al. (2021) have described how the logics of **autonomy**, **utilitarianism**, and **managerialism** influence the field of research and innovation actors. The increasing demands related societal challenges, innovations, and commercial activity also influence the field of research and innovation. The key insights from institutional entrepreneurship literature highlight how the implementation of RRI practices implies change in terms of institutional logics and practices. Therefore, **to develop systemic change, pre-existing institutional logics need to be analyzed and understood before novel divergent logics and practices can be implemented with the help of transformative capacities.**

To summarize, the four perspectives of institutional entrepreneurship, transition management, resilience studies and systems thinking can help to better understand and implement the existing transformative capacity framework.

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Co-funded by the Horizon 2020 programme
of the European Union

