DOMINO

Funded by the European Union

UKRI

DELIVERABLE

D.5.1 – Living lab manual

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101060218

DOMINO

D5.1

Living Lab manual

Deliverable Nr.	D5.1
Due date	August 2023
Submission date	August 2023
Deliverable type	R
Dissemination level	Public
Work package	WP5
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Document version	1.0		
Grant agreement	101060218	**Duration**	60 months
Start Date	March 2023	**End date**	February 2028

DOMINO

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Revision history

VERSION	DATE	REVIEWER	MODIFICATIONS
1	30/05/23	DOMINO Partners WP4	Feedback on content
2	12/07/23	DOMINO Partners WP4	Feedback on first draft

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1. Executive summary

Emerging food (processing) technologies, such as fermentation processes, have the potential to contribute to sustainable, healthy, resilient, and circular food systems. However, before they can do so, they have various challenges to overcome along the way. First, it takes detailed knowledge of the entire production process and life cycle of such foods. Moreover, consumers may be hesitant to consume foods with microbial solutions that they do not consider natural, healthy, safe, or tasty. Or producers may not be ready to adopt the new technologies to produce and commercialize these new, sustainable, and healthy foods. Potentially, due to a lack of knowledge, skills, instruments or trust in demand.

These challenges are general issues to take into account when working on innovations. For time and again we find that for technologies to be taken up in society and to make the desired impact, changes throughout entire systems are necessary. Just think about it: there would be no "ecological niche" for electric vehicles in the EU without, for instance, a proper charging infrastructure, global mineral and metal mining, global supply chains, and proven lesser greenhouse gas emissions of electric vehicles compared to cars with combustion engines

Of course, this is something one can take into account while working on innovations, so that not just technological readiness increases, but also societal readiness. To achieve this last objective, Living Labs (LLs) constitute a reliable and recognized instrument. By utilizing LLs as a method to incorporate multi-stakeholder perspective, six fermented food cases will be provided with knowledges, insights, experiences, needs and preferences of various, relevant stakeholders. Through this, the DOMINO project will ensure the largest possible impact on a sustainable and healthy food system.

To achieve this goal, this LL manual aims to provide LL (co-)coordinators with information on the most important concepts and tools one needs to be acquainted with when coordinating a LL. It hence covers a wide array of subjects, from in-depth background information containing history, challenges, and general structure of LLs, to the theoretical context of the issue by diving into Responsible Research and Innovation, Transdisciplinary research, or transition literature and how these contribute to addressing such complex problems. Ultimately, this document will supply you with real-life examples and practical exercises to familiarize you with what everything you need to be part of, or to coordinate a LL.

2. Setting the stage

2.1 Starting point for innovation: real-life societal problems

When referring to food systems, we refer to all elements and activities associated with producing, processing, transporting, and consuming food, as well as managing food waste. Food systems have a huge impact on our health, economy and environment (Parsons & Hawkes, 2018), just as economy and environment significantly impact food systems.

Food systems provide livelihoods for millions of people working throughout the value chain. While offering a wide range of food options to most of these people in return. However, food systems can also give rise to challenges including poor diets, and as consequence, diet-related conditions, including severe non-communicable diseases (NCDs) like diabetes, cardiovascular diseases and chronic respiratory diseases (Branca et al., 2019).

It is important to recognize that food systems simultaneously rely on nature while also exerting significant pressures on it. For example, agricultural activities within food systems account for up to 70% of global water use, putting significant pressure on water resources (Pimentel et al., 2004). In addition, food systems are responsible for 21-37% of global greenhouse gas emissions, making a significant contribution to climate change (Crippa et al., 2021; Rosenzweig et al., 2020). While climate change, in turn, constitutes a considerable threat to much global food production through intensifying draughts, wildfires and floodings.

Additionally, crises like the war in Ukraine and COVID-19, and expanding global human population put an increasing strain on global food systems (Lee, 2011). Compiling these insights, we can clearly discern the need for a transformative shift towards more sustainable and resilient food systems that can meet the needs of a growing population while still contributing to health, economic, and environmental outcomes.

Arguably, innovation in the development can aid the achievement of food systems that caters to the need for health, prosperity and environment but ascertaining that transformed food systems can factually do so, is no small task.

2.2 Policy

Creating sustainable and resilient food systems is an important policy goal that is shared by numerous countries and can also be recognized at the level of the European Union (EU). This is reflected by, for instance the EU's Food 2030 program. This project aims to prepare food systems for the future by achieving four key goals focused on nutrition, climate, circularity, and communities. By integrating research and innovation activities across different fields and disciplines, the program aims to address the interconnected challenges and contribute to improving policy coherence; facilitating and leveraging funding and investment; bridging the innovation gap; promoting the adoption of food products, tools and services in the marketplace and society; and supporting the role of disruptive technologies, new approaches and business models in the transition to sustainable, healthy, inclusive and resilient food systems (European Commission, s.a.).

3. Theoretical context

3.1 Transdisciplinary research

While it is widely recognized that research and innovation play a crucial role in addressing societal challenges, in practice, a gap often exists between what scientific research teaches us about how to deal with such challenges and the practical implementation of that knowledge. This gap can be attributed to a common mistake of employing a reductionistic approach, which attempts to break down complex problems into smaller parts (Plsek & Greenhalgh, 2001). The reductionist approach that often proves so fruitful within the realm of science has faced criticism in the context of inquiry into research impact, especially for its failure to acknowledge the interconnectedness and interactions of problems within larger systems (Lönngren & Van Poeck, 2021). To address this limitation, a more holistic approach has emerged, known as Systems Thinking (ST).

According to Hossain (2020), ST is a domain that offers different ways to better understand the behaviour and structure of a complex system" (Hossain et al., 2020). Arguably, then, also to facilitate the transformation of food systems it is crucial not only to recognize the significance of future technologies in areas such as food production, land use, GHG emission reduction, dietary improvements, and waste management, but also to emphasize the importance of adopting a system's perspective on these matters taken together.

One research approach gaining traction over the last two decades that shows a remarkable fit with ST and through the use thereof is bridging the gap between research and implementation, and theory and practice, is so-called transdisciplinary research (Herrero et al., 2020). Transdisciplinary research is to be distinguished from mono-, multi- and interdisciplinary research as follows:

- Monodisciplinary approaches investigate a topic or domain from the remit of a single discipline;
- Multidisciplinary approaches juxtapose different monodisciplinary perspectives who all work in parallel;
- Interdisciplinary approaches integrate knowledge from different disciplines;
- Transdisciplinary approaches extend collaboration and integration beyond scientific disciplines per se, involving different types of (pertinent) stakeholders in a collaborative process (see figure 1).

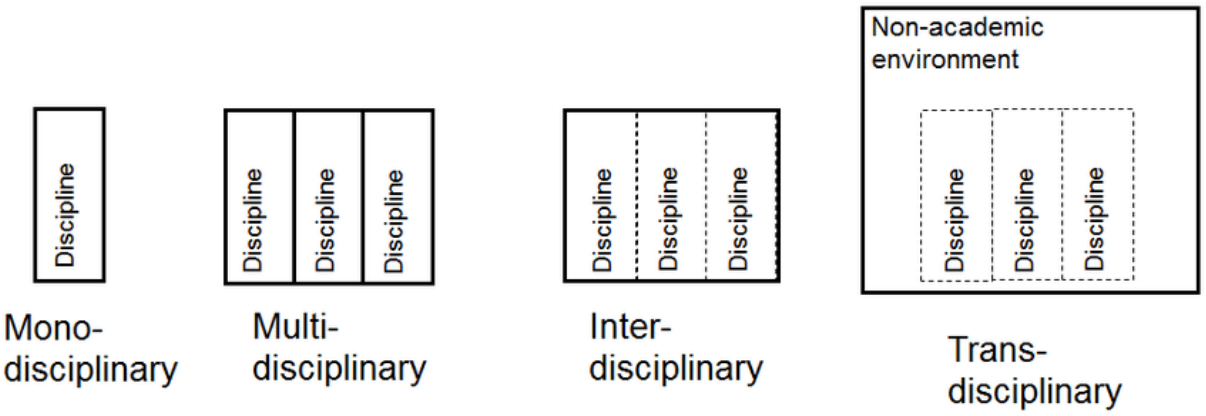


Figure 1. Transdisciplinary research should be distinguished from mono-, multi- and interdisciplinary research (Bunders, 2011).

3.1.1 Further readings transdisciplinary research

- Bunders, J. F., Bunders, A. E., & Zweekhorst, M. B. (2015). Challenges for transdisciplinary research. Global Sustainability: Cultural Perspectives and Challenges for Transdisciplinary Integrated Research, 17-50.

- Verwoerd, L., Klaassen, P., Van Veen, S. C., De Wildt-Liesveld, R., & Regeer, B. J. (2020). Combining the roles of evaluator and facilitator: Assessing societal impacts of transdisciplinary research while building capacities to improve its quality. Environmental Science & Policy, 103, 32-40.

3.2 Responsible Research and Innovation

Research and innovation acts as a key driver in accelerating the transition to sustainable, healthy, inclusive, and resilient food systems from primary production to consumption. The concept of Responsible Research and Innovation (RRI) was introduced with the aim of aligning research and innovation, both fundamental and applied, more effectively with the needs and values of society because this would presumably help research with achieving a greater impact.

Although many different conceptualizations and definitions of RRI circulate in the literature, we define it as follows: "Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability, and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)" (Von Schomberg, 2013).

The literature on RRI describes a number of process dimensions for research and innovation to substantiate what it takes to practically engage in doing RRI (Kupper et al., 2015):

- **Diversity & inclusion**
  Diversity and inclusion can be achieved by involving a variety of stakeholder groups and make sure each and every one is heard during the entire research and innovation process. Note: be sensitive to research biases, include diverse voices and make results beneficial to a wider community.

- **Openness & transparency**
  Openness and transparency are important for accountability, liability, and therefore responsibility. Simply being more open does not automatically result in increased trust. Trust requires one to behave trustworthy, which also means being responsive to others' needs and desires. Note: share objectives, methods, and, whenever possible and appropriate, results and inform others about potential conflicts of interests.

- **Anticipation & reflection**
  Anticipating the future involves envisioning what lies ahead and then trying to predict how research and innovative practices will affect that future. This process allows individuals to prepare for future challenges. However, to respond effectively and remain attentive to potential shifts in direction, reflexivity is crucial. Engaging in reflexivity allows individuals to continually evaluate and reassess their assumptions and actions, leaving them open to adjusting their strategies and approaches as needed. This alignment between anticipation, reflexivity, and adaptability creates a logically sound and interconnected framework for addressing future uncertainties. Note: carefully consider the purposes and possible (negative) implications of your research and its outcomes and envisage all possible strategies and methods.

- **Responsiveness & adaptive change**
  Responsiveness refers to the ability to react and adapt to emerging knowledge, perspectives, views, and norms. RRI entails the capacity to modify or influence existing

patterns of thinking and behavior in response to evolving circumstances, fresh insights, and the values of stakeholders and the general public. Note: be responsive to (contextual) changes and external inputs, adapting your research plans to changing societal values and expectations.

The LL approach is a practical embodiment of the ideas and ideals in and underlying RRI, which is almost universally transdisciplinary in nature, and thus helps to do research that is among others relevant to practice, ethically acceptable, sustainable, and socially desirable.

3.2.1 Further readings responsible research and innovation

- Fraaije, A., & Flipse, S. M. (2020). Synthesizing an implementation framework for responsible research and innovation. Journal of Responsible Innovation, 7(1), 113-137.

- Malagrida, R., Klaassen, P., Ruiz-Mallén, I., & Broerse, J. E. (2022). Towards competencies and methods to support Responsible Research and Innovation within STEAM secondary education–the case of Spain. Research in Science & Technological Education, 1-21.

- Large set of resources on or in RRI, including tools, readings, best practice examples and more: https://rri-tools.eu/

- A MOOC (Massive Online Open Course) on RRI for businesses: Responsible Innovation: Building Tomorrow's Responsible Firms (Online Course) - Delft Design for Values Institute

3.3 What is a Living Lab

While there are a wide variety of LLs with different objectives, common grounds can be found in their impact creation within transformative processes through consistently challenging current dominant ideas and working methods (Erisman, Forthcoming).

A LL is a real-life experimental environment in which various relevant stakeholders come together in a temporary reflexive arrangement to foster innovation in complex transition processes (Labs, 2023; Loeber & Vermeulen, 2016). By re-iteratively including the 'voices' of stakeholders from disciplines, such as science, research & development, market, and society, LLs facilitate co-creative processes tailored to different phases of research and innovation. LLs can be used for various purposes, ranging from analyzing complex societal problems, rapid prototyping of potential solutions, and testing and upscaling of innovations for (sustainable) transitions (Labs, 2023).

As transitions are complex societal processes that involve various stakeholders holding diverging perspectives, needs, or values, taking into account these differences will increase the chance of the successful adoption of the developed innovation or solution (Bronson et al., 2021). LLs constitute a type of forum amenable to that.

The aim of LLs tends to go beyond simply tailoring to the needs or desires of some or another imagined group of end-users for an innovation or solution. Indeed, the possible reasons for running a LL are manifold:

- Identify potentially sound business and revenue models;
- Stimulate cooperation between stakeholders so as to ensure the innovation or solution is relevant to and accepted by all stakeholders;
- Enable specific stakeholder groups to influence design choices;
- Increase acceptance of stakeholders of innovations or solutions;
- Understand and tackle inhibiting factors, minimize failures, or study effects of introduction.

As LL initiatives proliferate, the question whether these aims are always being reached, becomes indispensable (Følstad, 2008; Ståhlbröst, 2012).

While LLs appear to be successful in the facilitation of a collaborative and transdisciplinary environment that can aid complex transition questions, there is no certainty that LLs are a 'better' way to tackle such challenges. However, traditional methodologies have proven to be less effective in developing practical, ethically high-standard, and socially robust knowledge. So, while we have still much to learn about the potential and effectiveness of LLs, we do know that they provide a setting in which stakeholders are comfortable to share what needs to be shared and that might not be shared in other research contexts, leaving space for further exploration and learning.

Textbox 1 – History of Living Labs

LLs have been first introduced in the MIT MediaLab by professor William Mitchell in the late 1990s, who used them as an experimental setting to observe and record routine activities and interactions in daily domestic life (Bronson et al., 2021; Kidd et al., 1999; Streitz et al., 2007). In this experimental design, a 'living laboratory' of over 90 square meters was built and contained all essential facilities of a typical home. These labs served as a temporary home-setting for volunteer participants in which technological innovations were tested to assess their fit with the domestic environment (Eriksson et al., 2006). While the term LLs have come a long way since their practice in the literal sense of the word, the current method still builds upon the study of stakeholders in a 'daily setting' (Loeber & Vermeulen, 2016).

Today, LLs have moved away from its traditional physical setting testing material products towards providing an environment in which networks of people can come together to share ideas and perspectives on all sorts of subjects. While LLs now are now implemented in various research fields, such as agri-food, energy, and health spanning different interpretations, the core concept remains that stakeholders are actively involved in the creation of user-centric solutions and innovations (Bronson et al., 2021; Erisman, Forthcoming).

3.3.1 Further readings Living Labs

- Kok, K. P., Den Boer, A. C., Cesuroglu, T., Van Der Meij, M. G., de Wildt-Liesveld, R., Regeer, B. J., & Broerse, J. E. (2019). Transforming research and innovation for sustainable food systems—a coupled-systems perspective. Sustainability, 11(24), 7176.

- Luoto, S., Luger, J., Kallio, E., Heikkilä, T., Lindell, M., Kivelä, R., ... & Van der Meij, M. (2022, November). Identifying Challenges of Food Living Labs in Food System Sustainability Transformation in Finland. In Proceedings of the OpenLivingLab Days Conference 2022. ENoLL–European Network of Living Labs.

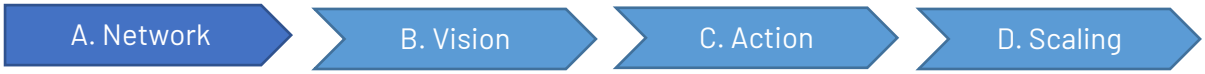
- An example of what implementing the Living Lab approach could mean, specifically in the context of food system innovation: Research & innovation for accelerating food system transformation - Publications Office of the EU (europa.eu)

4. Process description Living Lab

To get an idea of the components that generally make up LLs, this section gives a generic process description for running LLs. While this can provide a starting point to understanding the general structure, individual projects or LLs can take on different forms and can contain deviating activities, methods, or pathways. To provide more context, examples from a finalized project, FITFORFOOD2030 (FFF2030) (EUFIC, 2018), are included, as well as a number of exercises (Appendix I) that could be used in specific project contexts.

To understand the flow of a project, four phases are distinguished during a LL-process. The four phases are: network, vision, action, and scaling.

Phase A: Network



In this phase, the relevant stakeholders are identified and contacted. Involving the correct stakeholders is critical for creating successful impact and solutions. The steps in the networking phase are generally as follows:

1. Problem definition
2. Stakeholder analysis/identification
    i. *Who's problem are we solving and who can/should be part of a 'solution'?*
3. Creating a network/community building
    i. *Reflexivity to the problem definition: Does the problem definition still reflect the challenge that should be addressed correctly?*
    ii. *Reflexivity to the network: Are all relevant stakeholders included?*

During this phase, the process should be assessed re-iteratively by, for example consistently checking if stakeholders are missing or may not appear relevant after inclusion.

Exercise

See Appendix: Stakeholder identification and engagement exercise.

Text box 2 – Network phase in the FFF2030 project

The first period (M1-12) of the project was aimed at the identification and mobilization of relevant actors, uniting their visions, and increase their understanding of barriers and opportunities for transforming the current system. During this phase the FFF2030 project established the LL environments, 'EU Think Tank' (TT), 'Policy Labs' (PL) and 'City Labs' (CL) and provided training on setting up an effective Community of Practice (CoP).

Simultaneously an actor analysis was conducted, identifying important stakeholders that should be involved in the transformation of food systems. This included identifying groups that were underrepresented in the existing networks but who can have an essential contribution to the objective. The actor analysis was carried out recurrently in order to ensure that the stakeholder group continuously includes all those who can voice relevant opinions.

Phase B: Vision

In this phase, the challenge or problem at hand is defined and place in the larger context. From this, a vision for possible pathways can emerge. The steps in the visioning phase are generally as follows:

4. System analysis and problem statement
   i. Place problem in the context: Why does the problem occur?
5. Vision
   i. Formulate the questions arising from the gap between current situation (problem statement) and desired situation (vision)

Textbox 3 – Vision phase in the FFF2030 project

In the second phase, the EU TT, PL and/or CL also involved different stakeholders in processes of shared vision development and system understanding; identifying the underlying barriers to the realization of the vision and enablers that support it. The system analyses have further been informed by an inventory of current trends in food systems, food systems research and related research & innovation (R&I) policy frameworks at the three levels. This has since revealed: (a) dominances of R&I in specific areas; and (b) areas with a lack of R&I activity.

Exercise

See Appendix: Problem tree and visioning exercise.

Phase C: Action

In this phase, the possible pathways to realize the vision are made concrete. The course of this process should be assessed re-iteratively by consistently checking if the formulated activities or pathways are indeed effective in addressing the discrepancy between the problem statement and vision. The steps in the action phase are generally as follows:

6. Mapping/identify pathways or action-researched agenda
    i. *How to get to the vision?*
7. Think concretely about how your solution will be implemented at the end of the process.
8. Co-designing interventions/experiments
9. Carry out the interventions/experiments
    i. *Feedback loop into steps.*
10. Implement the solutions into the system
    i. *Feedback loop into previous steps*

Textbox 4 – Action phase in the FFF2030 project

In the next period (M10-16) transformation agendas were developed by identifying showcases in food systems R&I and exploring potential breakthroughs. Showcases are initiatives that contribute to food systems R&I developments. Assessing their characteristics, success factors and contributory conditions will result in criteria for best practices. A potential breakthrough is a significant achievement that may lead towards a change of food systems, making it more sustainable and resilient. The identification of success factors for these roadmaps will aid the formulation of transformation agendas.

At CL level, the second period led to the formulation of educational needs for R&I for those who will contribute to transforming food systems. At PL level, phase 2 led to national transformation agendas for food systems R&I, comprising visions, and potential areas for radical change, key areas of action and rules of cooperation. These agendas have formed input for the EU TT, by generating input for supported food systems research programs that prioritize the R&I themes and approaches required to transform the European food system.

Thereafter (M16-36), the transformation agendas were put into practice. PLs have organized workshops to bring regional/national stakeholders together and to work towards alignment of R&I policies and programs within the framework of the transformation agenda. CLs have developed prototypes for (in)formal trainings for different target groups. The experiences of the PLs and CLs have been discussed within the EU TT, and used as an input for further strategy development.

Exercise
See Appendix: Backcasting exercise.

Phase D: Scaling

This last phase can be part of the LL process or it can be a subsequent process after conducting the LLs. Here, the created product, idea, or solution is implemented back into the context to tackle the addressed challenge on a larger scale. While this is an important step in achieving the desired impact, and therefore important to be aware of, scaling is not part of the LL activities conducted in this project. The steps in the scaling phase are generally as follows:

11. Select suitable scaling strategy
    i. *Commercialize*
    i. *Replicate*
    i. *Institutionalize*
    i. ...

Textbox 4 – Scaling phase in the FFF2030 project

In the final phase, Phase 4 (months 26-36), the project aims to scale up. In year 1, the project started with 5 Policy Labs and 7 City Labs across Europe and has since expanded to 10 Policy Labs and 14 City Labs. The initial 5 Policy Labs, 7 City Labs and the EU Think Tank form the inner circle. The outer circle of 'followers' was developed during the later stages of the project. In addition, FIT4FOOD2030 developed instruments (guidelines and tools) which will be distributed through existing R&I policy collaboration initiatives. Instruments include guidelines on how to identify and mobilize actors, mapping exercises on trends, showcases and breakthroughs, alignment of policies, competences training and raising awareness.

4.1 Challenges

'Labbing' is not an easy endeavor. It entails the creation and sustaining of a (non-)physical space in which stakeholders with deviating perspectives are brought together, often with an ambitious aim to create sustainable impact beyond the scope of the project. As a result, conducting LLs can be challenging. Being aware of these challenges can help facilitators or initiators mitigate their effects. Therefore, the main challenges found by researchers are included in this section (Erisman, Forthcoming):

- Your role as a researcher (research-participation-observation)
  As LLs are dynamic and multi-stakeholder contexts, phases of the project and our own (diverse) roles therein can result in various types of dilemmas that emerge throughout the process. For example, on conceptualization of the findings and decisions about the actions to be taken (Erisman, Forthcoming; van Waes et al., 2021).
- Assessing/measuring impact (across different fields)

Developing pathways or frameworks to design, assess, and evaluate impact in a unambiguous manner has been found notoriously challenging by various scholars. It is not only complicated to determine the impact of concrete outcomes of the project but also to value the long-term or external effects of the process (Bronson et al., 2021; Lux et al., 2019). Moreover, what is considered to be impact and by whom is inherently political and often heavily debated. Implying the equally delicate task of measuring impact in all contexts (Erisman, Forthcoming; Regeer et al., 2016; Sharp & Salter, 2017).

- Dynamic developments and adequate responses as an (inexperienced) researcher
  Labs are constantly changing through the re-iterative nature of the methodology. Stakeholders, activities, visions, or pathways are subjected to potentially unforeseen, but necessary, changes. Adequately responding to and incorporating these changes can be difficult, especially for researches with modest experience with LLs.
- **Short-term orientation**
  LLs often have short-term, project-driven orientation, failing to evaluate the impact of labs systematically (Ballon et al., 2018; Schuurman et al., 2016).
- **Dealing with positionalities and power dynamics**
  As labs are aimed at creating sustainable transformations, it is important to consider which stakeholders to include and what their position and interconnected relationships are within the system. Groups with power or space to express their opinions can influence how impact is seen, designed, and evaluated.

5. Outline dynamic manual

In the previous chapters of the manual, we introduced real-life societal problems and their complexity. We highlighted the potential of among others RRI in addressing these problems by engaging publics and responsible actors in the science and innovation field to produce ethically acceptable, sustainable and socially desirable research and innovation outcomes. Moreover, we introduced LL that can serve as effective tools for creating impact by consistently challenging prevailing ideas and methodologies in transformative processes. However, the information provided in those chapters can be classified as general information or background information and is not specific to the DOMINO project. This section of the manual specifically addresses how the generic part of this manual integrates into the logic, goals, and timelines of the DOMINO project. Given that the project is reflective in nature, this part of the manual is iterative and can be adjusted as needed.

5.1 Outline dynamic part of the LL manual

The LL activities are divided into three phases: spanning from month 1 to 20, month 20 to 32, and month 32 to 60. Across these phases, a series of specific steps must be executed, each serving a distinct purpose within the project. These steps are designed to yield desired outcomes and encompass exercises that align with reporting templates. Throughout each step, well-defined deadlines, and meetings are scheduled, ensuring a structured an efficient progression.

5.1.1 Phase I [M1-M20]

Step 1: Create a multi-actor network

- Why (purpose)
- What (desired outcome)
- How (exercise, reporting templates)
- When (deadlines, regular meetings)
- Checklist

Step 2: Four visioning sessions with consumers to articulate their ideas on: sustainable healthy food systems; dietary shift from animal to vegetal proteins; and opportunities that are offered by fermentation-based solutions

- Why (purpose)
- What (desired outcome)
- How (exercise, reporting templates)
- When (deadlines, regular meetings)
- Checklist

Step 3: Pathway to impact session with a mixed group of stakeholders (e.g., policy-makers, farmers, consumers, regulatory bodies).

- Why (purpose)
- What (desired outcome)
- How (exercise, reporting templates)
- When (deadlines, regular meetings)
- Checklist

Step 4: A design workshop input for case-study design requirements

- Why (purpose)
- What (desired outcome)
- How (exercise, reporting templates)
- When (deadlines, regular meetings)
- Checklist

5.1.2 Phase II [M20-M32]

Step 1: Co-design communication material with consumers

- Why (purpose)
- What (desired outcome)
- How (exercise, reporting templates)
- When (deadlines, regular meetings)
- Checklist

Step 2: Session on integration & pilot design. Where the omics data and results of the prototyping, health, sustainability and market assessment are presented and collaboratively integrated.

- Why (purpose)
- What (desired outcome)
- How (exercise, reporting templates)
- When (deadlines, regular meetings)
- Checklist

5.1.3 Phase III [M32-M60]

Step 1: Strategic session about health where outcomes of milk kefir are presented to HCPs and policy makers to formulated recommendations for personalized nutrition solutions.

- Why (purpose)
- What (desired outcome)
- How (exercise, reporting templates)
- When (deadlines, regular meetings)
- Checklist

Step 2: Strategic session about plant-based based food prototypes with decision makers in food industry and food policy where a knowledge-based decision framework will be presented.

- Why (purpose)
- What (desired outcome)
- How (exercise, reporting templates)
- When (deadlines, regular meetings)
- Checklist

Step 3: Exploitation canvassing session with food industry partners to define product-market fit of value propositions that resonate with customers and embed them in scalable and profitable business models

- Why (purpose)
- What (desired outcome)
- How (exercise, reporting templates)
- When (deadlines, regular meetings)
- Checklist

Appendix

Stakeholder identification and engagement exercise

The following tool was developed as part of FIT4FOOD2030 project, see this tool and others on the FIT4FOOD2030 Knowledge Hub (Gjefsen, 2021)

EXERCISE #1: PREPARING FOR COMMUNICATION WITH STAKEHOLDERS

DURATION: 1 hour

The objective of this exercise is to develop empathy for the various stakeholders to be engaged in your transformative project.

This exercise uses the creation of a Persona as a method for 'empathizing'. A Persona is a fictitious person that 'summarizes' existing individuals with particular characteristics. A Persona's purpose is to create a connection between the Persona-creator and the Persona. This differs from thinking in stereotypes, of which the purpose is more to classify people, sometimes combined with humor or a cynical note. It can be helpful to make personas of various actors to support the development of an effective multi-stakeholder communication and engagement strategy. Using the Persona-template (Appendix A)

Persona creation comprises of the following steps:

• First, choose one actor who you are the least familiar with (or two in case this actor group is highly variable). Make a Persona of this actor by means filling out the template. Make this persona in such a way that you could feel a connection with them. Avoid taking a cynical stance towards this persona while making it.
• Write a letter / email (or create any other mean) to communicate with this persona.
• Reflect on the following:

- What would you tell her/him about your intended activities on transforming (R&I around) food systems?
- What life interests or motives of the persona can you appeal to?
- What would you 'ask from' him/her?
- In what way could the communication be more specifically oriented to this Persona in particular?

To justify/falsify the Persona, it can be useful to engage in a connection exercise with stakeholders that feel the most distant from your own network /position/context.

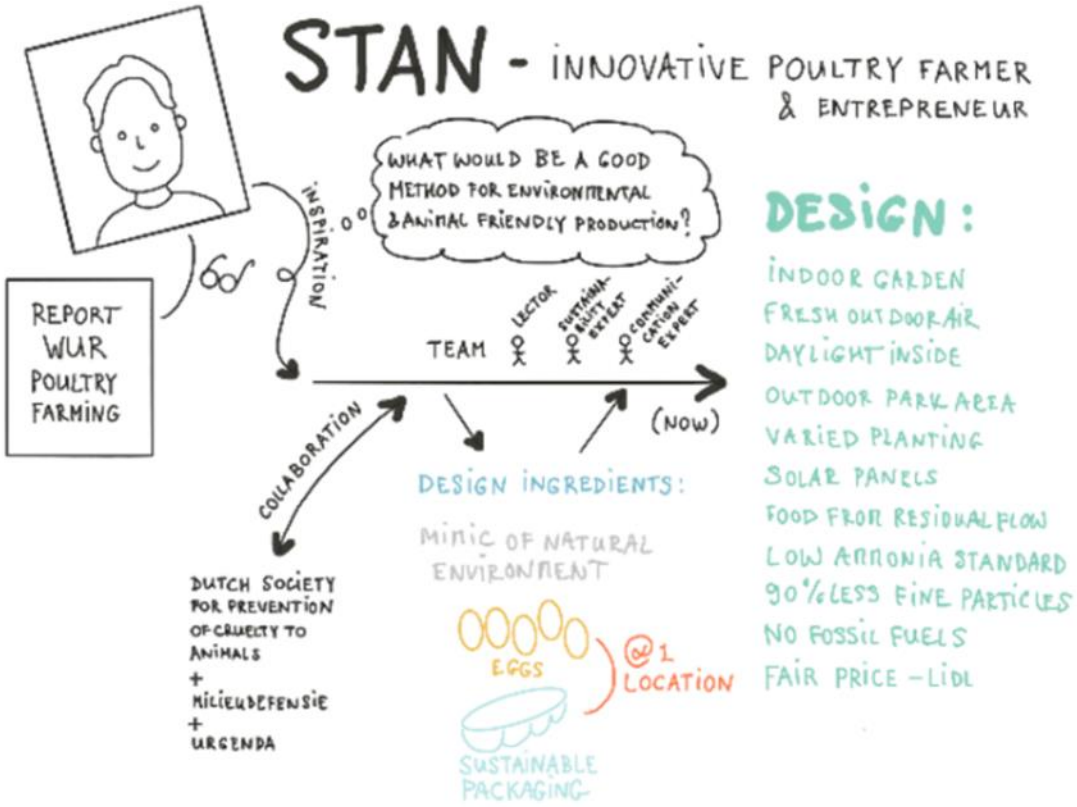


Figure 2. Persona Stan. Developed by the FIT4FOOD2030 project's Amsterdam City Lab. From FIT4FOOD20230 Deliverable 6.3 TOOLKIT FOR USE OF EDUCATIONAL MODULES.

EXERCISE #2: DESIGNING A COMMUNICATION STRATEGY
DURATION: 1 hour

The objective of this exercise is to develop a strategy for tailor-made communication with various stakeholders. Especially when it comes to multi-stakeholder events or processes, it is recommendable to operationalize the steps towards the (first) event with the help of the 5W+H principle (who, when, why, what, where, how). Figure 3 below is an example matrix that can be used to design a communicating plan for (personal) stakeholder communication, a (multi-) stakeholder event or process, with specific attention to tailoring the communication with regard to each stakeholder separately.

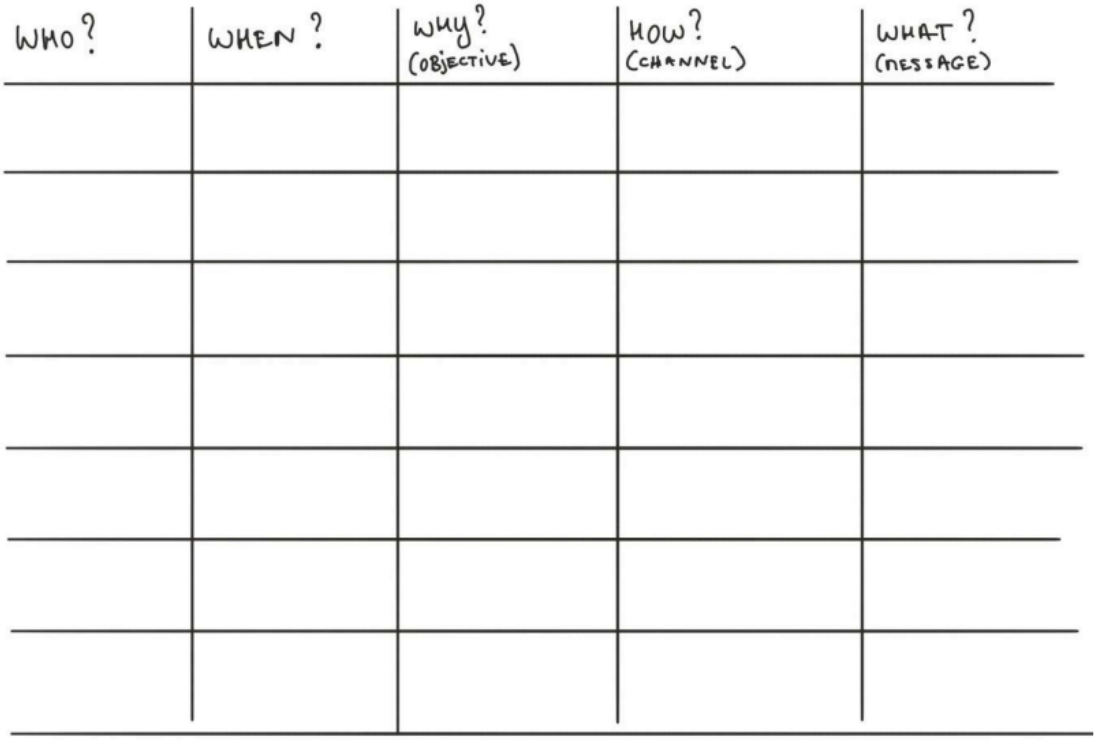


Figure 3. Figure taken from FIT4FOOD2030_D1.1_Tools&training for Setting Up a Transformative Network.

The following steps can help to create a communication plan:

- With your stakeholder analysis and Persona(s) in mind, make a timeline with an overview of 'who to contact when, with which means, to what goal, with which message', etc.
- Write a letter to one stakeholder first. How do you introduce your connection with them?
- What information do you provide? What is the action you ask from this stakeholder? With this letter as a template, create letters for all the other stakeholders in the list. Adjust jargon and message sequence accordingly.
- Let one other person read the letter(s) before using it.
- Think about how to keep actor(s) 'on board' once connected and contacted.

EXERCISE #3: CONNECTING TO INDIVIDUAL DRIVES

DURATION: 1 hour

The objective of this exercise is to create a connection between personal drives and transformation.

The idea of this exercise is to meet a (new) person with who(m) a connection is desirable, e.g. for the expansion of your network.

Take this person for a walk, e.g. outside in a green area. Either interview this person, or engage in a dialogue about the following questions:

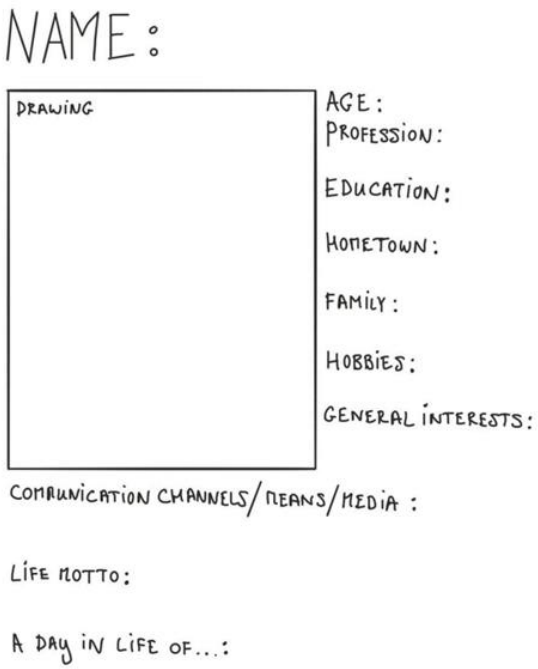
- Who am I / who are you?
- Why am I doing my work / why are you doing your work? (work motivation)
- What would I / you need to fully realize my / your work motivation?

It is advisable to let one person speak at a time; the listener does not necessarily have to ask questions. This allows more openness for what is actually being said (and little worries about which follow-up questions to pose). Furthermore, it is advisable to both look in the same direction / in front of you (and not in each other's eyes), to literally look at 'the future'.

In case of rain, place two chairs in front of a window with a good view, and look outside (so you do not look in each other's eyes).

This exercise can also be done as a self-reflection exercise, e.g. by journaling for yourself. Such reflection can help change makers to keep their transformative network activities/ actions connected to themselves.

Appendix A



Problem tree and visioning exercises

The aim of a visioning process is to develop long term goals and strategic objectives. The following exercise serves as an example how to shape a participatory session aiming to generate a vision of a preferred food system future. Ultimately, the food system visioning session helps formulate recommendations regarding among others policies, priorities, strategies, education and products (Athena Institute, 2018).

Visioning (Where do we want to be?) is usually done after the problem analysis (where are we now?). Hence, the first exercise helps to execute a problem analysis. The following tool was developed as part of the MSP Guide from the Wageningen University. For this and other tools, please visit the MSP Tools section on the MSP Guide website (MSP Tools – MSP Guide).

Exercise 1

This tool helps to create a structural analysis of the causes and effects of a problem. Moreover, this tool helps to break the problem down into manageable pieces, understanding the interconnectedness of problems and helps to build a shared understanding purpose and action.

Step 1) Discuss and agree the problem to be analyzed. The problem can be broad, as the problem tree will help break it down into smaller parts. The chosen problem needs to be written in the center of the flip chart and becomes the 'trunk' of the tree (see figure 4).

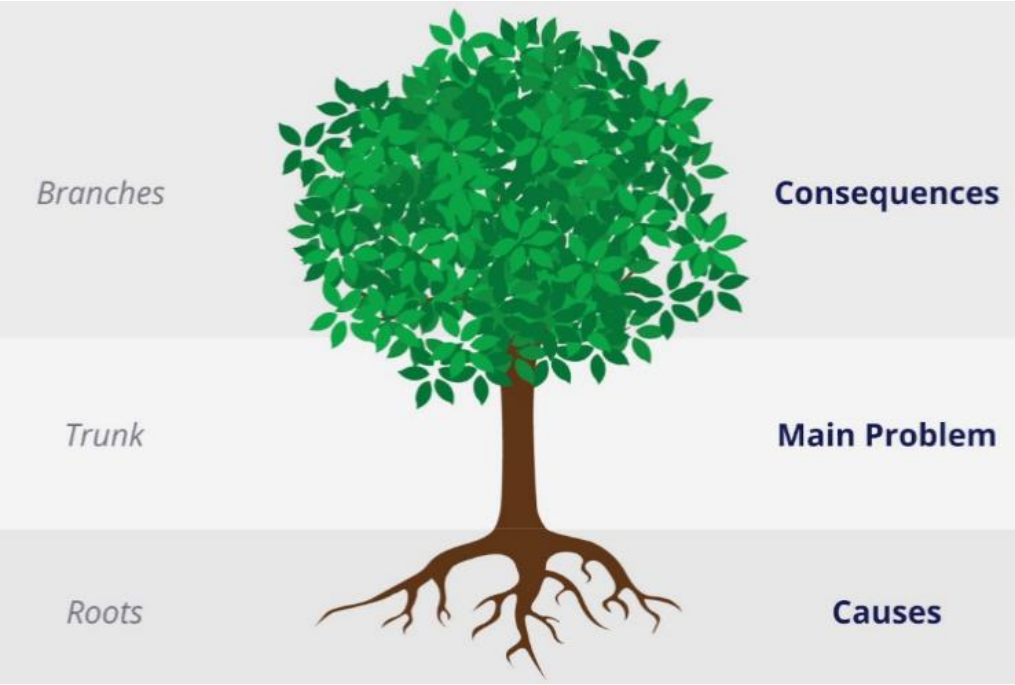


Figure 4. Visual representation of the problem tree.

Step 2) Pinpoint the underlying reasons behind the central problem, which will serve as the roots. Then, proceed to outline the resulting outcomes (effect of the problem), which will take on the form of branching elements. These causes and effects can be noted down on sticky notes or cards, either individually or in pairs, to facilitate their arrangement in a logical cause-and-effect sequence. See figure 5 for a visual example of how this could looks like on a flip over.

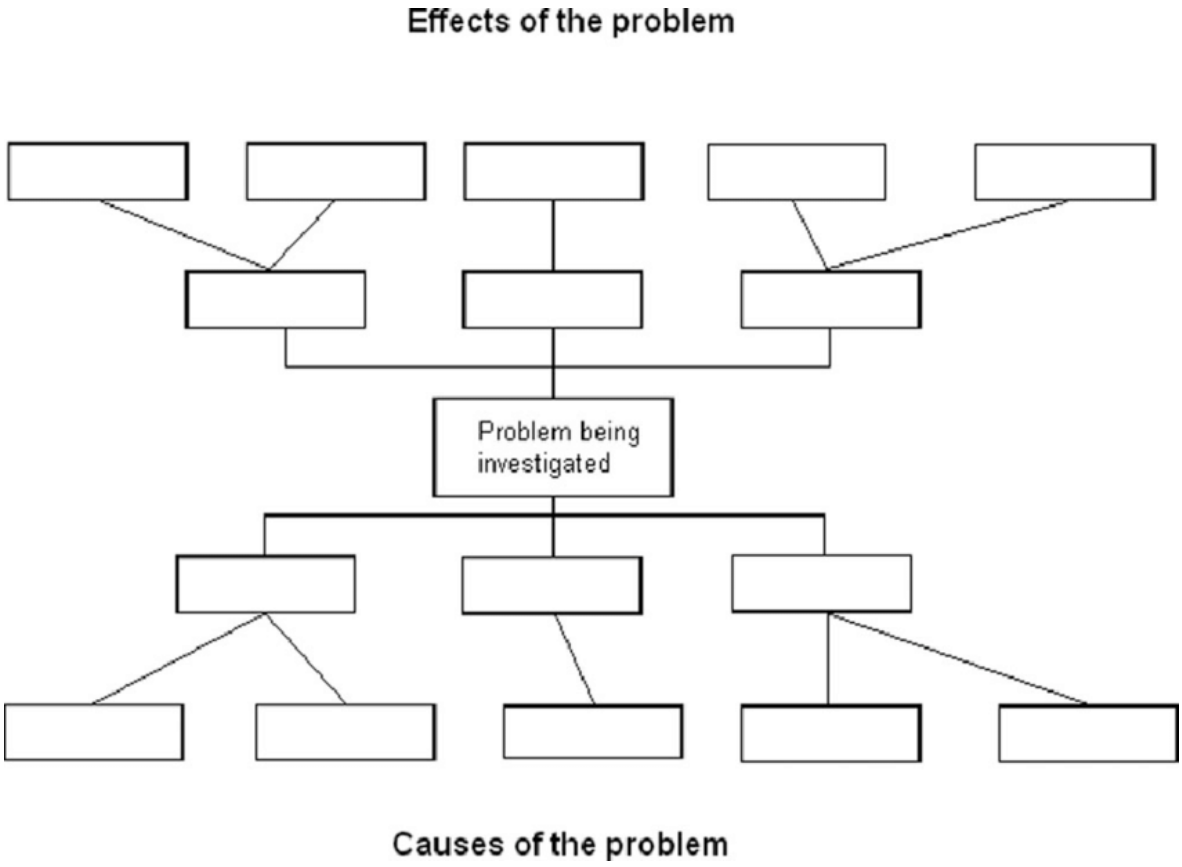


Figure 5. Example of (root) causes and effect (branches) when constructing a problem tree.

The essence of this exercise lies in the discussion, deliberation and exchange of ideas that arise during the creation of the tree. Allow time for participants to explain their emotions and motivations and document relevant concepts and perspectives on flip sheets labeled "solutions," "concerns" and "dilemmas.

Visioning exercise

The following tool was developed as part of FIT4FOOD2030 project, see this tool and others on the FIT4FOOD2030 Knowledge Hub (Athena Institute, 2018). This exercise stimulates people to intuitively analyze the food system and its corresponding challenges and opportunities. Moreover, it helps the participants to explore their own ideas about how a future-proof food-system should looks like.

In advance: Take a range of photographs depicting elements of the food system and its challenges and opportunities.

Step 1) Ask participants to cluster the photos (10 minutes)

Step 2) Ask the following questions to participants (10 minutes)

- What are the relations between the different elements?
- Is anything missing or underrepresented?
- Where (in) do you see the current food system 'dying'? Use the pictures of challenges in food systems to collectively depict the answer.
- Where (in) do you see 'new seeds' being planted, which (would) result in a rebirth of the food system?

Note: The visioning is not necessarily about 'positioning pictures on a table and clustering them', but more about the conversation and exchange of ideas that arise while doing the exercise. So frequently ask one another WHY particular pictures are positioned in a particular spot, and what the picture means to everybody. Ask a rapporteur to take notes of this exercise to report on the main thoughts that are being shared.

Step 3) Ask participants to write down characteristics of their vision on post-its (5 minutes) Ask participants to write down at least five characteristics based on (1) their own vision of the future (healthy and sustainable) food system and (2), if relevant, the discussion they had in subgroups.

Step 4) Ask subgroups to cluster their characteristics (10 minutes)
One of the participants in each subgroup starts with sharing one of his/her characteristics. Explore whether people have the same characteristics. Cluster them as a group together on a flipchart. Put a circle around the group of post-its and together decide on a name for that cluster and write it next to the circle. Then go to a next person to mention one of his/her characteristics. Again, cluster with others that are similar. Keep going until all post-its are gathered and cluster names are written down (cluster-naming can also happen after all post-its have been placed in groups, as the wrap-up of this exercise). Ask them to write these cluster names down on new post-its.

Step 5) Plenary: gather everyone's attention and ask subgroups to reflect on what they discussed (15 minutes). *The aim of this step is to 'cluster the clusters' and to prompt the plenary reflection in step 8 of this exercise.*

Start with asking one of the subgroups to mention and explain one of their clusters. Place the post-it with cluster-name on a flipchart/white board. Ask the subgroup to briefly mention which characteristics are within this cluster. Explore if there are different or conflicting characteristics within the cluster. Ask other groups to reflect on the cluster as well as if they do have similar clusters. Group similar post-its with cluster names together. Go on with this process until all clusters are mentioned and placed on the flipchart/whiteboard. Are there any other characteristics that are important to mention, but do not fit within one of the clusters?

Step 6) Plenary: take the last ten minutes to plenary reflect on the outcomes of the exercise (15 minutes). *One could choose to find out to what extent there is a shared vision for a future-proof food system among participants (i.e. clusters characteristics that all people agree on) and what the main differences are. However, another option is to choose that this exercise is meant to explore the variation in perspectives, rather than to build consensus. Different participants will have different perspectives; it is this diversity that is actually interesting. Whichever choice on the aim is made (vision-consensus or vision-diversity), try to be transparent about it to the participants in this last plenary step.*

Take three colored markers (put a legend on the flipchart, e.g. red = shared, green = less important, blue = disagreement). Start with the shared clusters (i.e. those that have many post-its) and check whether indeed this would be a characteristic of a shared vision according to participants. Why? Why not? Mark the shared clusters with red. Then move to the smaller groups and ask whether they are smaller because they are less important, or because people don't agree on them? Ask for explanation (ask multiple people to remark) and mark with green or blue, until all is covered.

Backcasting exercise

Backcasting serves as an alternative for conventional strategic planning methodologies in the field such as forecasting. Unlike forecasting, which is about predicting the future based on current patterns, backcasting is about creating a vision of an ideal future and distinct the necessary actions to achieve that vision. Consequently, backcasting begins with a clear end point in sight and then moves back to the present, which allows for the construction of a roadmap with clear milestones leading to the intended future goal (see figure 6).

Step 1) Find a suitable place, such as a spacious wall or a long table. Gather small and large sticky notes in different colors to make the process easier.

Step 2) Recruit a team composed of a variety of stakeholders. The backcasting process is more streamlined when all participants are physically present in the same room.

Step 3) Brief your stakeholders on the purpose of the backcasting session and the ground rules such as active listening, respecting diverse viewpoints, refraining from interrupting and adhering to scheduled timings.

Step 4) Conduct the problem tree and visioning exercise to identify the current state and future ideal states or scenarios.

Step 5) Consider each future state and work backwards to identify actions, assumptions, risks, benefits, and other indicators that could lead to these future states.

Step 6) Consult additional stakeholders who were not involved in the backcasting exercise and get their feedback.

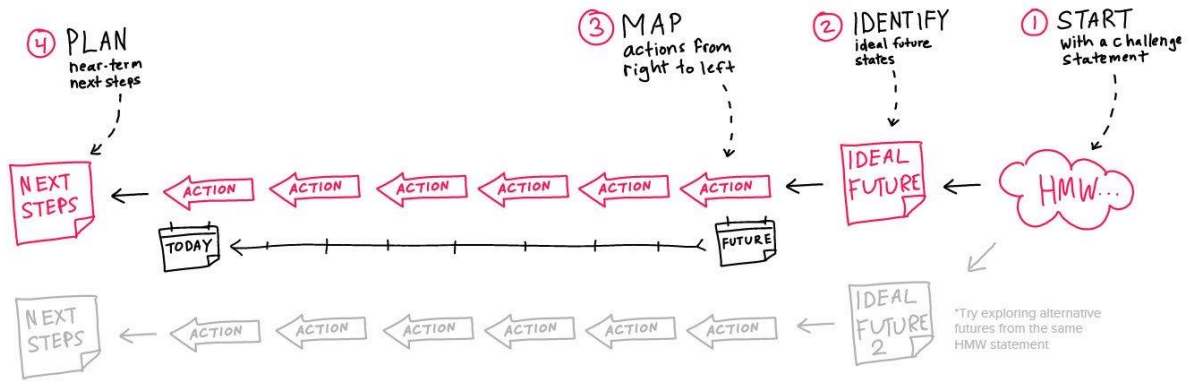


Figure 6. Visual example backcasting exercise.

References

Athena Institute. (2018). *Visioning*. VU University. https://knowledgehub.fit4food2030.eu/wp-content/uploads/2020/06/FIT4FOOD2030_Tool_training_module_visioning-1.pdf

Ballon, P., Van Hoed, M., & Schuurman, D. (2018). The effectiveness of involving users in digital innovation: Measuring the impact of living labs. *Telematics Informatics*, *35*(5), 1201-1214.

Branca, F., Lartey, A., Oenema, S., Aguayo, V., Stordalen, G. A., Richardson, R., Arvelo, M., & Afshin, A. (2019). Transforming the food system to fight non-communicable diseases. *Bmj*, *364*.

Bronson, K., Devkota, R., & Nguyen, V. (2021). Moving toward generalizability? A scoping review on measuring the impact of living labs. *Sustainability*, *13*(2), 502.

Bunders, J. (2011). Boundary crossing in Transdisciplinarity: A research approach. *PPT presentation*.

Crippa, M., Solazzo, E., Guizzardi, D., Monforti-Ferrario, F., Tubiello, F. N., & Leip, A. (2021). Food systems are responsible for a third of global anthropogenic GHG emissions. *Nature Food*, *2*(3), 198-209.

Eriksson, M., Niitamo, V.-P., Kulkki, S., & Hribernik, K. A. (2006). Living labs as a multi-contextual R&D methodology. 2006 IEEE International Technology Management Conference (ICE),

Erisman, J. C., Feenstra, L.D., Broerse, J.E.W., De Hoop, E., Grijseels, M., Gudek, L., Jones, T.S., Loeber, A.M.C., Luger, J., Prūse, B., Regeer, B.J., Saidi, T., Schrammeijer, E.A., Van Der Meij, M.G., Zeidan, H., Zuiderent-Jerak, T., & Kok, K.P.W. (Forthcoming). Facing challenges and sharing strategies in 'Labbing' in inclusive sustainability transformations: learning from a Community of Practice. *GAIA- Ecological perspectives for science and society*.

EUFIC. (2018). *The four phases*. https://fit4food2030.eu/theproject/fit4food2030-four-phases/

European Commission. (s.a.). *Food 2030*. Retrieved 15-08-2023 from https://research-and-innovation.ec.europa.eu/research-area/environment/bioeconomy/food-systems/food-2030_en

Følstad, A. (2008). Living labs for innovation and development of information and communication technology: a literature review.

Gjefsen, M., D & Svare, H. (2021). *Stakeholder identification and engagement*. FIT4FOOD2030. Retrieved 12/7/23 from https://knowledgehub.fit4food2030.eu/resource/stakeholder-identification-and-engagement/

Herrero, M., Thornton, P. K., Mason-D'Croz, D., Palmer, J., Benton, T. G., Bodirsky, B. L., Bogard, J. R., Hall, A., Lee, B., & Nyborg, K. (2020). Innovation can accelerate the transition towards a sustainable food system. *Nature Food*, *1*(5), 266-272.

Hossain, N. U. I., Dayarathna, V. L., Nagahi, M., & Jaradat, R. (2020). Systems thinking: A review and bibliometric analysis. *Systems*, *8*(3), 23.

Kidd, C. D., Orr, R., Abowd, G. D., Atkeson, C. G., Essa, I. A., MacIntyre, B., Mynatt, E., Starner, T. E., & Newstetter, W. (1999). The aware home: A living laboratory for ubiquitous computing research. Cooperative Buildings. Integrating Information, Organizations, and Architecture: Second International Workshop, CoBuild'99, Pittsburgh, PA, USA, October 1-2, 1999. Proceedings 2,

Kupper, F., Klaassen, P., Rijnen, M., Vermeulen, S., & Broerse, J. (2015). Report on the quality criteria of Good Practice Standards in RRI. *Amsterdam: RRI Tools*.

Labs, E. N. o. L. (2023). *What is ENoLL*. Retrieved 29-06 from https://enoll.org/about-us/

Lee, R. (2011). The outlook for population growth. *Science*, *333*(6042), 569-573.

Loeber, A., & Vermeulen, T. (2016). Reflexive project management in high-ambition projects: Exploring the competencies for managing innovative sustainable designs. *Social Business*, *6*(1), 15-37.

Lönngren, J., & Van Poeck, K. (2021). Wicked problems: A mapping review of the literature. *International Journal of Sustainable Development & World Ecology*, *28*(6), 481-502.

Lux, A., Schäfer, M., Bergmann, M., Jahn, T., Marg, O., Nagy, E., Ransiek, A.-C., & Theiler, L. (2019). Societal effects of transdisciplinary sustainability research—How can they be strengthened during the research process? *Environmental Science & Policy*, *101*, 183-191.

Parsons, K., & Hawkes, C. (2018). Connecting food systems for co-benefits: how can food systems combine diet-related health with environmental and economic policy goals?

Pimentel, D., Berger, B., Filiberto, D., Newton, M., Wolfe, B., Karabinakis, E., Clark, S., Poon, E., Abbett, E., & Nandagopal, S. (2004). Water resources: agricultural and environmental issues. *BioScience*, *54*(10), 909-918.

Plsek, P. E., & Greenhalgh, T. (2001). The challenge of complexity in health care. *Bmj*, *323*(7313), 625-628.

Regeer, B. J., de Wildt-Liesveld, R., van Mierlo, B., & Bunders, J. F. (2016). Exploring ways to reconcile accountability and learning in the evaluation of niche experiments. *Evaluation*, *22*(1), 6-28.

Rosenzweig, C., Mbow, C., Barioni, L. G., Benton, T. G., Herrero, M., Krishnapillai, M., Liwenga, E. T., Pradhan, P., Rivera-Ferre, M. G., & Sapkota, T. (2020). Climate change responses benefit from a global food system approach. *Nature Food*, *1*(2), 94-97.

Schuurman, D., De Marez, L., & Ballon, P. (2016). The impact of living lab methodology on open innovation contributions and outcomes. *Technology Innovation Management Review*, *6*(1), 7-16.

Sharp, D., & Salter, R. (2017). Direct impacts of an urban living lab from the participants' perspective: Livewell Yarra. *Sustainability*, *9*(10), 1699.

Ståhlbröst, A. (2012). A set of key principles to assess the impact of Living Labs. *International Journal of Product Development*, *17*(1-2), 60-75.

Streitz, N., Konomi, S. i., & Burkhardt, H.-J. (2007). *Cooperative buildings: integrating information, organization, and architecture* (Vol. 1370). Springer.

van Waes, A., Nikolaeva, A., & Raven, R. (2021). Challenges and dilemmas in strategic urban experimentation An analysis of four cycling innovation living labs. *Technological forecasting and social change*, *172*, 121004.

Von Schomberg, R. (2013). A vision of responsible research and innovation. *Responsible innovation: Managing the responsible emergence of science and innovation in society*, 51-74.