DESIGNING FOR SYSTEMIC GOODBYES

DEANIMALISING OUR DIETS TO FOSTER THE PROTEIN TRANSITION

Master Thesis by Inés Bernal Leal

DESIGNING FOR SYSTEMIC GOODBYES

DEANIMALISING OUR DIETS TO FOSTER THE PROTEIN TRANSITION

Master Thesis by Inés Bernal Leal

Master Thesis
15th May 2025

MSc Strategic Product Design
Faculty Industrial Design Engineering
Delft University of Technology

Author
Inés Bernal Leal

Graduation committee
L.B.M. Magnier
A.L. Peeters

Company mentor WWF
C. van Dooren

Company mentor Livework
S. Wetzer

ACKNOWLEDGEMENTS

After months of working on this graduation project, it is finally time to close this chapter. This project has been an immense challenge, a time full of doubt, persistence, and learning to sit with the discomfort of complexity. And I wouldn't have made it through without the people around me.

Anna and Lise, thank you for your patience and for believing in me. For keeping it honest, for showing that even if the future feels unsettling, we can have a laugh about it. Your guidance, curiosity, and care have meant more than you know. I hope this report does your support justice.

Corné, thank you for making this collaboration possible. Anna, thank you for opening the doors of Livework to me. To the Livework team, thank you for making space for me in your world, for involving me in your group activities and for being a source of constant inspiration. And to Stein, thank you for your unshakable encouragement.

To my friends: thank you for simply being the greatest friends one could wish for. For still walking by my side since we were crazy teenage girls, for making me miss my hometown in the best way. To Celia, for being my partner in misery and for listening to every step of the way.

To my parents, thank you. I know you are always there, cheering for me in the shadows. To my siblings, thank you for being people I admire deeply and who continue to inspire me.

To my very-soon-to-be husband, Vincent, there are no words in this world to express the depth of my gratitude. Thank you for being here every single minute. For bringing joy, calm, and perspective. For holding and loving me fully, especially when I forget to be kind to myself.

To everyone who showed interest in this project, offered a kind word, shared their thoughts, or encouraged me along the way, thank you.

And to all the thinkers, designers, scholars, and changemakers whose work inspired and informed this project, thank you.

Enjoy the read,

Inés

SUMMARY

The global food system is facing increasing pressure to transition away from animal-based proteins due to environmental, ethical, and health-related concerns. In the Netherlands, this protein transition is gaining momentum, yet remains hindered by deeply rooted consumption patterns and cultural norms. This project, in collaboration with WWF-NL, investigates how systemic design can support the reduction of animal-based food consumption among Dutch consumers, focusing on the TU Delft campus as a representative context of study.

WWF-NL recognizes the urgency of transforming food systems, aligning its strategy with the protein transition to reduce environmental impact and restore biodiversity. Despite public awareness, key challenges persist: policy implementation is slow, market incentives are misaligned, and individual behaviour change is difficult to sustain. Drawing from WWF's own findings, the project explores why conventional interventions, such as awareness campaigns, often fall short and asks: what else is needed to realise meaningful dietary shifts?

To answer this, the project frames the transition not just as a behavioural issue, but as a systemic challenge embedded in narratives, routines, and relationships. The research uncovers dominant and counter narratives through interviews, observations, and workshops. These insights are then translated into six systemic barriers that slow down change on campus, including social norms, infrastructural gaps, and emotional disconnection from the food system. These barriers operate across multiple levels and often reinforce each other through feedback loops.

In response, this project concludes with a portfolio of seven interventions. Some restructure the food environment to enable more sustainable choices through nudging and increased visibility. Others engage individuals more deeply by fostering reflection, emotional connection, and collective identity. The interventions are intentionally non-prescriptive and adaptable, designed to tap into existing structures and shift them from within. This degrowth-oriented strategy avoids introducing new products or services, focusing instead on redirecting current resources toward supporting the transition.

First validations confirmed that the interventions resonate across actors and levels. Students connected through stories, sensory experiences, and shared spaces, while institutional stakeholders valued the alignment with sustainability goals and the practical feasibility of some of the interventions.

Rather than offering a one-size-fits-all solution, this project aims to start an uncomfortable conversation and open space for experimentation, participation, and narrative change. By guiding consumers through a journey of discovery, unlearning, and letting go, this strategy moves beyond short-term gains and towards long-term cultural shifts.

TABLE OF CONTENTS

INTRODUCTION

THE PROTEIN TRANSITION

WHAT IS THE PROTEIN TRANSITION?

The protein transition refers to the shift in production and consumption from animal-based to plant-based proteins. This change is driven by environmental, health, and economic concerns, aiming to create a more sustainable and resilient food system. Rather than calling for the complete elimination of animal products, the approach advocated by international organizations such as the EAT-Lancet Commission focuses on significantly reducing animal protein intake in favour of plant-based sources.

WHY IS THE PROTEIN TRANSITION RELEVANT?

The urgency of the protein transition surges from a global food production system that is under increasing pressure due to population growth, climate change, and resource constraints. The environmental costs of animal agriculture are well-documented. Producing beef, for example, requires up to twenty times more land and generates twenty times higher greenhouse gas emissions per unit of protein compared to plant-based alternatives such as beans or lentils. Beyond land use and emissions, industrial animal agriculture drives deforestation, depletes freshwater resources, and contributes significantly to soil and water pollution.

However, the implications of the protein transition go beyond sustainability. Ethical and societal dimensions also demand attention:

- Animal welfare: Industrial agriculture operates on a massive scale, often at the expense of animal well-being.
- Resource inefficiency: A disproportionate share of land and crops is used to feed livestock instead of people, exacerbating global food insecurity.
- Global inequality: Unequal access to food is compounded by a system that prioritizes animal feed over human nutrition.
- Public health risks: Intensive animal farming increases the likelihood of zoonotic diseases, contributes to antibiotic resistance, and poses risks of future pandemics.

Achieving this transition, however, is a complex challenge. The protein transition calls not only changing individual consumer choices, deeply linked to culture, but transforming entire systems of production, relying on technology, economy and policy.

At the policy level, governments are beginning to integrate food sustainability into broader environmental and health agendas. However, progress remains slow. Established industry players, including meat and dairy producers, exert significant influence through subsidies, lobbying, and entrenched economic interests. Simultaneously, cultural traditions and social norms reinforce the status quo.

In this context, the protein transition requires more than product innovation or information. It demands a coordinated effort that addresses the interconnected forces of behaviour, policy, and market dynamics. Understanding these complexities is essential for identifying leverage points and guiding the transition effectively.

THE PROTEIN TRANSITION IN THE NETHERLANDS

The Netherlands is widely recognized as a global leader in agricultural innovation and food technology. It is home to key research institutions such as Wageningen University and industry clusters like Food Valley NL, both of which are actively shaping the development of alternative protein sources. However, the transition towards plant-based diets remains gradual.

Recent data reveals that the Netherlands is behind on its target to achieve a 50/50 balance between plant- and animal-based protein consumption by 2030 (Health Council of the Netherlands, 2023). Traditional dietary patterns, heavily relying on dairy, meat, and processed foods, continue to shape food choices, reinforced by market structures favouring animal-based products. Nonetheless, policy initiatives and industry commitments increasingly reflect an urgency to shift toward a more sustainable protein supply.

To guide this transition, the standard for achieving the protein transition in the Netherlands is set to a 60/40 ratio, aiming for at least 60% of all protein consumed to come from plant-based sources, without increasing total protein intake (Green Protein Alliance).

ORGANIZATIONS AND ALLIANCES SUPPORTING THE TRANSITION

Several organizations and alliances are actively working to advance the protein transition in the Netherlands. Research institutions like Wageningen University provide scientific insights and technological advance-

ments. Government bodies, including the Dutch Ministry of Agriculture, Nature, and Food Quality, are shaping policies that support plant-based innovation and sustainable farming practices. Industry networks such as those connecting startups, investors, and researchers help accelerate the adoption of alternative proteins.

Additionally, non-governmental organizations (NGOs), including WWF, the client of this project, are playing a role in raising awareness and pushing for systemic changes in food production and consumption.

THE CLIENT - WWF

ABOUT AND STRATEGY

The World Wildlife Fund (WWF) is an independent conservation non-profit organization active in more than 100 countries, including the Netherlands. Its mission is to halt the degradation of nature by focusing on biodiversity conservation, sustainable resource use, and reducing environmental impact.

Food systems are a key focus for WWF, under the goal: "Produce enough food to nourish everyone in the world while reducing the environmental footprint of food systems".

The Dutch branch of WWF, from now on WWF-NL, works with partners to create a food system that restores biodiversity while ensuring access to sufficient and healthy food for all. Their approach integrates food production with nature conservation.

Their approach to food systems focuses on four key areas, one of which is encouraging a more sustainable diet. In this context, WWF aligns with the protein transition, recognizing that the consumption of animal products has a significant environmental footprint. WWF advocates for a shift toward plant-based foods, emphasizing locally grown beans and nuts as viable alternatives. Their report Gezond Eten Binnen de Grenzen van Eén Aarde (WWF-NL, 2023) highlights this priority, with its main recommendation encouraging the shift from animal-based to plant-based.

A more comprehensive analysis of food system challenges is presented in Solving the Great Food Puzzle, a WWF (2024) publication that examines country-specific differences to develop targeted strategies. Using the Netherlands as a case study, the report identifies gaps in financial instruments, innovation incentives, and policy implementation. One of its key takeaways is that there are no silver-bullet solutions: while high-tech food production methods play a role, their impact is often overestimated. Instead, WWF emphasizes the importance of investing in low-hanging fruit solutions and social innovations.

The experts' consensus from this report is that knowledge is not the primary barrier to transformation. The main challenge lies in translating insights into actionable policies and industry commitments. Some of the highest impact transformation levers to in the Netherlands are represented in Table 1. The complementarity of strategic action areas stresses that governance, education, and financial mechanisms must work together to unlock meaningful change.

Table 1. Potential of individual action levers to transform the Dutch Food System.

Strategic action areas	Transformation levers	Potential
Natural resource management	Optimize land use	Lower
	Restore Biodiversity	Higher
	Increase carbon storage	Medium
	Increase food and agri-diversity	Medium to higher
Governance	Support smallholders	Lower
	Improve land tenure rights	Lower
	Strengthen commitments and implementation	Higher
	Foster multi-stakeholder collaboration	Medium
Education and knowledge	Strengthen research and development	Medium to lower
	Improve data collection and measurement	Medium
	Increase public awareness	Medium to higher
	Promote healthy, sustainable and traditional foods	Medium to lower
Technology	Adopt high-tech methods	Medium to lower
	Develop supply chain infrastructure	Medium to lower
	Develop alternative proteins	Medium to higher
Trade	Support healthy food imports and exports	Medium to lower
	Develop nature-positive supply chains	Medium
Finance	Redirect subsidies and increase de-risking investments	Higher
	Finance school food and public procurement programmes	Medium to higher
	Provide financial incentives and taxes to improve consumption	Higher

Note. Adapted from *Solving the Great Food Puzzle* (p.50), by WWF, 2024.

INSTRUMENTS AND ACTIVITIES

WWF-NL has a multi-layered approach to drive the food system transformation, working at different levels of influence. Some of their key instruments and activities are:

- Policy Advocacy: Working with national and EU-level policymakers to improve legislation, shift subsidies, and establish agreements across the food industry.
- Public Awareness Campaigns: Utilizing social media, ambassadors, press releases, and research-based reports to raise awareness and influence consumer behaviour.
- Financial Support: Funding initiatives such as Stichting Voedselbos and local protein farmers to scale sustainable agriculture.
- Strategic partnerships, a core component of WWF-NL's work. Some notable collaborations supporting the protein transition include:
  - Retailers and Catering Companies: WWF-NL collaborates with Albert Heijn and Sodexo to set sustainability goals, such as achieving 60% plant-based protein sales.
  - Transitiecoalitie Voedsel: A coalition focused on accelerating food system transformation through policy and industry engagement
  - Groene 11: A coalition of Dutch environmental organisations that operates as a green lobby in parliament.
  - Green Protein Alliance: An alliance to help food providers grow plant-based. Experts in the protein transition in the areas of monitoring, behavioural interventions and spokespersons.

LIMITATIONS AND CHALLENGES

WWF-NL acknowledges that the transition to a more sustainable food system is not happening fast enough. According to them, several forces slowing the transition are:

- Slow Policy Implementation: While the knowledge and evidence for change exist, translating them into action remains a challenge. Key policies, such as agricultural agreements, have failed due to a lack of cooperation. Additionally, the current political landscape is an obstacle for sustainability goals.
- Market Forces and Economic Barriers: Economic developments, including inflation, reduce consumers' willingness to pay for sustainable products. Meanwhile, powerful agribusinesses and traditional farming interests continue to resist change. The meat and dairy lobbies exert significant influence, aiming to maintain the current system.
- Limited Organizational Capacity: As a relatively small team, WWF-NL must prioritize its efforts.
- Structural Barriers to Transition: Even when sustainable alternatives exist, the transition process is often slow due to financial constraints, legislative hurdles, and long investment timelines. For example, transitioning to nut farming in the Netherlands requires years before trees yield viable crops, making it a long-term commitment with uncertain market returns.

ABOUT THIS PROJECT

ASSIGNMENT

Design is often viewed as a process of creating and replacing old systems with new ones. Yet the notion of "undesign", intentionally removing or subtracting elements from existing systems, remains relatively underexplored. In the context of our current food system, which is heavily dependent on animal products, this perspective becomes especially relevant. Only 15% of the protein and energy derived from crops is ultimately consumed by humans; while the remaining 85% is lost, primarily through inefficient animal agriculture, resulting in significant environmental strain (Aiking, 2011; Hartmann & Siegrist, 2017). A shift towards a (more) plant-based food system is crucial to mitigate these impacts.

This project focuses on the protein transition and explores how systemic design can support the shift from animal-based to plant-based diets, with a specific focus on Dutch consumers. To date, most efforts have prioritized developing plant-based alternatives that mimic meat and dairy products (Peeters et al., 2024). However, equally important, and often overlooked, is the need to reduce overall consumption of animal products in line with long-term sustainability goals (WWF-NL, 2022).

The aim of this project is to explore the barriers that hinder the implementation of the protein transition, particularly those rooted in consumer behaviour. In doing so, the project offers an opportunity to investigate how systemic design can facilitate behavioural change in the context of this transition.

WWF-NL acknowledges the complexity of changing consumer behaviour. Food choices are deeply embedded in people's daily routines, shaped by taste, tradition, and identity. Even when individuals are willing to change, old habits often prevail. WWF identifies four key strategies to support more sustainable eating habits:

- Making sustainable choices more affordable than non-sustainable ones
- Increasing the availability of sustainable food options
- Providing consumers with the skills and knowledge to make sustainable food choices
- Changing social norms, making plant-based more mainstream

Findings from WWF research (WWF-NL, 2023) reveal:

- 41% of consumers are willing to change their behaviour if they are confident it will contribute to nature conservation.

- 20–30% of consumers are particularly motivated to buy seasonal, local, fresh food and to eat less meat. However, one third struggle to reduce their meat and dairy consumption due to taste preferences, habitual routines, and health concerns.

- Price and quality are the most influential factors in food purchasing decisions.
- One third of consumers have already made changes to their food habits in recent months, with reducing meat consumption being the most common shift.

- Consumers expect supermarkets and the government to play an active role in providing information and facilitating access to sustainable, healthy food.
- The most effective interventions, according to consumers, include lower prices for sustainable products (72.9%), better visibility of local and seasonal options, and clearer sustainability labelling. In contrast, only 17.2% consider increased communication and awareness campaigns to be effective.

If increasing communication and awareness is not the answer, then what is? What other approaches could accelerate consumer adoption of the protein transition? This (wicked) question leads to the formulation of the assignment:

The goal of this project is to design an approach/strategy for WWF to guide Dutch consumers through the process of drastically reducing their consumption of animal-based proteins.

APPROACH

The project follows the structured process outlined in Design Journeys Through Complex Systems (Jones and Van Ael, 2022), a framework that guides systemic design through seven iterative stages. This approach enables a holistic exploration of complex challenges, balancing deep system understanding with actionable interventions.

Out of the seven stages, six are covered in this project, each with its own chapter:

1. Framing the System: Defining the scope, identifying key actors, and mapping systemic dynamics to establish a shared understanding of the problem space.
2. Listening to the System: Engaging with stakeholders and gathering qualitative insights to uncover underlying narratives, motivations, and resistance points.
3. Understanding the System: Synthesizing findings into patterns, relationships, and leverage points, revealing the tensions and opportunities within the system.
4. Envisioning Desired Futures: Exploring alternative futures and co-creating a vision that aligns with systemic shifts and stakeholder aspirations.
5. Exploring the Possibility Space: Developing and testing interventions that challenge existing structures while considering feasibility and adoption dynamics.
6. Planning the Change Process: Strategizing implementation pathways, and designing for long-term systemic impact.

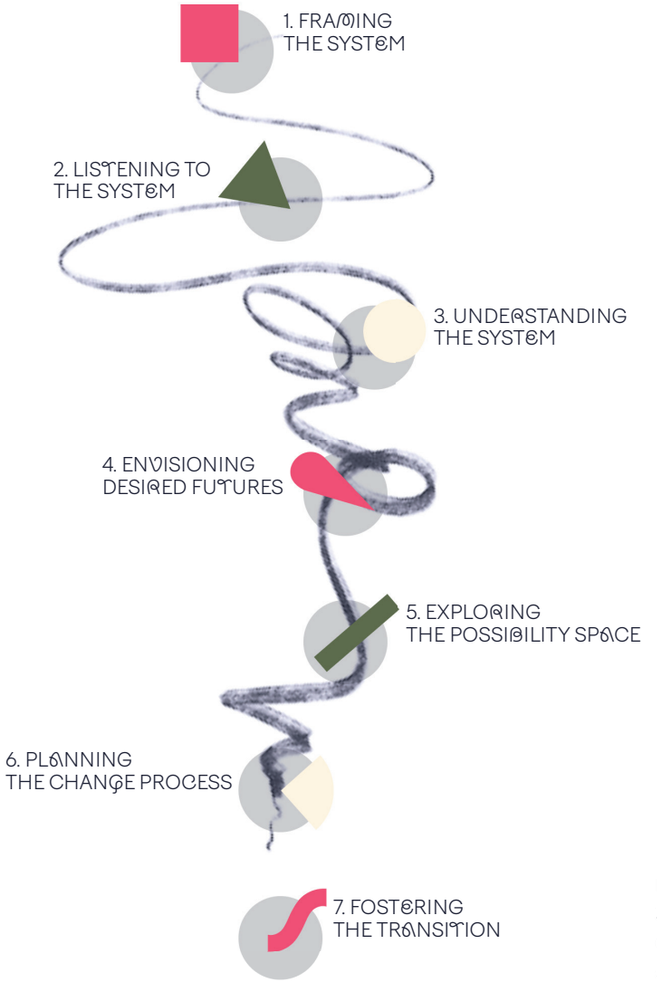


Figure 1. Design Journeys Through Complex Systems approach (adapted from Jones and Van Ael, 2022).

CHAPTER 1

FRAMING THE SYSTEM

Framing is the first step toward making sense of complexity. It allows for setting boundaries and narrowing the system to a manageable scope for exploration. By establishing a common understanding of the system, framing helps align perspectives and provides a foundation for further research.

Framing is not a neutral act. The decision to include or exclude certain elements is a process of sense making and intentional choice. Each of these decisions reflects a particular stance, my way of interpreting the system, and in doing so, draws the boundaries of the system under study.

In this stage, I take the liberty to expand on what framing entails. While framing is often understood as the process of defining the context of study (the system), I also consider it to include the deliberate selection of knowledge fields that guide my approach. These theoretical lenses shape how I interpret and engage with the system, and therefore, are part of how I frame it.

For this reason, the chapter is divided into two parts: theoretical framework and context of study.

1.1 THEORETICAL FRAMEWORK

1.1.1 SUSTAINABLE TRANSITIONS THEORY

The protein transition can be situated within the broader literature on sustainability transitions, which explores how societies shift from one relatively stable state to another in response to pressing environmental, social, and economic challenges.

Like other sustainability transitions, it involves complex and contested change processes that span long timeframes, face resistance from incumbents, and require alignment across multiple dimensions: technological, social, economic, and political. Meaning, the transition is not limited to food production and distribution. It also calls for deep shifts in cultural norms, consumer behaviour, and regulatory frameworks.

To understand how transitions unfold, I draw on two key frameworks: the Multi-Level Perspective (MLP) (Geels, 2002) and the X-curve framework (Loorbach et al., 2017).

1.1.1.1 MULTI-LEVEL PERSPECTIVE MODEL

The MLP offers a way to analyse systemic change by examining interactions across three levels:

- Landscape (macro-level forces): Broad contextual pressures such as climate change, global food insecurity, shifting consumer values, and geopolitical events. These pressures can create windows of opportunity for transformation.
- Regime (dominant system): The established structures, routines, and institutions that maintain the status quo, such as industrialized animal agriculture, existing food policies, and corporate supply chains. Regimes are resilient and resist change through reinforcing norms and infrastructure.
- Niches (innovation spaces): Small-scale alternatives and experimental initiatives. Niches can gain momentum and challenge regimes, particularly when landscape pressures destabilize dominant structures.

According to MLP, systemic change occurs when niche innovations scale up and regime systems become destabilized under landscape pressure. However, transitions are rarely smooth or linear, and dominant regimes tend to resist disruption, making change a difficult process. In the case of the protein transition, momentum is building in some niches (e.g., plant-based markets), but the regime remains strong.

1.1.1.2 X-CURVE FRAMEWORK

While the MLP maps the structure of transitions, the X-curve framework (Loorbach et al., 2017; Hebinck et al., 2022; Allen & Malekpour, 2023) offers a dynamic view of how systems break down and reconfigure over time (Figure 2). Most importantly, it shows that transitions require both the decline of the old (exnovation) and the rise of the new (innovation).

The X-curve framework identifies two system configurations: the unsustainable system, which begins as the dominant configuration, and the sustainable system, which emerges to eventually become dominant. The transition between these two configurations unfolds across three phases:

1. Destabilisation / emergence
2. Breakdown / acceleration
3. Phase out / stabilisation

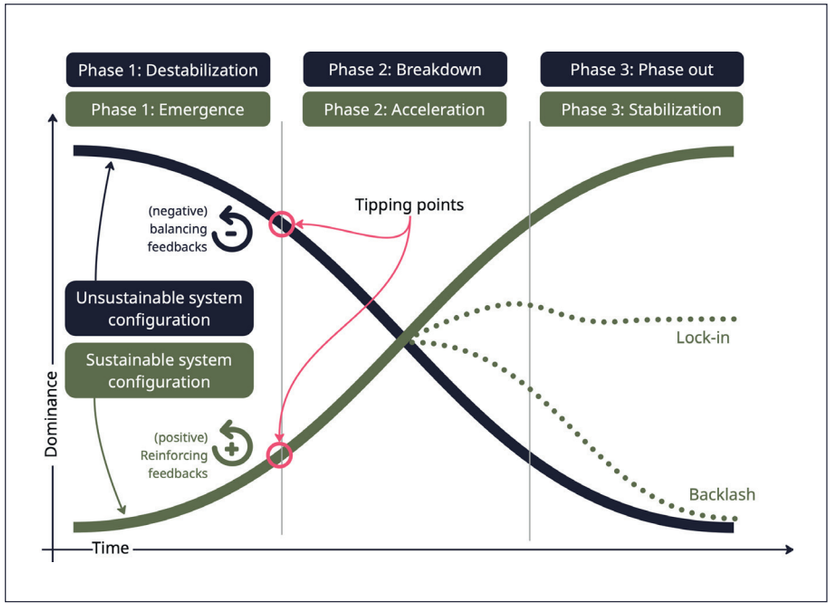


Figure 2. X-curve framework (adapted from Allen and Malekpour, 2023).

At present, the protein transition is in its first phase. While momentum is increasing, the dominant system is not visibly changing. According to Allen and Malekpour (2023), this stage is shaped by the following critical barriers and enabling conditions:

- Barriers: Lack of agreement on the need for change, disinformation, narrow problem framing, social norms against change, and fear of change.
- Enabling conditions: New narratives and framings, awareness of the need for change, protected spaces for innovation, experimentation and coproduction, and opportunities for contestation.

Loorbach et al. (2017) identify common characteristics that different approaches to understanding and analysing societal transitions share in how they aim to support transformative change. These include:

- Empowering different forms of agency to influence the speed and direction of transitions.
- Reframing the problem through systemic thinking, shared discourse, and recognition of persistent challenges such as path dependencies and lock-ins.
- The role of visioning to develop compelling futures to motivate and coordinate action.
- Emphasis on experimentation, learning and reflection, as a means of adapting, disrupting dominant practices, and enabling actors to reshape behaviours, roles, and knowledge.

Sustainability transitions are layered processes, influencing and being influenced by multiple domains. Given the scope of this project, I focus on the behavioural layer, that explores how individuals and groups accept, resist, or adapt their behaviours within the transition process.

1.1.1.3 BEHAVIOURAL DYNAMICS

Allen and Malekpour (2023) gather several behavioural positive reinforcement loops that can aid the new system to gain momentum. These include:

- Increasing capacity to adopt new behaviours
- Behavioural nudges
- Financial incentives or rewards
- Positive narratives and experiences
- Greater access to information and independent media
- Education and awareness
- Enhanced desirability and availability of alternatives

However, no single intervention will achieve a shift as significant as the protein transition. Rather, research (Abson et al., 2017; Loorbach et al., 2017; Markard et al., 2020; Simoens et al., 2022) points to the need for a portfolio of interventions operating across multiple levels of society. Allen and Malekpour (2023) emphasize the importance of strategically aligned sequenced interventions that reinforce one another. When coordinated effectively, these can simultaneously weaken feedback loops that uphold the old system and strengthen those that support the new one. Over time, these changes can lead to tipping points, opening the door to the second phase of the transition.

1.1.1.4 LEVERAGE POINTS IN SUSTAINABILITY TRANSFORMATIONS

Abson et al. (2017) offer insight into three realms of deep leverage for sustainability transformation. Each of these areas call for a shift in how we relate to systems, to nature, and to knowledge itself.

1. Re-structure: Change, stability, and learning in institutions. Human societies rely on institutions, both formal (like laws and regulations) and informal (such as customs and social norms), to guide collective behaviour. While these structures tend to reinforce themselves over time, moments of crisis or intentional disruption can open the door to meaningful change. Drawing from historical perspectives and insights from social-ecological systems, exploring institutional failure and designing for controlled phase-out can create space for transformative adaptation rather than just incremental shifts.
2. Re-connect: Interactions between people and nature. Our relationship with nature, both as individuals and as societies, shapes the choices we make and the values we hold. Beyond material interactions, it is the deeper emotional and experiential bonds with the natural world that influence behaviour. The authors critique the modern disconnection from nature and its negative impact in sustainability, and suggest that restoring these connections, through ethical reflection and practical engagement, can shift the cultural narratives that define how we live. Re-connecting is not only about physical proximity to nature but also about recognizing the moral responsibilities that come with it.
3. Re-think: How knowledge is produced and used. How we generate and use knowledge shapes what we see as possible. Dominant paradigms and path dependencies dictate how sustainability issues are framed and solved. To re-think is to ask questions such as: Whose knowledge is valued? How is it integrated? And what assumptions go unchallenged? By examining these questions, this realm encourages a more open, adaptive way of thinking.

1.1.2 BEHAVIOUR, LETTING GO, AND TRANSITION PAIN

Changing behaviours is a complex challenge. It is not simply a matter of offering better options. Shifting away from animal-based diets often triggers deep attachments, social norms, and emotional responses. Yet, transition frameworks rarely address the psychological processes that underlie these behavioural shifts. De Vries et al. (2021) argue that psychology is the missing link in transitions research, essential for understanding how and why people change their behaviour in sustainability transitions.

Behavioural change is rarely rational or linear. Research shows that humans are loss averse, we tend to feel losses more intensely than equivalent gains (Kahneman et al., 1991). This supports the status quo bias, where familiar habits feel "good enough," and change is perceived as risk. In the context of dietary transitions, giving up meat or dairy is often framed as a loss, of pleasure, tradition, or convenience, rather than a gain in health or sustainability. These perceptions fuel resistance, even when individuals recognize the long-term benefits of change.

However, loss aversion is only part of the story. Beyond cognitive resistance, there is also emotional and social discomfort tied to letting go of familiar behaviours. Feola and Jaworska (2019) argue that transitions research has long overlooked the emotional toll of change, despite emotions being central to how people engage with transitions. Recent research highlights the importance of transition pain: the negative emotions individuals experience when required to phase out established practices. Bogner et al. (2024) describe how transitions, particularly those involving personal lifestyle change, can provoke anxiety, grief, identity disruption, and even backlash. For instance, long-time meat consumers may feel cultural dislocation or defensiveness when asked to give up animal products, especially if such change feels imposed or judged.

These emotional responses can stall progress. Bogner et al. (2024) argue that ignoring the psychological dimension of transitions, especially the coping mechanisms people use to manage loss, leaves a gap in transition management. They call for integrating behavioural science and emotional awareness into sustainability transitions to support individuals in "letting go" of the old with less pain. This might involve:

- Reframing loss through new narratives
- Creating communities of practice where people support one another.
- Providing off-ramps, gradual, empowering steps that allow people to phase out old behaviours on their terms.

Complementing this, Tonkinwise (2015) argues that successful transitions require more than policy change or high-level systems thinking. They demand tangible, attractive alternatives that embed new behaviours into daily life. He critiques the overemphasis on strategic planning in design-for-transitions discourse, urging designers to engage with the everyday actions that shape consumption. People must be able to see, imagine, and experience new futures, which can inspire voluntary change before external crises force it.

In practice, this means designing interventions that reduce friction and make sustainable behaviours desirable.

1.1.3 CURRENT CONTEXT AND NARRATIVES IN THE NETHERLANDS

The protein transition unfolds within a contested social, political, and cultural landscape.

Research by Michielsen and Van Der Horst (2022) illustrates how populist ideology has become a significant barrier to meat-reduction efforts. Analysing online discourse in the Netherlands, they found that opposition to the protein transition is often framed through anti-elitism (the belief that sustainability policies represent interference by the elites) and carnism (the ideology that eating meat is natural, normal, and necessary). Together, these narratives position meat reduction as a threat to personal freedom, fuelling emotional backlash and political resistance.

This backlash is not limited to the Netherlands. The EAT-Lancet Commission's report (2019), which advocated for global dietary shifts to improve health and reduce environmental impact, faced intense criticism under the hashtag #yes2meat. This counter-movement spread misinformation and conspiracy theories, suggesting a secret elite agenda to control people's food choices.

These examples reveal how identity-charged narratives can reframe scientific recommendations as attacks on autonomy, eroding trust and polarizing public debate. In today's highly polarized media environment, science communication around sustainability issues faces increasing resistance and reinterpretation.

Simoens et al. (2022) argue that transitions are, in part, discursive struggles between dominant narratives and emerging counter-narratives. Dominant narratives represent mainstream viewpoints that uphold existing power dynamics; they are typically supported by the majority or those in positions of power. Counter-narratives offer divergent perspectives that challenge the status quo and can serve as tools for empowerment and systemic change.

Here, design plays a critical role. As Shaw and Nickpour (2024) argue, designers inherently embed and convey narratives through their work, whether consciously or not, and as such, design is not a neutral tool.

Design is a channel through which social meanings are expressed, reinforced, or challenged; a practice capable of questioning dominant norms, amplifying alternative perspectives, and contributing to systemic change.

1.1.4 DEGROWTH AND UNMAKING IN THE PROTEIN TRANSITION

At its core, the protein transition is not just about adding alternatives, it is about unmaking an unsustainable system. The push to reduce animal-based consumption stems from the recognition that infinite growth in resource-intensive practices is incompatible with ecological and social well-being. Degrowth theory offers a critical lens here, emphasizing that true sustainability requires scaling down production and consumption in affluent societies, not simply "greening" existing patterns (Feola, 2019).

Degrowth fundamentally challenges the dominant narrative of progress as accumulation, calling instead for the dismantling of harmful systems and norms. It advocates for alternative ways of living centered on sufficiency, equity, and ecological balance. In the context of the protein transition, this involves questioning the economic and cultural structures that normalize animal-based consumption and maintain its dominance. As Feola (2019) argues, a post-growth future demands both the disruption of established practices and the creation of low-impact alternatives. This means reconfiguring social expectations and practices, not just offering replacements. In parallel, Shove (2012) stresses that sustainability cannot rely on persuasion alone; it requires the disruption of ingrained social practices and routines that drive overconsumption.

This is where design can become an agent of unmaking. Tonkinwise (2014) frames design as a means of deliberately phasing out unsustainable behaviours by reshaping what is considered normal. He also highlights a critical ethical question, drawing from Tony Fry's work, that speaks to the designer's responsibility in evaluating the consequences of what they bring into the world:

> *"Is what you make worth what you will have destroyed to make it and have it taken up in the world?"*
>
> TONY FRY

1.1.5 DESIGNING FOR TRANSITIONS

1.1.5.1 DESIGN LOGIC: ABDUCTION

Design logic, often captured through the concept of abduction (Dorst, 2011), challenges traditional, linear approaches to problem solving. Designers do not simply apply existing methods to solve predefined problems; they must define the problem, imagine the solution, and figure out the working principle. Often, all at once. This iterative, exploratory and open-ended process eventually leads to a tentative proposal that links value to action, outcome to mechanism.

This is where creativity comes in: imagining what the solution could be (an intervention, a system, a strategy), and, at the same time, how it could function in reality.

WHAT (thing) + HOW (working principle) leads to VALUE (aspired)

This graduation project starts with an aspired value: to guide Dutch consumers to drastically reduce their animal protein consumption. Chapter 4 will focus on exploring the "how"; while Chapters 5 and 6 will focus on the "what". To pursue this goal, the project draws from design approaches that help navigate complexity, such as systemic design, transition design and systems-shifting design.

1.1.5.2 SYSTEMIC DESIGN

Systemic design integrates design methodologies with systems thinking to address complex societal challenges. Design has historically evolved to accommodate increasing complexity, moving beyond traditional product and service design to engage with policies, social structures, and large-scale strategies aimed at generating collective benefits. This shift reflects what Buchanan (1992) described as fourth-order design, the design of complex systems.

> *"Systemic design is one of the interdisciplines that addresses design's role in transformative change in the pursuit of sustainable, just and resilient futures"*
>
> MIEKE VAN DER BIJL-BROUWER

Building on this evolution, systemic design recognises that today's challenges are deeply interconnected. Solutions cannot be developed in isolation, nor can they rely solely on linear problem-solving. At its core, systemic design merges the analytical depth of systems thinking with the action orientation of design. While systems thinking excels at mapping interdependencies and understanding complexity, it has long been critiqued for lacking mechanisms for action.

Design, in contrast, is solution-driven but has traditionally struggled to engage effectively with systemic complexity (Buchanan, 2019). Systemic design bridges this gap, offering both theoretical foundations and practical methodologies for intervening within complex, adaptive systems.

Yet, even within systemic design, a core tension remains: large-scale change cannot always be "designed" in the conventional sense, as complex systems are adaptive, non-linear, and resist control. Systems thinking reveals interdependencies and contextual insight, but it does not define which problems to address or how to intervene effectively. As Weick (1984) observes, people often frame societal problems in ways that overwhelm their ability to act. In response, Buchanan (2019) advocates for focusing on small wins, identifying leverage points where modest interventions can trigger cascading systemic effects.

Systemic design embraces this perspective, acknowledging that no single actor controls systemic change, but that strategic interventions can shift conditions for transformation. Rather than seeking total control, systemic design aims to amplify potential within complex systems, guiding coordinated efforts toward more just, sustainable, and resilient futures.

To support this, Jones (2014) outlines a set of systemic design principles, including boundary framing, requisite variety, generative emergence, and continuous adaptation. These principles reflect the need for ongoing learning, flexible engagement, and context-specific strategies.

1.1.5.3 TRANSITION DESIGN

Transition Design positions design as a fundamental driver of the systemic transformations required in society (Tonkinwise, 2015). Irwin (2019) describes Transition Design as a design-led approach for addressing "wicked" problems, arguing that design interventions must align with broader societal transitions rather than focus solely on short-term optimization. This approach recognizes that dominant lifestyles are inherently unsustainable, and that design, through shaping products, services, and systems, influences how people act and the options available to them.

Rather than treating design as a one-off intervention, Transition Design frames it as an iterative process, a cycle of designing, waiting, observing, re-framing, and envisioning desirable futures. It emphasizes working across multiple scales, from individual behaviours to institutional structures, in order to achieve long-term, systemic change.

Transition Design draws from multiple disciplines relevant to sustainable transitions, forming a fluid and evolving body of knowledge (Irwin et al., 2020). These influences include living systems theory, futuring, cosmopolitan localism, everyday life discourse, human needs theory, and social practice theory. This broad foundation highlights the need for design approaches that are context-sensitive, adaptive, and informed by multiple ways of knowing.

Both systemic design and transition design emphasize the role of designers in engaging with complexity, diverse stakeholders, and the alignment of short-term actions with long-term goals. Where systemic design equips designers with tools to analyse and intervene within complex systems, transition design advocates for a design practice that ensures that these interventions contribute meaningfully to sustainable futures.

Together, they legitimize design's role in societal transitions, demonstrating that designers can move beyond isolated problem-solving to shaping the conditions for transformation.

1.1.5.4 SYSTEMS-SHIFTING DESIGN

A complementary perspective that enriches the framing is Systems-Shifting Design, as articulated by the Design Council (2021). This approach highlights that driving fundamental transitions requires designing "things" that challenge the underlying beliefs, missions, and logics that shape the systems, and encourages designers to seek shift and depth, not scale. It offers a lens for understanding what designers should focus on and how they might intervene:

- Challenging Deep Structures: Designers are called to question and reshape the foundational narratives and assumptions that dictate a system's purpose and operations.
- Operating at Multiple Levels: Systems-Shifting Design aims to work across three interconnected levels:
  - Meso: Forging new relationships between organizations and institutions to support emergent practices.
  - Macro: Crafting new narratives that redefine the overarching vision of the system.
  - Meta: Cultivating new values that reshape what is considered desirable and ethical.
- Facilitating Systemic Transformation: Rather than offering isolated solutions, Systems-Shifting Design advocates for interventions that collectively reconfigure a system's purpose, power structures, relationships, and resource flows.
- Bringing Potential Systems into Being: This approach values the role of imagination in systemic change, through provocation, speculation, or creating spaces for others to envision alternative possibilities. Prototyping plays a central role in this process, as a tool to reveal possibility.

1.1.5.5 WICKED PROBLEMS

When designing for transitions, the notion of the wicked problem inevitably arises.

The concept of wicked problems, introduced by Rittel and Webber (1973), offers a useful lens for understanding the complexity of the protein transition. While it may seem that individuals changing their diets is relatively simple (after all, many people voluntarily reduce or eliminate animal products), this perspective shifts dramatically when we zoom out to the level of collective behaviour. At scale, the challenge becomes entangled with cultural norms, economic systems, identity, and political narratives, revealing the problem's wicked nature.

As Rittel and Webber (1973) note, there is no definitive formulation of a wicked problem, no single, correct way to describe or contain it. The protein transition is just one framing of a larger sustainability crisis, one attempt to engage with the broader question of how societies can reduce environmental strain and move towards resilient futures.

Throughout this project, I have encountered many of the defining characteristics of wicked problems. In Table 2, I reflect on the ten properties of wicked problems, indicating where in this report each one becomes most apparent. This reflection is a reminder of the complexity of the project and a way to situate my approach within a realistic understanding of what design can and cannot do.

Table 2. Manifestations of wicked problem properties across the report

Property of wicked problems	Where in the report	How it manifests in the project
1. There is no definitive formulation of a wicked problem	Chapter 1	Trying to delineate the protein transition shows how impossible it is to arrive at a complete or 'correct' problem definition. Framing is always subjective and shaped by content.
2. Wicked problems have no stopping rule	Chapter 7	There is no logical point where the problem is simply "solved." Work stops because of external limits: time, resources, or because it feels "good enough" to move on.
3. Solutions are not true-or-false, but good-or-bad	Chapter 6	Design outcomes are judged, not proven. What seems like a good outcome varies depending on who is looking and what they value.
4. There is no immediate and no ultimate test of a solution	Chapter 6	The full consequences of any intervention only unfold over time, and there is no way to trace all the ripple effects through every life or context it might touch.
5. Every solution is a one-shot operation	Chapter 7	Every action leaves traces and influences what comes next. In living systems, outcomes cannot be isolated or undone.
6. There is no enumerable set of solutions, nor a well-defined set of operations	Chapter 5	There is no fixed solution space; it shifts with context, creativity, and judgment. Sometimes, there may be no clear solution at all.
7. Every wicked problem is essentially unique	Throughout	Patterns might repeat, but each situation, in this case, each project, is shaped by its own cultural, economic, and political realities.
8. Every wicked problem can be considered a symptom of another problem	Chapters 1 and 3	There is no "natural" level at which to frame a wicked problem. The unsustainability of the food system connects to broader crises like climate change, but at some point, it becomes hard to distinguish cause from consequence. Should we address the food system directly, or tackle the larger dynamics that shape it? In chapter 3, I argue that the slow pace of the protein transition can be considered a symptom of the dynamics I identify as systemic barriers.
9. The existence of a discrepancy can be explained in multiple ways	Chapter 4	There is more than one way to explain what is "wrong" and what needs to change, and those explanations are not purely logical. As Rittel and Webber (1973) note, we tend to go with what aligns with how we see the world and what we believe is possible to change. In this project, how I frame the protein transition and what I choose to focus on reflects both analysis and position: what I see as possible, necessary, and worth pursuing.
10. The planner has no right to be wrong	Chapter 7	Designers have to navigate uncertainty, knowing that actions have consequences even when intentions are good.

1.2 CONTEXT OF STUDY: THE TU DELFT FOOD SYSTEM

Framing a system involves making deliberate choices about scope and context. To ground this project and ensure the relevance of insights, the food system at TU Delft's campus was selected as the context of study.

This choice was made for several reasons. First, it provides access to a reachable and well-defined target group: a population of students, faculty, and staff who share infrastructure, routines, and institutional frameworks. This bounded context allows for focused observation of behaviours, needs, and opportunities, all rooted in the everyday reality of a university setting.

Second, the transferability of insights is relevant for the client, WWF-NL. As a university at the forefront of technological and social innovation, TU Delft offers a testbed for change. What happens here can inform strategies for similar institutions, or even broader public settings where sustainable food transitions are being explored.

Third, TU Delft actively positions itself as a leader in innovation and sustainability, with ambitious targets for reducing environmental impact. This makes it a suitable environment for experimentation, since change is, to some extent, institutionally supported, and at the same time the systems still reflect the norms of the dominant food regime. That tension, between ambition and status quo, makes TU Delft a relevant and realistic case for exploring both the barriers and the windows of opportunity that shape the protein transition in practice.

The main actors within this system include the catering providers, who manage food offerings across campus; facility management, which oversees sustainability policies and contracts; and the students and faculty staff, as the primary consumers. The sustainability team plays a central role in both shaping institutional goals and mobilizing the campus community toward them. Their position, connecting sustainability ambitions to action, reflects the advisory role of WWF-NL (Figure 3).

Once this context is defined, and the main actors are identified, the next step is to engage with the system.

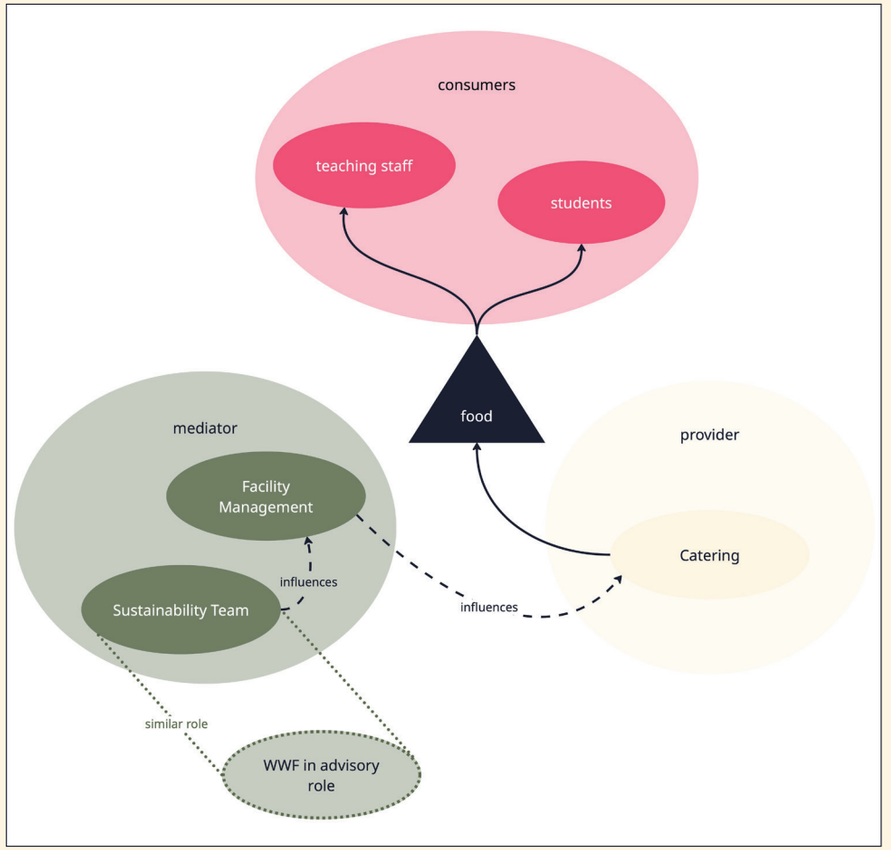


Figure 3. Main actors within the context of study.

CHAPTER 2

LISTENING TO THE SYSTEM

This chapter captures the stage of human research, in which I engaged with the system through a series of field activities to observe behaviours, gather perspectives, and surface underlying dynamics. The goal of this research was to better understand the actors and relationships shaping the campus food system, to explore consumer perspectives on food choices and sustainability, and to identify opportunities for the protein transition. Since food consumption is influenced by a web of habits, social norms, infrastructure, and institutional structures, I sought to capture insights across multiple levels of the system.

The chapter begins by outlining the approach I followed, including the methods and activities used to collect data. I then describe how this data was analyzed and what emerged from that process. Finally, I present the main insights, valuable lessons learned from this stage of the process that informed the next steps in the design journey.

2.1 Approach

Drawing from the theoretical framework, I approached the system with an interest in how narratives influence behaviour. I focused on identifying the dominant narratives that uphold the current food system, while also paying attention to counter and alternative narratives that may point to change. The research methods and activities are grouped into the following four focus areas:

- Understanding the dominant narrative on campus, through observations and short interviews (section 2.1.1).
- Understanding consumer perspectives, through in-depth interviews that surfaced both dominant and counter narratives (section 2.1.2).
- Including other system actors' perspectives, through semi-structured interviews (section 2.1.3).
- Exploring alternative narratives that challenge or reimagine current norms, through the participation in a workshop (section 2.1.4).

Figure 4 shows the temporal sequence of activities conducted within each of these focus areas.

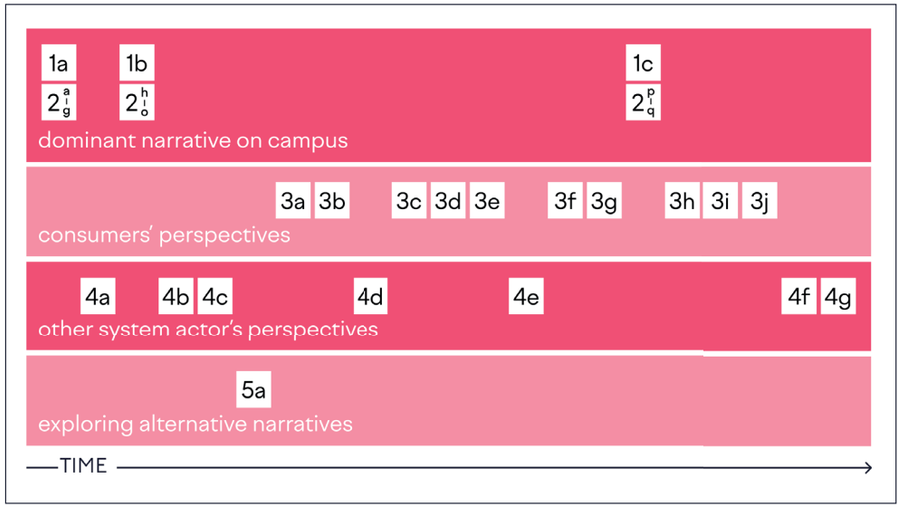


Figure 4. Sequence of field research activities

2.1.1 UNDERSTANDING THE DOMINANT NARRATIVE: THE CAMPUS FOOD SYSTEM

The first step was to observe how food is consumed and perceived within the campus setting, paying attention to everyday behaviours, informal interactions, and environmental cues. These initial activities are summarised in Table 3.

Table 3. Field research methods to understand the campus food system

ID	Field Research Activity	How many	Duration (each)	Documentation
1a-1c	Observations at food outlets	3	60-75 minutes	Fieldnotes, photos
2a-2q	Quick interviews at food outlets	17	5-10 minutes	In-situ notetaking

OBSERVATIONS AT FOOD OUTLETS

Observations at three campus catering locations to understand how people interact with food spaces, the roles and presence of different actors, whether consumers eat alone or in groups, and how they navigate the available food outlets.

The locations were:

1. Aula Food Square outlet, with the biggest offer on campus, counts with its own kitchen, offering more food items and warm meals than other locations.
2. Fellowship: food market run by local entrepreneurs, with a very different offer than Appel's outlets. Homemade traditional Greek and Italian food.
3. Echo: Food of the future, with a full vegetarian assortment, a cross-faculty building with seven teaching rooms and 350 study spaces.

QUICK INTERVIEWS AT FOOD OUTLETS

Quick consumer interviews, I tried to capture how students make food choices on campus. Questions focused on decision-making factors, preferences, satisfaction levels and attitudes towards sustainability and reducing animal-based consumption.

These activities provided a baseline understanding of the dominant food

culture on campus, showing how the current system is structured and how consumers engage with it. Insights from these activities helped building the interview guides (which can be found in Appendix B): relevant themes, gaps in understanding and targeted questions.

Figure 5. Aula Food Square outlet.

TAKEAWAYS

- Food choices are shaped by convenience and appearance.
- Labelling is confusing, many symbols with different purposes.
- Catering is perceived as transactional, little to no interaction between staff and consumers.
- The dominant narrative is one of neutrality.
- Outlets have distinct identities, and people associate them with different values and experiences.
- There is no sense of urgency around the protein transition, it is perceived as distant and unrelated to academic priorities.

2.1.2 UNDERSTANDING CONSUMER PERSPECTIVES

Consumers are at the centre of this project. Their behaviours are the ones I seek to guide, and so collecting their nuanced views on food, identity, and sustainability formed the core of this research phase. To uncover the emotional, relational, and cognitive layers influencing food behaviour in the context of the protein transition, I conducted a series of in-depth interviews. These conversations were designed to surface lived experiences and tensions that might not emerge through more direct questioning. Table 4 summarises the field research methods used to explore consumer perspectives.

Table 4. Field research methods to understand consumer perspectives

ID	Field Research Activity	How many	Duration (each)	Documentation
3a-3e	In-depth interviews to IDE students	5	60-75 minutes	Audio recording and transcription
3f-3j	In-depth interviews to non-IDE students	5	60-75 minutes	Audio recording and transcription

IN-DEPTH INTERVIEWS

To explore the emotional dimensions of the protein transition and gain insight into transition pain, I conducted semi-structured interviews. This approach allowed for a balance between structure and flexibility, ensuring consistency while leaving space for emergent themes (Patton, 2002). The interview guide, provided in the Appendix B, covered three main themes, following the experience domain (Sanders, 2001; Figure 6).:

- Person-food ecosystem (past and present)
  - Mapping daily eating habits to uncover relationships, actors, and meanings.
  - Exploring food identity in connection to personal values.
  - Identifying behavioural changes related to the protein transition.
- Perspectives on the protein transition
  - Understanding participants' interpretations, narratives, and perceived barriers.
  - Examining the connection between protein transition, sustainability goals, and justice.
  - Exploring perceived fairness, emotional responses, and the role of responsibility.
- Exploration of speculative futures
  - Investigating concerns, hopes, and coping mechanisms regarding dietary change.
  - Using speculative future scenarios to elicit emotional reactions and uncover underlying values.
  - Identifying opportunities for making space for change.

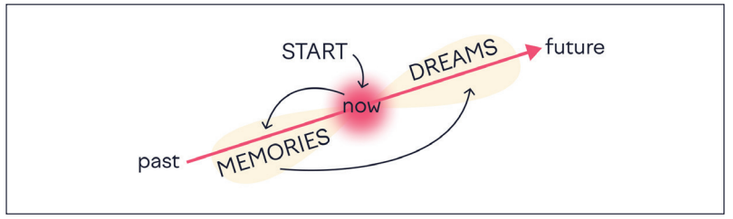


Figure 6. The experience domain (adapted from Sanders, 2001).

I used day-in-the-life walkthroughs and a collage activity to explore how people relate to food on both a practical and emotional level.

The walkthrough, at the start of each interview, helped participants reflect on their eating habits, what they ate, where, and with whom. This anchored the conversation in real experiences, surfacing routines, emotions, and social dynamics that shape their choices.

The collaging activity was chosen to evoke memories and emotional responses. The creative process helps participants become more aware of their experiences, and once they have assembled their collages, they articulate the meanings behind their choices. Their stories often reveal rich insights, offering valuable information for designers (Stappers and Sanders, 2008). The set of collage images was prepared in accordance with the guidelines by Visser et al. (2005). The collage exercise allowed them to express their connection to food in a more abstract way. Instead of just describing their thoughts, they selected images that resonated with them, triggering personal stories and associations. Some reflected comfort, tradition, or identity, while others pointed to concerns about health, ethics, or the future of food. The ambiguity of the images left room for interpretation, ensuring that their own meanings and motivations emerged rather than being influenced by the framing of the interview.

These two methods complemented each other: the walkthrough captured concrete habits, while the collage revealed deeper layers of meaning. Both fit within a generative research approach, designed to surface implicit knowledge otherwise difficult to articulate (Visser et al., 2005). This helped me move beyond surface, level opinions, uncovering the tensions, values, and emotions tied to food, essential for understanding transition pain and designing interventions that resonate with people's lived experiences.

To talk about the future, and try to elicit transition pain, I prepared a future scenarios activity, that consisted of presenting 4 scenarios and prompt discussion and reflection. By engaging with these speculative futures, participants were encouraged to articulate their concerns, aspirations, and tensions surrounding the protein transition. The four-quadrant structure facilitated this process by exploring anticipated trade-offs and underlying values (Figure 7). I chose the axes based on themes that emerged during the desk research and the quick interviews. Tensions around freedom, agency, and personal choice are represented on the individualism/collectivism axis,

while concerns about what is perceived as "natural" versus "processed", including arguments of tradition versus technological advancement, are captured on the back-to-nature/over-engineered axis.

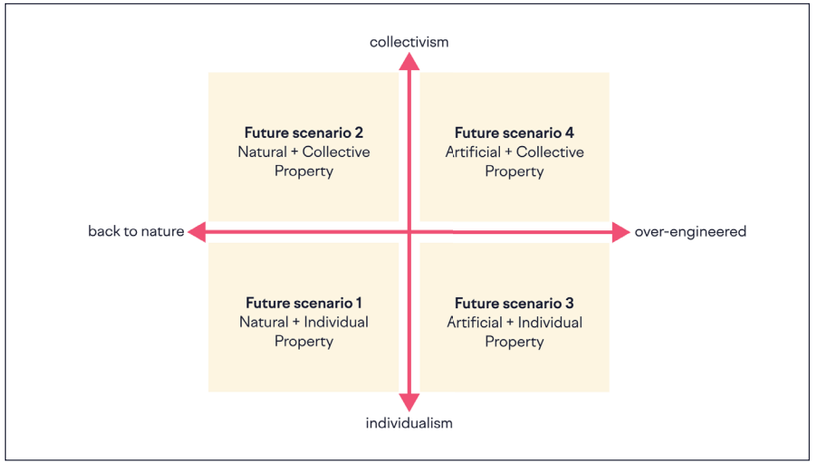


Figure 7. Simplified version of future scenarios (extended version can be found in Appendix B).

Each scenario presents speculative futures that involve some level of emotional trade-off, such as a loss of autonomy, communal living, or the over-engineering of food systems. The scenarios are intentionally framed to include both desirable and undesirable elements, acknowledging that real-life transitions are rarely linear improvements but rather complex shifts where gains (e.g., sustainability) often come with sacrifices (e.g., loss of cultural traditions).

The dimensions along which these futures were constructed emerged from a combination of intuitive synthesis and thematic contrasts observed in the desk research and quick interviews. Specifically, I chose to structure the scenario space around tensions that reflect widely held but often conflicting worldviews: the individualism–collectivism axis captures the political and moral opposition between liberal, capitalist values and more communal or state-led approaches (e.g., associations with communism or shared responsibility); the back-to-nature–over-engineered axis captures tensions between techno-skepticism and techno-optimism.

By stepping into these speculative futures, participants could temporarily detach from their current reality and weigh different possibilities. This helped reveal not just their fears and desires but also the types of sacrifices they might be willing, or unwilling, to make.

After conducting the interviews, I categorised participants based on two dimensions: their attitude towards the protein transition and their level of knowledge and comfort regarding plant-based alternatives. I chose

these dimensions based on recurring themes in the interviews, reflecting differences in participant's motivation (supporter-skeptic) and perceived agency (within or outside their control). This resulted in a four-quadrant matrix (Figure 8).

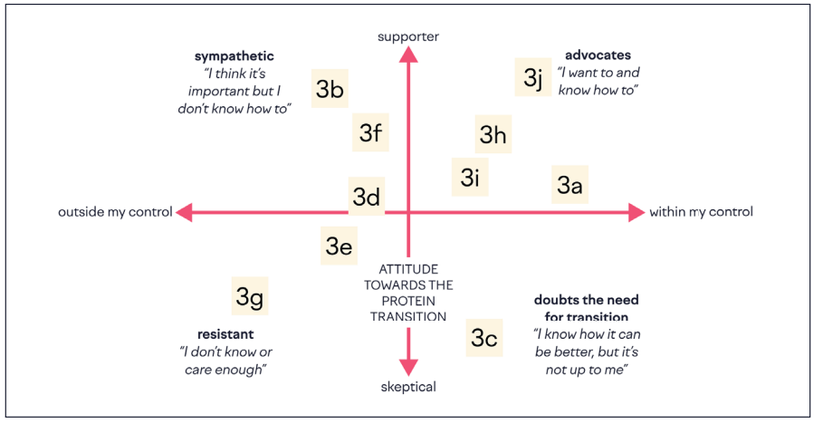


Figure 8. Four-quadrant matrix with consumers' attitude towards the protein transition.

The aim of this categorisation is not to frame any stance as more desirable nor to prescribe a progression from one quadrant to another. Rather, it serves to acknowledge the diversity of mindsets in the participants, and highlights that a one-size-fits-all approach would be ineffective.

2.1.3 INCLUDING OTHER SYSTEM ACTORS' PERSPECTIVES

To understand the broader system influencing food choices on campus, I engaged with institutional actors responsible for food offering and sustainability initiatives. This included semi-guided interviews with catering staff and sustainability representatives, complemented by on-site observation of a Green TU activity (Table 5). These activities offered insight into organisationalpriorities, constraints, and perceptions of responsibility.

Table 5. Field research methods to understand other actor's perspectives

ID	Field Research Activity	How many	Duration (each)	Documentation
4a-4g	Semi-guided interviews	7	60 minutes	Audio recording and transcription
5a	Observation of Green TU activity	1	50 minutes	Fieldnotes

SEMI-GUIDED INTERVIEWS

These interviews were approached in a more open and explorative manner, allowing conversations to unfold naturally rather than strictly following a predetermined guide. This flexibility provided deeper insights into the systemic forces at play. The interview guide can be found in Appendix B.

OBSERVATION OF GREEN TU ACTIVITY

In addition to the interviews, I observed a student-led Green TU activity focused on collecting feedback about sustainability efforts on campus. The event created a space for students to voice concerns and share ideas. Observing this interaction surfaced recurring themes such as skepticism toward institutional communication, doubts about the authenticity of green initiatives, and a perceived lack of transparency or follow-through. These impressions provided valuable context for interpreting the institutional narrative and its reception by the wider campus community.

2.1.4 EXPLORING ALTERNATIVE NARRATIVES: NICHE AND FUTURE FOOD PRACTICES

Beyond the dominant system and institutional transition efforts, I also explored niche food system initiatives. A key activity in this area was my participation in a pilot workshop on the future of community kitchens in Rotterdam, run by a volunteer in Belvédère's Volkskeuken (Figure 9). The event brought together a diverse group of participants, including:

- Researchers working on food systems, circularity, and social design
- Food creatives and practitioners active in grassroots or experimental food networks
- Volunteers and community members engaged in local food initiatives and alternative economies

The goal of the workshop was to reflect on the social and infrastructural role of community kitchens, and to collectively imagine how these spaces could evolve in the context of urban transitions, particularly in relation to cultural diversity. Belvédère's Volkskeuken often brings together immigrants, refugees, and other groups with varied cultural backgrounds, making the kitchen not just a food space, but a site of cultural merging and solidarity.

This experience offered a glimpse into alternative ways of relating to food, and initiatives that understand food beyond the limits of a mainstream capitalist logic, such as food waste kitchens, community gardens, and cooperative food-sharing models. These initiatives exist parallel to main-

stream food systems, not necessarily as direct counterforces but as spaces for experimentation and reimagining food beyond commercial or institutional models.

While these niches may seem distant from the campus context, they raised questions that are relevant to this project. How can we make space for collective ownership and participation in food decisions? Could food on campus become more than a transactional offering? Participants voiced concerns about scale, disconnection and the market-driven nature of sustainability, stressing the need for more localised, relational food systems. These insights offer inspiration for interventions that foster more collective, participatory food practices.

Figure 9. Activity in the workshop on the future of community kitchens in Rotterdam.

2.2 DATA ANALYSIS

2.2.1 METHOD

For the consumer interviews, I used a thematic analysis approach (Braun & Clarke, 2006). I began by familiarising myself with the data, generating initial codes, and then searching for themes. This iterative process, reviewing, defining, and naming themes, was conducted using a mix of inductive and deductive approaches, with a focus on discovering latent knowledge about consumers' mindsets and contexts. The collected data included interview recordings and transcripts (automatically generated with Microsoft Word and manually reviewed for accuracy), participant-made collages during in-depth interviews, as well as pictures and handwritten notes. Initial coding was carried out using ATLAS.ti software, and subsequent clustering and refinement took place in Miro.

For insights drawn from other system actors and activities, I adopted a more interpretative approach. Rather than a detailed, formal coding process, these data sources were analysed through contextual reading, reflection, and mapping. This method allowed me to capture the broader systemic dynamics and perspectives of various actors. The insights from other actors aided during the sense-making phase in Chapter 3.

2.2.2 OVERARCHING THEMES FROM CONSUMER PERSPECTIVES

The overarching themes capture different dimensions of consumers' experiences in relation to the protein transition, as emerged from the in-depth interviews:

THEME 1. IDENTITY, CULTURE AND SOCIAL DYNAMICS

Food is a central marker of cultural identity and social belonging, a theme that resonates deeply across the interviews. Many participants spoke of how their traditional cuisines, family rituals, and cultural practices form the backbone of their daily food choices, elements that cannot be easily pushed aside. Food is also used as a social currency, shaping group belonging and signalling identity in social settings. Social expectations and collective identities reinforce dietary norms, influencing openness or resistance to the protein transition. The shift away from animal-based foods is both a change in consumption patterns and challenge to ingrained cultural narratives and communal rituals.

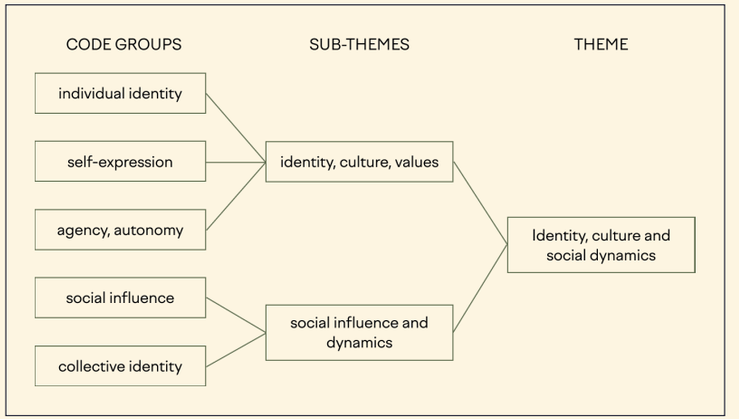


Figure 10. Code chart for theme 1: code groups and sub-themes.

THEME 2. EMOTIONAL AND PSYCHOLOGICAL DIMENSIONS

Beyond sustenance, food holds a deep emotional charge, tied to comfort, nostalgia, and personal well-being. Participants frequently associated food with emotional security, recounting how specific dishes evoke memories, serve as a coping mechanism, or provide a sense of stability in daily life. The prospect of reducing animal-based foods triggers transition pain, with participants describing feelings of loss, guilt, and cognitive dissonance when confronted with the need to change long-standing habits. Emotional attachment to food can create psychological resistance to change, especially when shifts in diet feel externally imposed rather than self-directed. At the same time, some participants found ways to emotionally reframe plant-based eating, adapting their preferences through positive associations and new routines.

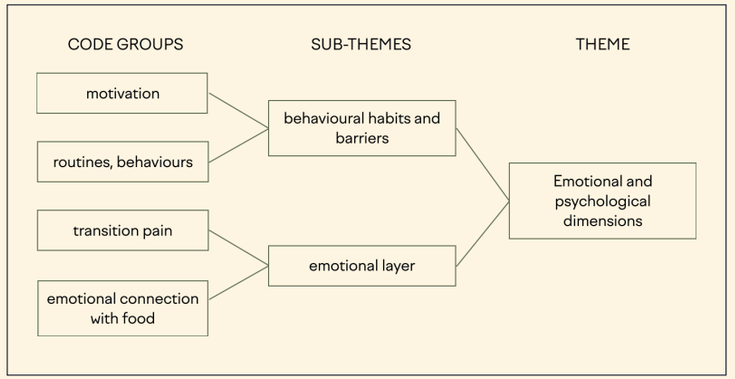


Figure 11. Code chart for theme 2: code groups and sub-themes.

THEME 3. PERCEPTIONS AND NARRATIVES OF THE PROTEIN TRANSITION

The transition away from animal-based foods is shaped by conflicting narratives, both personal and societal. Participants expressed a range of perspectives, from openness to skepticism, shaped by factors such as cultural beliefs, ethical considerations, and distrust toward food industry marketing. Some saw the protein transition as an inevitable shift aligned with sustainability goals, while others perceived it as an ideological imposition, resisting what they viewed as an encroachment on personal choice or cultural heritage. Cognitive dissonance was evident, with some participants simultaneously acknowledging the environmental impact of meat consumption while maintaining habitual eating patterns. The credibility of plant-based alternatives was also questioned, with some expressing skepticism toward the commercialization of sustainability, particularly when meat replacements were viewed as overly processed or disconnected from their perception of "real food."

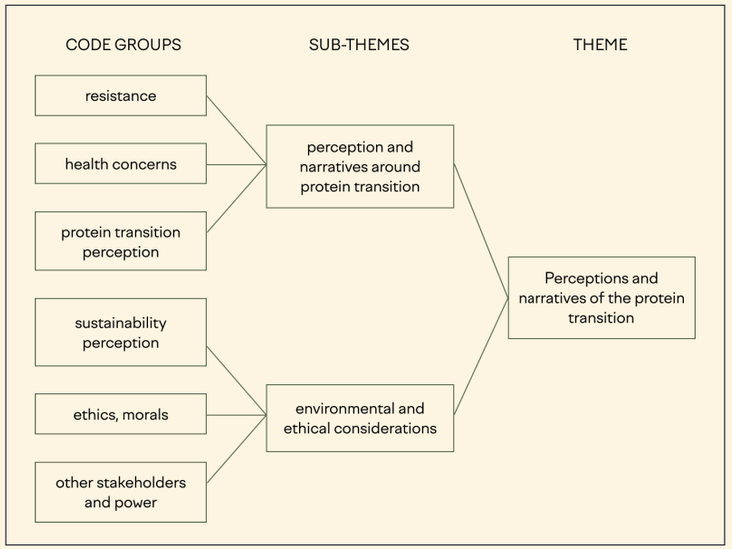


Figure 12. Code chart for theme 3: code groups and sub-themes.

THEME 4. PRACTICAL CONSTRAINTS AND SENSORY EXPERIENCE

Even when participants were open to reducing their consumption of animal-based foods, practical barriers often outweighed ideological considerations. Cost and convenience were recurring concerns, with some perceiving plant-based options as more expensive, less accessible, or requiring more effort to prepare. Time constraints and ingrained habits also played a role, as cooking routines were often built around familiar animal-based staples. Beyond logistics, sensory experience was a defining factor, with participants emphasizing the role of taste, texture, and satiety in food satisfaction. Some found plant-based alternatives lacking in richness or depth of flavour, while others were hesitant to fully replace foods that carried strong sensorial and cultural associations. In this context, food choices were not merely about sustainability or ethics but about the practical realities of daily life, sensory pleasure, and the deeply personal act of eating.

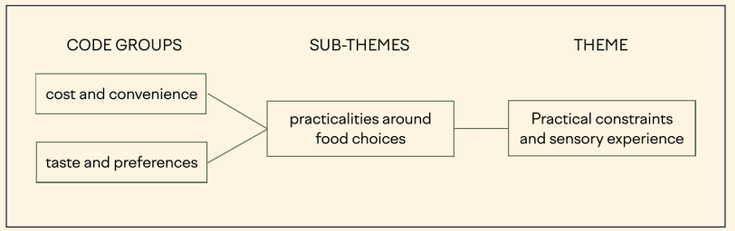


Figure 13. Code chart for theme 4: code groups and sub-themes.

2.3 MAIN INSIGHTS

DIFFICULTY IN ACCESSING THE EMOTIONAL LEVEL AND EXPLORING TRANSITION PAIN

While the primary goal of the consumer interviews was to explore the emotional dimensions of the protein transition and gain insight into transition pain, I learned during the interviews that it is difficult for participants to access or articulate transition pain. Firstly, because they struggle to imagine themselves in a situation where they truly have to say goodbye to animal products, as it seems a far-fetched reality. Secondly, because tapping into vulnerability and saying goodbye requires time and trust, the interviews not being the appropriate setup for this. However, the discussions helped uncover related themes that are relevant at this stage of the transition. For instance, participants talked about their reduction in consumption, the reasons to do so and the influences they had. At the experiential level, food can be an instrument of change, shifting mindsets and allowing for a gradual adaptation rather than immediate loss.

EMOTIONAL DISCONNECTION FROM THE FOOD SYSTEM AS A MAJOR BARRIER

I argue that it is difficult to reach the emotional side of transitions when people do not feel personally connected to the transition itself. Across the interviews, participants consistently described the food system in mechanistic, transactional terms, revealing a generally neutral attitude towards its workings and little deliberate reflection on where their food comes from. In other words, there is an emotional disconnection between consumers and the food system in transformation. The immense distance between food consumption and food production is a key problem that is slowing the pace of the protein transition. Without fostering a stronger emotional or cognitive link between consumers and the food system, change will remain slow and fragmented.

NEITHER INSTITUTIONS NOR INDIVIDUALS CAN DRIVE THIS TRANSITION ALONE

Meaningful change cannot come solely from top-down initiatives, just as it cannot rest entirely on consumer responsibility. The research highlights the limitations of both extremes: institutional efforts often feel disconnected

from consumer realities, while expecting individuals to drive systemic change on their own is unrealistic. A more integrated approach is needed, one that acknowledges the power dynamics within the system while also addressing the lived experiences and constraints of consumers.

THE DOMINANT NARRATIVE IS FILLED WITH PARADOXES

The interviews exposed contradictions in how participants make sense of their behaviour, making it difficult to define a single "right approach" to behavioural change and reinforcing the complexity of the topic. When asked to explain their choices, participants often produced reasoning that contradicted itself, revealing both the limits of rationality and the cognitive shortcuts we rely on. These tensions highlight how we navigate conflicting truths, often without realizing it. Rather than resolving these paradoxes, it is essential to hold space for them and acknowledge their role in shaping behaviour. After all, as Wagensberg (2017, p.34) said, a paradox is a sign of a missing idea, suggesting that paradoxes point to the limits of our current understanding and the possibility that something essential is still unknown.

"Giving my children a happy life requires a healthy planet... I'm in for less animal stuff [...] Sometimes I'm eating like a ton of the cheapest meat I can find." - Interviewee 3f

"I don't really like it... I think we should not compromise too much on food [...] Maybe a maximum you can buy in a week... I can be OK with it." - Interviewee 3g

BARRIERS AND OPPORTUNITIES FOR CONSUMERS IN THE TRANSITION

By analysing the content of the interviews, I identified key opportunities and barriers to dietary shifts from the consumer perspective (see Figure 14 for a reduce version with two items per layer, full version in Appendix B). When zooming out to a systemic level, these verbalised and observed barriers reveal structural forces that reinforce the status quo. This first approach to barriers and opportunities will be the grounds for the sense-making phase in the next chapter.

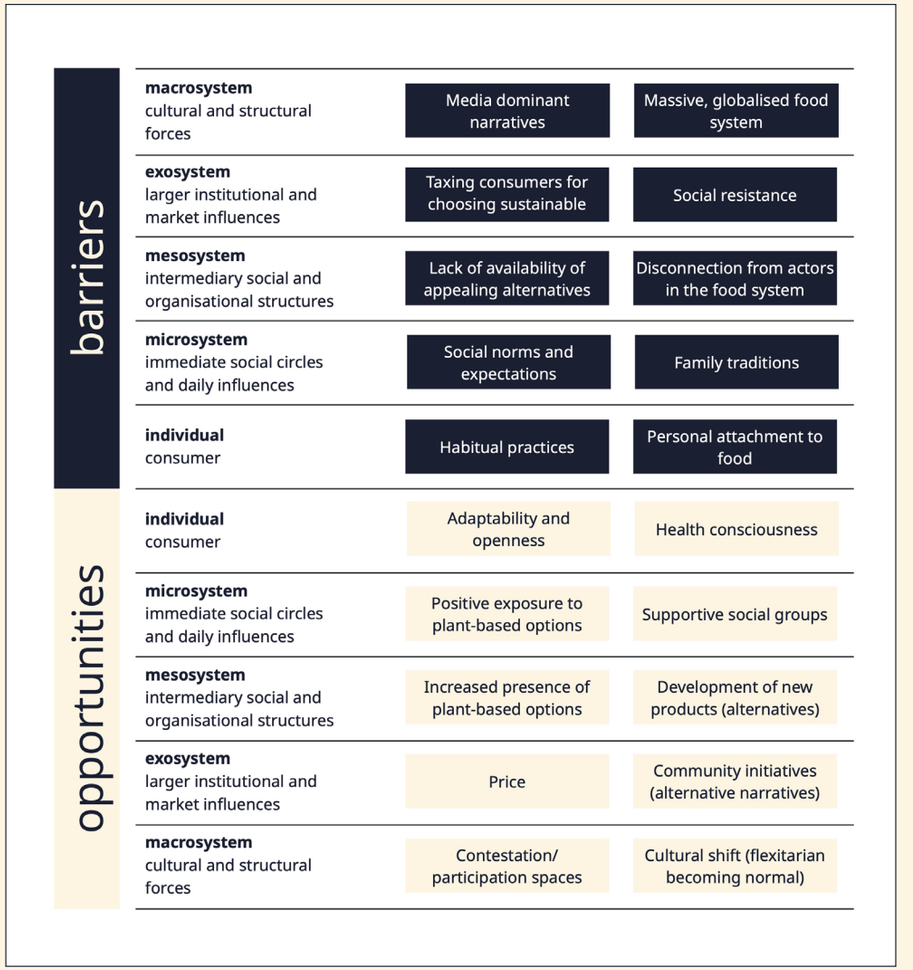
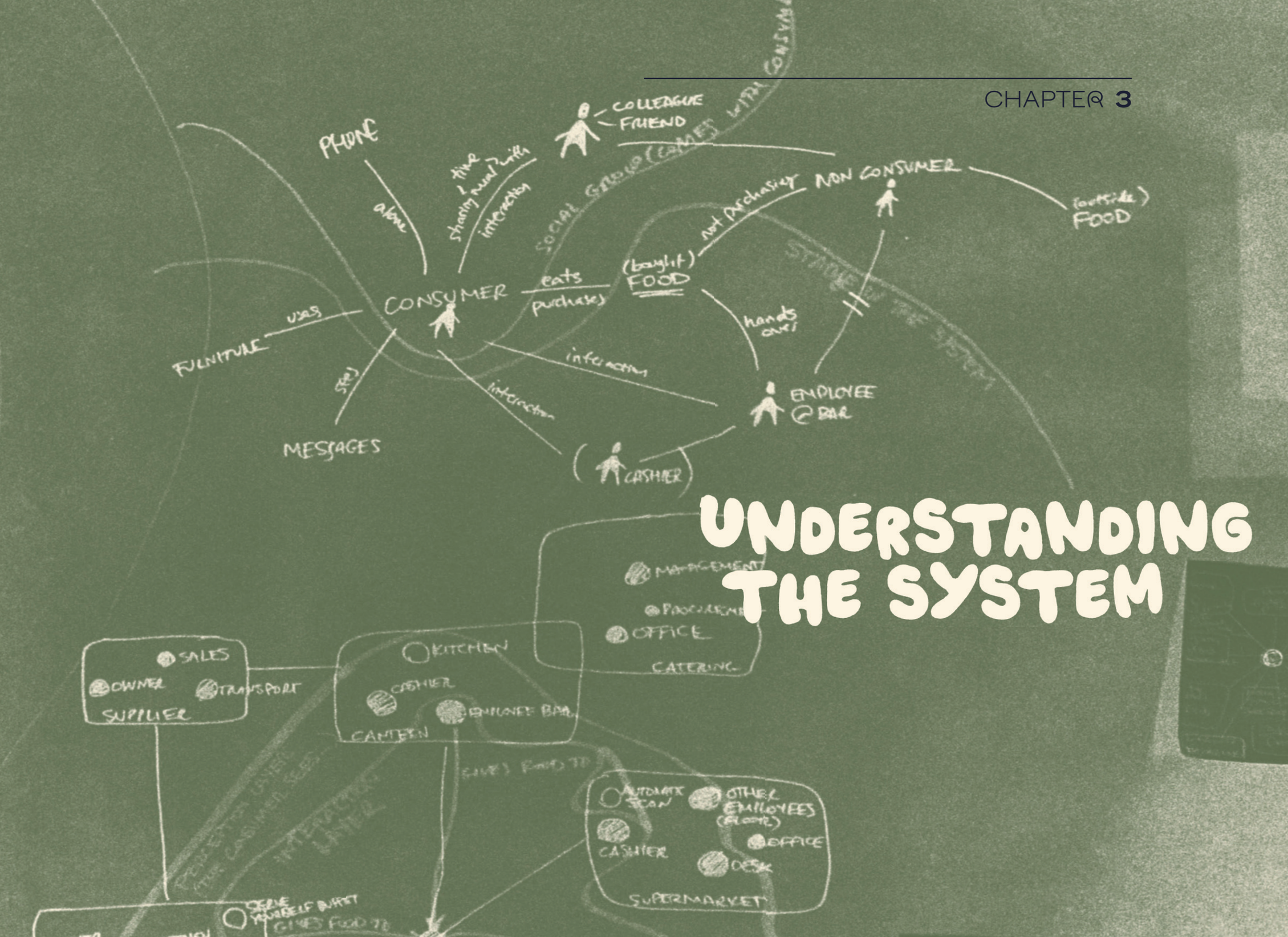


Figure 14. Barriers and opportunities for consumers, reduced version.



UNDERSTANDING THE SYSTEM

Understanding is about exploring the forces that shape system behaviours. In a traditional double diamond process, this phase marks the first moment of convergence. From all the information gathered during the framing and listening phases, this chapter seeks to make sense of the insights in a way that guides the design process toward next steps.

This stage is supported by systems mapping, using tools to model complex system behaviours and provide different perspectives on system dynamics. These tools enable a better grasp of the complexity by highlighting specific insights drawn from the system and allow for visual and simplified communication of those insights.

In this chapter, I make sense of the system by creating several actor maps, each with a main takeaway, and plotting the contextual factors identified in the interviews within a causal loop diagram.

Finally, I condense all insights into six systemic barriers that, according to my understanding of the system, help explain what is stopping the protein transition from accelerating or gaining momentum.

3.1 Actor maps

The following actor maps place the consumer at the centre of the system. Given the focus of this project, understanding the consumer's perspective is key. Each map explores a different nuance of the consumer's relationship with the food system, ranging from systemic influences and perceived roles, to visibility, agency, and the dynamics within the specific context of TU Delft. Rather than presenting a single static view, these five maps work together to unpack layers of interaction, power, and disconnection that shape food-related behaviours.

3.1.1 Actor map 1: consumer influences and Dutch food system

In Eetplan voor de Planeet (WWF-NL, 2022), Figure 11 (p. 32) illustrates the Dutch food system from table to farmer, representing the parties that shape the food environment. Focusing on the consumer perspective, I expand this visual by adding what I refer to as "consumer baggage": all the influences that consumers bring into the system, which have a significant impact on their behaviour.

What I want to emphasize is that this consumer baggage cannot be conceptualised as an actor in the same way that the other actors are represented in the map. However, this does not mean that these abstract notions lack influence within the system.

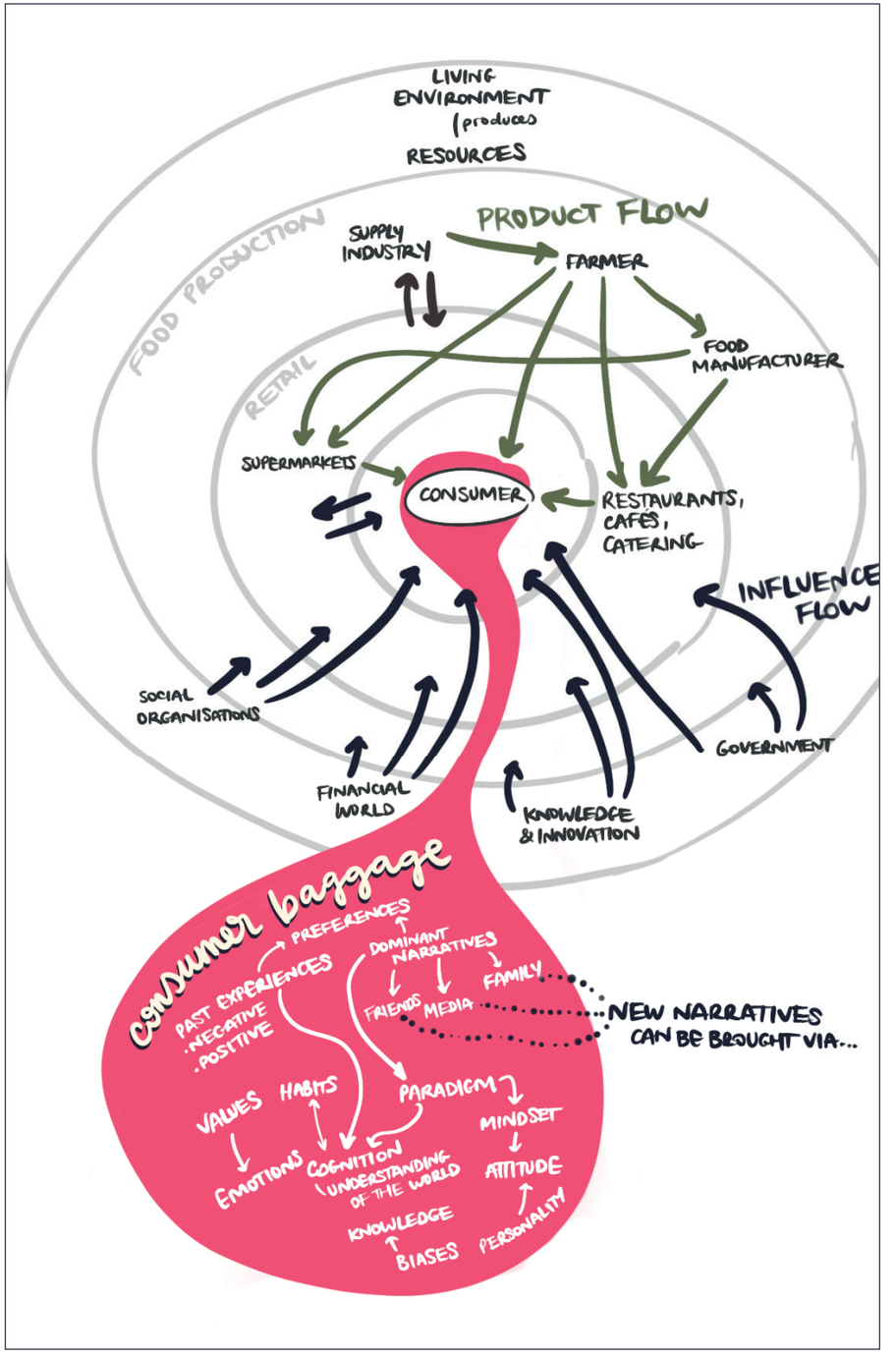


Figure 15. Actor map 1: consumer influences and Dutch food system.

3.1.2 ACTOR MAP 2: CONSUMER PERCEPTION OF FOOD SYSTEM'S ACTORS

This map represents the different spaces the consumer moves through when engaging with the food system. What it aims to highlight is the incredibly limited perception, and even more limited human-to-human interaction, that typically occurs in these spaces.

Besides, from the consumer's perspective, each interaction is framed as a service experience, a value exchange (MONEY ↔ FOOD + EXPERIENCE), reinforcing a mindset of "I am here to be served". This individualistic view supports the belief that, as paying customers, consumers are entitled to act solely in their own interest, free from accountability for the collective impacts of their choices.

Figure 16. Actor map 2: consumer perception of food system's actors.

3.1.3 ACTOR MAP 3: CONSUMER IN THE TU DELFT FOOD SYSTEM

This map follows the logic of the previous one but narrows the scope to TU Delft. It also highlights which actors in this food sub-system come into contact with food.

This is key because eating is a sensorial and supposedly pleasurable experience, yet menu decisions are made by people who never engage with the food itself. These decisions are based on sustainability guidelines that may, or may not, align with consumer preferences, leading to a reductionist, parameter-driving approach to food preparation.

This points out that disconnection is not limited to the consumer side. It also exists on the supply side, where decision-makers are detached from the outcomes of their work and the food experience they shape.

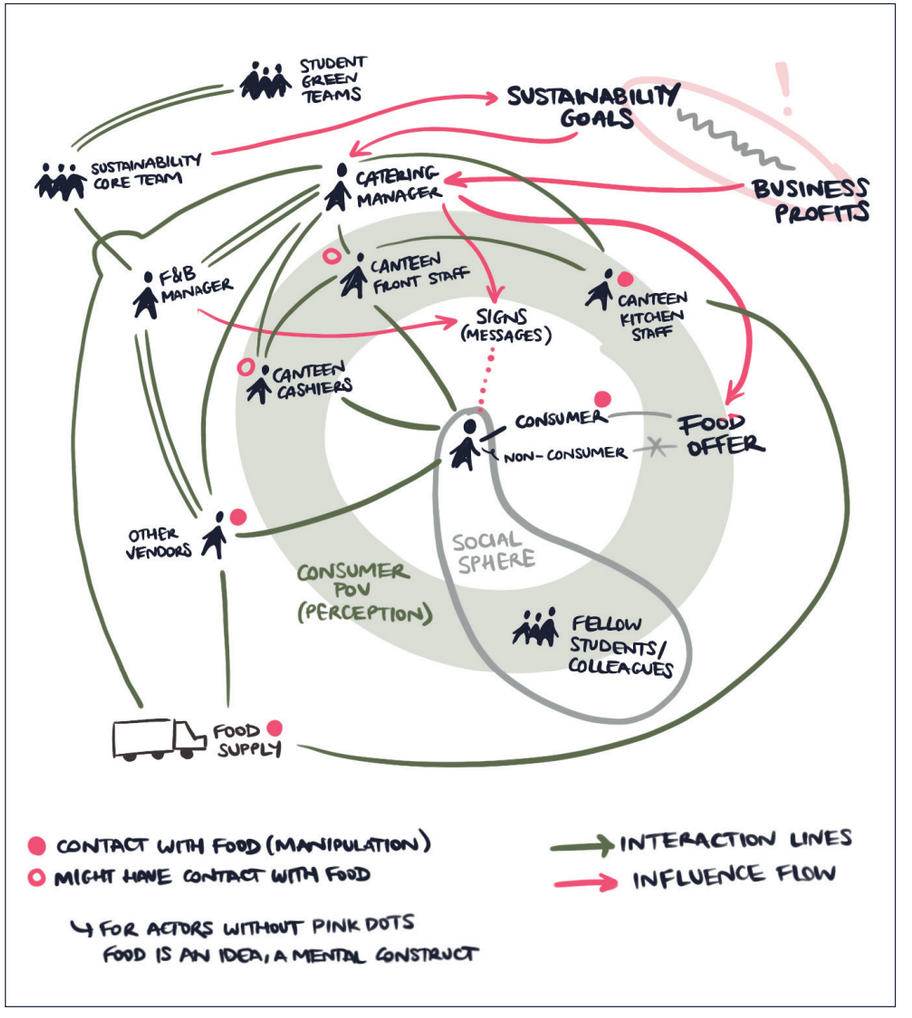


Figure 17. Actor map 3: consumer in the TU Delft food system

3.1.4 ACTOR MAP 4: IN OR OUT OF THE SYSTEM, FREEDOM OF CHOICE

Actor Map 3 fails to highlight the nature of individual belonging within the system, how individuals retain freedom of choice and can fully remove themselves from a specific food sub-system, while other actors remain fixed and dependent on individuals becoming consumers.

This presents a paradox: consumers seem to have little influence over what the food system offers, since they are often seen as passive recipients, with most decisions made without their input. Yet, at the same time, consumers have the power to change the system through demand.

This is the dynamic represented in Actor Map 4. The takeaway: although individuals, as consumers, cannot escape the whole food system, their participation in specific food sub-systems is optional and based on choice. There must be willingness, which ties into the idea that consumers cannot be forced into specific behaviours. If they feel coerced, they will exit that sub-system and seek out one that aligns with their preferences.

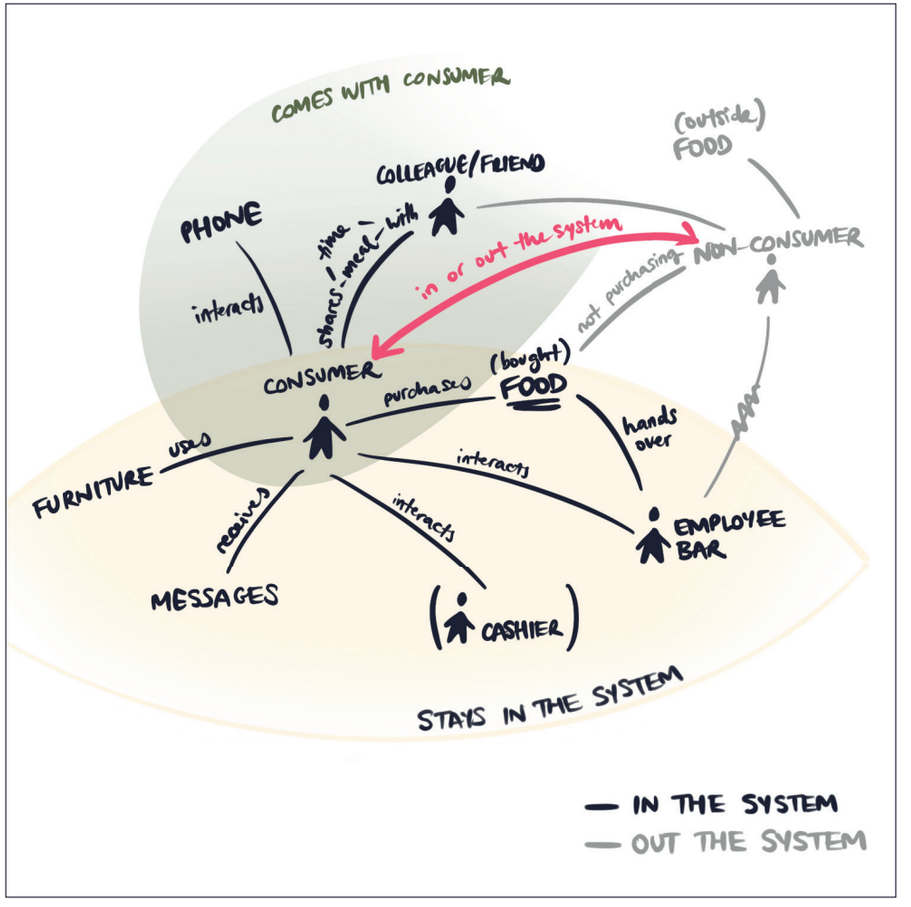


Figure 18. Actor map 4: in or out of the system.

3.1.5 ACTOR MAP 5: EXTENDED TU DELFT FOOD SYST€M

This final map presents an overview of all relevant actors influencing the TU Delft food system, along with the flow of food across different services and spaces. Consumers are divided into two groups, students and faculty staff, each with distinct characteristics (e.g., rotation patterns).

On the supply side (in beige), the main catering contractor is shown alongside other involved parties. The sustainability team is positioned as a mediator that can advise or recommend, but does not have direct decision-making power over suppliers. Final decisions are made by the Executive Board.

Food flow follows the pink arrows, while influece is represented by the dark arrows.

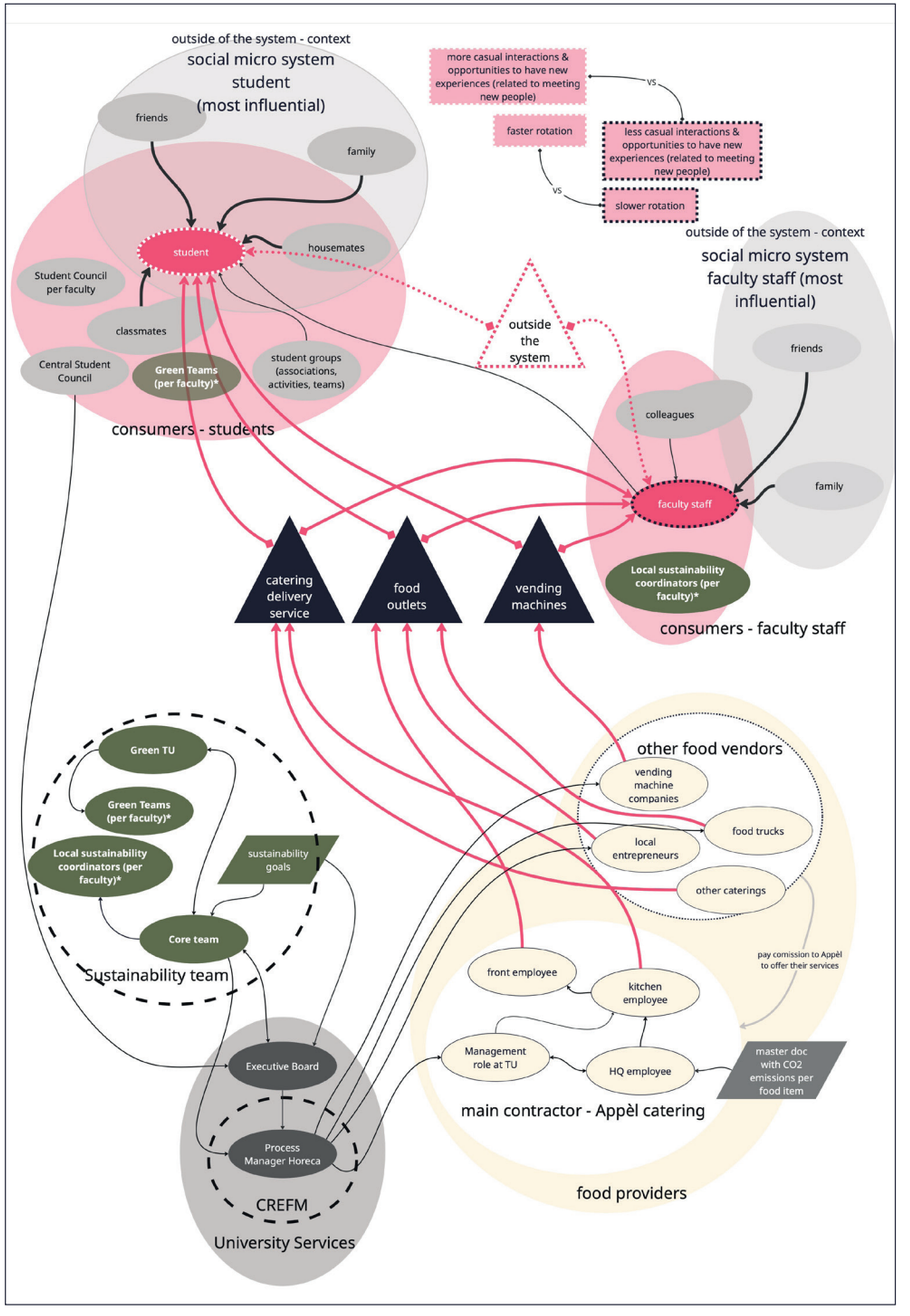


Figure 19. Actor map 5: extended TU Delft food system.

3.2 CAUSAL LOOP DIAGRAM

This causal loop diagram tells the story of the factors shaping the consumer perspective on the food system, supporting or hindering the protein transition. It follows participant narratives and brings together political, societal, commercial, and individual factors to illustrate the complexity and interrelatedness of influences on consumer choice. This selection of factors highlights the systemic nature of the challenge, offering a visual understanding of why change is difficult and where opportunities might lie.

Figure 20 presents a selected portion of the full diagram, which can be found in Appendix C.

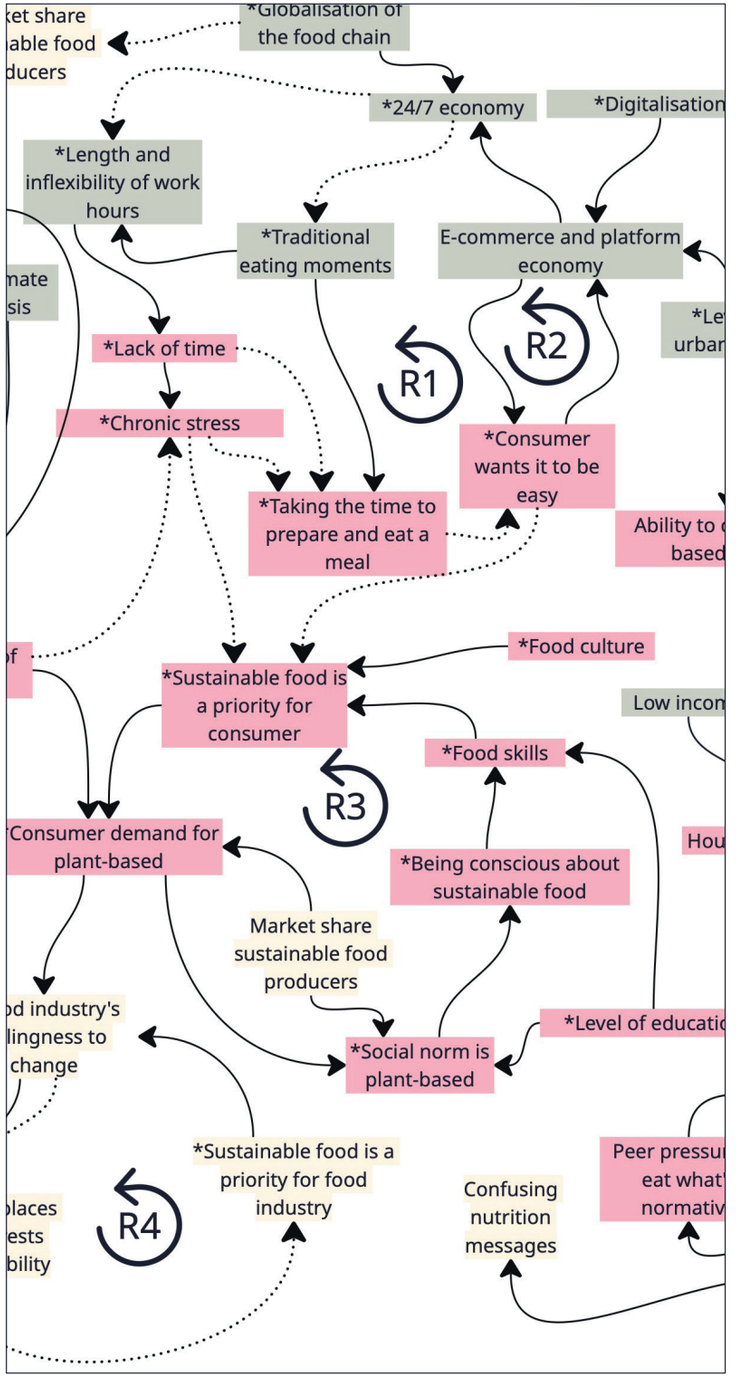


Figure 20.
Context factors that emerged during the interviews illustrated on a causal loop diagram. Adapted from Gerritsen et al. (2019) and Wopereis et al. (2024).

3.3 SYSTEMIC BARRIERS

Finally, drawing on all insights, I identified six systemic barriers that reinforce the status quo and hinder systemic change. These barriers represent problematic dynamics within the current system, forming a network of interconnected feedback loops that resist the behavioural shifts needed to reduce animal-based food consumption at TU Delft. Embedded in the dominant narrative, these barriers influence and reinforce one another (Figure 21).

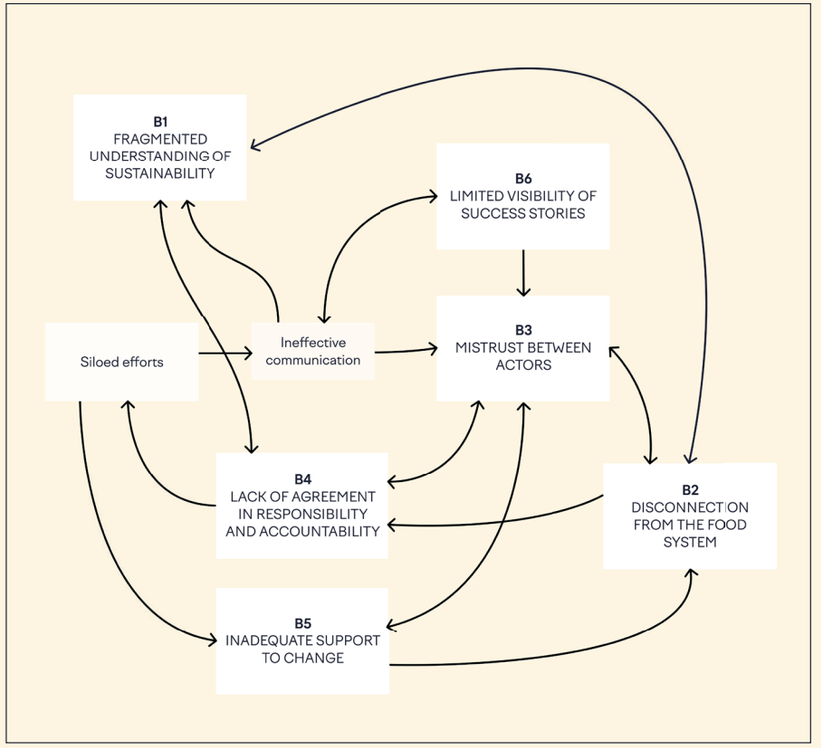


FIgure 21. Interrelatedness of systemic barriers

3.3.1 SIX BARRIERS TO THE PROTEIN TRANSITION

BARRIER 1 – FRAGMENTED UNDERSTANDING OF SUSTAINABILITY

Consumers struggle to prioritise sustainability in their dietary choices, especially when the personal impact of their actions feels intangible. The connection between individual behaviour and broader sustainability goals is unclear, making it difficult for consumers to understand how their individual food choices contribute to global environmental issues. Additionally, consumers hold fragmented narratives around food, shaped by cultural norms, personal identity, and emotional attachments, which further complicate the adoption of sustainable behaviours.

Observed manifestations:

- Difficulty prioritising sustainability
- Resistance to change due to ingrained habits
- Cognitive biases reinforcing unsustainable behaviours

BARRIER 2 – DISCONNECTION FROM THE FOOD SYSTEM

There is a significant lack of emotional connection and belonging to the food system that contributes to consumer resistance to dietary changes. Current food systems, as seen in the actor maps, facilitate the detachment from the origins of food, leading to a lack of understanding and empathy for the consequences of consumption. This is further exacerbated by limited human relationships and interaction with other actors in the food system, which diminishes the sense of responsibility consumers feel towards the food they buy.

Observed manifestations:

- Disconnection from other actors in the system
- Emotional disconnection
- Overwhelm: massive food system

BARRIER 3 – MISTRUST BETWEEN ACTORS

There is a pervasive sense of mistrust across different levels of the food system. Consumers are skeptical of the motives behind corporate sustainability efforts, often perceiving them as inauthentic or opportunistic. This mistrust is amplified by experiences with greenwashing and top-down initiatives that feel disconnected from consumer realities. As a result, consumers question whether proposed solutions genuinely aim to serve sustainability goals or are simply a branding exercise. This erosion of trust undermines collaboration and dampens motivation to engage with or support systemic change.

Beyond the food system, this barrier reflects a broader societal climate marked by polarization and ideological divides, where public trust in institutions, and in science itself, is being eroded. We are living through a moment where conspiracy thinking, misinformation, and the spread of fake news fuel a form of skepticism that goes beyond healthy doubt and turns into rejection. This cultural context also shapes how people interpret sustainability efforts, often viewing them through a lens of suspicion rather than cooperation.

Observed manifestations:

- Erosion of trust in corporate sustainability efforts
  - Perception of greenwashing
  - Professional opportunism
  - Inauthentic solutions

BARRIER 4 – LACK OF AGREEMENT IN RESPONSIBILITY AND ACCOUNTABILITY

There is no shared vision or clear accountability for advancing the protein transition in support of sustainability goals across stakeholders, including governments, corporations, and consumers. Responsibility for driving sustainable change in the food system remains undefined. Efforts are siloed, with policies and initiatives often fragmented or inconsistent across actors and sub-systems. Without clear accountability structures or coordinated action, responsibility is frequently shifted or avoided, stalling progress and leaving individuals unsupported in making sustainable choices.

Observed manifestations:

- Siloed efforts:
  - Fragmented policies and unclear roles
  - Ineffective communication
- Intention - behaviour gap:
  - Lack of accountability
  - Confusion over individual responsibility

Figure 22. "Who wants change? Who wants to change?" Two-panel cartoon by Brazilian artist Lute (2012).

Translated from Portuguese: "Who wants to live in a better and more harmonious world? Who is willing to abandon this model of unrestrained consumption to achieve it?"

BARRIER 5 – INADEQUATE SUPPORT TO CHANGE

Consumers are often forced to pay a premium for sustainable options, such as plant-based meals, due to larger economic forces (e.g., industrial agriculture subsidies, pricing structures) that create a systemic bias toward unsustainable choices. This economic burden, combined with a lack of affordable and accessible alternatives, makes it difficult for many to adopt more sustainable diets.

Beyond cost, there is also the mental load of re-learning: finding replacements, informing oneself about nutrition, and adjusting daily habits. Consumers are largely left to navigate this alone.

At a structural level, there is a lack of participatory spaces where consumers can voice concerns or influence decisions.

This inadequate support for consumers ultimately reflects back as a lack of consumer support for sustainability initiatives.

Observed manifestations:

- Economic disincentives
- Transition burden - mental load

BARRIER 6 – LIMITED VISIBILITY OF SUCCESS STORIES

There is a lack of strong, relatable role models who visibly embrace and embody sustainable dietary change. Success stories of individuals or organisations making significant shifts are underrepresented in public discourse and media, creating the perception that plant-based diets are unattainable, undesirable, or not widely accepted.

In addition, dominant narratives often portray plant-based eating negatively, as restrictive, unhealthy, quirky, elitist, or socially isolating. These portrayals reinforce stereotypes and discourage broader acceptance.

Observed manifestations:

- Lack of relatable role models or ambassadors
- Stigma around plant-based eating
- Difficulty reaching beyond the sustainability bubble

3.3.2 ADDRESSING THE SYSTEMIC BARRIERS

CONNECTING SYSTEMIC BARRIERS TO SYSTEMIC DESIGN PRINCIPLES

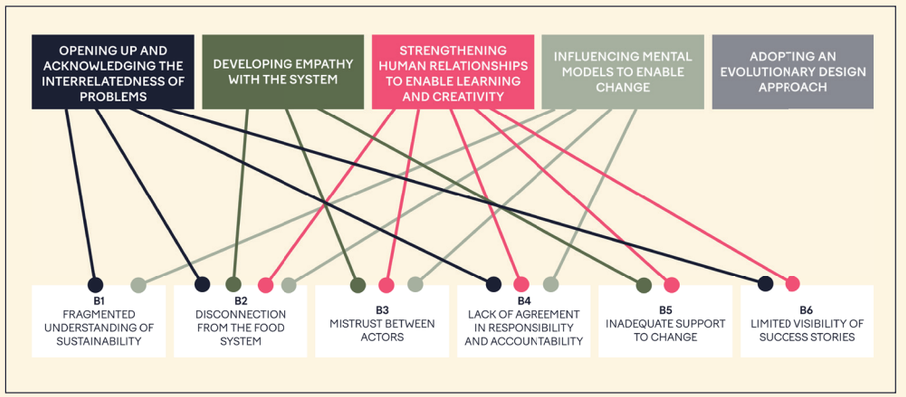


Figure 23. Principles of systemic design linked to systemic barriers.

Connecting the systemic barriers to the principles of systemic design (Van der Bijl-Brouwer & Malcolm, 2020) uncovers opportunities for addressing these challenges. Visualising the connections between the barriers and principles highlights where and how the most meaningful impact can be made and sets the stage for the design phase, guiding the next steps of the project (Figure 23).

LEVERAGE POINTS

When defining the barriers, I intentionally focused on high leverage points. While this means the barriers are more deeply ingrained and challenging to address, breaking them down offers the greatest potential for meaningful impact and lasting change.

In Figure 24, I map the barriers to Meadows' (1999) 12 leverage points (LP) to identify where to focus efforts and prioritize interventions. The higher the leverage point, the stronger the barrier, as its effects cascade down to lower levels. For example, the lack of accountability (B4) operates at a higher leverage point, such as self-organization (LP4), which cascades down to rules (LP5) manifested as siloed efforts and further affects information flows (LP6) as ineffective communication. To simplify, each barrier is plotted only once at the highest, most influential LP it affects.

Barriers B2 (emotional disconnect) and B3 (mistrust between actors) stand out, as they are rooted in mindsets that shape relationships and perceptions within the system. Addressing these barriers at this high leverage point can have a transformative impact on the system. Besides, because the barriers are interconnected, addressing one inherently influences the others.

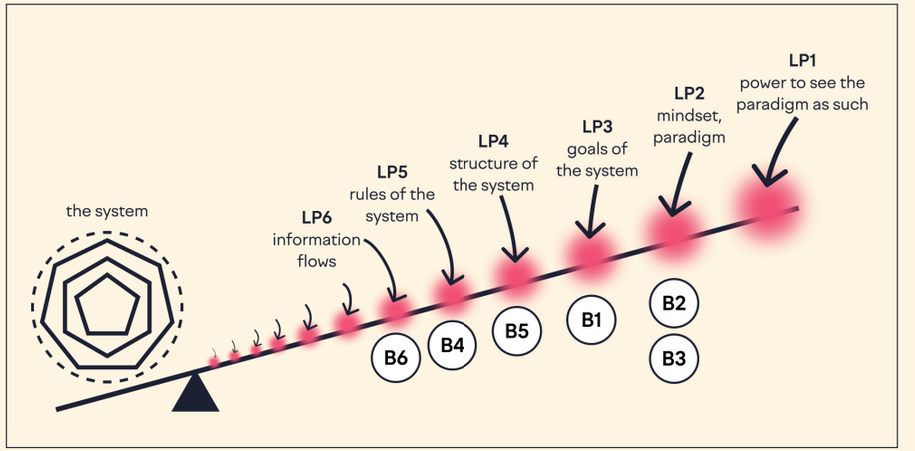


Figure 24. Systemic barriers linked to leverage points.

CONNECTING SYSTEMIC BARRIERS TO SUSTAINABILITY TRANSITIONS THEORY

BARRIERS

The systemic barriers I identified line up closely with the critical barriers outlined in sustainable transitions theory (Allen & Malekpour, 2023), though there are some key contextual differences. For instance, the theory points to "lack of agreement on the need for change" and "disinformation," which connect directly to the fragmented understanding of sustainability I observed, where conflicting narratives and limited knowledge hold back cohesive action. Similarly, mistrust between actors and the lack of agreement on responsibility align with deficits in trust, representation, and power imbalances highlighted in the theory. Inadequate support in my findings parallels weak institutions and a lack of systemic backing, while the limited visibility of success stories reflects the absence of inspiring leadership or guiding narratives. That said, my barriers put more focus on the disconnection from the food system, which relates to the theory's mentions of social norms and fear of change while adopting a more emotional and relational angle.

ENABLERS

Sustainability transitions theory highlights enabling conditions that drive change. Creating new narratives stands out, especially when it comes to shifting the mindset of the system (LP2). Design plays a crucial role here, not just in facilitating but also delivering transformative narratives (Grimaldi et al., 2013). These narratives have the power to reshape societal imaginaries, challenge the status quo, and build empathy while fostering new connections and shifting perspectives (Snow et al., 2022).

In Table 6, I present new counter narratives that oppose the dominant ones, effectively addressing the barriers. Exploring opportunities to bring, embed, and scale these narratives into the system is where design can really deliver impact that drives systemic change (Shaw & Nickpour, 2024).

Table 6. Barriers and their counter new narratives

Barriers	→	New narratives
1. Fragmented understanding of sustainability		*I can replace / change / introduce new habits that are more sustainable and I feel good about it*
2. Disconnection from the food system		*I care for the system and the people in it*
3. Mistrust between actors		*I assume good intentions in others and take responsibility for showing mine*
4. Lack of agreement in responsibility and accountability		*Even if small, I play a part and my actions matter*
5. Inadequate support		*I listen and support consumers with their needs*
6. Limited visibility of success stories		*Supportive narratives embodying "being the revolution"*

CHAPTER 4

ENVISIONING DESIRED FUTURES

Envisioning is about defining a clear direction for change by translating insights into intentions. In the double diamond process, this phase represents a strategic narrowing of scope, moving from understanding complexity to setting a design direction that can guide ideation (Chapter 5) and development (Chapter 6).

This chapter revisits the initial framing of the project, which was deliberately broad, and reframes it with sharper focus through a design statement. Grounded in the systemic barriers identified in Chapter 3, this statement connects behavioural goals with social and individual meaning, using caring and relationships as central levers of change.

To support this direction, I adopt a portfolio approach: rather than proposing a single solution, I define a set of interventions aimed at strengthening key relationships within the TU Delft food system. The outcome map introduced at the end of this chapter visualises how these interventions are expected to trigger systemic change, laying the foundation for the ideation phase that follows.

4.1 DESIGN STATEMENT

Bringing together the systemic barriers, leverage points, enablers from theory, and systemic design principles provides a clear foundation for crafting the design statement that will guide the next phases of this project.

This statement, as described in Designing for Society (Tromp & Hekkert, 2019), articulates three dimensions:

- The behaviour I aim to support through design (what);
- The social implications of this behaviour and how these address collective concerns (end goal); and
- The meaning this behaviour holds for individuals, particularly in relation to their personal concerns (how).

The design statement for this project becomes:

who
To guide TU Delft students and staff
end goal
in reducing their consumption of animal-based products
what
I aim to foster a genuine sense of care
how (mechanism of change)
by strengthening human relationships and so addressing

the systemic barriers that maintain the system's inertia
how (approach)
(through a portfolio of interventions).

Strengthening human relationships is the mechanism of change that unlocks the feeling of care. Caring is the driving force that expands the system boundary in the right direction, providing directionality to the system shift (Figure 25). I have chosen caring based on the assumption that caring more about others, and about what others care for, will lead people to care more for our shared future, our shared resources, and our planet. In doing so, it builds a narrative that connects sustainability to individuals on a deeply personal level.

While a behavioural change in consumers is clearly the end goal of this design statement, the how remains open-ended, as does which relationships need to be addressed. This is intentional, acknowledging that many relationships exist within the system. In later steps, I will identify which relationships to focus on, at least as a starting point.

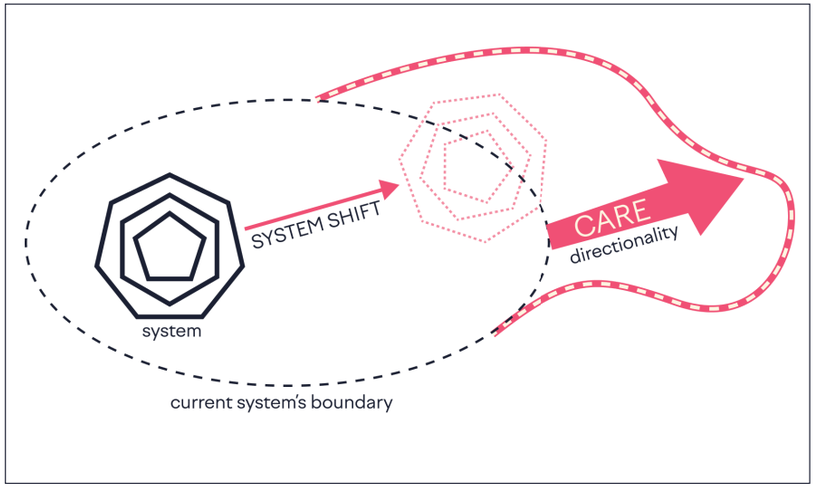


Figure 25. Caring as the driving force giving directionality to the system shift

4.1.1 RATIONALE

WHAT + HOW

I chose 'caring' and 'strengthening relationships' as the central elements of my design statement because they tap into both intrinsic motivation and the potential for systemic change.

While the target group is generally well-educated and financially capable of making informed, sustainable choices, intrinsic motivation often remains a barrier. Caring is key to unlocking this, as it activates deeper emotional and moral engagement. Drawing from the ethics of care, which emphasise that the inclination to care is primary, the feeling of "I must do something" becomes a moral duty, not just a personal preference. This sense of moral responsibility can serve as the driving force for voluntary behavioural change, motivating individuals to care more about the environmental impacts of their food choices. However, for this shift to happen, a relationship must, or have the potential to, exist (Burton & Dunn, 2023). This brings us to strengthening relationships.

Strengthening relationships addresses the relational aspects that support this moral obligation and facilitate behaviour change. While design cannot directly control relationships (Snelders et al., 2014), it can create opportunities for positive human connections that act as leverage points for

systemic transformation (Van Der Bijl-Brouwer, 2022). Positive human relationships enable positive emergent system behaviour (Arena, 2018) and organisations that have capacity for healthy relationships, have the capacity to adapt and grow (Wheatley, 2006). The Design Council (2021) refers to this as tending to the collective: "designing more interdependence, more contingency, making the collective stronger, building more collective awareness, and investing in the entwinement"; and encourage designers to help create the conditions for a new value system to emerge by strengthening relationships and developing the relational capacity of the system.

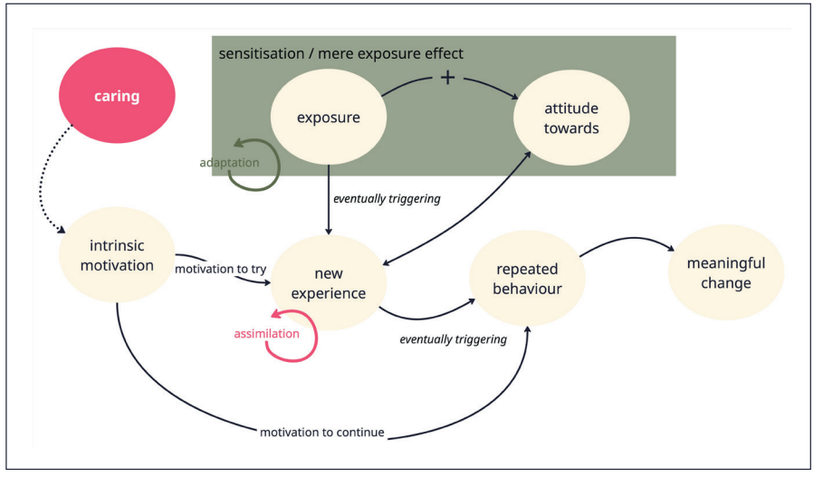


Figure 26. Caring as an influencer of intrinsic motivation.

In this context, the act of caring is not isolated; it becomes embedded within networks of relationships, making change a collective effort. As Wheatley and Frieze (2006) point out, "the world doesn't change one person at a time. It changes as networks of relationships form among people who share a common cause."

APPROACH – PORTFOLIO OF INTERVENTIONS

TU Delft's food system operates as a complex adaptive system, where change emerges from the dynamic interplay of actors. As such, relational services cannot be designed in a prescriptive way; they can only be enabled (Cipolla & Manzini, 2019). This demands an approach that is non-prescriptive, open-ended (Boon et al., 2018), and responsive to emergent conditions within the system (Waddell, 2016).

As such, I decided to go towards a portfolio approach. Instead of proposing a single intervention, I aim to come up with a set of interventions that collectively strengthen relationships within the system. This aligns with the idea of 'infrastructuring' (Design Council, 2021): creating conditions for new values and behaviours to emerge. The role of design is not to dictate outcomes, but to support relational capacity and give space for caring to emerge.

4.2 OUTCOME MAP

Through the portfolio approach, I seek to strengthen the relationships between four key actors in the system: students and faculty staff (as consumers), catering staff, and the sustainability team. Figure 27 presents a simplified version of the actor map from Chapter 3 (Fig. 19), with arrows illustrating these relationships.

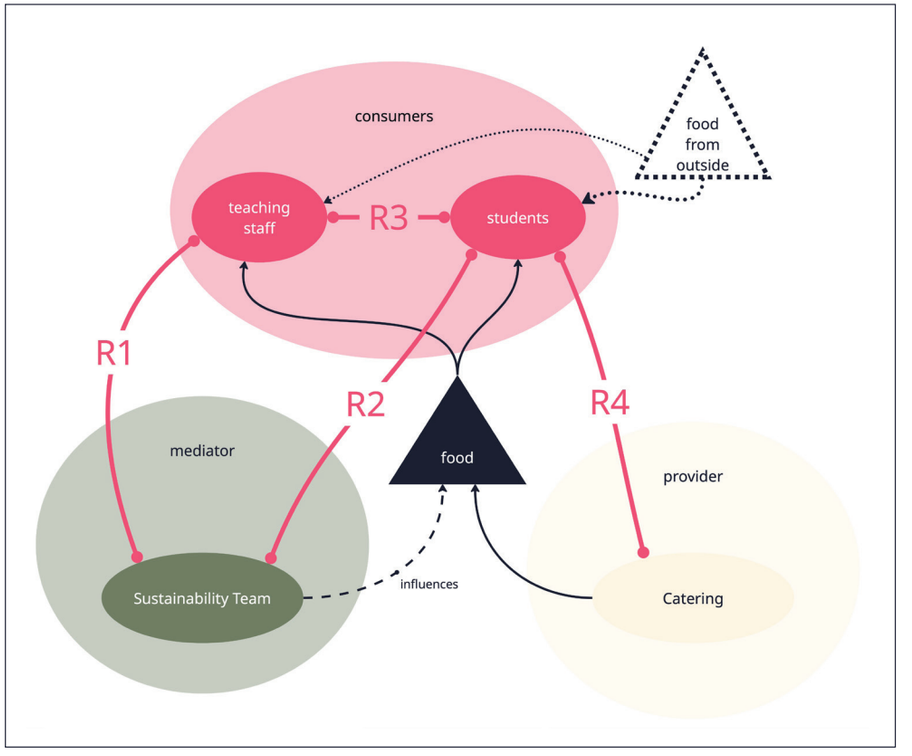


Figure 27. Simplification of Actor map 5 (Chapter 3) and choice of relationships to strengthen (R1 - R4).

To visualise the logic behind this portfolio approach, I used the outcome map tool from Jones and Van Ael (2022, p. 172). This tool helps define and map the major activities and outcomes of a change programme, aligning them with the intended strategy and desired system impacts.

The elements in the outcome map are:

- Activities represent the interventions I will ideate as part of the portfolio.
- These lead to enabling outcomes: the strengthening of the four relationships between the key actors in the system.
- These strengthened relationships create the conditions for a strategic outcome: a genuine sense of care within the system.
- This, in turn, enables broader impacts, the breaking down of systemic barriers that currently hinder the shift toward more sustainable diets.
- Finally, these impacts contribute to the strategic impact of the project: the reduction of animal-based product consumption.

The outcome map (Figure 28) provides a structured way to trace how interventions lead to change. It captures the logic in the design statement while reflecting the relational and emergent nature of the process. Following a Theory of Change logic, the map deliberately does not include outputs, the tangible, immediate results of an activity, because these are not treated as indicators of success. This allows for a more open-ended understanding of value, where the worth of an intervention does not depend on what the activity is, but on the effects it generates. For example, a storytelling workshop might appear modest in form, yet its value lies in how it stimulates reflection, brings people together, or invites more conscious choices around food. In this logic, it is not the number of attendees that matters most, but the changes or effects it sets in motion within individuals and their environment

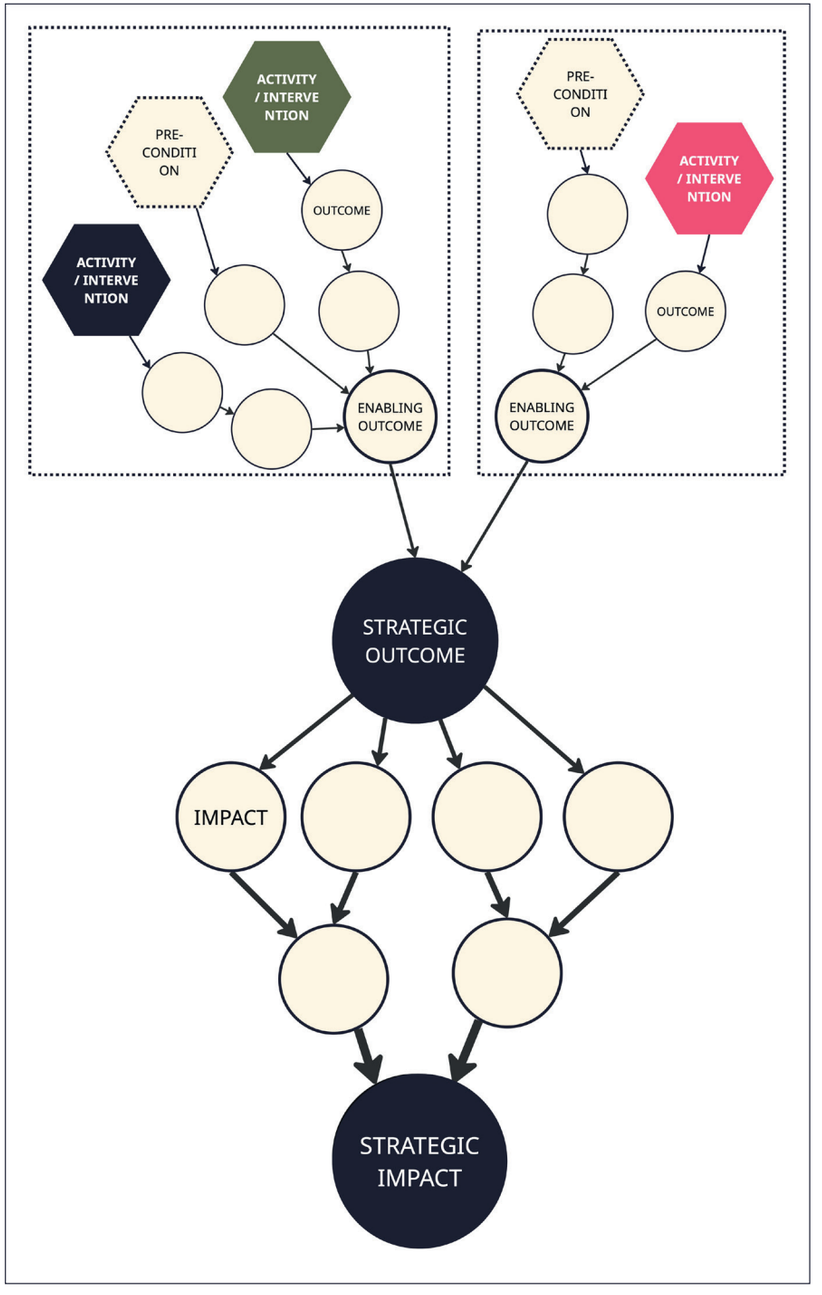


Figure 28. Outcome map framework.

CHAPTER 5

EXPLORING THE POSSIBILITY SPACE

In the exploring the possibility space phase is where abstract intentions begin to take shape. In the design journey, this chapter marks the ideation phase, where the direction defined in the design statement is translated into concrete concepts. It builds on the understanding of the system and the desired future to imagine how change might take place.

This chapter unfolds in two stages: idea generation and idea selection. First, through collaborative and individual ideation sessions, a wide range of ideas were generated to explore different ways of strengthening relationships within the TU Delft food system.

Second, I moved into the process of idea selection. Using a series of evaluation methods, I clustered, assessed, and refined the ideas to define a set of strategic interventions. This resulted in a curated portfolio aligned with the design statement, addressing both systemic and behavioural change mechanisms.

> *"In the end, it will be just one of the forces that move society in the desirable direction, rather than THE solution. Recalling this fact may relieve you of any burdensome sense of duty, and allow the light-heartedness that lets creativity flow."*
>
> NYNKE TROMP & PAUL HEKKERT

5.1 IDEATION

Before diving into ideation activities, I found it important to first define the kind of interaction I envision between the user and the future intervention. Defining this interaction helps identify a pattern that will lead to the desired effect, even before knowing what the final design or concept will be. I approached this through the use of an analogy.

5.1.1 ANALOGY

To help envision this interaction, I use an analogy of *Tending a Campfire* or *Sitting at a Campfire*. Exploring this analogy helps revealing qualities that can be applied to the future design, such as:

- It is welcoming and provides a safe space.
- It offers warmth and light, creating comfort and a sense of belonging.
- It reveals something, inviting reflection and sharing.
- It starts small, with an initial impact of curiosity or interest, but is engaging enough to encourage investment.
- It requires deliberate effort to sustain: a fire must be tended to, requiring awareness and consistency.
- It must be protected from threats to keep it from dying out.
- It can spread: a flame can be taken from one fire to ignite another.
- Its intensity may vary, but as long as it keeps burning, it serves its purpose.
- Stories are told around a campfire

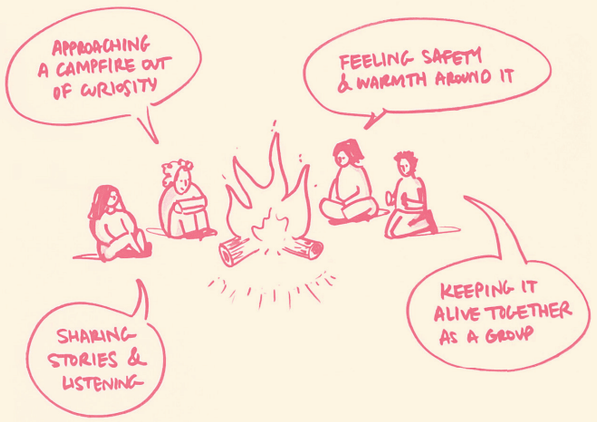


Figure 29. Impression of the analogy.

5.1.2 IDEA GENERATION

To explore possible interventions, I organized three ideation sessions with different participant profiles and complementary purposes:

- Session 1 – Livework designers: This session tapped into the experience of professional service designers. Their more mature perspective aligned with how teaching staff at TU Delft might approach the problem.
- Session 2 – IDE students: This group brought in the perspective of actual users of the food system on campus. Their lived experiences added depth and relevance to the ideas.
- Session 3 – Individual reflection: After the group sessions, I took time to cluster, reflect on, and build on the ideas through individual brainstorming over several days.

Table 7 summarises the number of participants, duration, objective and outcomes of the group sessions. Pictures of the creative sessions, as well as the session schedules and materials used, can be found in Appendix E.

Table 7. Overview of Group Ideation Sessions

Session	Participants	Duration	Objective	Session outcomes
1	6 designers	90 minutes	Generate as many ideas as possible to strengthen relationships between system actors	• 78 ideas generated in the How Might We activity • 6 concept cards
2	4 design students	120 minutes	Generate ideas to strengthen relationships between system actors and explore the campfire analogy as a design lens	• 70 ideas generated in the How Might We activity • 39 ideas generated in the Analogy activity

IDEATION SESSION 1 – LIVEWORK DESIGNERS

The session was structured into two parts.

PART 1: BRAINSTORMING WITH HOW MIGHT WE QUESTIONS

In the first phase, participants worked on four How Might We (HMW) questions, each focused on a different relationship within the system. They were split into two groups, each working on two questions sequentially.

To guide the process, each HMW question canvas was divided into four sections, each suggesting a dimension of change based on Vervoort et

Figure 30. 9 dimensions of transformative creative practice (Vervoort et al., 2024).

al. (2024). However, participants were explicitly encouraged not to limit their ideas to these categories (Figure 30).

Additionally, I prepared *What If* prompt cards, which I handed out depending on how the groups navigated the brainstorming process. These prompts helped participants overcome creative blocks and encouraged divergent thinking.

PART 2: CONCEPT CREATION

After a short break, participants regrouped into pairs and selected two ideas from the brainstorming session to develop into concept cards. I designed these canvases to align with Dorst's logical framework for design reasoning (Dorst, 2011); forcing participants to elaborate on their rationale: how they expected something to work and how it could lead to the desired value or outcome.

As participants explained and presented their concepts, new ideas emerged that further supported the mechanisms of change. They were also asked to identify potential barriers to implementation and explore ways to turn these obstacles into opportunities for success.

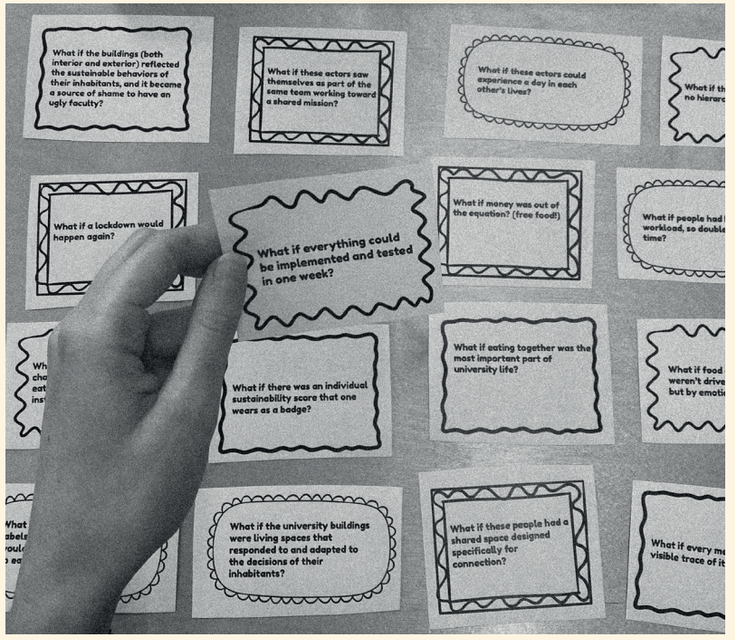


Figure 31. *What If* cards used in ideation sessions.

IDEATION SESSION 2: IDE STUDENTS

The session was structured into three parts.

PART 1: BRAINSTORMING WITH HOW MIGHT WE QUESTIONS

This first activity was similar to the first ideation session, same canvases and stimuli (*What If* prompt cards, Figure 31) with some small changes. Participants worked together on all four HMW questions sequentially.

PART 2: IDEA CLUSTERING AND REFLECTION

After the brainstorm, participants went through all the ideas, clustering similar activities, discussing patterns, and spotting potential. They also reflected on viability, desirability, and what actually sparks inspiration.

Unlike the first session, there was more space for discussion and sparring. Since the students are both consumers in the system and part of the target group, their personal experiences added depth to the conversation. The back-and-forth questioning and bringing in personal takes, made this session more reflective and layered than the first.

PART 3: BRAINSTORMING WITH ANALOGY

For the final activity, participants explored how users could interact with the intervention by means of the campfire analogy.

They generated ideas by associating specific characteristics of tending a campfire, such as curiosity, warmth, storytelling, and shared responsibility, with activities in their daily lives that evoke similar feelings or interactions. The goal was to extract key dynamics that could help shape the user experience of the intervention.

From this exploration, the ideas can be grouped into the following categories:

- Rituals and emotionally meaningful events
- Memories and storytelling moments
- Artistic or symbolic experiences
- Visual cues and sensory engagement
- Comfort, celebration, and shared discovery

These categories are largely tied to positive relationships, validating the relevance of the analogy in exploring interventions to strengthen connections between actors within the system. While the specific activities may not directly translate into final interventions, examining "why" they hold value reveals dynamics that can inspire alternative "hows".

IDEATION SESSION 3: INDIVIDUAL BRAINSTORMING

The first step in this phase was to transfer the physical content into a Miro board, in order to cluster all ideas generated during the two group sessions. Through several iterations, I identified patterns and relationships between ideas, which helped structure the raw input into a more coherent overview. After this clustering process, I conducted iterative individual brainstorming across several days. This involved generating new ideas as well as refining existing ones, drawing inspiration from the group sessions' results.

5.1.3 IDEA SELECTION

After the idea generation phase, I moved into idea selection. From all the ideas, I selected 15 proto-concepts based on the variety of change mechanisms, diversity of activities, and their potential to strengthen relationships. I defined each with a short description, the relationship it aims to strengthen, and the change mechanism it leverages, which are categories I created by clustering all the ideas.

Looking for further refinement and definition, and aiming to reach a smaller number of interventions, I evaluated these proto-concepts in different ways.

IDEA EVALUATION

I used different ways to assess complementarity and identify gaps, exploring micro, meso, and macro components within the possibility space:

1. I plotted the ideas according to engagement types (reflective, participatory, relational), which helped clarify how different interventions might resonate with various forms of user involvement (Figure 32).
2. I mapped them against both behavioural change mechanisms and systemic change mechanisms to see how each idea could support both individual-level shifts and system-level transformations. This dual perspective highlighted which interventions were more immediate versus those that could foster long-term impact (Figures 33 and 34).
3. Finally, I assessed the proto-concepts by mapping them onto the intervention functions associated with the six behavioural change mechanisms from the Capability Opportunity Motivation Behaviour (COM-B) model (Michie et al., 2011). This exercise helped identify a complementary combination of interventions capable of addressing all functions (Figure 35).

FIlled-in assessment tables can be found in Appendix E.

ENGAGEMENT TYPES		
Reflective Shifting perceptions	**Participatory** Encouraging action	**Relational** Strengthening social connections

Figure 32. Engagement types assessment table, header.

BEHAVIOURAL CHANGE MECHANISMS					
Automatic motivation	Reflective motivation	Social Opportunity	Physical Opportunity	Psychological Capability	Physical Capability

Figure 33. Behavioural change mechanisms assessment table, header.

SYSTEMIC CHANGE MECHANISMS				
Change in relationships	Change in infrastructure	Change in narratives	Change in rules, organisation	Changes in mental models

Figure 34. Systemic change mechanisms assessment table, header.

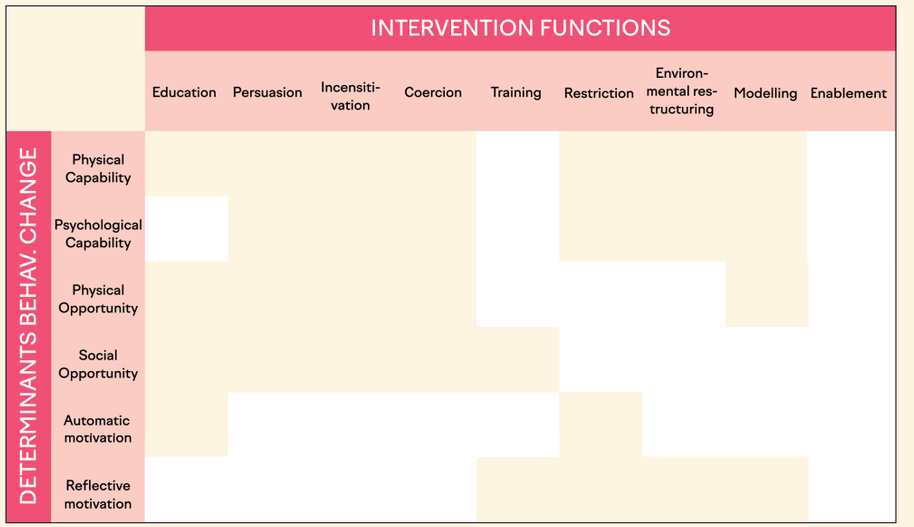


Figure 35. Intervention functions and behavioural change determinants assessment table.

At this point, based on the theoretical framework I had gathered so far, it became clear that the portfolio of interventions needed to serve two purposes. When placed along a temporal line, these purposes define both the starting point, what can be done now, and the intended outcome, what I hope is achieved through the implementation of the portfolio. Everything in between, the journey from A to B, takes shape through the selected interventions.

The first purpose is infrastructuring: building the relational capability. This involves creating space, both physical and temporal, for interactions to happen. Relationships cannot be strengthened if they do not exist in the first place, which means part of the work lies in making them possible. The second purpose is to reimagine futures. As Hebinck et al. (2022) argue, transitions require a clearly articulated vision of the desired future system to give direction to the transition and guide strategic choices.

To support this, I created a temporal line that linked mechanisms of change to different stages of the journey and plotted the concepts along this continuum (Figure 36). This visualization allowed me to explore ways to combine concepts, expand on their specifics, identify interconnections, and assess possible modifications to enhance coherence and impact (extended activity can be found in Appendix E).

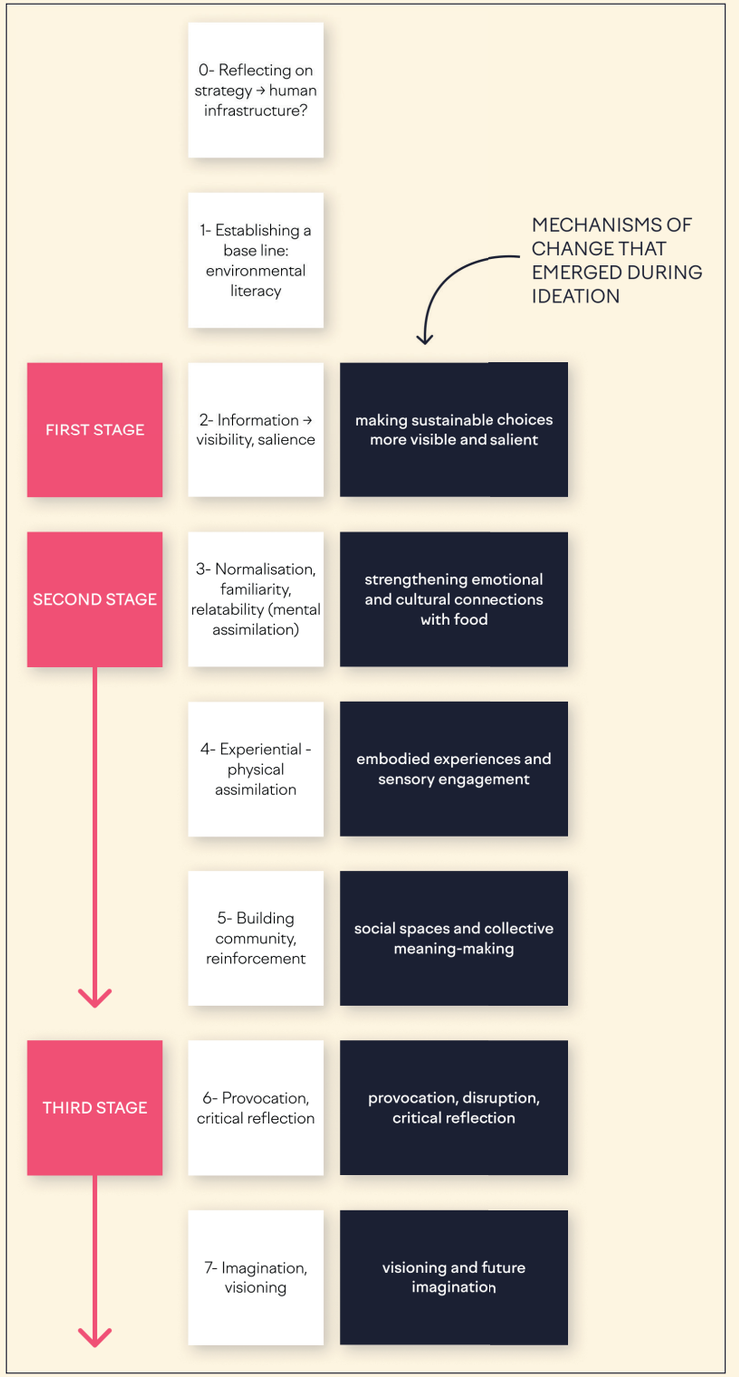


Figure 36. Sequence of intervention's functions for idea evaluation.

5.2 FROM IDEAS TO INTERVENTIONS

While all 15 proto-concepts had potential to contribute meaningfully to strengthen relationships, I needed to align the selection process with the overarching goal of the design statement: reducing animal-based product consumption. To this end, I focused on the concepts most directly tied to achieving it, while also considering practical criteria such as the feasibility of small-scale implementation for testing.

This resulted in the selection of seven refined concepts. Together, they address all the intervention functions (Michie et al., 2011) and offer a comprehensive approach to the outcome map (Figure 37).

Figure 37. Intervention functions per intervention.

Figure 38 illustrates the first part of the outcome map in which the interventions are plotted as the activities that contribute to the enabling outcomes (strengthening relationships).

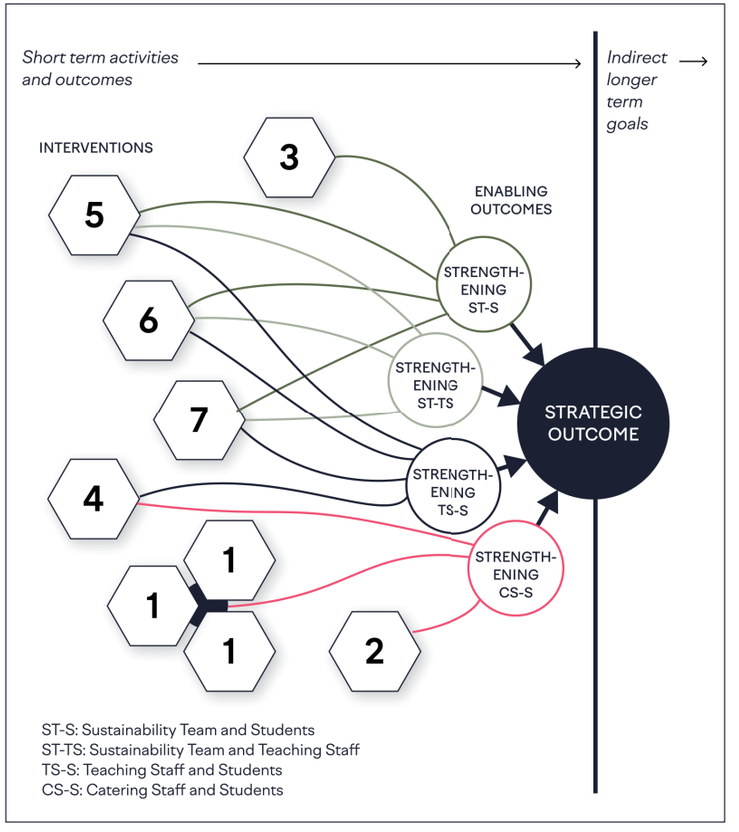


Figure 38. Partial view of the outcome map, showcasing which interventions strengthen each relationship.

Before diving into the specifics of the interventions, it is worth highlighting a prerequisite stage that I introduced in the outcome map (Appendix E).

PREREQUISITE STAGE

Discussions around sustainability goals and purpose often focus on the actions needed to move forward, but the most sensible place to start is by critically assessing the strategic agenda of TU Delft itself. The TU Delft Strategic Agenda 2024–2030 outlines broad commitments to sustainability and societal impact (Delft University of Technology, 2024):

> *"At TU Delft, we want to contribute to solving societal challenges with high-quality education, research, and innovation activities. This is how we realise an impact on society.*
>
> *Sustainability is central to everything we do, so we are well on our way to a sustainable campus in 2030 and we contribute to the climate objectives with, among other things, education and research through the Climate Action programme."*

Yet, criticism has been raised about whether these ambitions translate into meaningful action or remain performative (Hartmann, 2025).

If the goal is meaningful change, a critical assessment is needed, both of TU Delft's sustainability ambitions and of the human capacity and infrastructure allocated to pursuing them. This prerequisite stage should focus on:

- Reassessing the university's ability to implement sustainability goals beyond statements and commitments.
- Building and effectively distributing a baseline for environmental literacy across the entire TU Delft community.
- Providing clear guidelines and expectations on sustainable behaviour for all TU Delft members.

CHAPTER 6

PLANNING THE CHANGE PROCESS

Planning the change process is about turning intention into action. After defining a design direction (Chapter 4) and exploring a wide range of possible interventions (Chapter 5), this chapter consolidates those insights into a coherent portfolio of interventions.

The first part of this chapter introduces the interventions in detail, building on the outcome map and theory of change introduced earlier. Each intervention is designed not as a stand-alone solution, but as a mechanism that creates space for relational and cultural shifts within the TU Delft food system. Together, they offer a flexible, interconnected approach that leverages both short-term nudges and long-term transformation.

The second part of the chapter focuses on validation. Drawing on feedback from consumers, institutional actors, and experts, the goal is not to prove whether the interventions "work" in a traditional sense, but to understand how they resonate emotionally, socially, and systemically. This validation process offers insights into how the portfolio can evolve, adapt, and be meaningfully embedded, while revealing opportunities and tensions.

6.1 PORTFOLIO OF INTERVENTIONS

In this chapter, I detail the interventions that compose our portfolio approach, expanding on the Outcome Map presented in the previous chapter. The portfolio brings together seven interventions that address both short-term behavioural nudges and long-term systemic change. They work on two levels:

1. Environmental Restructuring and Choice Architecture.
   Interventions 1 and 2 focus on reconfiguring the physical and informational environment to facilitate immediate, automatic sustainable choices. Intervention 1 by making sustainable options more visible and salient, these interventions directly counter habitual, non-reflective behaviours. And intervention 2 by creating an extended, accessible food service during exam week. An approach that not only meets an immediate need but subtly nudges students toward sustainable eating by providing a reliable, comforting option introduced with novelty.

2. Individual Perception and Deep Engagement.
   The remaining interventions aim to expand individual perception and redefine the role of the consumer within the food system by inviting participants to move beyond passivity. They encourage embodied experiences, critical reflection, and active participation, thereby fostering emotional connections, community building, and collective meaning-making. Research supports that labels such as "consumer" may be too narrow and potentially undermine individuals' sense of agency and belonging (Bauer et al., 2012). Encouraging a shared identity can help boost community well-being and support sustainable behaviours (Kramer & Brewer, 1984). Extending this insight, it becomes evident that the traditional division between "student" and "teaching staff" might also limit opportunities for genuine engagement. By designing activities that encourage both groups to adopt a unified role, one that transcends their institutional labels, participants can cultivate a stronger sense of community and shared purpose. In the end, ideally transforming how individuals view their influence on and responsibility for the food system.

6.1.1 ON THE SELECTION OF INTERVENTIONS

The selected interventions are not designed to follow a fixed sequence. Instead, they provide multiple entry points for engaging with the system, adaptable to the resources, responsibilities, and accountabilities of those involved. This flexibility allows stakeholders to assess where their capacities lie at any given moment and tailor their approach accordingly.

While certain aspects of the interventions remain intentionally non-prescriptive, leaving room for contextual adaptation, the mechanisms of change underpinning each intervention are made explicit. These mechanisms should be preserved to maintain the integrity and intended impact of the interventions.

The selection process was guided by feasibility. Each intervention builds on existing activities, roles, and services, ensuring alignment with current structures. My aim was to lower the threshold for implementation, which meant prioritizing feasibility over more conceptually ambitious or "designerly" solutions. In this sense, the interventions deliberately repurpose what is already present within the system, rather than introducing new products, services, or actors. This logic reflects a degrowth-oriented mindset, an approach that is not about adding, but about shifting and redirecting existing resources from sustaining the regime toward enabling niche practices that support a new way of being.

Beyond feasibility and degrowth principles, the interventions are not conceived as stand-alone outputs. Instead, they function as mechanisms that allow conditions for change to emerge organically within the system. They aim to amplify existing potential, connect actors in new ways, and spark agency among individuals typically relegated to passive roles.

6.1.2 FORMAT OF THE INTERVENTIONS

The value of these interventions is clear: rather than enforcing change, they allow and structure conditions for change to take place in the system in the desired direction.

Following Dorst's (2011) design logic (What + How → Value), each intervention begins with the What, the core activity or initiative. This is followed by the mechanisms of change (the hows), which outline the underlying processes driving the intervention.

Each intervention is then explored at different levels of abstraction:

- Micro level: addressing behavioural change determinants.
- Meso level: strengthening relationships between actors within the system.
- Macro level: addressing systemic barriers.

Making these levels explicit is crucial to understanding how interventions function across different scales.

Finally, each intervention includes practical considerations, covering:

- Temporality: how often and for how long the intervention should take place.
- Audience / mindset: who the intervention is aimed at, and what attitudes or roles.
- Potential challenges and unintended consequences: risks and factors to anticipate.
- Synergies: how the intervention connects with or reinforces other interventions in the portfolio
- Minimal Viable Intervention: an example of a scaled-down version that tests feasibility before full implementation.

6.1.3 INTERVENTIONS IN DETAIL

The following pages present the concept booklet that contains the full portfolio of the seven interventions. Each intervention is presented using the structure introduced above. This section is designed as a self-contained document that could be shared independently. The academic report continues on page 158.

PORTFOLIO OF INTERVENTIONS TO SUPPORT
THE PROTEIN TRANSTION AT TU DELFT

Shifting practices, shaping futures

This booklet presents a portfolio of seven interventions designed to support the protein transition at TU Delft. Each intervention responds to insights gathered throughout the design process and aims to create conditions for change, ranging from immediate behavioural nudges to deeper shifts in perception and participation. Together, they explore how students and staff can play an active role in shaping a more sustainable food system on campus.

Intervention Index

INTERVENTION 1

Changes in the food outlets

All three elements of Intervention 1, the Transition spectrum, True pricing and detailed labelling, and the CO_2 Counter are designed to operate synergistically. They target different moments in the consumer's journey: initial presentation (Transition spectrum), decision at checkout (True pricing), and post-purchase feedback (CO_2 Counter). This layered approach reinforces behavioural change across several determinants. While the Transition spectrum sets up the initial framework for making sustainable choices more visible, True pricing deepens this framework by adding economic transparency and personal accountability. The CO_2 Counter then provides real-time, collective feedback, turning individual decisions into a shared metric of sustainability.

INTERVENTION 1.1

Transition spectrum

What it is

The Transition Spectrum restructures how food options are presented in university food outlets based on their sustainability credentials. Items are arranged along a continuum, with the least sustainable options placed furthest from the cash counter and the most sustainable, aligned with standards like the EAT-Lancet menu, positioned closest. A QR code at the counter invites customers to provide quick feedback on their experience, turning routine purchases into moments for reflection and dialogue.

Mechanisms of change

The Transition Spectrum restructures how food options are presented in university food outlets based on their sustainability credentials. Items are arranged along a continuum, with the least sustainable options placed furthest from the cash counter and the most sustainable, aligned with standards like the EAT-Lancet menu, positioned closest. A QR code at the counter invites customers to provide quick feedback on their experience, turning routine purchases into moments for reflection and dialogue.

Determinants of behavioural change

- Physical Opportunity: The placement of food items makes sustainable choices more salient and visible.
- Automatic Motivation: The visual layout triggers quick preferences for sustainable options.
- Reflective Motivation: The QR feedback mechanism encourages consumers to consider the sustainability impact of their choices, fostering deeper engagement.

Strengthen relationships

This intervention strengthens connections between catering staff and students by creating a structured feedback loop. The QR code gives students a space to share their perspectives and experiences, offering a contestation space.

Addressing systemic barriers

- B1 - Fragmented understanding of sustainability → Clearly categorizes food based on sustainability credentials.
- B2 - Disconnection from the food system → Links consumer choices directly to environmental impact, making consequences tangible.
- B3 - Mistrust between actors → Enables direct feedback, fostering dialogue and trust.
- B5 - Lack of consumer support → Supports customers in making informed choices by simplifying decision-making.

Practical considerations

Temporality

- Could be tested as a one-time experiment to collect insights and adjusted for future iterations.
- If successful, food placement could be permanently restructured.

Audience / Mindset

- All customers in university food outlets (students and staff).

Potential Challenges

- Lack of engagement: Customers may ignore the setup or QR feedback.
- Catering staff resistance: Requires buy-in from staff to implement effectively.
- Limited reach: Doesn’t engage those who don’t purchase food on campus. It can be countered with a communication campaign.
- Unintended consequences: May increase food waste if less sustainable items are avoided entirely.
- Perceived strictness: Displaying individual items may seem overly rigid, misrepresenting the balance of a weekly diet.

- Compensation strategy: Present as an experiment rather than a permanent change.

Synergies

As the first intervention, the Transition Spectrum establishes an easily implementable visual and structural guide that supports later interventions. It works in tandem with True Pricing and the CO-Counter, reinforcing economic transparency and collective feedback mechanisms. Together, these elements form a scalable, adaptable, multi-layered strategy for guiding consumer choices.

Another potential synergy is integrating this setup into student introduction sessions (e.g., Food for Thought) to familiarize students with labels and display logic from the start.

Minimal Viable Intervention

A simple “Future Proof 2030” sticker on meals that meet sustainability requirements, highlighting the best options without restructuring the entire layout.

INTERVENTION 1.2

True pricing and detailed labelling

What it is

This intervention enhances environmental restructuring by expanding food labelling beyond basic categorization. Each item is labelled with both quantitative environmental impact data (e.g., CO_2 emissions per kilogram, water usage) and qualitative ratings (e.g., high, medium, low), along with its origin.

A pivotal moment occurs at checkout: the cashier directly asks whether the customer wants to pay the "true price"(which accounts for environmental externalities) or the standard, subsidized market price. This confrontation makes the environmental cost of food choices explicit, encouraging reflection and accountability.

Mechanisms of change

- Information and visibility → Increases awareness of environmental impact, triggering both reflective and automatic motivation.
- Environmental restructuring → Labels make sustainability information more accessible.
- Confrontation → Openly asking about pricing forces an explicit, conscious choice.

Determinants of behavioural change

- Psychological Capability: Increases understanding of true environmental costs.
- Physical Opportunity: Clear and accessible labelling facilitates informed decision-making.
- Automatic Motivation: Seeing impact labels triggers quick, subconscious reactions.
- Reflective Motivation: The explicit pricing choice encourages reflection.

Strengthen relationships

The direct questioning at checkout transforms a routine transaction into a moment of reflection and interaction. It increases transparency regarding sustainability initiatives from the catering towards consumers.

Addressing systemic barriers

- B1 - Fragmented understanding of sustainability → Exposes hidden environmental costs.
- B2 - Disconnection from the food system → Links personal spending choices to environmental impact.
- B4 - Lack of accountability → Makes sustainability an explicit financial decision.

Practical considerations

Temporality

- Labels can be implemented long-term with minimal disruption.
- The checkout question could be tested as a short-term trial to assess its effectiveness and reception.

Audience / Mindset

- All customers in university food outlets (students and staff).

Potential Challenges

- Requires transparent and credible data on food items to avoid skepticism.
- If customers choose to pay the true price, it may lead to undesirable moral licensing (e.g., feeling justified in making less sustainable choices by paying more). It also may lead to questioning where the extra funds go. Compensation strategy: Clearly communicate what is done with the extra funds (e.g., supporting NGOs or initiatives for protein transition).

Synergies

As a complement to the Transition Spectrum, True Pricing adds a layer of economic transparency. While the Transition Spectrum passively guides choices through spatial organization, True Pricing forces an explicit choice, strengthening the intervention’s impact by introducing

economic and moral considerations. This deepens the nudge system, ensuring consumers engage with sustainability from multiple angles.

Minimal Viable Intervention

Instead of labelling each item individually, a small sign near the cashier could state:

> *"You can choose to pay the true price to account for environmental costs."*

This could be supported by the cashier verbally prompting:

> *"Would you like to pay the true price?"*

Alternatively, the pricing question could apply only to the least sustainable items.

INTERVENTION 1.3

CO_2 Counter

What it is

The CO_2 Counter is a digital display that aggregates and shows the daily average CO_2 impact per kilogram of food purchased. Using real-time data, it indicates whether the collective environmental footprint is trending toward sustainable or unsustainable outcomes, with clear reference benchmarks, good, okay or bad levels, to guide interpretation.

Positioned at a highly visible point in the dining area, it ensures that both customers and people seating around see the evolving environmental impact throughout the day, making the consequences of food choices more tangible. Sales tracking could provide data on its effectiveness in shifting purchasing behaviour.

Mechanisms of change

- Social norming → By providing immediate, aggregated feedback, the counter makes the environmental impact of food choices visible.
- Provocation & coercion (mild social pressure) → Publicly displaying the CO_2 footprint can create an implicit incentive for consumers to choose lower-impact foods, leveraging social accountability as a nudge.

Determinants of behavioural change

- Reflective Motivation: Seeing the cumulative environmental impact encourages consumers to think critically about their choices.
- Automatic Motivation: The public nature of the counter introduces a social pressure effect.
- Social Opportunity: Facilitates shared awareness and group-level accountability.

Strengthen relationships

The CO_2 Counter fosters ongoing dialogue between catering staff and students by making sustainability efforts transparent. As customers see their collective impact, it can spark conversations, promote accountability, and build a sense of shared responsibility for sustainable dining.

Addressing systemic barriers

- B1 - Fragmented understanding of sustainability → Exposes environmental costs.
- B2 - Disconnection from the food system → Links personal spending choices to environmental impact.
- B4 - Lack of accountability → Openly displays the environmental cost of individual and aggregated choices.

Practical considerations

Temporality

- Can be implemented as a short-term social experiment (e.g., one week) to assess impact and engagement.

Audience / mindset

- Customers making purchases and diners seated in the eating area, as they are exposed to the changing counter display.

Potential challenges

- Fear of public shaming → Some customers may feel uncomfortable seeing the collective impact displayed.
- Gamification by skeptics → Opponents of the protein transition might intentionally try to drive the counter toward the highest (most unsustainable) impact. Compensation strategy: Frame the intervention as an informative rather than judgmental tool.

Synergies

The CO_2 Counter complements the Transition Spectrum and True Pricing interventions by offering a group feedback mechanism. While the first two operate at the individual purchase level, the counter aggregates choices over time, reinforcing the principle that every decision contributes to a larger outcome.

Minimal Viable Intervention

Instead of a digital display, a simple, tangible alternative could be a transparent bowl at the checkout:

- After each purchase, the cashier (or the customer) drops a coloured marble into the bowl: Green = Sustainable choice / Red = Unsustainable choice
- Items could also be labelled with green or red stickers (connecting with the True Pricing).
- Over the course of the day, the bowl visually represents the cumulative food choices, providing a physical, immediate view of sustainable purchase behaviour.

INTERVENTION 2

Exam week-Comfort food

What it is

This intervention introduces extended food service hours during exam periods, offering a single, comforting, by default plant-based meal (e.g., a burger or ramen). The goal is to support students during high-stress periods by providing a nutritionally balanced, filling, and convenient meal.

By keeping the offering intentionally simple, one dish served throughout the day, this approach streamlines operations, reduces food waste, and ensures affordability.

Mechanisms of change

This intervention leverages environmental restructuring and enablement by adapting food services to students' needs during exams. By establishing a new, comforting ritual, it encourages sustainable eating habits in moments when students have little time to take care of their meals and can default to convenience-based options.

Determinants of behavioural change

- Physical Opportunity: Extended service hours and the availability of a convenient, satisfying and affordable meal.
- Social Opportunity: The shared experience of enjoying a comforting meal during high-stress periods fosters a sense of community and strengthens social connections between students and catering staff.
- Automatic Motivation: The appeal of a delicious meal encourages participation without requiring extensive deliberation.

Strengthen relationships

By proactively responding to students' needs during the exam period, this initiative fosters trust and reinforces the catering staff's role as an attentive, flexible, and supportive presence in student life.

Addressing systemic barriers

- B3 - mistrust between actors → By offering a reliable service, the intervention strengthens trust between students and catering staff.
- B5 - consumer support → Provides tangible evidence that the catering acknowledges and accommodates student needs.

Practical considerations

Temporality

- Implemented quarterly during exam weeks.

Audience / mindset

- All students

Potential challenges

- Food quality concerns → Ensure high quality through recipe testing and student feedback.
- Affordability → Control costs through bulk purchasing and efficient meal planning.
- Limited awareness → Implement a targeted communication campaign to maximize reach.

Synergies

Students could be informed about this service during Intervention 3 (Food for Thought), reinforcing awareness and uptake.

Minimal Viable Intervention

A one-week pilot during exam week at a strategic food outlet (e.g., near the library), testing student engagement and feasibility before scaling up.

INTERVENTION 3

Introduction session- Food for thought

What it is

This intervention is a combined session held during the introduction week of the academic year, designed to serve two key functions: informing students about TU Delft's sustainability goals, agenda, and strategy, helping them understand how their choices as consumers align with the university's broader sustainability targets; and experiencing sustainability firsthand through a free, high-quality lunch aligned with EAT-Lancet guidelines, offering a tangible introduction to what a sustainable diet could look and taste like.

By merging information with a sensory experience, this intervention transforms abstract sustainability principles into tangible, relatable actions. A Q&A session ensures open dialogue, allowing students to ask questions, engage in discussion, and critically reflect on sustainability in food choices. Additionally, showcasing different meal options could provide a real-world representation of what a sustainable diet could look like in everyday life.

Mechanisms of change

- Informational and Experiential combination → Combining education with direct tasting engages both cognitive and emotional mechanisms, making sustainability more accessible and personally relevant.
- Initiation and Belonging → Potentially creating a sense of community and shared purpose among new students
- Engagement and Reflection → The session serves as a contestation space, allowing students to question, discuss, and critically engage with sustainability in food.

Determinants of behavioural change

- Psychological Capability: Students gain a clear understanding of TU Delft's sustainability strategy and their role in it.
- Physical Opportunity: A free, accessible meal provides an immediate, positive example of sustainable eating.
- Social Opportunity: The shared experience fosters a sense of collective discovery and responsibility.
- Automatic Motivation: Enjoying a delicious meal creates positive emotional associations with sustainable choices.

Strengthen relationships

The direct engagement between the sustainability team and students fosters trust and builds rapport. By combining dialogue with a sensory experience, the intervention ensures alignment between messaging and practice.

Addressing systemic barriers

- B1 - Fragmented understanding of sustainability → Clearly outlines the university's sustainability strategy.
- B2 - Disconnection from the food system → Experiencing sustainable meals firsthand makes sustainability goals more tangible and relatable.
- B3 - mistrust between actors → Including a Q&A, combined with offering a free meal, shows transparency and trust between students and institutional actors.
- B4 - lack of shared responsibility and accountability → Frames sustainability as a collective mission, reinforcing the idea that both the institution and students have an active role to play.

Practical considerations

Temporality

- Once per academic year, during introduction week.

Audience / mindset

- Open to all students interested in attending.

Potential challenges

- Low attendance (since it's not mandatory).
- Some students may attend only for the free food without engaging in the session.
- Large-scale food service logistics could lead to excess food waste.

Compensation strategies: Ensure exceptional food quality so it serves as a hook for further engagement, paired with a communication campaign; monitor attendance and engagement to improve future iterations.

Synergies

As an initiation event, this intervention lays the foundation for continued engagement with sustainability efforts throughout the academic year, and it serves as a platform to introduce students to other interventions, such as Interventions 1 and 2.

Minimal Viable Intervention

Run the session once as a pilot, gather insights, and iterate for future editions.

INTERVENTION 4

Cooking workshop- Food with history

What it is

Food with History combines a hands-on cooking workshop with the direct harvest of a key ingredient from the vegetable garden, creating a deeper connection between food, its origins, and sustainable eating. Recipes follow sustainable guidelines, such as the EAT-Lancet menu, and offer participants the choice to prepare them entirely plant-based or with minimal animal-based ingredients. Building on the existing vegan cooking workshops, this intervention shifts away from the vegan label that may push participants away, instead offering an inclusive approach to sustainable diets. Additionally, taking inspiration from community kitchens, the workshops could feature guest chefs from diverse backgrounds, introducing a multicultural layer that celebrates different food traditions.

This intervention has three key moments:

- Harvest at the vegetable garden → Each session begins at the university's vegetable garden, where participants harvest ingredients and learn about growing food.
- Cooking + storytelling → The lead chef leads the cooking workshop, sharing historical and/or personal stories behind specific dishes or ingredients, blending cooking with storytelling.
- Social dining→ The workshop concludes with a shared meal, working on the social aspect of eating

Mechanisms of change

- Reconnection with nature and seasonality → Starting in the vegetable garden and emphasizing seasonal produce makes sustainability tangible and experiential
- Skill building and embodied learning → Hands-on cooking enhances culinary skills and confidence
- Cultural and social engagement → Storytelling brings historical and cultural depth to food choices, transforming the workshop into a memorable and meaningful experience

Determinants of behavioural change

- Physical Capability: Participants develop practical cooking skills and learn to work with seasonal ingredients.
- Psychological Capability: The workshop deepens knowledge of sustainable cooking practices
- Physical Opportunity: The combination of a garden and kitchen provides an accessible and enriched learning environment.
- Social Opportunity: By bringing together students, teaching staff, and sustainability teams, the intervention fosters shared experiences and supportive relationships.
- Reflective Motivation: Engaging with the history, culture, and direct experience of sustainable cooking prompts participants to reconsider their own food choices

Strengthen relationships

- Between Sustainability Team, catering and students → Direct interaction builds trust and demonstrates the university's commitment to sustainable practices.
- Among Participants (students and teaching staff) → both groups take the role of participants, fostering a horizontal relationship

Addressing systemic barriers

- B2 - disconnection from the food system → Experiencing the earth-to-table process allows participants to reconnect with nature and the food system
- B5 - inadequate support (capacity building) → The workshop serves as a direct capacity-building exercise, equipping participants with practical cooking skills
- B6 - limited visibility of success stories → It becomes a reference point as an enjoyable and meaningful experience

Practical considerations

Temporality

- Periodic event, potentially aligned with seasonal harvests (autumn, spring, summer).

Audience / Mindset

- Students and teaching staff interested in cooking

Potential Challenges

- Relying on the vegetable garden and its management adds a layer of complexity in coordination.
- Limited diversity in participants (risk of only attracting those already interested in sustainable eating). Compensation strategy: A targeted communication campaign to reach a broader audience (but even if only cooking enthusiasts attend, they are more likely to cook for others, increasing intervention's reach).

Synergies

The workshop creates opportunities to sensitize participants to sustainability efforts beyond the session itself. It can align with the restructuring of food outlets (Intervention 1), promote Intervention 2 (Exam Week - Comfort Food), and encourage interest in attending Intervention 5 (Thematic Lunches).

Minimal Viable Intervention

Run a pilot session with an in-house chef, testing logistics before exploring external guest chefs.

INTERVENTION 5

Thematic lunches

What it is

This intervention introduces a series of lunch sessions centred on the protein transition and our role and agency as consumers. Moderated by members of the sustainability team, these sessions provide a space for open dialogue, inviting participants to engage with a (potentially) uncomfortable topic and explore broader systemic food questions.
In this sense, this intervention addresses the deliberate creation of spaces for letting go, an exercise that would inevitably evoke feelings of sadness that would need to be worked through (Coops et al., 2024).
To further enrich the discussion, experts in food systems and protein transition may be invited as guest speakers, leveraging their expertise and offering new perspectives.

During the lunches, students, teaching staff, and sustainability teams gather for open, non-hierarchical discussions while sharing a free meal aligned with the EAT-Lancet guidelines.

To extend the conversation beyond the sessions, provocative posters are placed in high-traffic areas like study spaces and coffee corners. These posters ask reflective questions, such as:

"Which is the bigger loss?", accompanied by images of animals in industrial farming vs. a plate without meat, or Amazon deforestation for cattle feed vs. a meat-free meal.

Each poster features a QR code linking to a website with additional resources and a sign-up form for upcoming sessions.

Mechanisms of change

- Provocation and Disruption → Challenging questions on posters encourage critical reflection
- Contestation spaces and collective intelligence → The dialogue sessions create an open space for debate, knowledge exchange, and collective reflection

Determinants of behavioural change

- Physical Opportunity: The sessions provide a low-barrier entry point for trying sustainable meals
- Social Opportunity: The intervention fosters horizontal interactions between students, faculty, and sustainability teams, breaking down hierarchies and building a sense of shared responsibility
- Reflective Motivation: The questioning posters and structured discussions encourage deeper reflection on the impacts of food choices.

Strengthen relationships

By bringing together diverse groups (students, faculty, and sustainability team) in a non-hierarchical setting, the intervention reinforces a collective sense of agency.

Addressing systemic barriers

- B1 - Fragmented understanding → by creating a space for discussion that is both grounded in science and provides a clear benchmark for sustainable eating
- B2 - disconnection from the food system → rethinking and expanding our role as consumers in the food system
- B3 - mistrust between actors → Open discussions help build trust and understanding between actors.
- B4 - Lack of agreement on responsibility → By framing sustainability as a shared challenge, the intervention fosters collective accountability.
- B6 - limited visibility of success stories → creating a space for real world experiences and personal narratives to be shared, making concrete examples visible

Practical considerations

Temporality

- Can be a one-time event or a series running throughout the academic year

Audience / Mindset

- Primarily for early adopters and those interested in sustainability

Potential Challenges

- Low attendance. Compensation strategies: direct faculty invitations (email, phone, in-person) to ensure teaching staff engagement; encourage student associations to participate; host a session per faculty to minimise the need to move across campus; hosting the sessions during the lunch break makes it easier for participants to join.
- Requires proper moderation, a well-prepared moderator should facilitate open but structured conversations.

Synergies

This intervention sets the stage for Interventions 6 and 7 by working on personal agency and engagement with key questions on the protein transition and the future of sustainability. It helps assess how different faculties perceive change and identifies participants who may be interested in sharing their experiences for Intervention 6 (Transition Stories). Insights from these sessions can guide future interventions and iterations.

Minimal Viable Intervention

Pilot a single session, supported by one single poster placed across campus to raise awareness.

INTERVENTION 6

Transition stories

What it is

Transition Stories is a storytelling-based intervention that collects and showcases personal narratives from individuals within the campus community (students, teaching staff, catering personnel, and others) who are navigating the protein transition.

The format is flexible, serving as a showcase that can be physical, digital, or both. The launch begins with an opening gathering that introduces the intervention, explains its raison d'être, and creates a space for discussion and connection around this topic. The Week Without Meat and Dairy would be an ideal moment to launch this intervention.

Mechanisms of change

- Inspiration through representation → By highlighting both successes and challenges, it provides a nuanced, relatable perspective on dietary change.

Determinants of behavioural change

- Physical Opportunity → By existing in physical and/or digital spaces, Transition Stories becomes an everyday part of campus life.
- Social Opportunity → Facilitating the exchange of experiences fosters community and shared responsibility.
- Reflective Motivation → Emotionally engaging stories create an intrinsic motivation for change.

Strengthen relationships

Between students and faculty → Members of both groups are showcased as equals in the transition, fostering a sense of shared mission

Addressing systemic barriers

- B2 - Disconnection from the food system → Personal stories humanise sustainability efforts and highlight our role in the system
- B6 - Limited visibility of success stories → Explicitly showcasing success stories, providing validation for those already taking part in the protein transition and inspiration for those considering it.

Practical considerations

Temporality

- Launch as a one-time event with longer-term access to digital platform

Audience / mindset

- To provide content → Early adopters willing to share their experiences.
- To engage with content → The entire university community, from the curious to those actively considering dietary changes.

Potential challenges

- Collecting compelling stories → Needs active outreach, and possibly small incentives for participants.
- Limited audience reach. Compensation strategies: use multiple formats (physical exhibition, long-lasting website, short interactive materials); leverage institutional channels (faculty newsletters, campus emails); introduce low-threshold touchpoints (e.g., posters featuring “A Tip from Jap”: bite-size inspiration from real transition stories).

Synergies

This intervention builds on Interventions 3 and 5 by offering a space to deepen the reflections sparked during informational sessions and food-related experiences. It reinforces the themes introduced in Intervention 3 (Food for Thought) and brings forward personal insights that can be shared and expanded. Participants engaged in Intervention 5 (Thematic Lunches) may be encouraged to contribute their own stories, helping to connect everyday experiences with broader narratives of change.

Minimal Viable Intervention

Showcase a selection of stories through a digital platform, such as a website or social media channel.

INTERVENTION 7

Stories from the future

What it is

Stories from the Future is a visionary intervention designed to create space for radical future-thinking, enabling participants to transcend present constraints and explore alternative narratives for a sustainable campus. It is structured in two parts:

1. Creative contest and exhibition. The intervention begins with a creative call open to the entire campus community, inviting participants to submit artworks, written pieces, videos, 3D models, or other creative expressions that envision a sustainable future for TU Delft. After a curation process, selected works are showcased in an interactive exhibition.

   The exhibition launches with an opening event consisting of a roundtable session exploring the key themes from the submitted works, followed by a moment to acknowledge and award the contest winners.

2. Participatory workshop and strategic visioning. Building on the exhibition, a future visioning workshop brings together a diverse group of participants (students, faculty, members of the executive board...) to co-create strategic narratives of change. The goal is to translate future visions into actionable strategies to transform TU Delft and its purpose of working towards a sustainable society. Ideally, key insights from this session would be integrated into the university's strategic agenda, ensuring the results of the workshop are the basis of real change.

This intervention directly addresses what Mulgan (2020, p.4) calls the "deficit of social imagination", our struggle to envision positive, transformative futures compared to dystopian collapse. By flipping this narrative, Stories from the Future encourages aspirational, tangible visions of change, reinforcing collective agency over TU Delft's sustainability trajectory.

Mechanisms of change

- Visioning and Narrative Creation → By enabling participants to articulate and share future scenarios, this intervention shifts mental models, challenging the inertia of path dependency and short-term thinking.

- Collective Imagination → The combination of individual storytelling (contest) and collaborative discussion (workshop) strengthens the belief that transformative change is possible.
- Strategic Co-Creation → Insights from both the exhibition and workshop can directly inform TU Delft's strategy, ensuring that bold visions contribute to long-term institutional change.

Determinants of behavioural change

- Psychological Capability → Engaging in future visioning expands cognitive flexibility, allowing participants to think beyond existing limitations.
- Reflective Motivation → Immersion in aspirational narratives strengthens commitment to sustainability, reinforcing a sense of agency and responsibility.
- Social Opportunity → Bringing together students, faculty, and sustainability teams in a creative, collaborative setting ensures that diverse voices shape the future that is being built.

Strengthen relationships

This intervention establishes horizontal collaboration, where students, faculty, and sustainability teams co-create the future together, reinforcing the idea that everyone has a role in shaping TU Delft's future.

Addressing systemic barriers

- B1 – fragmented understanding of sustainability → the contest and exhibition provide a shared reference point for desirable sustainable futures. The workshop bridges gaps in understanding by fostering a more aligned view of sustainability among participants.
- B4 - lack of agreement in responsibility and accountability → By co-creating future narratives, participants develop a collective sense of ownership over sustainability goals.
- B6 - limited visibility of success stories → The exhibition and visioning outcomes create tangible reference points for long-term sustainability discussions.

Practical considerations

Temporality

- One-time event with the potential for future iterations. Ideal launch → During a major sustainability-focused day, such as Earth Day or Earth Overshoot Day.

Audience / mindset

- Creative contest → Open to all, but likely to attract visionaries, innovators, and early adopters.
- Future visioning workshop → Requires a diverse mix of students, faculty, sustainability teams, and decision-makers.

Potential challenges

- Lack of clear session guidance → Requires expert facilitation in futures thinking and transition theory.
- Low engagement → A strong communication campaign is crucial, leveraging faculty newsletters, campus-wide emails, and personal invitations to key stakeholders.
- Conceptual outputs with no real implementation → To ensure impact, the executive board should be involved in the workshop's outcome translation into actionable steps.

Synergies

This intervention complements Intervention 6 (Transition Stories) by building on personal narratives and adding a forward-looking perspective. It also draws from Intervention 5 (Thematic Lunches), using insights from shared meals and discussions to explore future-oriented scenarios around dietary change.

Minimal Viable Intervention

- Pilot a single visioning workshop with a diverse participant group, focusing on guided future exploration.
- Capture the ideas and insights in a visual format (mural, short video, or webpage) to share across campus and gather feedback.

6.2 VALIDATION

The aim of validation is twofold: first, to assess the perceived effectiveness, adaptability, and resonance of the interventions with key actors; and second, to surface tensions, barriers, and opportunities for refinement. Consumers, stakeholders, and the client were asked for an initial response to the concepts.

Rather than validating whether the interventions "work" in a narrow behavioural sense, this chapter focuses on how students perceive and relate to the interventions, emotionally, socially, and practically. In line with the project's systemic design approach, validation is treated as an exploratory process that reveals not only where the interventions succeed, but also how they might unintentionally exclude, alienate, or fall short of real-life conditions.

The evaluation draws from a consumer validation session in which participants engaged with the intervention concepts and reflected on their willingness to participate, the perceived coherence of the portfolio, and the extent to which the interventions felt accessible, and meaningful. These conversations were guided by prompts exploring engagement, adaptability, and coherence, and aimed to uncover both individual and collective insights.

6.2.1 FACILITATING IMPLEMENTATION: RETHINKING CRITERIA

In design and innovation practice, ideas are commonly assessed using three criteria: desirability, feasibility, and viability. According to this logic, if an idea meets all three, it holds the characteristics of a successful innovation:

- A desirable solution: one your audience really wants.
- A feasible solution: one that builds on existing operational capabilities.
- A viable solution: one with a sustainable business model.

While widely used, this framework is rooted in a consumer-centric and growth-oriented paradigm. It assumes the value of design lies in meeting individual needs, operating efficiently within current systems, and generating financial return. However, within this project, these criteria are neither optimal nor appropriate.

Take desirability. From an individual perspective, maintaining current dietary habits easily checks the desirability box, it preserves familiarity, comfort, and autonomy. Yet from a broader societal perspective, this same inaction fuels undesirable outcomes: environmental degradation, ethical tradeoffs, and social burdens. This paradox highlights the inadequacy of evaluating desirability solely through individual preference, especially when the goal is to cultivate collective value. These interventions intentionally step away from serving conventional consumer "wants." Instead, they reframe dietary change as an act of care and connection, a trade-off for the loss of material value.

As for viability, the conventional focus lies in long-term profitability, whether an idea can support a business model. In this context, that question is irrelevant. The interventions are not products, nor are they anchored in commercial logic. They are part of a portfolio approach that emphasizes experimentation, emergence, and iteration. Their value lies in what they shift within the system, not in whether they remain financially self-sustaining.

This brings us to feasibility. While still relevant, it also benefits from reframing. Instead of asking, "Can we build this from scratch?", feasibility here refers to alignment and resource redirection. Each intervention was selected for its ability to tap into existing services, roles, and infrastructures. The aim was not to add more, but to reconfigure what is already present, aligned with a degrowth logic that shifts resources away from reinforcing the dominant regime and toward supporting alternative practices.

By redefining feasibility in this way, implementation becomes less about scale and more about systemic fit.

To address immediate feasibility, I developed RACI matrices (Responsible, Accountable, Consulted, Informed) for each intervention (Appendix F). These outline key tasks and role distribution among actors, offering an initial scaffold for implementation. Again, these are not fixed blueprints but starting points for collaborative development, open to reinterpretation as the interventions evolve.

6.2.2 VALIDATION CRITERIA

Given the critique of the innovation trifecta, I selected a new set of criteria more suited to the context of this project and the long-term systemic changes it aims to support.

- Engagement instead of desirability expands the question from "do people want this?" to "are the right people invested enough to shape and sustain change?" In systemic interventions, long-term buy-in and shared ownership are what allow ideas to survive and evolve.
- Adaptability instead of viability reframes "will this survive?" into "can this evolve?" A design that adapts well is more likely to endure, not

because it is locked in, but because it is responsive, reflexive, and open to learning.

- Coherence instead of feasibility broadens feasibility's narrow focus on execution. It asks whether the interventions align: with each other, with the culture, and with systemic rhythms. Coherence becomes a measure of whether interventions reinforce, rather than compete with, existing workflows, power relations, and mental models.

The selection of these three lenses draws from literature on systemic design, behaviour change, and transition governance, as well as from fieldwork and interviews conducted throughout this project. Together, these sources pointed toward more context-sensitive markers of success, especially when outcomes are long-term or intangible.

During the validation session, I introduced these three criteria and invited participants to assess each intervention accordingly. Their reflections provided insight into how engagement, adaptability, and coherence show up in practice.

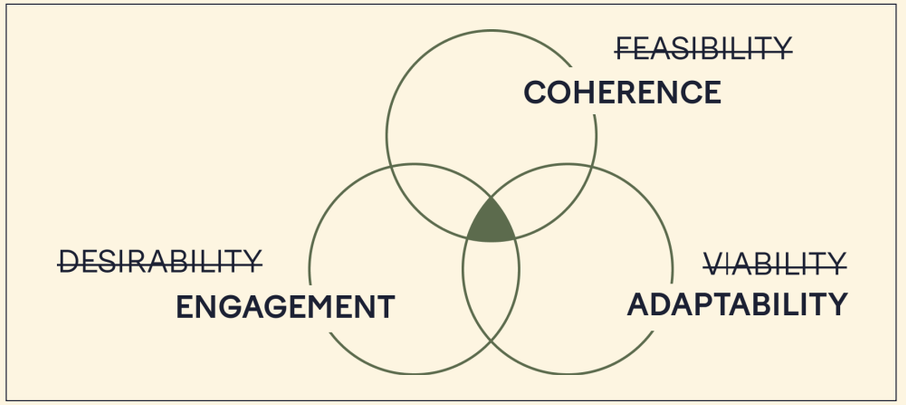


Figure 39. Validation criteria.

6.2.3 APPROACH

To validate the relevance and potential impact of the intervention portfolio, I consulted three types of stakeholders: students as consumers, a member of the sustainability team, and the client. The primary method was a consumer validation session with four TU Delft students. Participants were presented with the interventions and asked to reflect on their perceived engagement, adaptability, and coherence. Particular attention was paid to uncovering tensions, challenges, opportunities, and areas for improvement.

The session combined open-ended discussions with targeted prompts.

Participants reflected on questions like:

- What would make you want to participate in this?
- What would help you return or stay involved?
- Does this intervention feel like it belongs on campus?
- Is there anything that feels off?

6.2.4 VALIDATION RESULTS

CONSUMER RESULTS

ENGAGEMENT

Students responded most strongly to interventions that resonated with them personally. Interventions that evoked care, humor, or storytelling sparked more curiosity and reflection. Drivers of engagement included real human stories and shared sensory experiences (cooking and dining together).

However, several students noted that initial engagement can fade if the intervention feels like a one-off or lacks repetition. There is a need to balance immediate appeal with sustained presence.

ADAPTABILITY

Participants appreciated the variety of entry points across the portfolio. Having both low-barrier actions (e.g. tastings, visual nudges) and deeper experiences (e.g. storytelling events, reflective dialogue) allowed them to self-select based on time, energy, and willingness.

This adaptability was seen as a key strength, especially in the context of student life, which is full of other demands.

The ability to meet people where they are emerged as an essential quality, which suggest that there is an opportunity in creating casual and commited pathways for potential participants.

COHERENCE

Despite the diversity of formats, most students recognized a shared tone of exploration, reflection, and community-building. They noted that different interventions touched different dimensions of experience. This sense of diversity while preserving alignment contributed to a feeling of coherence. Still, some participants observed that without a central narrative, the interventions risked feeling like isolated events rather than parts of a shared direction.

STAKEHOLDER RESULTS

To assess the feasibility and strategic potential of the portfolio, I presented all interventions to a sustainability officer at TU Delft Facilities. His feedback focused on operational constraints, institutional dynamics, and implementation opportunities.

In general, the portfolio is viewed as timely, relevant, and well-aligned with TU Delft's strategic sustainability ambitions.

"Some of these ideas could really work, not just for sustainability, but to build a sense of connection."

FEASIBILITY AND CONSTRAINTS

- Simplified signage: Consolidating labels into a recognizable, cohesive system was seen as highly feasible and beneficial. TU Delft already uses nudging strategies (e.g. placing vegetarian options first), but overcrowded messaging weakens the effect.
- True pricing: Real-time calculations are not currently feasible. However, displaying estimated true prices for one-off menus or campaigns was seen as a low-effort, high-impact alternative.
- Data feedback loops: While TU Delft collects campus-wide purchasing data, it cannot be linked to individual meals. Weekly retrospectives (e.g. "Here's what the campus saved last week") were seen as effective and realistic alternative.
- Exam-week comfort meal: This was considered especially promising, both in terms of student experience and sustainability, if framed as a thoughtful gesture.
- Cooking workshops: Reframing from "vegan" to "future-proof cooking" was welcomed as a smart move to broaden appeal.
- Exhibition and storytelling formats: These were appreciated for their potential to spark conversations across audiences. Integration with TU Delft's existing sustainability agenda would be key to avoid fragmentation.

"The biggest challenge is not resources. It's people not seeing themselves in the sustainability story."

CLIENT RESULTS

The feedback from the client brought an external, strategic perspective, highlighting the conceptual depth and broader potential of the portfolio.

The client recognized the systemic logic and emotional framing of the interventions. He noted that the portfolio goes beyond surface-level nudges and aims to shift deeper cultural values around food.

He emphasized that the conceptual foundation was the most valuable aspect, validating the strength of the interventions' theoretical framing and design rationale.

The interventions show potential for broader applicability beyond the university setting, with possibilities for adaptation in NGOs, municipalities, and commercial canteens. Narrative-based approaches, such as speculative futures and real-life stories, were seen as especially engaging. Framing the transition around care sparked more personal conversations grounded in identity, belonging, and agency. The client expressed particular interest in supporting these narrative-driven interventions, especially those involving outreach and storytelling.

6.2.5 SUMMARY OF KEY INSIGHTS

Recurring patterns emerged across all stakeholders. These insights are synthesized into strengths, challenges, and opportunities that inform how the portfolio of interventions could evolve and be implemented within TU Delft.

STRENGTHS

- Diverse entry points: interventions range from sensory (cooking, tasting), to reflective (storytelling, dialogue), to structural (pricing cues, placement strategies).
- Balance between immediacy and depth: interventions offer quick hooks as well as pathways for deeper engagement.
- Emotional and social relevance: students felt recognized in interventions that addressed exam-related stress or everyday food rituals.
- Institutional resonance: several interventions align with existing goals, agendas, and infrastructures, making integration feasible
- Low-threshold adaptability: the portfolio allows for flexible participation, from passive observation to active co-creation.

CHALLENGES

- Risk of perceived moralizing: excessive use of labels such as "sustainable" can alienate less-engaged audiences.
- Sustainability fatigue: repetitive or abstract messaging may feel disconnected from lived experience.
- Low visibility of existing efforts: new interventions must navigate the challenges that current ones face.
- Internal resistance from teaching staff: skepticism or detachment toward sustainability can undermine coherence and credibility of interventions aimed at students.
- Institutional change is slow and layered: new initiatives need to complement existing agendas, not compete with them.
- Value-level interventions are harder to validate: outcomes may be intangible or slow to surface.

OPPORTUNITIES

- Use "moments of care" (e.g. exams, orientation) to build trust and emotional connection.
- Scale real personal stories and rituals: use storytelling to normalize struggle, complexity, and imperfection in the sustainability journey.
- Leverage art, humor, and imagination: speculative and creative formats can spark curiosity and open new forms of engagement.
- Make invisible progress visible: use data feedback loops, prototypes, and real stories to help people see that their actions matter, even when change is slow
- Connect new interventions to existing efforts to increase visibility and legitimacy.

> *"Rather than viewing the success of our work through the lens of creation and production, we should focus more on measuring our impact through restoration, connection, and amplification. [...] The true magic of design lies not in what we create but in the change we help others achieve."*
>
> DESIGNSHIFTS.ORG

CHAPTER 7

WRAPPING UP, LETTING GO

7.1 DISCUSSION

7.1.1 LIMITATIONS

PERSONAL AND STRUCTURAL LIMITS

Like any other, this project was developed under limited time, capacity, and, at times, limited hope. It would be disingenuous not to acknowledge the weight of working on a topic that often feels overwhelming. Designing within a system that asks us to confront what must be given up, rather than what can be gained, challenges both the cognitive and emotional resources of any designer. And when the system in question is as culturally embedded and politically charged as food, it can sometimes feels absurd to attempt systemic change from the position of a single master's student.

This is the paradox of approaching a project like this through a systemic design lens: it draws on collective intelligence, embraces interdependence, and relies on collaboration, yet the work is carried out individually. No matter how many stakeholders I spoke to, or how many frameworks I drew, the process remained shaped by my own limitations, assumptions, and blind spots.

RESEARCH LIMITATIONS

The project relied primarily on qualitative methods, especially interviews. These methods were well-suited to uncover emotional undercurrents and narrative patterns, but they remain subjective and shaped by my positionality.

The sample of participants was also narrow. Except for one participant, all consumer interviews were conducted with students, limiting the consumer perspective to the student body. This excludes the views of other key actors within TU Delft, such as teaching staff, who are also consumers but operate with different routines, norms, and levels of autonomy. Additionally, half the participants were design students, which introduced a bias: sustainability is more normalized within this faculty, potentially skewing responses. I tried to compensate for this by focusing the analysis on resistant narratives, which ultimately informed the identification of systemic barriers. Nonetheless, a broader and more diverse sample would have provided a fuller picture.

SOLUTION LIMITATIONS

None of the interventions proposed are flashy or revolutionary. Some may even seem too small. But what is the point of designing for an ideal world if the result can't function in the real one? These interventions were intentionally grounded, designed not to fix the system, but to create cracks in it. Their ambition lies in their realism. In a transition that asks people to have less, small and feasible shifts may be the most effective place to begin.

Design often gravitates toward sleek, "sexy" solutions. I chose instead to propose interventions that feel possible. Not because imagination was limited, but because the most radical gesture may be to work with what already exists. My aim was to do as much as possible with the system, and as little as possible against it.

That said, implementation remains hypothetical. The interventions were validated through conversations and feedback, and structured around feasible conditions. But real-world systems are unpredictable. Institutional resistance, competing agendas, resource constraints, or political backlash could all undermine the intended impacts.

FIELD LIMITATIONS

The field of sustainability transitions is still relatively young. Much of the work remains theoretical, with limited historical precedent to draw on. And one of the hardest realisations is that transitions of this scale take time, generations, not years. Whether we have that time is not the point of this project, but it's the reality behind every hopeful attempt.

One final limitation is philosophical: the dominance of behaviourism in shaping how we understand human action. While behavioural science offers valuable tools, its framing can be reductive. Nudges and incentive structures reduce complex beings to predictable actors, responding to surface-level cues. In the context of the protein transition, many existing interventions rely on these principles.

I suggest an alternative lens. A humanistic perspective, one that sees people as reflective, emotional, relational, and intentional, might offer deeper traction. Humanism emphasizes that people are not just cognitive machines, but meaning-makers. In transitions that challenge normalised habits, identities, and values, this lens can open space for more authentic forms of engagement.

7.1.2 RECOMMENDATIONS

FURTHER RESEARCH

Future research could explore how different consumer mindsets (as defined in Figure 8, p. 48) respond to specific intervention functions, helping to tailor approaches that increase both relevance and resonance. Particular attention is needed for individuals in the bottom-left quadrant—those who are both skeptical and disengaged. These participants are not actively resistant, but rather distant, uncertain, or indifferent. A light sense of recognition, fostered through repeated exposure to alternatives, may help soften rigid views. The mere exposure effect (Figure 26, p. 90) suggests that familiarity alone can shift perception, and if the interventions proposed here manage to create that subtle shift, it would already be a meaningful step. Future studies could examine which mechanisms are most effective at nudging different mindsets toward openness or action.

I also hope that future research continues to focus on the emotional dimension of the protein transition, as emotions play a central role in how people relate to food, interpret change, and decide whether or not to engage.

FURTHER DEVELOPMENT OF THE CONCEPT

The validation sessions showed clear willingness among stakeholders to engage with and potentially pilot some of the proposed interventions. To move forward, I recommend beginning with small-scale pilots based on the Minimal Viable Intervention (MVI) versions included in this portfolio. These scaled-down versions are intentionally low-barrier, allowing for rapid testing, iteration, and feedback.

It is important to reiterate that the portfolio is not a linear plan. The interventions were designed to be modular and adaptable. This flexibility is not a weakness but a strength. It allows those in charge to align interventions with existing structures and timelines.

Moreover, implementation should not be limited to university actors. Students, catering staff, and even external partners could take on facilitation roles depending on the context. Designing for distributed agency means allowing change to emerge from multiple points, not just from the top down.

RECOMMENDATIONS FOR WWF-NL

This project offers WWF-NL a design-led perspective on consumer behaviour within the food system, not abstracted or simplified, but embedded in the cultural and emotional messiness of real life.

While WWF-NL already plays a strong role in advocacy, partnerships, and communication, this work suggests an expanded advisory role: supporting institutions like universities and companies in implementing emotionally sensitive, behaviourally informed interventions. Not by prescribing fixed solutions, but by helping them translate systemic insights into tailored, situated actions.

The logic behind the portfolio is also transferable. Canteens in office settings mirror university contexts. Employees, like students, often feel disconnected from the origins and impact of their food. The same mechanisms, visibility, reflection, ritual, shared identity, can be adapted for different audiences.

In parallel, WWF-NL could strengthen its collaboration with educational institutions, not only to influence future consumers, but to empower them as active changemakers. Students are already critical and curious. With the right support, they can design and drive the very transitions we seek.

Finally, I encourage WWF-NL to continue investing in the emotional dimension of the protein transition. People are not just information processors, we are emotional beings, shaped by habits, histories, relationships, and fears. Our inner world is not separate from the food system we are embedded in. It is part of it. If we want new systems to emerge, we need new stories. Stories that make space for discomfort, but also for hope.

7.2 CONCLUSION

The final result of this project is a portfolio of seven interventions that support the reduction of animal-based protein consumption at TU Delft. The interventions vary in focus and format: some restructure the food environment to make sustainable choices easier and more visible, while others aim to deepen personal engagement through reflection, shared experiences, and collective identity. They are intentionally small in scale but grounded in realistic mechanisms of change, and designed to work within the existing system rather than against it.

This result responds to the central research question: "How can WWF guide Dutch consumers in drastically reducing their consumption of animal-based proteins?" The answer proposed here is not a single solution, but a strategy, a way to navigate systemic change by working through existing structures, engaging with local narratives, and staying in tune with the emotional dimension.

The project builds on WWF's ongoing efforts to address the protein transition and complements its strategy by offering a design-led approach. The insights gathered through interviews and field research were translated into six systemic barriers that help explain resistance to dietary change, not only on campus, but beyond. These barriers informed the design of the intervention portfolio and offer concrete starting points for future action. The concept was positively received by stakeholders, who expressed interest in piloting or adapting several of the interventions.

This thesis contributes to the broader field of systemic design by offering an in-depth case study of a food system within a university context. It combines systemic design and design for transitions with transitions for sustainability theory. The approach emphasizes degrowth thinking, emotional resonance, and non-prescriptive formats, prioritizing transferability and adaptability over fixed outcomes.

As discussed in the limitations, several challenges remain on the path to implementation, and further research is needed to test the interventions over time and in other contexts. However, this work shows that even within a constrained academic project, it is possible to take a first step into a complex system, uncover new insights, and propose meaningful directions forward.

As I close this project, I realise the goal was never to find the solution to accelerate the protein transition, but to offer a new way of looking at it, and to design from that perspective. If this project helps others act, question, or reframe their own narratives, then it has served its purpose.

7.3 PERSONAL REFLECTION

Designing for goodbyes, designing for exnovation, has been one of the most counterintuitive challenges I've faced as a designer. Unlike traditional innovation processes, which often revolve around introducing something new, appealing, or convenient, this project asked me to engage with what needs to end. That shift changes everything. It meant resisting the instinct to make things easier or more desirable. It meant not prioritizing short-term user needs. And in this case, it meant asking people to give something up.

That made it an uncomfortable process. We're trained to empathize with users and smooth their journey. Here, I had to challenge them instead. I had to design for friction, to uncover discomfort, and to trust that those moments could still hold value. Designing for exnovation is not only about removing something from the system. It's also about what gets surfaced. For me, that included doubt, resistance, grief, attachment, and contradiction. First in the system, and then in myself.

This transition is not about convenience. It's about facing the reality that some beliefs, habits, and systems must be phased out for the sake of long-term well-being. That required a different kind of design posture, one of accountability. From the beginning, I knew I wanted to design for systemic change rather than produce something that would fuel consumption. That motivation stayed with me throughout the process. I immersed myself in the protein transition, transition design, behavioural science, and systemic methodologies. But theory alone was not enough. Applying it meant moving through emotional and intellectual discomfort, and figuring out what role I could realistically play within a much larger system.

One of the biggest personal challenges was letting go of the idea that designers can always offer clear solutions. This project reminded me that systems are bigger than us. No matter how many frameworks I drew or conversations I had, I remained one person, with a limited perspective. And I carried my own biases, assumptions, and blind spots. That recognition didn't stop the process, but it did slow it down. At times, it made me feel stuck, especially when no clear path forward appeared.

I also had to let go of the illusion of control. Much of this project felt like navigating in the dark. The literature review became my safe space: reading, making connections, looking at the problem from every angle. It gave me a sense of progress. But I knew I couldn't stay there. Moving forward meant entering field research with uncertainty still in hand. That was hard.

There were also practical and emotional disruptions. A few significant personal setbacks at the start of the project made it difficult to connect to the topic, and I felt emotionally distant from the work for a while. My productivity came in waves, periods of focus and energy were followed by moments of withdrawal. Looking back, I think those fluctuations weren't a weakness, but a way to cope with the mental toll of engaging with such an overwhelming challenge.

Still, I'm proud of where I arrived. This report, and the project behind it, reflect something I wasn't always sure would materialise. During long stretches of uncertainty, I questioned whether it would all come together. But it did, and it feels honest to the process that led here.

In terms of my learning goals, I can confidently say that I achieved them. I deepened my knowledge in systemic and transition design and explored how these ideas intersect with behavioural change. I also pushed myself in stakeholder engagement, facilitation, and project management. I know I'm not yet where I'd like to be, but I can clearly see the progress. As an extra challenge, I decided it was a good idea to design this entire report in InDesign, a tool I had never used before (and probably wouldn't recommend picking up at the end of a thesis). But despite the struggle, I'm more than satisfied with the result.

Collaborating with Livework added another layer to the experience. Their openness, feedback, and perspective helped support the more exploratory aspects of the project. Being welcomed into their practice reminded me that systemic design is not just about the outcomes we create, but also about how we engage in process, especially with others.

Finally, this project has confirmed what I long suspected about design. I began with the motivation to contribute to the protein transition, and I leave with a deeper appreciation for the emotional terrain that transition work demands. Change is not just a technical challenge, it is personal, messy, and slow. Designing for it means holding space for all of that. I'm sure this mindset makes the role of the designer heavier, but I also believe it makes it more honest.

This has not been a project of answers. It has been a project of learning to ask better questions and to recognise, as Ursula K. Le Guin once wrote, that "to learn which questions are unanswerable, and not to answer them: this skill is most needful in times of stress and darkness."

If there's one thing I take with me, it's that sometimes, the most meaningful form of progress is simply learning how to move forward without certainty.

*“Magical leverage points are not easily accessible, even if we know where they are and which direction to push on them. There are no cheap tickets to mastery. You have to work at it, whether that means rigorously analyzing a system or rigorously casting off your own paradigms and throwing yourself into the humility of Not Knowing. In the end, it seems that power has less to do with pushing leverage points than it does with strategically, profoundly, madly **letting go**.”*

DONELLA MEADOWS

REFERENCES

Abson, D. J., Fischer, J., Leventon, J., Newig, J., Schomerus, T., Vilsmaier, U., Von Wehrden, H., Abernethy, P., Ives, C. D., Jager, N. W., & Lang, D. J. (2017). Leverage points for sustainability transformation. Ambio, 46(1), 30–39.

Allen, C., & Malekpour, S. (2023). Unlocking and accelerating transformations to the SDGs: A review of existing knowledge. Sustainability Science, 18(4), 1939–1960. Argyris, Ch., & Schön, D. A. (1997). Organizational Learning: A Theory of Action Perspective. Reis, 77/78, 345.

Arena, M. J. (2018). Adaptive space – How GM and other companies are positively dirsupting themselves and transforming into agile organisations. McGraw-Hill.

Bauer, M. A., Wilkie, J. E. B., Kim, J. K., & Bodenhausen, G. V. (2012). Cuing Consumerism: Situational Materialism Undermines Personal and Social Well-Being. Psychological Science, 23(5), 517–523.

Bogner, K., Kump, B., Beekman, M., & Wittmayer, J. (2024). Coping with transition pain: An emotions perspective on phase-outs in sustainability transitions. Environmental Innovation and Societal Transitions, 50, 100806.

Boon, B., Rozendaal, M., & Stappers, P. J. (2018, June 28). Ambiguity and Open-Endedness in Behavioural Design. Design Research Society Conference 2018.

Buchanan, R. (1992). Wicked Problems in Design Thinking. Design Issues, 8(2), 5.

Buchanan, R. (2019). Systems Thinking and Design Thinking: The Search for Principles in the World We Are Making. She Ji: The Journal of Design, Economics, and Innovation, 5(2), 85–104.

Burton, B.K., Dunn, C.P. (2023, June 8). ethics of care. Encyclopedia Britannica. https://www.britannica.com/topic/ethics-of-care

Cipolla, C., & Manzini, E. (2009). Relational services. Knowledge, Technology & Policy/Knowledge in Society/Knowledge, Technology, & Policy, 22(1), 45–50.

Coops, F., Bogner, K., & Hummels, C. (2024). Letting Go in Sustainability Transitions. In R. B. Egenhoefer, Routledge Handbook of Sustainable Design (2nd ed., pp. 493–504). Routledge.

De Vries, G., Biely, K., & Chappin, E. (2021). Psychology: The missing link in transitions research. Environmental Innovation and Societal Transitions, 41, 42–44.

Delft University of Technology. (2024). Strategic Agenda TU Delft 2024-2030: Impact for a sustainable society. https://filelist.tudelft.nl/TUDelft/Over_TU_Delft/Strategie/Institutional%20plan%20TU%20Delft%20-%20EN-DEF-online.pdf

Design Council and The Point People. (2021). System-shifting design: An emerging practice explored. Design Council & The Point People. https://www.designcouncil.org.uk/fileadmin/uploads/dc/Documents/Systemic%2520Design%2520Report.pdf

Dorst, K. (2011). The core of 'design thinking' and its application. Design Studies, 32(6), 521–532.

Feola, G. (2019). Degrowth and the Unmaking of Capitalism: Beyond 'Decolonization of the Imaginary".

Feola, G., & Jaworska, S. (2019). One transition, many transitions? A corpus-based study of societal sustainability transition discourses in four civil society's proposals. Sustainability Science, 14(6), 1643–1656.

Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. Research Policy, 31(8–9), 1257–1274.

Gerritsen, S., Renker-Darby, A., Harré, S., Rees, D., Raroa, D. A., Eickstaedt, M., Sushil, Z., Allan, K., Bartos, A. E., Waterlander, W. E., & Swinburn, B. (2019). Improving low fruit and vegetable intake in children: Findings from a system dynamics, community group model building study. PLoS ONE, 14(8), e0221107.

Green Protein Alliance. (n.d.). https://greenproteinalliance.nl/

Grimaldi, S., Fokkinga, S., & Ocnarescu, I. (2013, September). Narratives in design: a study of the types, applications and functions of narratives in design practice. In Proceedings of the 6th International Conference on Designing Pleasurable Products and Interfaces (pp. 201-210).

Hartmann, D. (2025, February 13). Strategy videos - Delta. Delta. https://delta.tudelft.nl/en/article/strategy-videos

Health Council of the Netherlands. (2023). A healthy protein transition (Publication No. 2023/19e). Health Council of the Netherlands.

Hebinck, A., Diercks, G., Von Wirth, T., Beers, P. J., Barsties, L., Buchel, S., Greer, R., Van Steenbergen, F., & Loorbach, D. (2022). An actionable understanding of societal transitions: The X-curve framework. Sustainability Science, 17(3), 1009–1021.

Irwin, T. (2019). The emerging transition design approach. Cuadernos Del Centro De Estudios De Diseño Y Comunicación, 73.

Irwin, T., Tonkinwise, C., & Kossoff, G. (2020). Transition Design: An Educational Framework for Advancing the Study and Design of Sustainable Transitions. Cuadernos Del Centro de Estudios de Diseño y Comunicación, 105.

Jones, P. H. (2014). Systemic Design Principles for Complex Social Systems. In G. S. Metcalf (Ed.), Social Systems and Design (Vol. 1, pp. 91–128). Springer Japan.

Jones, P. H., & Ael, K. van. (2022). Design journeys through complex systems: Practice tools for systemic design. BIS Publishers.

Kramer, R. M., & Brewer, M. B. (1984). Effects of group identity on resource use in a simulated commons dilemma. Journal of Personality and Social Psychology, 46(5), 1044–1057.

Loorbach, D. A. (2022). Designing radical transitions: A plea for a new governance culture to empower deep transformative change. City, Territory and Architecture, 9(1), 30. https://doi.org/10.1186/s40410-022-00176-z

Loorbach, D., Frantzeskaki, N., & Avelino, F. (2017). Sustainability Transitions Research: Transforming Science and Practice for Societal Change. Annual Review of Environment and Resources, 42(1), 599–626.

Markard, J., Geels, F. W., & Raven, R. (2020). Challenges in the acceleration of sustainability transitions. Environmental Research Letters, 15(8), 081001.

Meadows, D. (1999). Leverage Points: Places to Intervene in a System. Sustainability Institute, The Donella Meadows Project, Academy for System Change, 10 p.

Michie, S., Van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. Implementation Science, 6(1).

Michielsen, Y. J. E., & Van Der Horst, H. M. (2022). Backlash against Meat Curtailment Policies in online discourse: Populism as a missing link. Appetite, 171, 105931.

Mulgan, G., UCL, Demos Helsinki, & Untitled. (2020). The Imaginary Crisis (and how we might quicken social and public imagination). https://demoshelsinki.fi/new/wp-content/uploads/2020/04/the-imaginary-crisis-web.pdf

Patton, M. Q. (2002). Qualitative research & evaluation methods. In SAGE Publications eBooks (Issue 1).

Peeters, A.-L., Tromp, N., Bulah, B. M., Van Der Meer, M., Van Den Boom, L., & Hekkert, P. P. M. (2024). Framing for the protein transition: Eight pathways to foster plant-based diets through design. Environmental Innovation and Societal Transitions, 52, 100848.

Pierce, J. (2012). Undesigning technology: Considering the negation of design by design. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 957–966.

Sanders, E.B.-N. (2001) Virtuosos of the experience domain. Proceedings of the 2001 IDSA Education Conference.

Sanders, E. B., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. CoDesign, 4(1), 5–18.

Shaw, C., & Nickpour, F. (2024). Design as an agent of narratives: A matrix and framework for incorporating narratives into design processes. Advanced Design Research, 2(1), 37–44.

Shove, E. (2012). The shadowy side of innovation: Unmaking and sustainability. Technology Analysis & Strategic Management, 24(4), 363–375.

Simoens, M. C., Leipold, S., & Fuenfschilling, L. (2022). Locked in unsustainability: Understanding lock-ins and their interactions using the case of food packaging. Environmental Innovation and Societal Transitions, 45, 14–29.

Snelders, D., van de Garde-Perik, E., & Secomandi, F. (2014). Design strategies for human relations in services. In Proceedings of the 4th conference on service futures (pp. 133-142). Linköping University Press.

Snow, T., Murikumthara, D., Dusseldorp, T., Fyfe, R., Wolff, L., & McCracken, J. (2022). Storytelling for systems change: Insights from the field. Centre for Public Impact. https://www.centreforpublicimpact.org/assets/documents/storytelling-for-systems-change-report.pdf

Tonkinwise, C. (2014). Design away. In S. Yelavich & B. Adams (Eds.), Design as futuremaking (pp. 198–213). Bloomsbury Academic.

Tonkinwise, C. (2015). Design for Transitions—from and to what? Design Philosophy Papers, 13(1), 85–92.

Tromp, N., & Hekkert, P. (2019). Designing for society: Products and services for a better world. Bloomsbury Visual Arts.

Van Der Bijl-Brouwer, M. (2022). Service designing for human relationships to positively enable social systemic change. International Journal of Design, 16(1), 23-34.

Van Der Bijl-Brouwer, M., & Malcolm, B. (2020). Systemic Design Principles in Social Innovation: A study of expert practices and design Rationales. She Ji, 6(3), 386–407.

Vervoort, J., Smeenk, T., Zamuruieva, I., Reichelt, L., Van Veldhoven, M., Rutting, L., Light, A., Houston, L., Wolstenholme, R., Dolejšová, M., Jain, A., Ardern, J., Catlow, R., Vaajakallio, K., Von Flittner, Z. F., Putrle-Srdić, J., Lohmann, J., Moossdorff, C., Mattelmäki, T., . . . Mangnus, A. (2024). 9 Dimensions for evaluating how art and creative practice stimulate societal transformations. Ecology and Society, 29(1).

Visser, F. S., Stappers, P. J., Van Der Lugt, R., & Sanders, E. B.-N. (2005). Contextmapping: Experiences from practice. CoDesign, 1(2), 119–149. https://doi.org/10.1080/15710880500135987

Waddell, S. (2016). Societal Change Systems: A Framework to Address Wicked Problems. The Journal of Applied Behavioral Science, 52(4), 422–449. https://doi.org/10.1177/0021886316666374

Wagensberg, J. (2017). Teoría de la creatividad: Eclosión, gloria y miseria de las ideas. Tusquets.

Wereld Natuur Fonds. (2022). Eetplan voor de Planeet. https://www.wwf.nl/globalassets/pdf/toolkit/eetplan-voor-de-planeet.pdf

Wereld Natuur Fonds. (2023). Gezond Eten Binnen de Grenzen van Eén Aarde. https://www.wwf.nl/globalassets/pdf/rapporten/wwf-nl-2023-gezond-eten-binnen-de-grenzen-van-een-aarde-samenvatting.pdf

Wheatley, M. J. (2006). Leadership and the new science: Discovering order in a chaotic world. Berrett-Koehler Publishers.

Wopereis, T. M., Dijkstra, C., Wierda, J. J., Rongen, F. C., & Poelman, M. P. (2024). Systems thinking for local food environments: a participatory approach identifying leverage points and actions for healthy and sustainable transformations. Health Research Policy and Systems, 22(1).

WWF. (2024). Solving the great food puzzle: Place-based solutions to help scale national action. WWF. https://wwfint.awsassets.panda.org/downloads/solving-the-great-food-puzzle-wwf-2024.pdf