Noticing and the Hidden Potential of More-than-Human Actors in Service Design:

Exploring Sustainability-focused Educational Services through the Case of Avnø Eco-village

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Abstract

The design landscape is significantly transformed by converging sociocultural and environmental forces. This shift coincides with the emergence of the post-anthropocene era, characterised by climate change and exploitation of nature. In the post-anthropocene, designers have a critical role as educators and advocates, driving awareness and responsibility for a more sustainable future. The research focus of this thesis tackles the application of More-than-Human approaches within service design, specifically noticing, as a contrast to the user-centred approach. Applying noticing in the different stages of the service design process led to classifying the approaches to noticing as explorative and systemic. These two approaches complement each other and provide structure for involving MtH actors and communicating their needs in a service design process.

Keywords: service design, more-than-human, more-than-human actors, noticing

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1. Introduction

Katerina Wenzlova and Victoria Giurda wrote this master's thesis for the master's programme Service Systems Design at Aalborg University Copenhagen. The project lasted from 1 February until 24 May 2024, and Luca Simeone, a professor at Aalborg University, supervised it. The context-specific service concept was developed for a Danish eco-village called Avnø. This thesis's foundations are service design, the more-than-human approach, and the rooted concern for a declining human connection to nature. This thesis calls for research into the development of educational services that promote environmental care and responsibility and therefore foster transformative pro-environmental attitudes.

1.1 Learning Objectives

This thesis's learning objectives align with the formal criteria outlined by the Service Systems Design department at Aalborg University (2024) and our learning aspirations. We aim to demonstrate mastery of the competencies, skills, and knowledge necessary for a Service Design project.

1.1.1 Official Learning Objectives

Knowledge

- Must know the appropriate methodological approaches, design theories and methods that focus on designing advanced and complex product-service systems.

- Must know the relevant literature in the service design field and be able to account for the scientific foundation and scientific problem areas.
- Must describe the state of the art of relevant research.

Skills

- Must identify problem areas and address problems and opportunities.
- Must analyse, design and represent innovative solutions.
- Must evaluate and address major organisational and business issues emerging in product-service system design.
- Must produce a project report according to norms of the area, apply correct terminology, document extensive command over relevant literature, and communicate the research-based foundation, problem and results of the project.
- Critically evaluate the project's results based on relevant literature and established scientific methods and models.
- Evaluate and discuss the project’s problem area in an appropriate scientific context and discuss its potential for further development.

Competences

- Must master design and development work in complex, unpredictable situations that require new solutions.
- Must independently initiate and implement discipline-specific and interdisciplinary cooperation and assume professional responsibility.

- Participate in and independently conduct technological development and research and apply scientific methods to solve complex problems.
- Must plan, execute and manage complex research and development tasks, and assume professional responsibility for independently carrying out potentially cross-disciplinary collaborations.

1.1.2 Personal objectives

Our personal learning objectives were established based on our motivations and shared areas of interest as service design professionals.

- We aimed to contribute to a shared aspiration for a brighter future; therefore, this thesis emphasises advocating for exploring innovative paradigms within service design.
- Our primary aim was to contribute to the service design community through our research. We specifically focus on making the involvement of more-than-human actors more tangible and directly applicable to real design projects. This would, in turn, contribute to the field's advancement and evolution.
- We aimed to collaborate effectively, sharing our knowledge and abilities while complementing each other's experiences and strengths.
- We aimed to explore more-than-human approaches and, through our process, inspire designers and individuals interested in the field, further expanding their interest in more-than-human approaches.
- We wanted to spread awareness and knowledge about human connection with nature, which is getting lost but should be rediscovered.

1.2 Brief Description of the Identified Problem

The current design landscape reveals numerous patterns of change caused by the combined effects of changing sociocultural, business, environmental, and technological realities (Brand & Rocchi, 2010). New terms have appeared in the context of our age: the anthropocene and the post-anthropocene (Kress & Stine, 2017), and post-humanism (Hayles, 1999). In the post-anthropocene, humanity has already been challenged by food scares, public revolts, pollution scandals, and financial crises, and the negative consequences of climate change have become increasingly evident (Akama et al., 2020). The capitalist structures have further intensified the exploitation of non-human life for economic gain (Roudavski, 2020). The imperative of the post-anthropocentric world is to accommodate meaningful, resilient, customised, and sustainable solutions with high adaptability (Brand & Rocchi, 2010; Matyushok et al., 2021).

The meaning of design methodologies, tools, and vocabulary starts to demand revision. On top of that, with the ever-changing number of actors and the unpredictability of current design problems, service design is becoming more complex and participatory (Goodwill et al., 2021). Wicked problems challenge designers' perceptions, appearing emergent but with no immediate solutions; the problems involve more uncertainty, ambiguity, and open-endedness; service design systems include more and more exchanges (Julier, 2013).

In the new post-anthropocentric paradigm, the significance of materiality and goods production declines, while new needs for the necessary change of mind and a new way of seeing become evident (Meadows, 1999). On an individual level, the change could happen in a matter of seconds, while on the societal level, this process is more lengthy since forces are protecting the current paradigm

(Rosén, 2022). Therefore, the post-anthropocentric world requires more education on awareness and responsibilities that the shared future demands (Arvanitis et al., 2021), as well as for the designers to become the engines and advocates for these new needs (Meyer & Norman, 2020; Norman & Vredenburg, n.d.).

1.3 Project Context

This thesis tackles sustainability-focused educational services and how such a service design project can involve the more-than-human (from now MtH) approach. An educational service is any organised learning experience outside a traditional school or university setting, often suggesting self-directed, interest-based learning (Unesco, n.d.). Sustainability-focused educational services address sustainability across different dimensions, encompassing personal actions and professional practices and shifting perspectives and mindsets toward deepening environmental care and responsibility (Spychalski, 2023).

Service design and the MtH approach are two other building stones of this thesis. Service design focuses on creating service offerings and providing experiences over time and across different touchpoints (Clatworthy, 2017). It implies that an organisation proposes different service encounters to users, delivering desired outcomes (Clatworthy, 2017).

Traditionally, design has revolved around humans as unique beings deserving of design tailored to their needs (Metcalfe, 2015). However, central to this thesis, the MtH approach advocates for the design of service systems that cater to the needs of MtH actors involved and influenced. This approach broadens the focus from humans alone and underscores the importance of holistic design

spaces by highlighting the mutual interdependencies of organisms (Rosén et al., 2022).
An initial design brief was formulated based on the brief description of the identified problem and the project context.

How might we design a sustainability-focused educational service while applying a more-than-human approach to strengthen awareness and acknowledge human interconnection with nature?

1.4 Reading Guide

The structure of this thesis is the following:

Chapter 2. Literature Review

This chapter lays the theoretical foundations for this thesis, which explores sustainability-focused educational services, and MtH approaches and briefly defines service design. It presents noticing as a major unexplored concept within service design and depicts its potential.

Chapter 3. Methodology

This chapter presents the Double Diamond methodology for designing a sustainability-focused educational service and exploring the academic research question. Traditional service design research methods are combined with methods that help address the research question. In addition, the chapter gives an overview of the overall research process.

Chapter 4. The Design Process

This chapter documents and reflects on the design process used to examine the academic research question. Throughout the Discover phase, several research methods are employed to comprehend better the context of educational-focused services and users' motivations and frustrations in the service context. In the Define phase, these findings are analysed and used to narrow down into specific insights. During the Develop phase, ideation methods are combined to transform the insights into a final service concept. In the Deliver phase, the idea is communicated through service design tools.

Chapter 5. Discussion

This chapter discusses and reflects on the key learnings of the design process with the academic research question. It reflects on noticing as a research focus, as well as on its impact in the service design process. It also discusses the chosen methodology and the service concept. Lastly, it discusses to what extent we reached this thesis's official and personal learning goals.

Chapter 6. Conclusion

This chapter summarises three key learnings and findings from the use of noticing throughout the design process and concludes with the discussion chapter.

2. Literature Review

This chapter introduces the fundamental concepts of this thesis, which includes exploring sustainability-focused educational services and MtH approaches through a review of related literature that gradually built up into a research question. The design brief examines the research question contributing to the service design field. The chapter concludes with an opportunity identified from the literature around MtH approaches within service design, which is the research focus of this thesis.

The following subchapters are discussed in this chapter:

2.1 Sustainability-focused Educational Services

2.2 Service Design

2.3 More-than-Human Approaches

2.4 Research Question

2.1 Sustainability-focused Educational Services

Sustainability represents a multifaceted systemic challenge that seems tightly connected to moral and ethical considerations - “What is sustained, and for whom?” (Rosén, 2022, p. 8). This thesis works with the view of sustainability as environmental ethics expanded in time and space (Kibert et al., 2011).

In a recent report advocating for the evolution of education, a task force operating under UNESCO emphasised the importance of educating individuals and communities to 1) transcend self-centred individualism by fostering care for others, irrespective of national, social, or cultural boundaries; 2) cultivate an understanding of global histories, current challenges, and the experiences of people from diverse regions; and 3) prioritise environmental stewardship, promoting biodiversity, and mitigating the risks of climate change (Arvanitis et al., 2021). These urgent needs should be manifested through an appropriate and accessible education. Alternative educational curricula should be proposed, and expertise from environmental scientists, community members, indigenous elders, biologists, ecologists, and anthropologists should be incorporated to support more integrated sustainable knowledge (Clarke et al., 2019).

In Denmark, sustainability-focused educational services can be found in different contexts and with different approaches. We present three services as examples of how such education can be embodied from diverse sides of the spectrum. These three examples show the variability of sustainability as a topic and, therefore, how differently such an educational service can be addressed.

- **Cirka Cph** is a project advisory and consultancy that organises workshops and courses for businesses or public institutions to teach them how to make the best climate impact with their strategic choices (Cirka Cph, n.d.). One of the courses focuses

on transitions, whereas Cirka Cph includes “the topics of mindset changes and taking thoughts into action”.

- In contrast, **Think** (Nielsen, n.d.) is a one-man business owned by Martin K. N., an event organiser and speaker. He offers workshops mainly for students, starting from high school to university, and also for businesses. His vision is an informed, sustainable world. The workshops aim to challenge the norms and uncover new sustainable alternatives in our lives and professions.
- The third type of service is a community-based **Avnø**. Avnø classifies itself as an eco-village and offers ‘højskole’ education, courses and consultations for green enterprises, and co-housing (Frost, 2023). The specificity of Avnø is the length and approach to the education; the education involves being part of the community, and the offered courses can last between six and twelve months but can also be tailored for specific needs.

These services highlight the importance of integrating ethical considerations, community involvement, and environmental stewardship into educational frameworks. Applying service design principles can significantly enhance this type of service by providing a holistic approach to its development and implementation.

2.2 Service Design

Service design is an emerging field that has shown importance in the new design landscape, where service designers navigate increasingly intricate webs of relationships and dependencies (Goodwill et al., 2021). This chapter outlines the holistic service design approach used within the thesis.

2.2.1 Definition and Purposes

Service design is an interdisciplinary, practical and holistic practice that integrates tools and methods from different fields (Stickdorn & Schneider, 2010; Stickdorn et al., 2018). Designing a service is an exploratory process that creates new value relations among diverse actors within a socio-material configuration (Clatworthy, 2017). Furthermore, service design considers which actors should be involved and how (Clatworthy, 2017), focusing on creating suitable user experiences using a combination of intangible and tangible mediums (Stickdorn & Schneider, 2010). An essential practice is identifying the potential for reorganising relationships and roles among the actors involved (Clatworthy, 2017).

Service-dominant logic is the foundation of service design (Vargo & Lusch, 2004). Users are recognised as co-producers of the service and its value and, therefore, actively shape their user experience (Patricio et al., 2011). With service-dominant logic, value is created equally by integrating resources (including knowledge, skills, technology, and other assets) from different origins rather than transferring ownership of goods (Vargo & Lusch, 2008).

2.2.2 The Service Design Process

Service design embraces the mindset and workflow characteristic of the design process, a process grounded in a versatile set of tools drawn from different fields (Stickdorn et al., 2018). A service design process encompasses iterative research, ideation, prototyping, and implementation (Stickdorn et al., 2018), translating user insights and behaviours into new or enhanced service offerings.

One of the core principles in this domain is the multilevel service design (Patricio et al., 2011). This methodology underscores the importance of harmonising different service components and interactions across different organisational levels to construct a comprehensive and functional service offering (Patricio et al., 2011). This framework fosters a holistic, systemic perspective by defining the service offering across three layers - service concept, service system, and service encounter. Leveraging these layers, cross-disciplinary teams can zoom in and out of the design process, seamlessly transitioning between conceptual definitions and architectural details (Patricio et al., 2011).

2.2.3 Approaches

Design approaches and practices have evolved according to the markets and design landscapes to meet consumers' needs in the best possible ways. The first advances practised user-centred design from the expert perspective (Sanders & Stappers, 2008). From the expert perspective, qualified researchers studied largely passive users through observations or interviews. With the user-centred approach (user as 'subject') growing in popularity, the users gained more influence and room to provide expertise. With the market becoming more saturated, users and clients have become more savvy in making decisions in the design process, leading to more personalised solutions. The design approaches have started to employ participatory and co-design techniques, where the users and clients participate in the design process at the early stages, the idea generation, or the decision moments (Sanders & Stappers, 2008). Those approaches can be labelled human-centred design approaches (Ted Talks, 2002).

However, as humanity encounters the urgent realities of the paradigm shift, the human-centred design approach reveals limitations. The question for humanity becomes whether it is not time to scatter human agencies that suggest a hierarchical approach to design and initiate a more relational approach to the world, including all its species (Tsing, 2015). The relational approach towards design through fostering symbiotic relationships (Figure 1) is suggested in MtH-Centred design (Hromek, 2020).

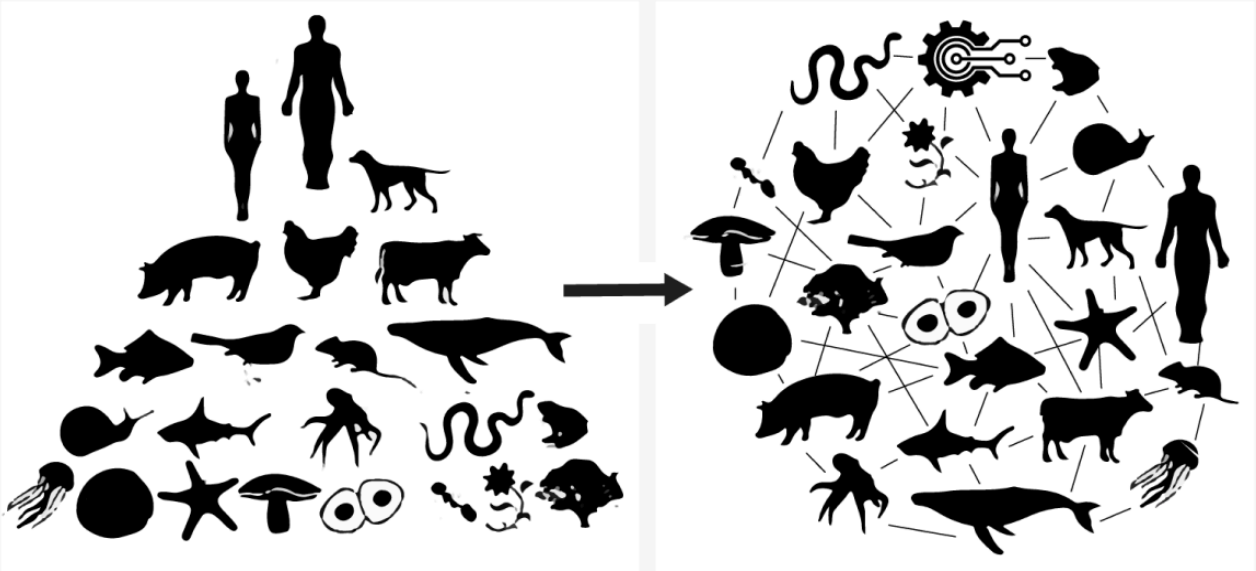


Figure 1: From human centred to more-than-human centred - (Steffen Lehmann, Eco v Ego, 2010)

2.3 More-than-Human Approaches

Humans have turned the Earth's ecosystem into the Anthropocene, their proper geological epoch characterised by significant human influence (Crutzen, 2006). Consequently, there is an urgent need to reconsider the human dependence on the well-being of other species

for survival (Akama et al., 2020), a process that will encourage a broader understanding of the interconnectedness of species and extend the care of diverse relationships (Drengson, 1997). Significant challenges appear as humans and wildlife increasingly coexist in urban environments (Clarke et al., 2019). The historical neglect and abuse of other species emphasise the urgency of moving beyond anthropocentric perspectives (Roudavski, 2020). While the user-centred design has been instrumental in technological advancement, its focus on human needs has often neglected MtH considerations (Rosén et al., 2022). Therefore, acknowledging and including non-human actors in design processes is crucial for creating more inclusive and sustainable solutions (Haldrup et al., 2022).

Emerging movements like ecophilosophy draw from philosophies such as Buddhism and Taoism to challenge human attitudes toward nature. They advocate for principles like peace, nonviolence, and symbiosis (Drengson, 1997) and emphasise human moral obligations toward the environment, MtH, and future generations.

Challenges in facilitating MtH cohabitation highlight the need for fundamental shifts in human behaviour and cultural norms (Roudavski, 2020). Achieving this requires embracing cosmologies that recognise the connection between all life forms and reimagining the role of designers as guardians of MtH commons (Haldrup et al., 2022).

The high complexity and unpredictable dynamic systems suggest that MtH cohabitation is a systemic challenge to be addressed, not just a problem to be solved (Rosén et al., 2022). The indefiniteness and vague ambiguity surrounding the topic give it a specific character called “Staying with the Trouble” (Haraway, 2016). Staying with the trouble suggests the need for constant negotiation between the different perspectives and recognition of

the world’s imperfection, where we can only do our best to live within it.

2.3.1 Definition and Origins

The term more-than-human originates from a science fiction novel by American writer Theodore Sturgeon (1953), “More Than Human”. The MtH concept acknowledges the coexistence and needs of different life forms, not only humans, including "things, objects, other animals, organisms, physical forces and spiritual entities" (Clarke et al., 2019, p. 60).

There are various terms for redefining the idioms of MtH (Price & Chao, 2023):

1. **Multispecies** was coined for the first time by Donna Haraway in her book “When Species Meet” (2008). In multispecies, the term "species" refers to specific modes of existence (Van Dooren et al., 2016). It encompasses the diversity of all living organisms and draws attention to their interaction (Price & Chao, 2023). Multispecies comprises all living biological species (Merriam-Webster, n.d.), while MtH refers to all entities beyond humans (Noorani & Brigstocke, 2018).
2. **Non-human** is used widely in social sciences as an umbrella term for all life forms outside the human category (Price & Chao, 2023). However, academia is turning away from this term because of the binary view it suggests on humans and “the others” (Price & Chao, 2023).
3. **Other-than-human** (Price & Chao, 2023) arises from MtH's critiques. Race scholars argue that MtH suggests a hierarchy. When applied to plants and animals, it can downplay the ongoing reality that many human groups,

> throughout history and today, are treated as less than humans (Weheliye, 2014).

All these terms are not mutually exclusive but should be used instead based on the context that is pertinent and accurate for them (Price & Chao, 2023). In this thesis, the term MtH is predominantly used as the more generous and far-reaching of the two (Price & Chao, 2023).

The concepts find their roots in ancient indigenous ontologies where all living beings are equals and integral parts of existence (Sacks et al., 2022). However, within Western cultures, historically focusing on a human-centred worldview, these concepts are now being explored across various fields and have recently gained importance among scholars. Considering MtH means giving aspects thought solely human, such as intelligence, sentience, and influence, to non-humans (Rosén et al., 2022). Therefore, to begin implementing this approach, it is essential to question the current binary vision that divides nature/humans, cities/ecosystems (Clarke et al., 2019) and to start seeing the world we live in more holistically.

Rethinking the relationship with the planet transcends the traditional separation of natural and social domains. Haldrup (2022) describes this notion as re-enchanting the Earth, wherein everyday actions and performances can cultivate affective connections and interdependencies among land, soil, vegetation, animals, and people, recognising them as inseparable forms of life co-living in urban environments (Clarke et al., 2019).

While some critics argue that the concept of species is anthropocentric, a closer examination reveals that humans are not unique in their ability to make an impact. This emphasises the importance of understanding how different entities influence one another through recognition and differentiation practices in MtH worlds (Van Dooren et al., 2016). Rather than focusing solely on

human-animal relationships, a MtH approach emphasises the diverse beings that mutually shape each other through interconnected relations beyond conventional dynamics like predator-prey interactions (Van Dooren et al., 2016).

Clarke (2019) presents a thought-provoking question to encourage readers to contemplate actionable steps in recognising the voices of MtH entities: "How do we make the experiences of non-human others tangible? How do we hear, and how do we encourage others to hear the non-human voices?" (Clarke et al., 2019, p. 61). Ultimately, our perception of the MtH world creates our understanding of it (Rosén et al., 2022).

2.3.2 More-than-Human-Centred Design

Including MtH perspectives in design can be described as a More-than-Human-Centred design (from now on, MtHC design) (Rosén et al., 2022). This approach acknowledges the inherent interconnectedness of all living beings within MtH communities, emphasising the importance of designing systems and artefacts that address the needs of MtH actors (Metcalfe, 2015). MtH actors are human and non-human and must be mapped with expanded perceptions and consciousness (Clarke et al., 2019).

Exploring the concept of MtHC design and its relevance within the contemporary design sphere is related to humans' need to connect with nature. Biophilia, this innate tendency, manifests across various cultures, with more significance in indigenous cosmologies (Akama et al., 2020). Indigenous cosmologies remind us of “humanity’s deep entanglements with the Earth and all forms of life that inhabit it” (Escobar, 2018, p.27). They offer a profound understanding of the Earth’s ecosystem with intuition and emotional connection, providing a scaffold for MtHC design (Kasulis, 2004).

When designers include MtH actors in design processes, they recognise human and non-human stakeholders (Rosén et al., 2022). This approach emphasises holistic and relational design spaces by focusing on the mutual interdependencies of organisms, expanding the focus beyond humans (Rosén et al., 2022). Designers need to reposition themselves to adapt to the needs of a more sustainable world that extends beyond human interests (Light, 2022). This reposition involves crafting environments conducive to this transformation and safeguarding these spaces to nurture the potential for wisdom, compassion, and creativity (Light, 2022).

Regarding methodology, the MtHC design employs ethnographic methods to study multiple organisms from social and cultural perspectives. Anticipatory methods include participatory exercises, the inclusion of relevant experts, and the design probes or experiments that encourage the recognition of multiple organisms as design stakeholders (Haldrup et al., 2022). It involves attending to the needs of unconventional users, such as micro-organisms and plants, challenging dominant forms of representation through experimentation with emotional and sensory communication (Rosén et al., 2022).

According to Haldrup (2022), fostering empathy and sensory experiences plays a crucial role in helping humans comprehend the lives of other species and recognise their interconnectedness. For instance, a solution could be to humanise other species by giving them recognisable faces to which humans can relate and reflect. This tendency to anthropomorphise and assign human traits, behaviours, or emotions to animals, objects, or natural phenomena (Allen and Bekoff, 2000) has appeared in various endeavours, such as fairy tales, mythologies, and branding. An example is the “Non-human Neighbours Leaflet Drop” (Open Lab, 2021), an exercise developed for connecting better human actors with their MtH neighbours. In this exercise (Digure 2), David the fox explains a bit about himself,

including how long he has lived here and what he likes and dislikes about the area.

Figure 2: Photos from Non-human Neighbours Leaflet Drop activity (Open Lab, 2021)

However, anthropomorphism often leads to misinterpretations of animals' needs, yet consulting scientific literature and engaging experts from fields such as ecology, biology, or animal behaviour can help gain clarity (Metcalfe, 2015). Furthermore, creating awareness and connection between different species can also be achieved through the language we use to name things. For example, while some politicians and planners may refer to an area as a garbage dump, activist groups refer to the place as an ecosystem, shaping the perception of the area's value and reality (Haldrup, 2022).

There are also polemical points to MtHC design (Chao et al., 2022). Much complexity and uncertainty surround MtH cohabitations

and systems, making it challenging to accurately predict the outcomes of design interventions (Chao et al., 2022). Existing design frameworks and structures are often created from the anthropocentric point of view and hinder efforts to integrate non-human interests into design processes effectively (Bardzell et al., 2021). Beyond doubt, it is a part of being human to embed our mental biases into everything we do, and it is easy to fall into the role of God in our attempts to affect and design MtH systems (Rosén, 2022).

2.3.3 More-than-Human Approaches within Service Design

The MtH approach has emerged in different design fields, including architecture, urban planning, landscape and service design. The holistic and multidisciplinary perspective that service design offers can benefit the field of MtH; collaboration with knowledgeable individuals from diverse backgrounds and expertise becomes crucial to communicating MtH needs (Haldrup et al., 2022). Through these collaborations, developing the skills to transform MtH expressions into narratives that evoke closeness, ethical connections, and care is possible. Service designers should conceive their role and knowledge as facilitators of exchanges and processes that shape the rules of engagement in MtH interactions instead of focusing solely on the resulting outcomes (Roudavski, 2020).

Metcalfe's (2015) proposal is also directly relevant to service design, as it advocates for a shift in perspective where animals are viewed as design clients, emphasising the importance of considering their needs and experiences throughout the design process rather than neglecting them. This approach highlights the necessity of exploring new methods of understanding animals and incorporating their perspectives into the design process. One suggested method is adapting the personas service design tool to animals (Francione,

2008). Personas, typically used to represent archetypes of potential human stakeholders in a system, can be adapted to define the characteristics and needs of various animal groups and integrate them into the design scenario (Tomitsch, 2021).

In recent years, designers interested in environmental issues have begun to reflect on expanding participation to include the voices and interests of MtH actors in design processes (Haldrup et al., 2022). While some existing models maintain a systemic, environmentally conscious perspective on design, others focus on inner lived experiences. However, only a few holistically uncover and combine these perspectives (Rosén et al., 2022). Although the motivation for incorporating MtHC design practices is evident, new design methods are needed to work with non-human stakeholders (Rosén et al., 2022; Metcalfe, 2015). These methods could offer insights into the lives of MtH interdependence (Metcalfe, 2015). Design disciplines must update their practices, including education and tooling (Roudavski, 2020), as conventional research methods provide few answers to understanding these non-human ways of being in the world.

Different worldviews, which are often more holistic and relational, can introduce new perspectives to design that value emotion, intuition, and the interconnectedness of all beings (Albarrán González, 2022).

2.3.4 Cosmovisions and the Natural World

A cosmovision is an apprehension of the world, especially from a specific standpoint (Merriam-Webster, 2019), set on understanding the universe, the world we live in, nature, humans, and the relationship between all those. A young, science-based cosmovision has predominantly shaped complex global systems (McDonnell, 2014).

Acquiring an overview of the ties between the cosmovisions and the problems is appropriate because only this realisation could potentially open new opportunities (Vargo & Lusch, 2004; Reitsma et al., 2019; Warren, 1991). It is becoming indispensable to question the limits of human knowledge by adhering to the hierarchy-based mindset, where the science-based, Westernised cosmovision is considered superior to other knowledge systems influenced by different cosmovisions (Albarrán González, 2022).

The concept of Western cosmovision originates in Greco-Roman civilisations. It identifies with specific periods of history, such as the Renaissance, the Age of Enlightenment, the Scientific Revolution, and the Industrial Revolution (Shvili, 2021). Western cosmovisions tend to overlook the complexities of the world's systems and instead focus on their isolated parts rather than the holistic landscape. Western societies have generally prioritised the anthropocentric worldview and economic growth (Mignolo, 1999). That way, Westernised ideologies have established and normalised a separation of humans and nature (Gonzales & Gonzales, 2010). Many phenomenons contributed to this separation - starting with the prominent figures in Western philosophies, such as Descartes, who proposed a dualistic view which isolates the body from the mind and humans from the rest of nature (Descartes & Cress, 1993). Science, in its essence, is reductionist, detaching the material from the immaterial. Therefore, it reinforces the idea of humans as separate observers of nature rather than an integral part of it (Gonzales & Gonzales, 2010). Urbanisation and industrialisation have led to people losing direct contact with nature, diminishing the sense of connection and appreciation for the natural world (Gonzales, 2015). All these influences have created a hierarchical relationship where humans see nature as something to be dominated and taken advantage of.

2.3.4.1 Andean Cosmovisions

The Andes, mountains running along South America's western side, are among the places that harnessed an evolution of indigenous cosmovisions (Albarrán González, 2022). In the Andean and Amazonian cosmovisions, being a person is not privileged to humans (Gonzales, 2015). All are persons, not in terms of having the human phenotype, but in the common attributes of everyone - "all are nurturers, eat, have a language - all forms of expression, wisdom, spirit, feelings, and knowledge, are living beings, merit respect and kindness, can converse, and can heal" (Gonzales, 2015, p. 122).

For example, the complexity of the local natural system is recognised and expressed through the complex yearly agro-festive and ritual calendar (Gonzales, 2015). This calendar (Figure 3) is a way to honour every time of the year based on what species flourish and create a balanced environment where certain species co-exist and benefit one another.

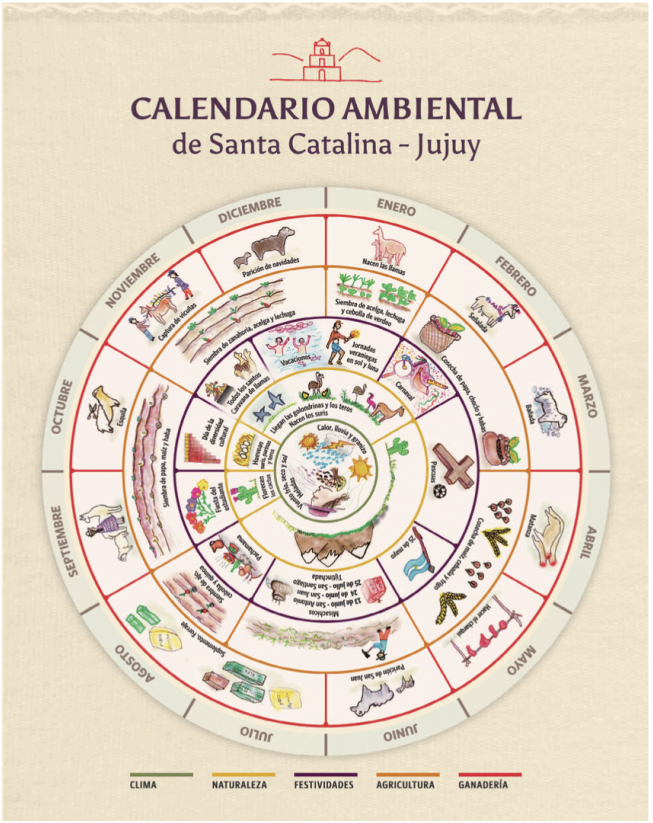


Figure 3: Yearly agro-festive and ritual calendar (Gonzales, 2015)

The Andean agro-festive and ritual calendar is one of the aspects that embody the sacred relationship with the land, holistic understanding of nature, community-centric values, and traditional ecological knowledge (Altamirano et al., 2021; Gonzales & Gonzales, 2010; Gonzales, 2015; Hromek, 2020).

2.3.4.2 Design in Non-western Context

Non-western cosmovisions provide insights into how to approach MtH. Nonetheless, it is necessary to comprehend how ideas can be envisioned through specific structures to help humans work with the complexity of the natural system. The concepts of empathy and emotionality towards nature are omnipresent in non-western design contexts; the term 'corazonar', created from the Spanish words 'corazon' (heart) and 'razonar' (to reason), stands for designing with heart and empathy (Albarrán González, 2022). It does not imply that emotions should be the primary decision-making engine; it suggests that emotions can provide design with vital energy and respect, impelling good reasons to move into a reasoned action (Albarrán González, 2022). Similar concepts are 'sentipensar', feeling-thinking (Akama et al., 2022), and 'weaving (Escobar, 2018). Weaving means unravelling the worldviews and connections to the natural world and allowing them to exist next to each other (Escobar, 2018). These terms appeared as approaches to decolonising designers' knowledge by questioning their identities and perceptions and confronting them with their participation in anthropocentric design dominance (Akama et al., 2022).

However, parallels to these non-Western approaches can also be found in Western contexts, as evidenced by concepts like the art of noticing (Tsing, 2015), which forwards the importance of recognising and appreciating the intricate interconnections within the natural world.

2.3.5 The Art of Noticing

"It is hard to care for that which we cannot perceive, and many matters are imperceptible to the human senses" (Rosén, 2022, p. 181). "Noticing a previously imperceptible matter in the environment may come with a sense of new responsibility. Once we notice something troubling in the environment – something previously imperceptible to us or that we overlooked – we cannot unsee it. We are responsible for tending to it, caring and taking action. By expanding the sensible, we expand the thinkable, hence our scope of responsibility and care." (Rosén, 2022, p. 182).

Anna Tsing (2015) is the original author of "The Arts of Noticing". She defines noticing as a skill that requires political and cultural sensitivity and a thorough study of the interconnectedness of ecological, economic, and cultural systems and how these systems function from MtH perspectives (Tsing, 2015; 2021). Noticing can assist researchers in gaining a deeper understanding of the complex and interconnected endeavours that constitute natural realms (Livio et al., 2019). It encompasses those instances in our lives when a profound shift occurs, altering our perception irreversibly (Braybrooke, 2022). Simply put, to notice is to become aware of and see something deserving of recognition (Rosén et al., 2022). An essential aspect of cultivating noticing is to move the attention from the experience of self to understanding oneself as a part of these interdependencies and as part of the environment on an experiential level (Rosén et al., 2022).

Noticing can bring people with different skills and backgrounds together and establish an awareness approach and understanding of the MtH world (Rosén, 2022). It coins the terms assemblage (Tsing, 2015) or entanglement (Haldrup et al., 2022) as the systems of MtH actors studies. Understanding assemblages or entanglements allows us to examine complex networks of people, practices, ideas, movements, objects, commodities, and emotions (Price & Chao, 2023). However,

there is also critique to assemblage or entanglement-thinking; there is a rhizomatic tendency (Strathern, 1996) when travelling down the countless capillaries of connections, which can end up overwhelming, but how do we decide where we cut the network?

2.3.6 Noticing within Service Design

As the role of other species in design systems remains an under-investigated area, stories and connecting practices that link humans with the natural world rather than separate them must emerge; other species may co-create the experiences, knowledge, and collaborations in livable environments (Haldrup et al., 2022). Designers should forge a collective space to explore sustainable MtH futures to notice the rights and interests of non-humans in our democratic assemblies (Haldrup et al., 2022). Noticing MtH actors can minimise ecological harm, encourage long-term thinking through resilient solutions, and open new systemic possibilities for a better future (Haraway, 2008; Hohti & Tammi, 2019; Tsing, 2015).

Practice-based approaches, such as noticing, foster a potential to initiate the understanding of MtH connections (Rosén, 2022). Recognising MtH needs requires first noticing them and mapping them with systemic and relational thinking to find the leverage points of the most significant impact (Meadows, 1999) and provide a scaffold for naturally occurring processes (Rosén, 2022).

The concept of noticing could be a methodology for perceiving services as complex systems characterised by mutual interdependence among organisms (Rosén et al., 2022). However, there is a need for more methodological approaches and appropriate tools and frameworks within this design field (Metcalfe, 2015).

2.4 Research Question

The literature review offered insights into several critical domains: sustainability-focused educational services, service design, and MtH approaches. Sustainability-focused educational services emphasise the urgency of transcending individualism, educating individuals about contemporary challenges, and prioritising environmental preservation.

Service design is an interdisciplinary practice that aims to forge meaningful user experiences by creating relationships among actors and acknowledging their roles within socio-material configurations. Simultaneously, MtH approaches underscore the interconnectedness of all living beings and advocate for the involvement of MtH actors in design processes to foster inclusive and sustainable solutions.

Within this scope, noticing emerges as a potent strategy for addressing MtH sensitivities. It encourages awareness of imperceptible environmental concerns, promoting a sense of responsibility and action. By integrating noticing into service design, we can nurture a better understanding of the MtH world and, therefore, a more profound service design practice.

The synthesis of these perspectives guides the formulation of the research question:

How can the practice of noticing, as an awareness approach, be utilised in service design to involve MtH actors?

This research question explores the potential of noticing as an approach for integrating MtH perspectives into service design practices, ultimately contributing to more sustainable and holistic design approaches.

3. Methodology

This chapter presents the Double Diamond methodology for designing a sustainability-focused educational service and explores the academic research question.

This chapter is divided into the corresponding two subchapters:

3.1 Double Diamond

3.2 Academic Research Process

3.1 Double Diamond

The Double Diamond model was chosen to structure our design process. This visual representation of a design methodology guided us throughout the project. The model was developed in 2005 by the Design Council, a British design organisation (Design Council, 2005). We opted for it because of prior experience with this framework in university projects. Consequently, we felt confident in its suitability, as it provides a clear process structure necessary to transition between phases, which was essential in this design project.

However, we were aware of its limitations. The framework's use can be perceived as idealistic due to its suggestion of four well-divided phases, which in real-life projects is debatable (Brooks, 2010). Also, the sequential progression that the Double Diamond suggests does not include many contextual circumstances, such as available resources and management prerequisites (Maffin, 1998). While we perceived this as advantageous in the context of our thesis, given its research-focused nature, we must have also ensured we had the necessary resources for delivering the actual service offering. The framework also emphasises the early stages of the design process, potentially providing less guidance for practical implementation (Ramsden, 2023).

In our journey through the Double Diamond framework, we encountered four main stages across two bordering diamonds, as it is shown in Figure 4:

Process timeline

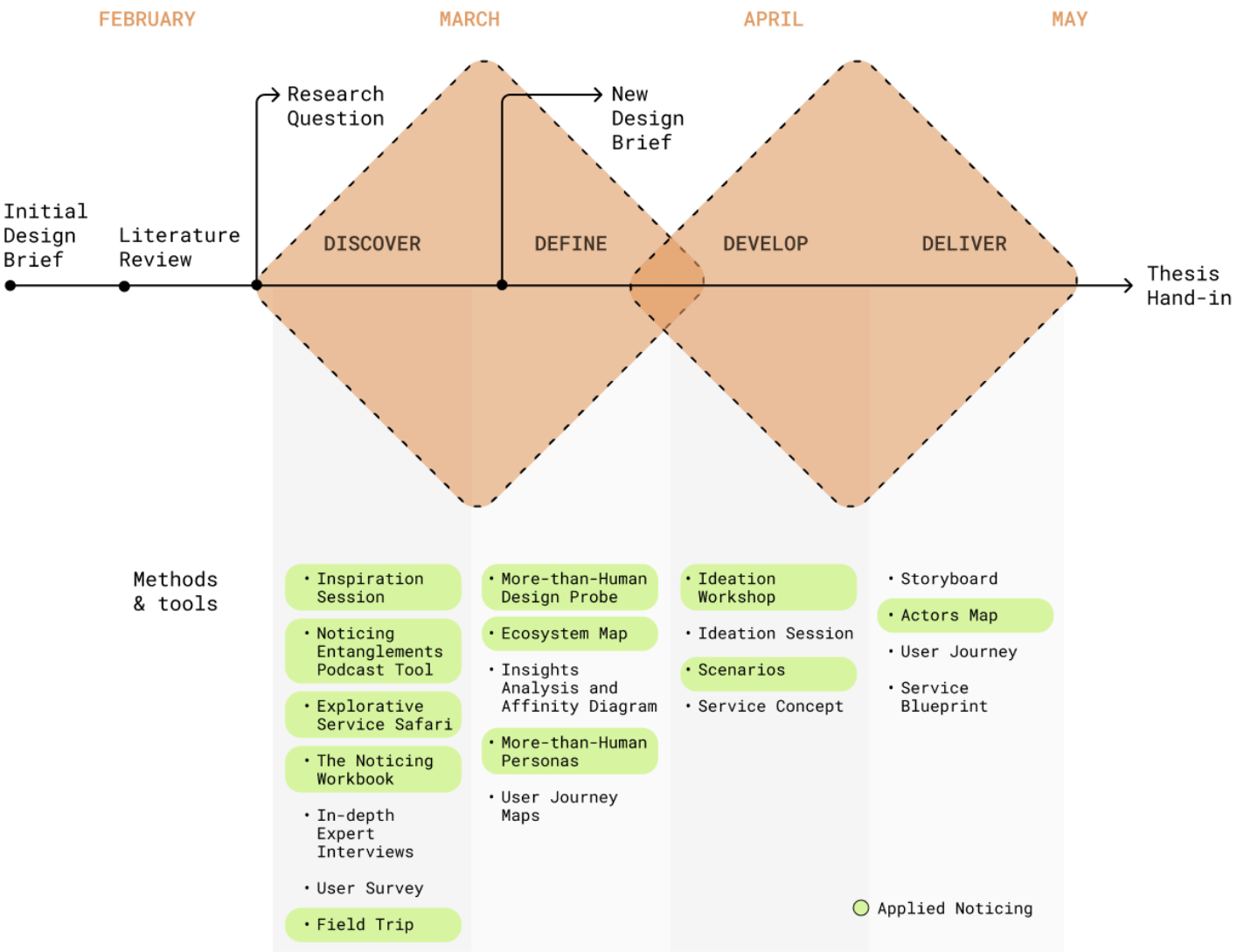


Figure 4: Research and design process timeline through Double Diamond (Design Council, 2005)

In the Discover phase, we engaged in divergent thinking, opening up a solution space and exploring various ideas and opportunities. Our toolkit included an inspiration session, in-depth expert interviews, service safaris, desktop research, a user survey, a Noticing Entanglements podcast tool, and a Noticing workbook.

Moving into the Define stage, we transitioned to convergent thinking, where we analysed, combined, and synthesised the findings from the Discover phase. Our work was guided by tools such as affinity diagrams, user journeys and ecosystem maps. The MtH Design probe played a crucial role in this phase. We also defined the MtH actors through MtH personas.

We converged again as we progressed to the Develop phase, formulating conceptual ideas to address the design brief and meet user needs, pain points, and opportunities identified in earlier stages. Our methods were an ideation workshop with service designers, an ideation session to brainstorm and brainwrite, and prototyping scenarios.

Finally, in the Deliver stage, our focus shifted to finalising the concept using service design tools, such as service blueprints, actors map, use cases, and storyboard, which assisted us in this phase.

3.2 Academic Research Process

Research through design suggests research outside of traditional science. However, it is conducted by people trained in research or the applied social sciences (Stappers & Giaccardi, 2015). It is not just a theoretical concept but a practical one, and its primary focus is to shape a research question and the final design outcome (Godin & Zahedi 2014). Design is an approach to applying techniques and methods to the research process to generate new knowledge (Zimmerman & Forlizzi, 2014). It leverages the

distinctive perspective gained through the research activities (Godin & Zahedi, 2014).

The research process had two outcomes: one for service design academia and one for the design brief on sustainability-focused educational services. This first outcome was the academic research contribution to applying noticing in the service design process. The second outcome was our contribution to the scope of educational purposes while considering the new needs based on post-anthropocentric and relational theories, and last but not least, creating a service offering with MtH clients.

We tackled the design process through the lens of noticing to implement a MtH approach; however, in particular traditional service design tools that were purely human-centred, applying noticing was challenging. Specific methods allowed us to fully explore the MtH actors (such as observations and service safaris), others were necessary to adapt to the MtH needs (such as MtH personas), while others limited us to keeping humans in the centre (such as interviews). That might have imposed limitations on our research. Nevertheless, we also explored tools and methods specifically designed for noticing MtH actors, for example the MtH Design Probe (Rosén, 2021) and Multispecies Design Cards (Metcalfe, 2015), which provided valuable insight.

4. The Design Process

This chapter details and reflects on the design process used to explore the academic research question.

The design process aimed to answer the design brief:
How might we design a sustainability-focused educational service while applying a MtH approach to strengthen awareness and acknowledge human interconnection with nature?

During the Discover phase, we employed various research methods to dive into the context surrounding sustainability-focused educational services and their possible MtH actors, including their motivations and frustrations. In the Define phase, the gathered findings are analysed and refined into specific insights. In the Develop phase, ideation methods are integrated to transform these insights into a final service concept. Throughout the Deliver phase, the concept is articulated using service design tools in preparation for the final presentation.

As the Double Diamond model contains four phases, this chapter is divided into the corresponding four subchapters:

4.1 Discover

4.2 Define

4.3 Develop

4.4 Deliver

4.1 Discover

In this stage, our focus was on understanding how the concept of noticing is used by different scholars and professionals and investigating different approaches to noticing as an effort to explore the research question:

How can the practice of noticing, as an awareness approach, be utilised in service design to involve MtH actors?

During this subchapter, the following methods and tools were employed:

4.1.1 Inspiration session

We initiated the design process with secondary desktop research that served as an inspiration session (Stickdorn et al., 2018), drawing insights from various sources, including other authors, academia, and companies. This type of research is less about finding answers and more about finding suitable prompts to guide the following Discovery methods (Stickdorn et al., 2018). The session was instrumental in shaping our understanding of how noticing MtH actors is approached by different authors, both strategically and in practice. Through online interviews, talks, and a company visit, we sought to gather diverse perspectives on the connection between MtH actors and design.

4.1.1.1 Online interviews in More-than-Human World Magazine

MtH World is an online magazine featuring interviews with academics and professionals worldwide. Its author, Sophie Chao, presents herself as an environmental anthropologist and scholar, actively engaging with the topics of post-anthropocentric humanities and the entanglements of humans and non-humans (Chao, n.d.). We found interviews with two scholars relevant - Karin Bolender, a multispecies ethnographer, and Laura Rival, a professor of anthropology. The two interviews had several themes in common; firstly, the fight against our human-centred mindset that we are not born with but the society establishes in us. The human-centred mindset makes us notice solely through human-centred vocabulary, so one of the possibilities of conquering it is distancing oneself from human-centred interpretations.

Another common theme is the need for slowness and introspection to connect and notice nature’s entanglements, which we are often deprived of as today’s world constantly guides us to seek external

persuasions; total sensory immersion in noticing the MtH world and sharing our perspectives with others is the right path.

4.1.1.2 The Mushroom at the End of the World

The Mushroom at the End of the World (2015) was an indispensable source for exploring the concept of noticing. In this book, Tsing presents the concept of noticing as a shift in focus from human actors and exploring the anthropocene through the matsutake mushroom, symbolising life's resilience, as it thrives also in disturbed environmental conditions. Tsing tells a story of the world from the matsutake mushroom perspective, even though this story often refers to human actors involved in the matsutake commodity chain, influenced by different historical and socio-cultural aspects (Figure 5). The concept of noticing matsutake mushrooms in this book goes beyond being aware or seeing; it guides the reader towards recognising the relations between the different actors and how they connect to the planet’s history. The book suggests noticing through a network of relations that the different actors cultivate between each other (Tsing, 2015)

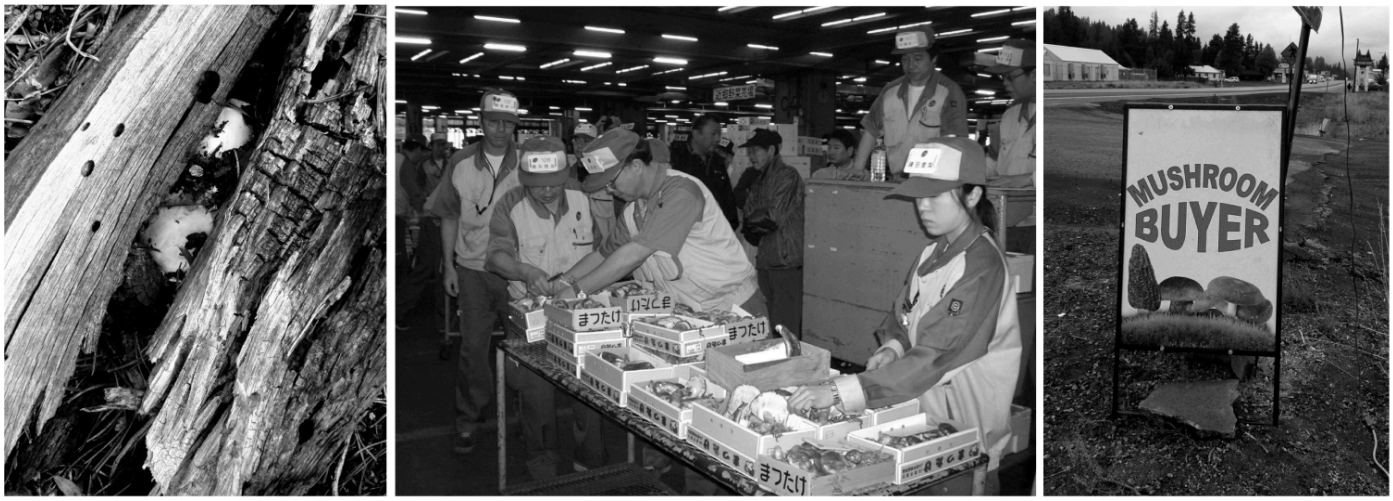


Figure 5: Matsutake mushroom story. Photos taken from the book “The Mushroom at the End of the World” (Tsign 2015)

4.1.1.3 Company visit at Bybi

A company visit to Bybi was an opportunity to see how the MtH approach can be applied in a business setting. We devised several topics beforehand, allowing us to target our questions to the company's owner Oliver. Still, we also allowed the talk to have a somewhat informal, unstructured character to be able to obtain unexpected information (Stickdorn et al., 2018) (see Appendix A).

The talk with Oliver inspired us in many ways. Bybi focuses on connecting humans with bees through workshops, talks, different activities, and consecutive honey purchases. The way the business model is approached is MtH; starting with the company's vocabulary, setting the perspective away from the human-centred mindset and focusing on the value that humans and bees can foster together (Figure 6).

Figure 6: Photo from Bybi's website

In Bybi, honey is not just honey, it is an invitation. Customers and bees are not just parts of the value chain, they are co-creators. Money is seen as an energy exchange between the

co-creators, and that way, fights the commodification of the animal-human relationship. Part of experiencing Bybi is also accepting the suggested terminology.

Oliver notices and recognises the needs of bees and humans through the ethos he tries to establish with Bybi. The ethos suggests a shared responsibility of all the actors because, as Oliver said, “as sole consumers, we are doomed to certain controlled ways of living”. We also discussed the importance of a community in such a type of service, and he emphasised the influence of sharing the experience with others, as everyone can notice the interactions with bees differently.

4.1.1.5 Outcomes and Reflections

From the inspiration session, we assembled significant themes that would establish the foundation for noticing MtH (Figure 7):

Figure 7: Inspiration session conclusions and themes

- The interviews with Laura Rival and Karin Bolender in MtH Worlds magazine suggest full sensory immersion in noticing MtH actors and the need for slowness and introspection, contrasting modern life's constant external stimulation. Those processes might be supported by distancing oneself from human-centred interpretations. They also advocate for the uniqueness of noticing experiences and, therefore, the need to share and discuss the experiences with others to achieve a more holistic interpretation of one’s noticing.
- The Mushroom at the End of the World presents noticing as a process of recognising MtH actors through networks of relations. The book's main protagonist, the matsutake mushroom, is presented as an actor through which we notice different historical and natural events and associated socio-cultural aspects of matsutake’s commodity chain.
- During the company visit at Bybi, we grasped how noticing could be reflected in a business. The company’s owner, Oliver, notices the different relations that humans can foster with bees and that bees foster between each other. He also mentioned the importance of a strong community and shared experiences to support the shared responsibility of all the actors.

We identified different themes and patterns through the inspiration session, which prompted further discovery. However, we might have established our confirmation bias equally because we would have followed those patterns in the design process. Having identified different themes and patterns in the inspiration session, we might have arrived at very different outcomes later.

4.1.2 Noticing Entanglements Podcast Tool

The identified vital themes would guide our noticing process following the inspiration session. In this initial stage of the design process, we aimed to use noticing to bring awareness to different MtH actors, which was the groundwork for the later inclusion of MtH actors in the service concept (Haldrup et al., 2022). The notes and link to the podcast can be found in Appendix B. Another goal was practising noticing itself. The themes identified in the inspiration session:

- Becoming aware of the human-centred mindset, shifting away from human-centred interpretations
- Noticing MtH actors as a network rather than individuals
- Seeing each experience of noticing as unique and personal, but also meant to be shared and discussed
- Slowness and introspection
- Full sensory immersion

We tried the Noticing Entanglements podcast tool (Nicenboim, 2023) in Frederiksberg Garden. This tool aims to cultivate designers' awareness of the ecological and interconnected systems within which they operate (Nicenboim, 2023). We utilised this podcast tool comprising five concise episodes, presenting a good approach to start experiencing noticing.

Overall, the tool prompted using all the senses, and time flexibility, suggesting no time limits for the activities. These were the five different activities:

The first activity: Detaching meaning.

Detaching meaning from anything we notice pushes us towards noticing through different lenses. The activity supported the shift from

human-centred interpretations, as suggested in the inspiration session (see Chapter 4.1.1). By detaching meaning, we also intended to leave the used terminology for the actors behind and just focus on purely noticing them in their environment with all our senses and without rush.

The second activity: Detaching meaning & noticing connections.
The second activity asked us to keep the noticing mindset from the first exercise and pick a MtH actor from the environment before us. Then we were asked to notice what other actors or processes it was connected to, to notice the actor with its entanglements (Haldrup et al., 2022; Tsing, 2015).

The third activity: Noticing entanglements at different scales.
This third activity instructed us to notice our chosen entanglement from different scales – seeing it as an ecosystem and part of a greater ecosystem. It also encouraged us to imagine how the entanglement would develop over time.

The fourth activity: Movements in the landscape.
The fourth part prompted us to notice movements in the landscape or, on the other hand, notice the stillness of certain elements. We reflected on what was causing the different movements or stillness in the landscape.

The fifth activity: Recording and reflecting.
The last exercise asked us to document our noticing through photos, videos, sketches and notes (Figure 8).

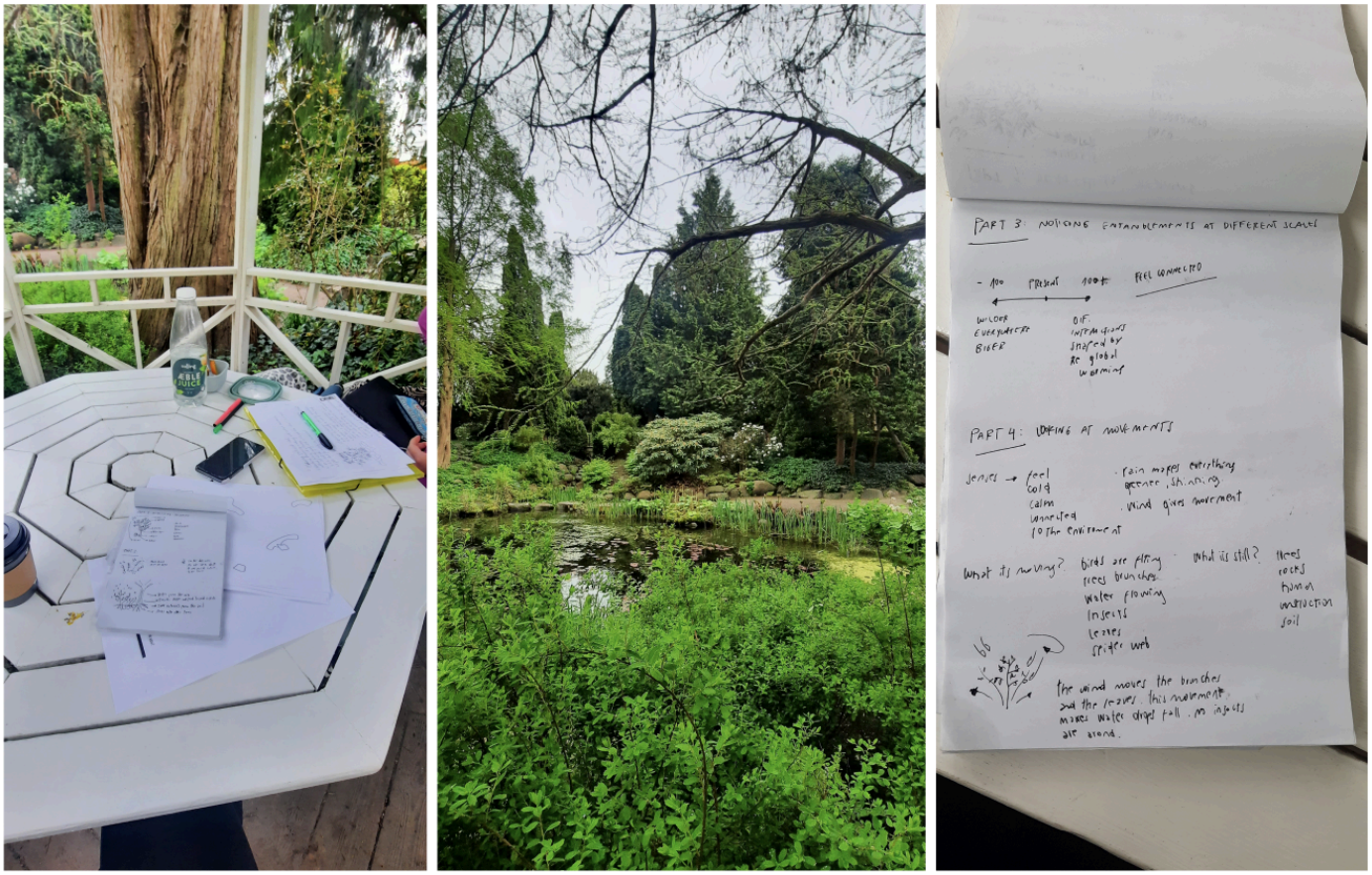


Figure 8: Photos taken during the session Noticing Entanglements podcast tool (Nicenboim, 2023) in Frederiksberg Garden

During these activities, the podcast asked us many intriguing reflective questions, which were valuable to remember but not necessary to answer accurately. We knew asking the right questions might be more valuable than providing precise answers (Haraway, 2016).

- Who am I in the environment?
- What is my connection to this place?
- How can my behaviour change this place?
- What makes me feel small? What makes me feel big?
- What movements surround us, and how do they shape the landscape?
- What do you notice at different scales?

4.1.2.1 Outcomes and Reflections

With each activity, we noticed more entanglements and connections, our noticing process went through different layers. We noticed how different species support each other for existence. While some provide shelter in a specific moment, others provide a place to live, feed, or nurture. For example, a single tree provides a place for birds to rest, meet other birds, and build a nest to live and give birth. It makes a home for small insects while a structure for spiders to create a web and hunt. Protects smaller plants from rain and wind. Their fallen leaves became food for microorganisms and insects, creating nutrients for the soil, but also nutrients for the plants.

Noticing at different scales, what the podcast called "zooming in and out" changed the way we perceived and defined the entanglements. It taught us that zooming in and out could impact the design, as we could define an entanglement as the whole environment we notice and equally as a small part or an actor in the environment. This approach was useful to remember when deciding how to define the MtH actors' network, as it is needed to set boundaries to avoid travelling down the countless overwhelming connections (Strathern, 1996).

When applying the Noticing Entanglements Podcast tool, we discovered a parallel between the characteristics of the multilevel service design framework (Patricio et al., 2011) and the MtH approach. We started to discuss the topic of zooming in and out, an approach used in multilevel service design, as well as noticing. The three levels of multilevel service design provide us with a possible perspective on the MtH entanglements: the conceptual level can be seen as the specific ecosystem that we focus on, the systemic level

allows us to recognise the interconnectedness and value exchange between the different species, and the level of encounter allows us to identify the experience of each organism.

Overall, the tool was great for connecting with the environment and noticing entanglements. Still, as the description promised noticing activities for designers, this tool was not connected to design practices. It taught us how to notice our environment but not how to frame the noticing outputs into design choices.

4.1.3 Explorative Service Safari

During an explorative service safari, as researchers, we immersed ourselves in the experience to collect data about positive and negative user experiences (Stickdorn et al., 2018). The focus is typically broad, and researchers approach the exploration with a mindset of curiosity and discovery (Stickdorn et al., 2018).

An explorative service safari was employed as a research method to gain insights into the experience of an existing sustainability-focused educational workshop at Aalborg University. By participating in the workshop, we aimed to identify its opportunities and pain points. The expected outcome was to draw a user journey of the students' experiences.

4.1.2.1 Preparation and Goals

We reached out to our university network, knowing that it offered the highest possibility of securing participation within a short timeframe (Bjørner, 2015). We were invited to a one-day sustainable design workshop in our university's service systems design class.

We defined the goals of the research activity as follows:

1) to gather insights about the students' experience

2) to explore how the education is conducted

3) to apply noticing

4.1.2.2 Execution

The session began with an introductory lecture, followed by a series of hands-on activities, concluding with a general reflection session. Noticing was employed on two different levels, the first one was us coming to the workshop to notice how the participants work and connect with nature. However, one of the workshop's exercises was called “Noticing”, which involved mapping MtH actors from our surroundings, researching them and their role in the ecosystem. It also presented the concept of temporal noticing - seeing time through the perspectives of MtH actors. We collaborated with the other students in separate groups, working on various tasks and documenting our experiences through photos and notes (Figure 9).

Figure 9: Photos taken during the explorative service safari at Aalborg University

4.1.2.3 Outcomes and Reflections

Noticing played a role in our ability to evaluate the workshop's effectiveness and find areas for improvement. Through active observation and reflection, we discerned which elements resonated most with participants and contributed positively to their experience. For example, we observed how specific exercises, such as "thinking with the materials", sparked creativity and facilitated meaningful discussions, indicating their effectiveness in engaging participants.

Additionally, noticing allowed us to identify aspects that could be improved. By paying attention to participants' reactions and feedback, we recognised that the time frame felt constrained, potentially limiting the depth of engagement. This finding, which we also previously encountered in the inspiration session (see Chapter 4.1.1), prompted us to consider strategies for better pacing and timing of the future service experience.

Moreover, noticing helped us to understand the importance of creating a holistic service environment, where every aspect, from organisation to materials, contributes to the overall learning experience; by observing how the experience was staged and the atmosphere cultivated, we gained insights into how to design future experiences that better support participant engagements.

Noticing helped us see the relationships the participants fostered with their environments and nature. Some found it easy to relate with nature concerning the design field, while some expressed distress, thinking of including nature in a design process. We used noticing to acknowledge what different MtH actors were and could have been involved in the service, such as algae and seaweed, trees, bushes, and plants.

4.1.4 Noticing Workbook

After the exploratory service safari, we realised different types of noticing could be employed, just like during the explorative service safari, we worked with the concept of temporal noticing. That is why we decided to try the Noticing workbook (Livio et al., 2019). This workbook is a set of generative methods for the use of noticing. The materials can be found in Appendix C. The different methods allowed us to go from broad perspectives noticing to more introspection and reflection. The noticing methods in the workbook were the following:

Method 1: Global noticing.
This method focused on noticing in its simplest form, meaning sitting and absorbing the world around us with all our senses. We found this method straightforward, as we had previously utilised the noticing podcast tool, and it was consistently effortless to employ.

Method 2: Focal noticing.
In this method, we picked MtH actors from the surroundings and noticed them from a close perspective. Our vision became dominant; we only noticed through our eyes during this exercise. Then, we asked ourselves what would have been different if we had used more of our senses for noticing.

Method 3: Noticing noticing.
This exercise reflected on the first two methods. Global noticing allowed us to use all our senses; however, many human-driven inputs were complicated to filter out. On the other hand, focal noticing allowed us to zoom in and closely notice our MtH actors, but we did not engage all our senses.

Method 4: Proximal noticing.

Proximity influences the details that we can notice. For example, the farther we were, the fewer sounds, colours, and movements we noticed. We could perceive many other shapes, shades, tones, structures, and compositions from a closer perspective. When we noticed our body experience, we felt what was connected with the environment, like the grass's softness, the sun's warmth, and the cold wind on the skin. We also realised that distance determines which senses we use to notice specific inputs.

Method 5: Panoramic noticing.

Panoramic noticing guided us to pay close attention to the entire surroundings of our chosen non-human actor, including the y-axis – what is above and below. This method was interesting because we naturally focus mainly on things that are in our view height, but we do not look so much above and under. That allowed us to identify different entanglements in the environment.

Method 6: Temporal noticing.

This noticing exercise requested us to take the same thing we noticed in Method 2 - Focal noticing and notice it again. Since we previously worked with the concept of temporal noticing (see Chapter 4.1.3), we decided to skip this particular method and focus on the other, less explored ones.

Method 7: Sense-based noticing.

This method appeared redundant because we consider all noticing to be sense-based. However, paying attention to inputs we perceive with one of our senses or a combination of them was interesting.

Method 8: Affect-based noticing.

Here, we were supposed to notice our present emotions and feelings and evaluate how they affect our ability to notice external inputs. As we advanced with the activities, our sense of connection with the environment grew deeper. However, with this method, we realised how our state of mind influences our noticing. Our affections influence our attention and interpretation of what we notice. Feeling tired or anxious may interpret the noticing outputs with more hostility and negativity. In this method, we contemplated the temperature and overwhelming sounds of nearby construction, which were hard to go unnoticed.

Method 9: Technoticing.

This method asked us to use analogue or digital technology to notice the previously chosen MtH actors. We both chose to take photos and record videos with our phones (Figure 10).

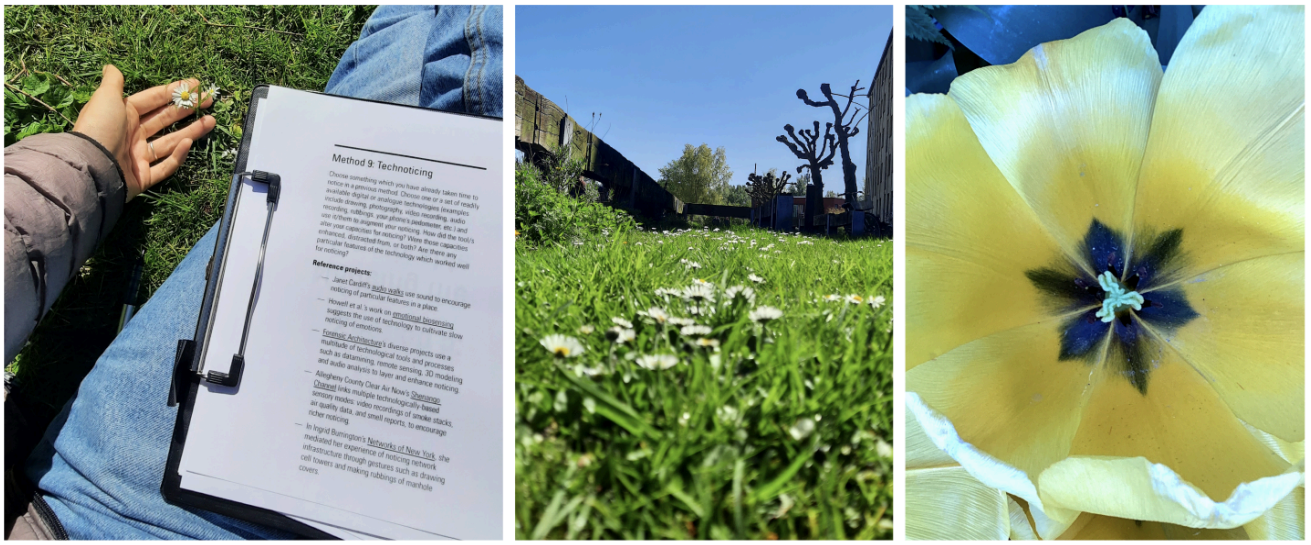


Figure 10: Photos taken during the technoticing activity from Noticing workbook (Livio et al., 2019)

Technology makes it easy to capture a specific moment that might be too brief to be noticed in detail. It also creates the option of embodying a MtH perspective (Haldrup et al., 2022). We attempted to embody a bee collecting nectar and a plant when taking pictures and videos. Using technology for noticing both enhanced and restricted our capacities simultaneously. Taking photos and videos allowed us to visually notice a specific moment and replay it repeatedly, allowing us to study it more deeply. On the other hand, using photography and taking videos completely excluded our other senses.

Method 10: Nonoticing.

In this last method, we were supposed to map the unknown around our chosen actor or process, something we knew was happening but could not notice personally. Mapping something that we were not aware of sounded contradictory; however, we used this method to frame many questions that we did not have answers to, which did not allow us to map the unknown directly but rather create awareness about questions that we did not have answers to regarding our chosen MtH actors.

4.3.3.1 Outcomes and Reflections

The notion of zooming in and out, which we encountered in the Noticing Entanglements Podcast tool (see Chapter 4.1.2), was still very present and essential when we focused on the different noticing types. The knowledge about different types of noticing raised questions about the approach to the design of the educational service. What was going to be our level of focus? As mentioned before, in the MtH world, the boundaries between actors are not well defined, so it was crucial to decide on which scope we would focus on at specific moments of the design process (Strathern, 1996).

4.1.5 In-depth Expert Interviews

In-depth interviewing is a qualitative research technique that is conducted by researchers with relevant stakeholders or experts aiming to gather information about a specific topic from different perspectives (Stickdorn et al., 2018). An in-depth interview approach was selected to gain insights into how facilitators of educational services, particularly those centred on sustainability and related topics, execute their services, including their relationship with the environment and how this relationship might influence their service offerings. These interviews aimed to gain clarity and knowledge about the facilitators' and their students' specific experiences, practices, expectations and concerns (see Appendix D for transcriptions).

4.1.5.1 Preparation and Goals

We contacted our network to identify relevant educational services and sent out interview invitations (Stickdorn et al., 2018). We aimed to select professionals who could offer valuable insights from diverse fields, approaches, and cultural backgrounds. Building on the responses we received, we arranged three interviews. The participants were:

- **Rike, a university teacher and researcher based in Copenhagen.** We approached Rike as a possible interviewee because she could provide us with close learnings on both topics as a service designer and also works with MtH.
- **Martin, a founder of an educational company on sustainability and systems thinking in Denmark**. We picked him because he offers students educational workshops that focus on challenging their current mindsets and envisioning a sustainable future.

- **Hector, a founder and educator for various educational and environmental projects in an indigenous community in Ecuador.** We contacted him because he promotes human interconnection with nature through his courses and because the talk was an opportunity to learn about his non-westernised cosmovision (Hromek, 2022).

The interviews were semi-structured (Stickdorn et al., 2018), with approximately thirty minutes of conversation prepared for each participant. Nevertheless, we maintained flexibility throughout the process, staying prepared to adapt our approach as necessary, ensuring we could capture the most valuable learnings from our participants.

4.1.5.2 Execution

We both participated in the interviews, alternating between facilitating and observing while taking notes. This rotation allowed us to experience both roles. Due to logistical considerations, we conducted the interviews online. We opted to audio record the interviews to ensure comprehensive data collection, allowing us to fully focus on the interviewees, remain attentive, and observe their gestures and body language.

4.1.5.3 Outcomes and Reflections

Some of the questions we posed to the interviewees focused on how they perceive the environment and their relationship with nature and their environment. These questions were derived from the research focus on noticing. We considered it relevant to understand how they experience this interconnectedness with nature, particularly with Hector, where the relations occur daily and naturally. Focusing too much on the questions about the

interviewees' relationships to nature and the environment may have led to a lack of responses regarding the organisational aspects of the services. If we had focused more on the organisational aspects, such as stakeholders and back-end processes, the insights we later framed in the Define phase would have differed, they would have focused more on the service's systemic aspect rather than the conceptual one.

In the interviews, we encountered abstract concepts that would help define the pillars upon which the service would be created to deliver a positive user experience. We also confirmed the validity of some of the starting prompts from the inspiration sessions, such as the uniqueness of personal experiences when noticing nature and noticing MtH actors through the network of their relations. However, we did not address more concrete topics regarding the organisation, stakeholders involved, and necessary resources. Nevertheless, this approach inspired us significantly. It made us realise the importance of facilitators' personal motivations and values for offering these types of services.

4.1.6 User Survey

An online survey was chosen as a time-efficient tool to gather diverse perspectives (Gideon, 2012) and to collect qualitative and quantitative data about possible users (Birnbaum, 2004).

4.1.6.1 Preparation and Goals

We contacted our network to share the survey. That could have restrained the variety of answers from different ages and occupations (Bjørner, 2015).

The survey aimed to explore respondents' experiences with educational services on sustainability, where they encountered them,

their expectations, what they enjoyed or did not, and how useful or relevant they found them for their personal and professional lives.

4.1.6.2 Execution

During the two weeks the survey was available, we gathered forty answers. Although this sample size cannot represent the whole target group, it has still provided valuable insights into individual experiences with educational activities on sustainability.

The survey comprised two sections, with respondents divided into one based on whether they had participated in sustainability-focused education. Each section would then carry four to six short questions. The interesting thing to point out was the indeterminateness of the experiences, with twenty participants having participated in such an educational activity and twenty participants not having ever participated.

4.1.6.3 Outcomes and Reflections

From the answers, we could conclude the following: the participants consider this type of education essential, and they seem interested, but if it is not offered to them, they might not pursue it themselves. Of the twenty students who have participated in such an activity, fourteen encountered it as part of their university courses. Of the twenty participants who have not done such an activity, six would still expect it to be offered by their education.

We created the survey's questions, perceiving the respondents more as professionals in whichever careers. That turned out to be a wrong assumption, as although we structured most of the questions to discover the respondents' approach to sustainability in their professions, the respondents kept their answers in the areas of

their personal lives. For example, with one of the questions from the section for users that have experienced sustainability-focused educational activity, we aimed to uncover the relevance of the gained knowledge in their professions. The question asked, " Did you apply any of that knowledge in real life?" However, all the answers halted using sustainable knowledge in the users' homes. This misinterpretation of the question came from understanding the expression "real-life practices", as we used it while having professional lives in mind, but with the participants interpreting that into their private lives. At first, we only recognised the wrong formulation of the question. However, then we realised the actual value of it, giving us a view of what the participants consider to be real-life skills and knowledge on sustainability. From all the answers, the term "real-life" appeared to evoke our day-to-day activities rather than professional life.

It is appropriate to reflect on the vagueness of some of the questions, mainly concerning the section for people who have never participated in this type of education. Being eager to discover the participants' wishes for such an education, we gave them a lot of space by asking open questions about their expectations. That way, we asked them what they would expect. However, we expected to gain answers about what they would like. Because of that, it was uncertain if the answers included their expectations or their wishes. A more refined formulation of some of these questions could have provided us with more input on the users' preferences.

4.1.7 New Design Brief

The project began with a broad initial design brief:

How might we design a sustainability-focused educational service while applying a more-than-human approach to strengthen awareness and acknowledge human interconnection with nature?

Because of the broad scope of the initial brief, we encountered challenges when attempting to translate the collected findings into more actionable steps. We were not working with a specific case but rather with a broad sector that could be approached in many different ways. Recognising the need for a new direction towards a particular design case, we initiated research on existing services in Denmark, particularly those focusing on sustainability.

The learnings gained during our in-depth interviews hinted that the values behind the service provider were crucial in creating valuable experiences for users. Therefore, our research efforts aimed to find a case company that shared intrinsic values and holistically emphasised sustainability.

We decided to proceed with Avnø, a service which we had already mapped before (see Chapter 2.1) and established contact with them. Avnø classifies itself as an eco-village and offers 'højskole' education, courses and consultations for green enterprises, and co-housing (Frost, 2023). The courses at Avnø last between six and twelve months but can also be tailored for specific needs. The specificity of Avnø is community involvement, with the students being considered members of the community.

With the data collected, we decided to iterate the design brief, making it more specific to our new direction:

How might we design a service, while applying a more-than-human approach, that educates students on sustainability and human interconnection with nature by exploring the case of Avnø?

4.1.8 Field Trip to Avnø

The eco-village Avnø is located in the nature reserve area in Lundby, a small town on the coast of Vordingborg Kommune. The area provides possible housing for around eighty persons, including a garden, gyms, a cinema hall, a library, workshops for wood, sewing, and many others. The three pillars of Avnø are: co-housing, højskole, and green enterprises (Figure 11). The educational courses provided through højskole and green enterprises tackle (not only limiting to) green living, eco-village design and permaculture, reconnection with nature, and sustainable practices.

Figure 11: Avnø's educational facilities

Firstly, we were greeted by the founder, Kristianne. She gave us a tour of the complex's central parts and told us about the place's history and the story behind the establishment, including

the search for funds and investors. We uncovered some of Avnø's most urgent needs, such as attracting more people to the courses, spreading awareness about the place, and creating a more long-lasting impact through their education.

Kristianne also explained how the place is run and maintained, including growing food and collaborating with local farmers and shops. Different people come to Avnø to work, live and volunteer. We discussed the systemic perspective of the educational courses, the currently involved stakeholders, potential actors, and collaborators. All this information would later serve as the groundwork for the ecosystem map (see Chapter 4.2.2).

The chief administrative stakeholders for Avnø are Coastal Directory and Vordingborg Kommune. The Coast Directory supervises the interventions in the coastal areas. Because of Avnø’s impending location on the coast, the Directory must approve many land-use plans and ideas. Avnø is also part of the Global Eco-village Network, which provides platforms and means for worldwide ecovillages to connect. This network is used to exchange ideas and information, transfer technologies, and develop educational exchanges (The Global Eco-village Network, 2023). Other most prominent partnerships are fostered with Gaia Education, the European Solidarity Course, and The Danish Eco-village network. All these stakeholders focus on connecting people who are interested in living sustainably and educating themselves on the topic. When taking the tour, we also asked specific questions about the local non-human actors to determine which ones dominated the local environment or were being pushed to the side.

4.1.8.1 Service Safari

We shared a community lunch, and we were invited to experience part of the Growing Green Skills course (Figure 12) in the garden. Having prepared activities to notice, we used this unplanned opportunity to notice MtH actors who were involved in the course.

Figure 12: Growing Green Skills course

We approached that opportunity as a service safari (Stickdorn et al., 2018) because we would get to experience a part of the service. The course facilitator, Helena, showed us around the garden, educated us on the species present and in the surrounding forest, and then assigned different tasks around the garden, as

shown in Figure 13. This second service safari benefitted us in two ways: first, we got information on the different MtH actors evolving around this educational course. Second, we connected deeper with the community members, gaining more insights into the course's organisation and facilitation.

Figure 13: Service safari during the Growing Green Skills course

4.1.8.2 Informal interview

We performed an informal interview (Stickdorn et al., 2018) with one of the members, Olga, and that way, we gained a better understanding of the course's organisation, the different touchpoints, and the stakeholders (see Chapters 4.2.2 & 4.2.5). She described in detail the user journeys of the short (12 weeks) and

long courses (27 weeks) and how the different classes can be tailored to the needs of the different clients, sometimes for corporate purposes and sometimes for team-building activities.

4.1.8.3 Outcomes and Reflections

Using a combination of global noticing, focal and panoramic (Livio et al., 2019), we discovered the following MtH actors (Figure 14):

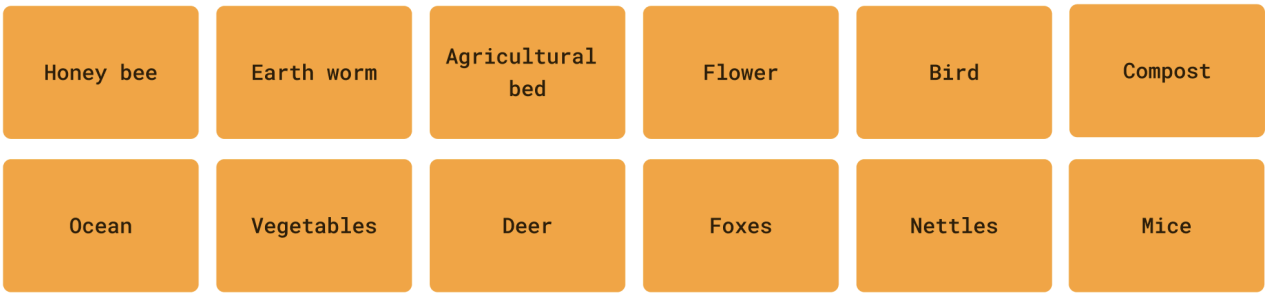


Figure 14: MtH actors identified during the field trip to Avnø

These actors would be subjects for further exploration in the following chapters. The field trip confirmed that Avnø's strengths lie in the community engagement and curriculum content. However, improved promotional strategies were needed to reach a wider audience.

After the field trip, we decided to use Growing Green Skills as a course case since it is a new course not as well established as the others they offer.

4.1.9 Preliminary Reflection

This chapter presents the preliminary reflection on the Discover phase.

We tried the Noticing Entanglements podcast tool and the Noticing workbook, acquiring knowledge on different types of noticing. It was favourable that we first tried noticing tools separately, just to experience noticing. Then we employed our learnings in some discovery methods, namely the explorative service safari, and the field trip. Noticing helped us to be present in the moment, and observe with an open mind, without putting labels or attaching meaning. We also learned how our personal biases, such as affections, might have affected how we interpreted and experienced the activities.

The inspiration session set the course of the Discover phase, supplying us with initial ingredients of noticing, such as slowness and introspection, full sensory immersion, uniqueness of the noticing experiences, and noticing MtH actors through their networks of relations. It was beneficial to have some initial prompts for noticing. However, these prompts also established the direction of the design process.

The explorative service safari was an opportunity to participate in a sustainability-focused educational course and relate to the participants' experiences and their connections to nature and the environment.

The in-depth expert interviews presented us with different abstract concepts that the experts used when educating on sustainability and human connection with nature. However, they did not address the services' more concrete, organisational and functional aspects. Still, they showed us how personal motivations and values frame those educational services, and these findings helped us redefine our design brief.

The execution of the user survey had a few limitations. We sent the survey to our network, spreading it among young professionals and university students. That allowed us to collect enough answers on time but heavily impacted how we perceived the target group. We finished the Discover phase with university students and young professionals in mind for the target group, as they were the prominent respondents of the survey. Also, the formulations of some of the questions might not have been understood correctly by the participants. However, we decoded the value of their interpretations.

In the later stage of the Discover phase, we identified the need for a new design brief that would focus on a specific design case rather than just a large sector of services. That is why we chose Avnø, a service most coherent with its approach to sustainability and human connection to nature.

Choosing Avnø with its Growing Green Skills education as a course case allowed us to apply noticing on the MtH actors surrounding this course. These actors were noticed primarily through our senses. The possible limitation of noticing only with senses is that we might have left out different valuable actors imperceptible to human senses, such as microorganisms in the soil, or were not present in the specific moment, such as insects and butterflies.

4.2 Define

In the Define phase, we aimed to approach the design process from a concrete angle based on the new design brief:

How might we design a service, while applying a More-than-Human approach, that educates students on sustainability and human interconnection with nature by exploring the case of Avnø?

This phase contained tools and methods to synthesise the collected data about the possible service users and define the potential MtH actors, and the system around them.

The tools and methods used:

4.2.1 More-than-Human Design Probe

4.2.2 Ecosystem Map

4.2.3 Insights Analysis and Affinity Diagram

4.2.4 More-than-Human Personas

4.2.5 User Journey Maps

4.2.6 Preliminary Reflection

4.2.1 More-than-Human Design Probe

Based on the actors we noticed during the field trip, we expanded our noticing outputs using a More-than-Human Design Probe (Rosén, 2021). The filled-out probes can be accessed in Appendix F.

More-than-Human Design Probe (Rosén, 2021) is based on findings from ethnographic research in an urban farming community. It aims to bridge the accessibility gap between design frameworks and tools and the inclusion of MtH actors. This design probe was developed during a PhD dissertation, "Noticing Nature: exploring more-than-human-centred Design in Urban Farming".

There are four probes in total; the first two focus on worldviews, definitions, and characteristics and show how the understanding of several phenomena must be expanded to include the plural, non-binary, and even unknown (Rosén, 2021). The third probe focuses on the analytical process of selecting which parts of a system to focus on in a design process. The fourth probe focuses on finding rational and sensible leverage points in such systems.

We worked with the following actors (Figure 15):

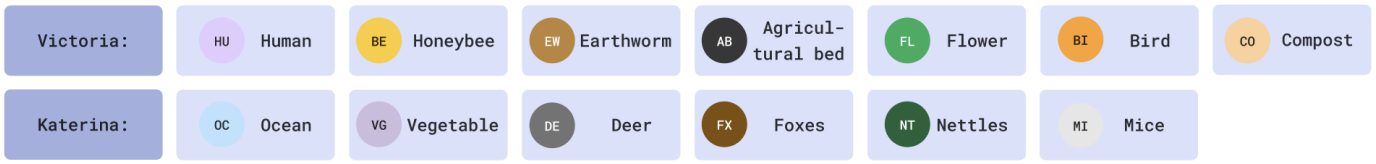


Figure 15: MtH actors identified in the field trip to Avnø and used for the MtH Design Probe (Rosén, 2021)

Overall, the experience of using the probes has expanded our perceptions of the chosen non-human actors.

The first probe: This first probe made us define the consciousness of the chosen actors and their different sensory abilities and made us aware of our hindered connections to them (Figure 16). It made us recognise the connections as well as the differences. That way, we established the vocabulary to express MtH phenomena, such as sensory experiences. While humans see, the plants sense the light. While humans use taste and smell, certain species, such as worms and other insects, use chemical sensing.

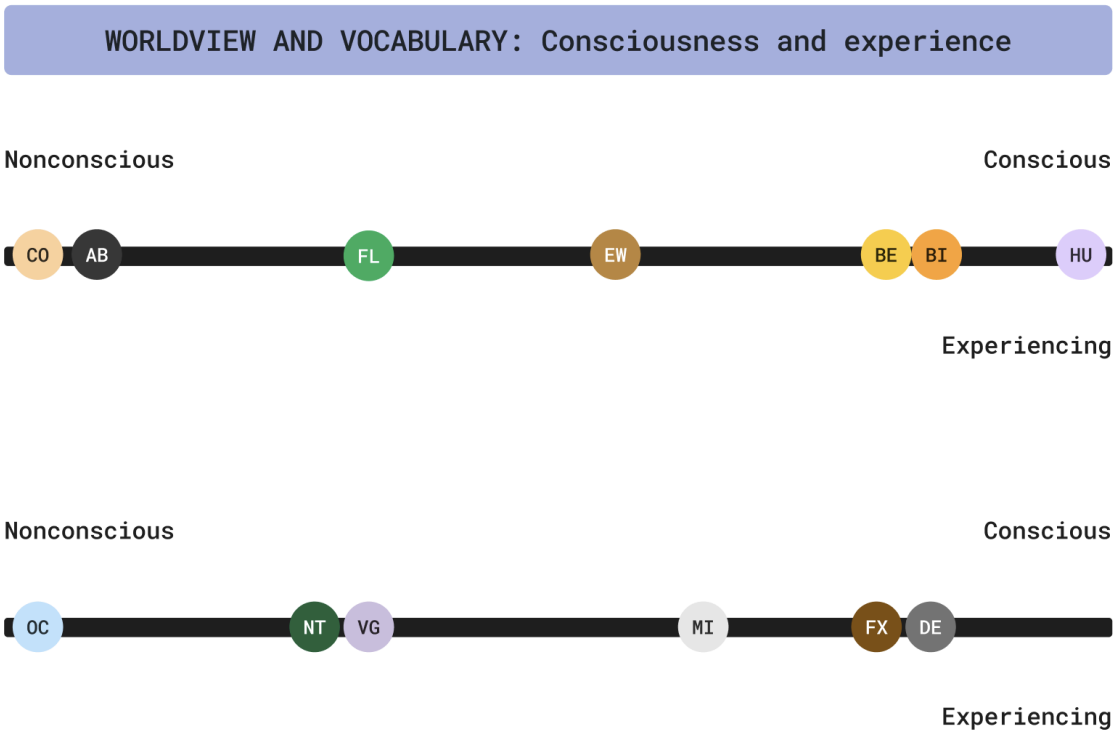
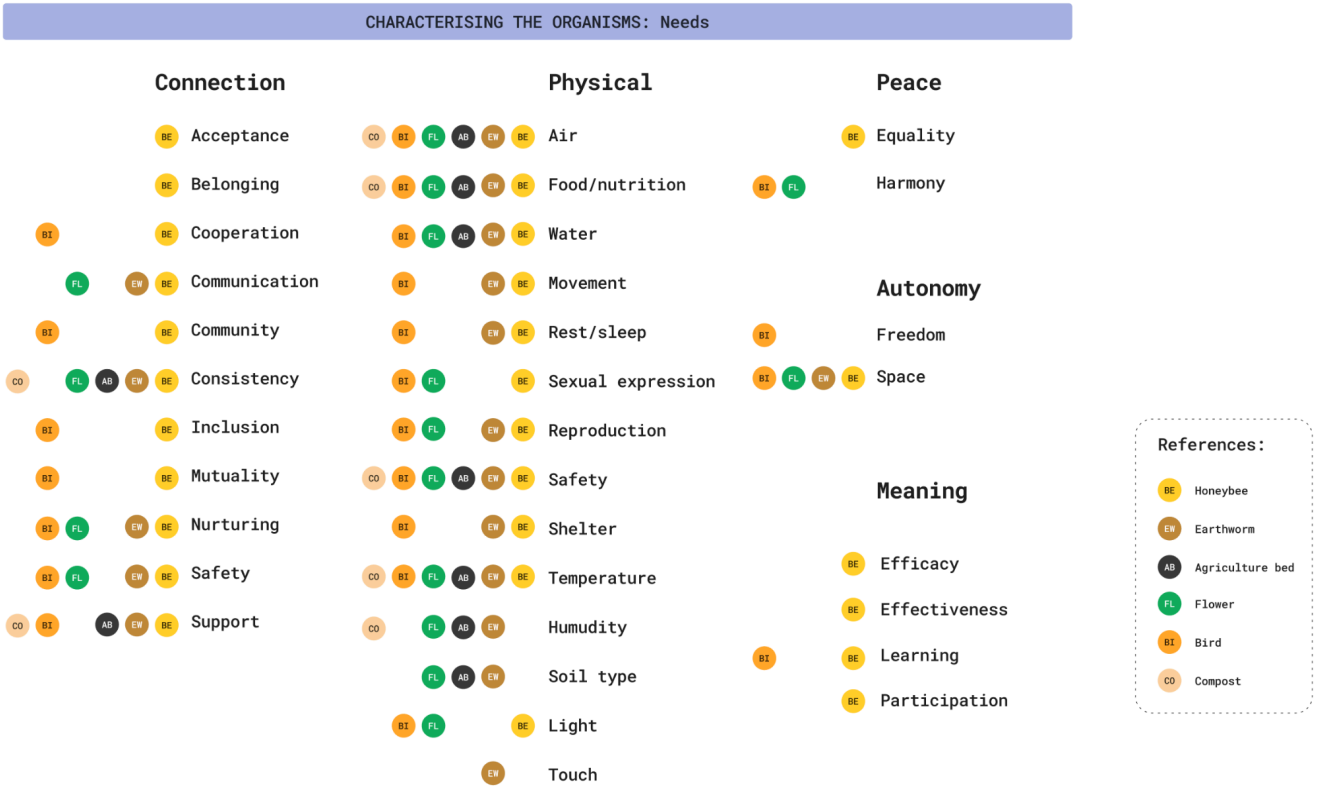


Figure 16: Outcomes of the first probe - MtH Design Probe (Rosén, 2021)

The second probe: focused on general characteristics, the MtH actors' inherent value to themselves and other ecosystem actors, and their value for humans. This part was helpful because it started

depicting parts of the ecosystem map. Then, we classified their interactive capabilities and found many things humans and other species had in common. Bees have a polarised vision, can detect gravity, and also have ultraviolet radiation detection. There were other interactive capabilities of non-humans that we rarely think of, such as electroreception, echolocation, and sensing the earth's magnetic field. We also characterised the needs of the different MtH actors (Figure 17). Investigating the needs of the different MtH actors was a ground-breaking exercise, as it was the first time we realised how much humans and the chosen non-humans had in common. The physical needs were fundamental, and the probe led to encountering different levels of needs, social, emotional, and cognitive. This probe uncovered the hidden needs of the MtH actors, which might generally be overlooked, and generated empathy and understanding of the MtH motivations and behaviours.



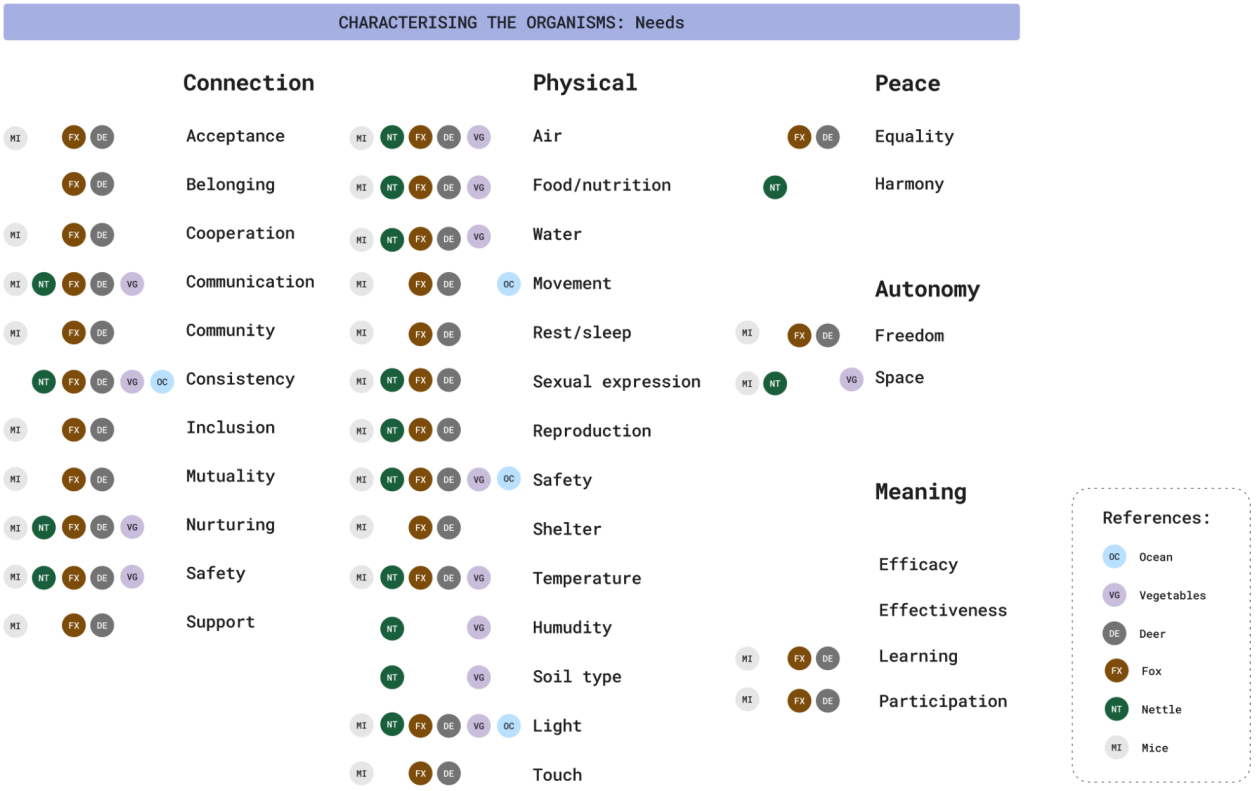


Figure 17: Outcomes of the second probe - MtH Design Probe (Rosén, 2021)

The third probe: We sketched out the MtH ecosystem map, including the value exchanges between the different actors (Figure 18).

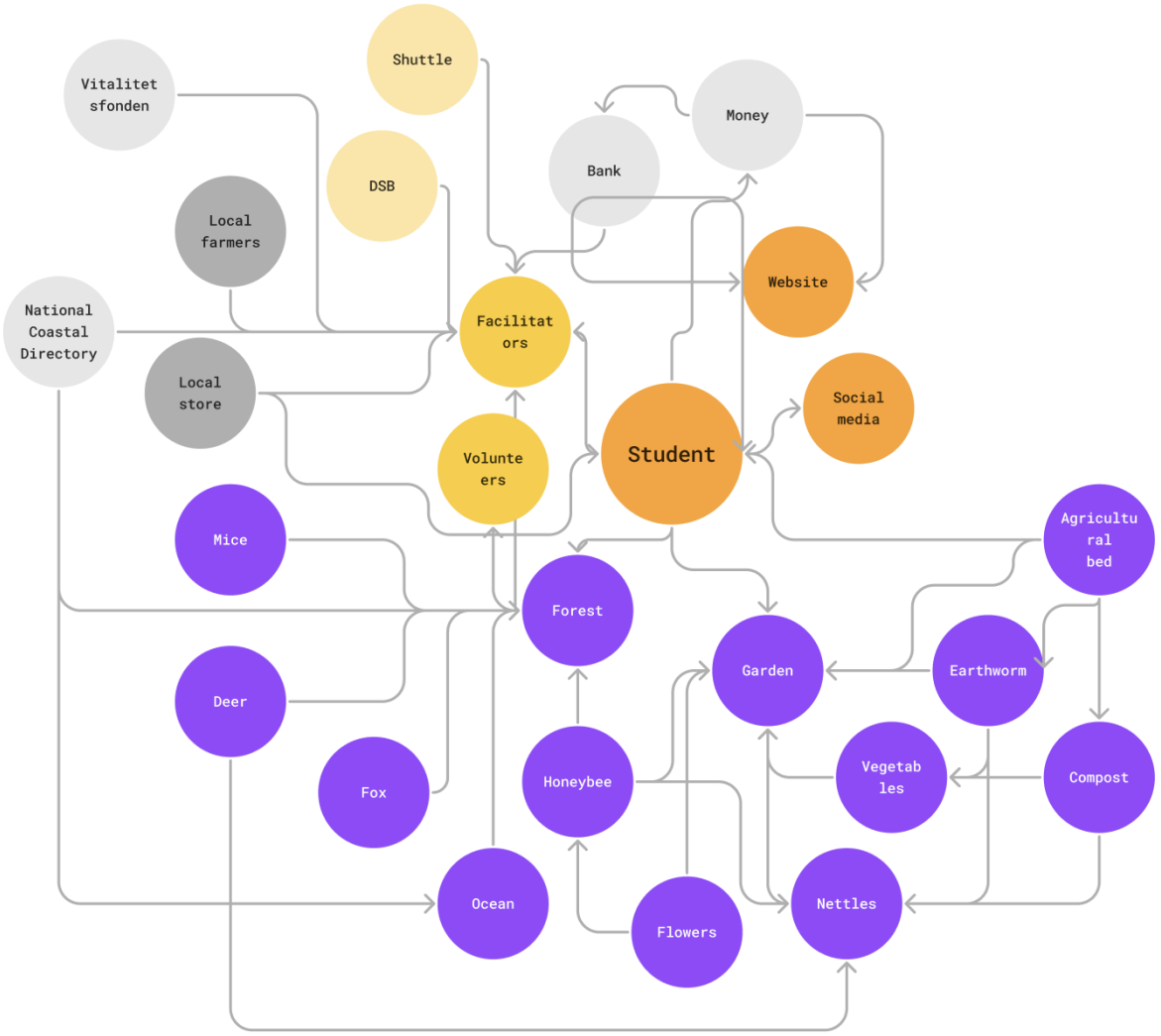


Figure 18: Outcomes of the third probe - MtH Design Probe (Rosén, 2021)

The fourth probe: This fourth probe helped us in the decision of which MtH actors to choose in relation to the Growing Green Skills course (Figure 19). It contained prompting questions called Agential cuts. Agential cuts are the cutting together/apart within

phenomena (Rosén, 2021) and enacting what is inside and outside of phenomena.

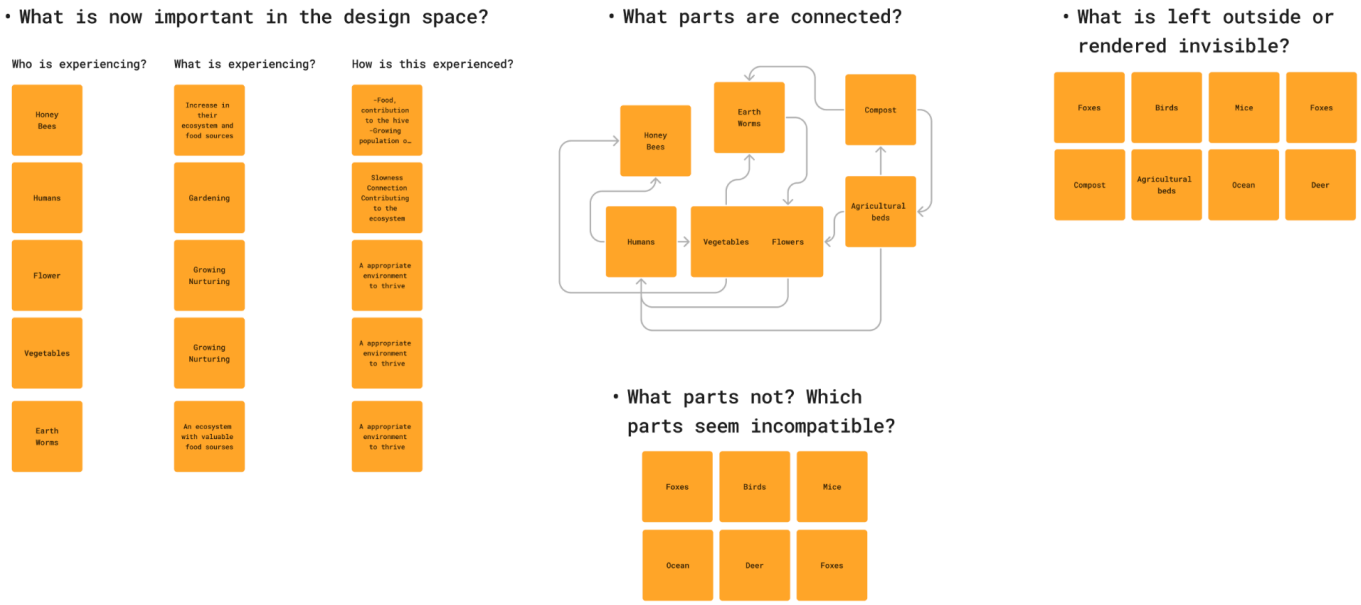


Figure 19: Outcomes of the fourth probe - MtH Design Probe (Rosén, 2021)

4.2.1.1 Outcomes and Reflections

Initially, we started filling out the probe just based on our assumptions. Then, we conducted desk research and corrected what we had written in the probe. Consulting scientific literature was crucial (Metcalfe, 2015), as it allowed us to explore the MtH actors profoundly.

The results would have been significantly different if we had completed the probe based solely on our assumptions. As designers, it is crucial to analyse actors' using data-driven information. We are used to working with human users in this manner, so we deemed applying the same approach to this specific case essential.

Certain actors from the same species group, such as mammals, were more accessible to relate to, and their needs correlated strongly with those of humans. As the exercises moved further away from the mammals' realm, they became harder. Classifying birds' or worms' needs and cognitive abilities is difficult; even researching them was complicated and lengthy.

The three probes revealed how many needs humans and non-humans might have in common, from physical ones, such as air, reproduction, and movement, to more spiritual ones, such as belonging, learning, and safety. Assigning human needs to non-human actors was challenging. How do we decide if they have those needs or not? After conducting more research, we could assign the non-humans more needs than just the physical ones; and deduct their other non-physical needs. For example, we found out bees do everything for their hive communities, so we deducted they had a sense of cooperation and belonging. The fourth probe provided Agential cuts that supported our decision-making when choosing the MtH actors for the new service.

Other reflections emerged after using the probe; firstly, the use of ecosystems, such as compost or ocean, as actors seemed too complex and did not allow us to use the probe to its full potential. Assigning characteristics to a whole ecosystem is problematic and risky. Ecosystems include many temporal dynamics that keep constantly changing and evolving (Blonder et al., 2012). Also, the angle and scale from which we observe the ecosystem are crucial, as we discovered during the previous noticing exercises (see Chapters 4.1.2 and 4.1.4); the ocean can be seen as a homogenous area seeing it from a large scale, but exhibits heterogeneity when we observe it at a finer scale.

We need to reflect on our own human biases; for example, the "halo effect" (Thorndike, 1920), which is a bias that describes that

it is in human nature to assign better qualities to entities that they consider “beautiful”, “valuable”, or “intelligent”. This bias is also influenced by the media we consume or our cultural background. For example, we did not realise earth worms and mice's importance and value to the ecosystem. At the same time, we distributed dignified abilities to deer and foxes (before conducting the desk research).

4.2.2 Ecosystem Map

Ecosystem maps are excellent tools for synthesising research data and can be created from different perspectives (Stickdorn et al., 2018). What sets this tool apart is its capacity to go beyond individual actors or stakeholders, describing an explicit picture of the interconnectedness of different actors within the ecosystem and how they mutually influence each other. To understand design spaces from a MtH perspective, we needed to sketch the interdependencies of the different entities (Rosén, 2022). Our approach to using the ecosystem map also aimed to assess the different actors’ potential for the new service by mapping the possible direct and indirect interactions between them (Roudavski, 2020).

Therefore, an ecosystem map was chosen to visualise the relationships and interactions between various entities within the Avnø educational programs ecosystem, including MtH actors, stakeholders, and organisations, as shown in Figure 20. This tool allowed us to use the knowledge acquired from the MtH Design Probe (see Chapter 4.2.1) and the field trip to Avnø (see Chapter 4.1.8).

By combining technoticing, focal noticing, and proximal noticing, we learned more about the entangled and complex processes surrounding those actors (Livio et al., 2019). The ecosystem map allowed us to describe the connections between the actors beyond the

typical interactions and on a bigger scale. That way, we mapped and specified the network of MtH actors we would focus on (Strathern, 1996).

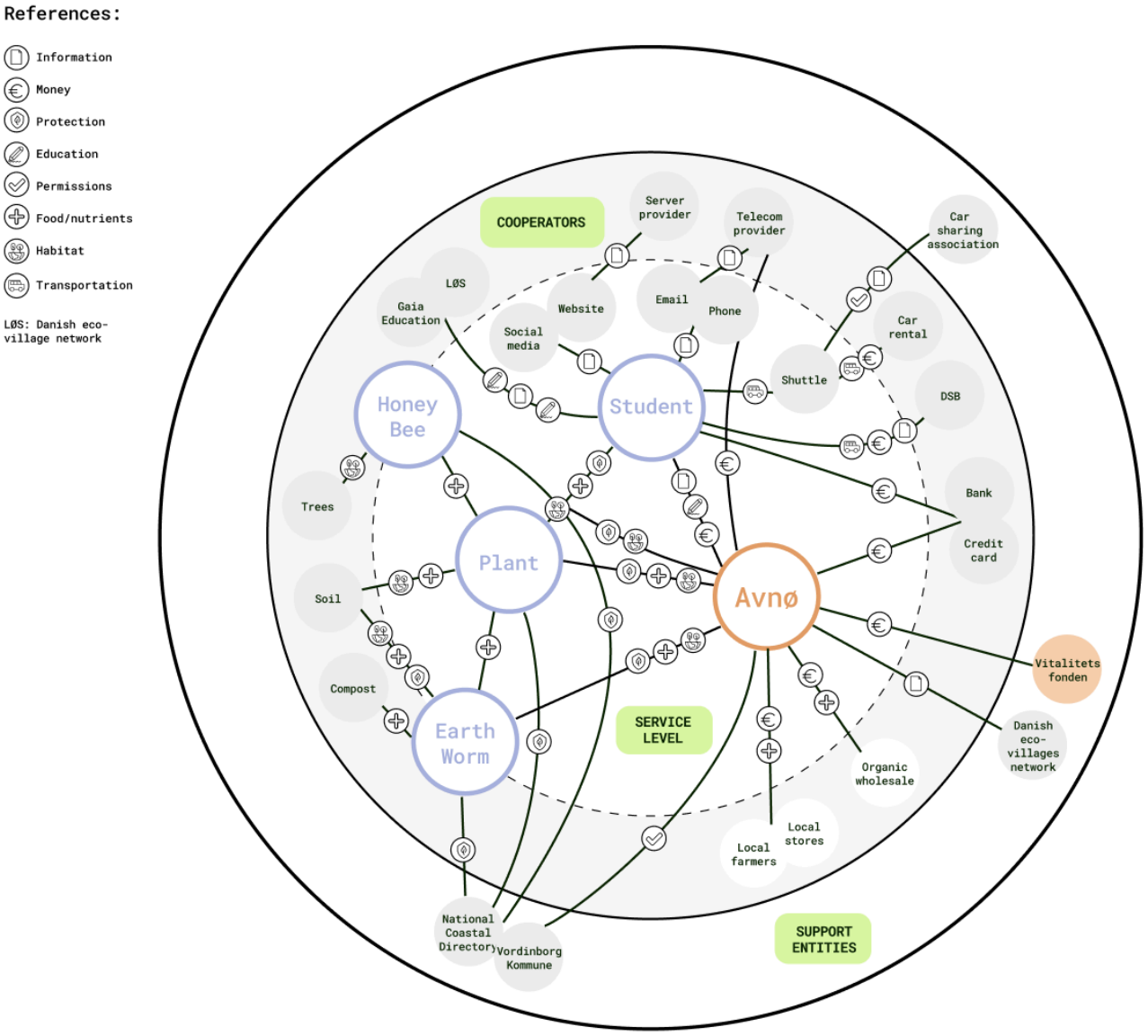


Figure 20: Avnø´s ecosystem map - Growing Green Skills course

In this ecosystem map, the MtH actors and Avnø are the central parts because we considered the optimal way to map all the interactions and value exchange between the service actors. This approach was chosen to ensure their synergy and balance (Reitsma et al., 2019).

The actors were mapped according to three layers:

- **The service level:** All actors at the service level are in the sphere of influence of Avnø.
- **The infrastructure level:** Actors that are close to the MtH actors of the service and facilitate the service operations according to each of their needs.
- **The regulation entities:** Entities that control and ensure the well-functioning of the service but are not part of it. For example, the National Coastal Directory influences the non-human actors, and Avnø controls which activities can be done in the area to ensure the conservation of the ecosystem.

4.2.2.1 Outcomes and Reflections

Even though noticing assisted us in gaining an understanding of the complex endeavours that constitute the chosen ecosystem (Livio et al., 2019), it was also challenging to use the tool because of all the interconnections and the more profound levels of which the connections can be tracked. In human-centred design, the divisions of the different components are apparent. However, in MtHC design, the interactions and connections are infinite, so we had to map only specific value exchanges consciously. We mapped exclusively the value exchanges between the main MtH actors, excluding possible value exchanges between the other actors. For example, we have yet to map the value exchanges between Vordingbord Kommune and the

Coastal Directory, between the local farmers and the local stores, etc. Also, honey bees and earth worms are placed between the service and infrastructure levels. That is because we consider them as parts of the service, but at the same time, they facilitate the plants' operation.

An ecosystem map is still a static representation of the dynamic MtH network; there are possible misinterpretations (Metcalfe, 2015). Some of the actors might have a seasonal or indirect impact on the service, making it hard to visualise the connections accurately. The challenge was also mapping the non-linear relationships many of the MtH actors foster. For example, an increase in the population of honey bees and earth worms' predators would disrupt these dynamics.

Another limitation of the ecosystem map might be its focus on location over function. Adhering to the non-western cosmovisions, which are intertwined with a place (Warren, 1991), resonated with us as we pursued the ecosystem map with Avnø's ecosystem in mind. That might have influenced our judgement of which MtH actors to include and how to communicate their interconnections.

4.2.3 Insights Analysis and Affinity Diagramming

An affinity diagram was chosen to proceed with (Dam & Siang, 2019) as a method. Affinity diagramming tackles the challenge of making sense of vast amounts of data by externalising it and then organising it into meaningful groups (Lucero, 2015). While gathering the data, we intended to condense it systematically (Malterud, 2012) to break heavy and long data sets into smaller components describing their meaning. We transcribed all the expert interviews and gathered them on a Figma board with the data collected from the user survey,

and the explorative service safari. That way, we evaluated the information based on its relevance and ended up with raw quotes for the following analysis. We first analysed the data from the different methods separately and identified insights for each of them. Then, we compared them and synthesised them together.

4.2.3.1 Expert Interviews Analysis

After transcribing the expert interviews, we organised the raw quotes into clusters created for each interview separately to identify the main topics.

Clusters from the interview with Rike, a university teacher and researcher based in Copenhagen (Figure 21):

Figure 21: In-depth expert interview clusters (Rike)

1. Mindset and opportunities:
    - “What can we do to make people sustain the perspective even after the educational course? Sometimes they might find it interesting during the

course, but after they return to reality, they don’t find it so relevant anymore.”

- “Mind shifts need to be done to make a real impact. The actual system has been created and worked according to the current ways of thinking and society paradigms, so to make real changes, first change how people think about sustainability and then the changes in the system will follow.”

2. Challenges
    - “There is also a difference between how people accept knowledge as individuals, students, and professionals.”
    - “We have to challenge how we educate about sustainability because I truly believe that people need more time for self-reflection when trying to engage with this approach. We ask them questions, but we do not give them time to think about those questions.”
    - “Educating on how to live sustainably sometimes generates more questions and unsolved endings, so it's difficult for some people to work with the knowledge.”

Clusters from the interview with Martin, a founder of an educational company on sustainability and systems thinking in Denmark (Figure 22):

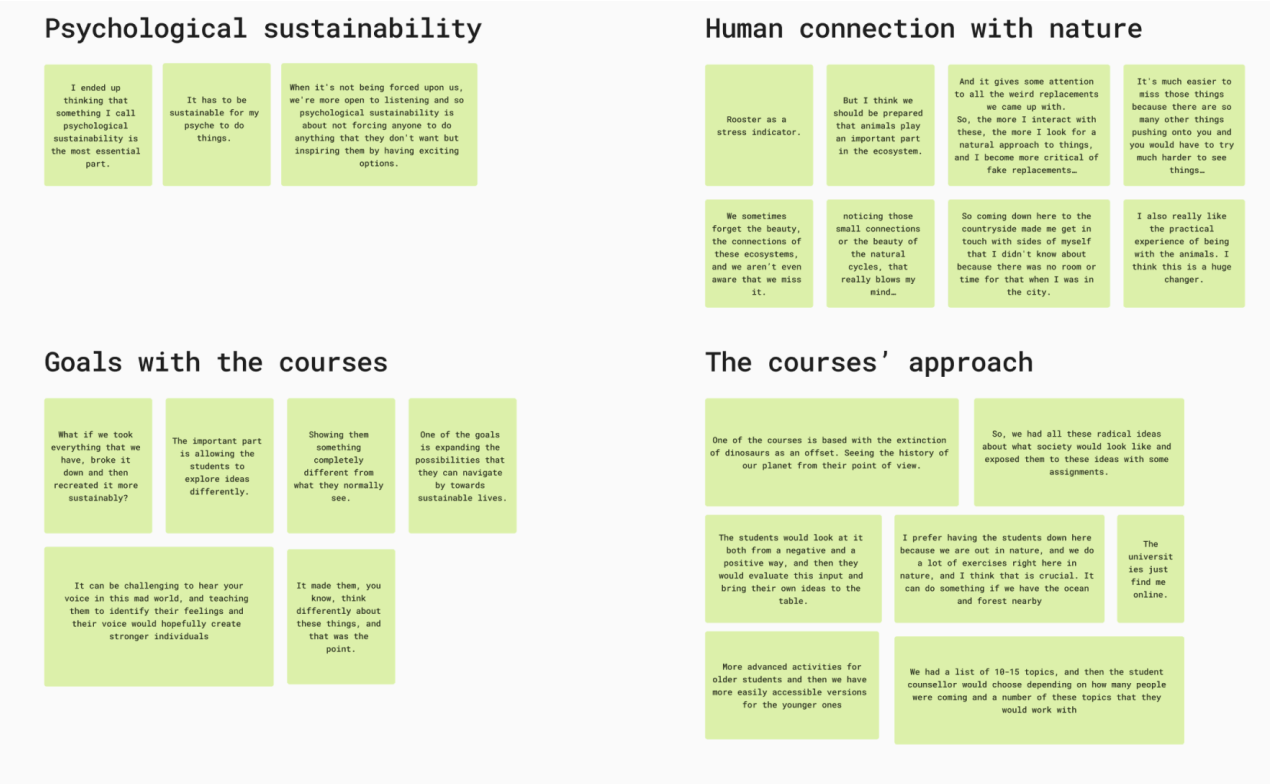


Figure 22: In-depth expert interview clusters (Martin)

1. Psychological sustainability
    - "It has to be sustainable for my psyche to do things."
    - "When it is not being forced upon us, we are more open to listening and so psychological sustainability is about not forcing anyone to do anything that they do not want but inspiring them by having exciting options."
2. Goals with his educational courses
    - "The important part is allowing the students to explore ideas differently."
    - "One of the goals is expanding the possibilities that they can navigate towards sustainable lives."
3. The courses' approach

- “I prefer having the students down here because we are out in nature, and we do a lot of exercises right here surrounded by it, and I think that is crucial. It can do something if we have the ocean and forest nearby.”

4. Human connection to nature
    - “We sometimes forget the beauty, the connections of these ecosystems, and we are not even aware that we miss it.”

Clusters from the interview with Hector, a founder and educator for various educational and environmental projects in an indigenous community in Ecuador (Figure 23):

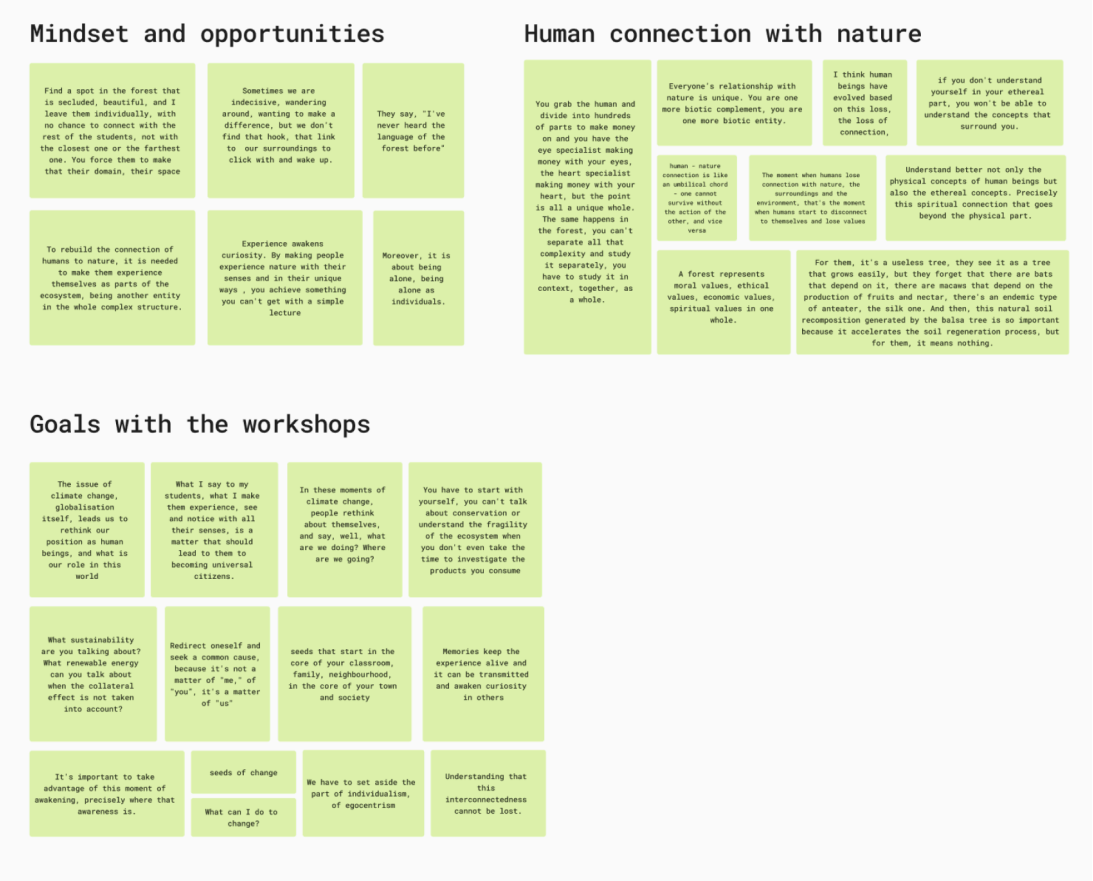


Figure 23: In-depth expert interview clusters (Hector)

1. Mindset and opportunities
    - “Sometimes we are indecisive, wandering around, wanting to make a difference, but we do not find that hook that links to our surroundings to click with and wake up.”
    - “Experience awakens curiosity. By making people experience nature with their senses and in their unique ways, you achieve something you cannot get with a simple lecture.”
    - “To rebuild the connection of humans to nature, it is needed to make them experience themselves as parts of the ecosystem, being another entity in the whole complex structure.”
2. Goals with his educational courses
    - “What I say to my students, what I make them experience, see and notice with all their senses, is a matter that should lead to them becoming universal citizens.”
    - “The issue of climate change, globalisation itself, leads us to rethink our position as human beings and our role in this world.”
    - “You have to start with yourself; you cannot talk about conservation or understand the ecosystem's fragility when you do not even take the time to investigate the products you consume.”

3. Human connection to nature
    - “For them, it is a useless tree; they see it as a tree that grows easily, but they forget that there are bats that depend on it, there are macaws that depend on the production of fruits and nectar, there

is an endemic type of anteater, the silk one. And then, this natural soil recomposition generated by the balsa tree is so important because it accelerates the soil regeneration process, but for them, it means nothing."

- "Everyone's relationship with nature is unique. You are one more biotic complement; one more biotic entity."

The insights defined based on the expert interviews:

1. Individual roles when receiving education influence how it is accepted. On an individual level it might feel more accessible than on the professional one.
2. An important aspect of sustainability is psychological. We should do things that feel sustainable and accessible for us as individuals.
3. Becoming more environmentally aware might require slowness, self-reflection and discussions with others to realise the uniqueness of everyone's experiences.
4. Seeing humans as a part of a greater whole comes from the possibility of experiencing this union. That can happen through sensory, hands-on experiences surrounded by nature, avoiding unnecessary stimuli.

4.2.3.2 User Survey Analysis

As mentioned, the user survey divided the respondents into two groups based on whether they had participated in or never participated in any sustainability-focused education. Of the forty

answers, twenty respondents answered yes, and twenty answered no to this first question. We would transcribe all the answers into a Figma board and group them based on similarities and the number of answers (Figure 24). Then we would identify the common themes in those groups.

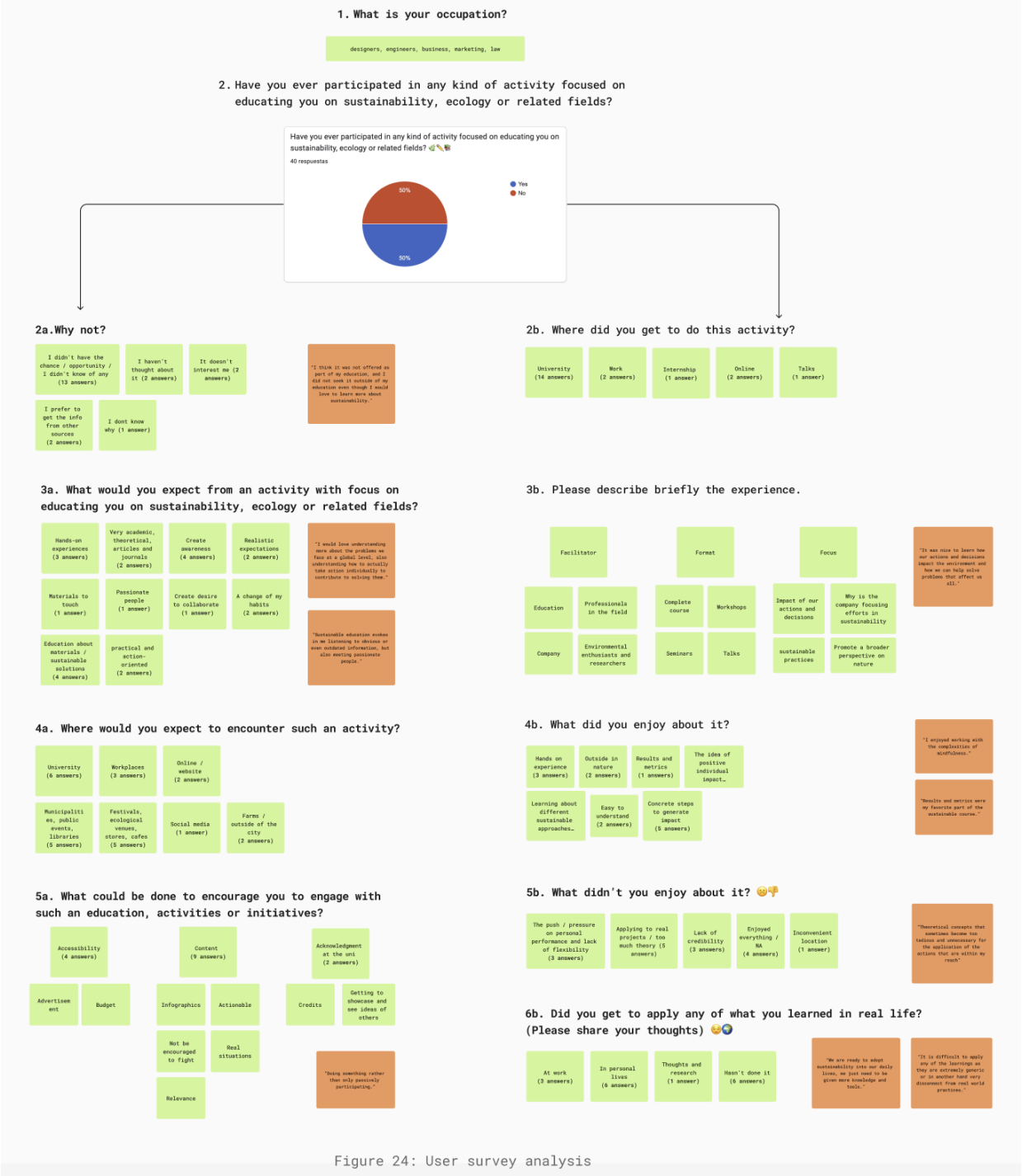


Figure 24: User survey analysis

The insights identified from the user survey:

- Users seem interested in sustainability, but it is also often an unexplored area. They would expect or search for it in libraries, universities, public events, student cafés, or from the municipalities.
- There is a need for real-life practices – advice about living sustainably often feels disconnected from the real world.
- There is an interest in receiving actionable, hands-on education.
- Applying sustainable practices to real life does not need to be connected to the respondents' professions, many of them associate it more with their personal lives.
- The respondents want to feel free to explore the topic according to their personal perspectives.
- The accessibility of sustainability, meaning financial and timely, of the course is as important as the knowledge the students receive.

4.2.3.3 Explorative Service Safari Analysis

The data collected during the explorative service safari consisted of handwritten notes and photos we took during the workshop. It contained our observations, as well as quotes from the other students. We transferred the data on a Figma board and arranged it based on the order of the activities in the workshop:

- The lecture
- Indoor workshop
- Outdoor workshop
- Reflection session

The insights identified from the explorative service safari:

- Rush is the enemy of tuning into an environment. Slowness and time to reflect might be a necessity to truly connect.
- Staging the course holistically (place, materials, organisation, music etc.) can increase engagement.
- Give freedom to students to approach the topic from different angles to make everyone feel comfortable (people relate to different aspects and approach tasks differently).
- As a hands-on approach, thinking with the materials facilitates creativity, exploration and further discussions.

4.2.3.4 Meta-insights

After defining the insights for each method separately, we gathered them on one board to create meta-insights that would summarise the conceptual pillars of our service.

The meta-insights were the following:

1. **Accessibility**.
    a) Psychological accessibility of sustainability
    b) Financial and timely accessibility of sustainability
    c) Accessibility to nature
2. **Exploratory mindset**
    a) Hands-on experiences
    b) Sharing ideas
3. **Holistic approach**

a) Understanding the moral, ethical, economic and spiritual values of the environment
b) Holistic staging of the educational course

4. **Freedom and flexibility**
   a) The users desire to be sustainable precisely in the ways that make the most sense to them. They do not want to feel like the topic is forced upon them.
   b) Exploring the topic of sustainability in personal, independent ways and approaching the topic differently.

5. Slowness and connection
   a) Rush is the enemy of tuning in with the environment.
   b) The process of becoming more environmentally aware requires slowness and introspection.

6. Actionable knowledge
   a) Applying sustainability in their daily lives
   b) Sustainable knowledge feels disconnected from the real world

4.2.3.4 Reflections on the Insights Analysis

Our approach to the analysis of the insights could have been more efficient. We relied only on affinity diagramming, and when driving for synthesis of all the data we focused on attaining too many details, which for insights creation might have been optional. While affinity diagramming helped us to organise the data, the method's reliance on clustering raw quotes may have limited our ability to capture the nuances of the insights. Possibly we were breaking the data into too small components, which might have been the reason for focusing on too many details and, therefore, very time-consuming.

Colour coding (Bjørner, 2015) would have been a more efficient tool. It is an analysis method that assigns different colours to

specific data or information, making it easy to analyse. By using colour coding, we could have identified the patterns and relationships within the data faster.

4.2.4 More-than-Human Personas

At the end of the Define phase, it was necessary to define the service's MtH target group. That turned out to be a challenging process. Mingling between the collected data and defining tools that either focused on non-humans or humans, we were trying to keep the relational approach in mind (Hromek, 2020), trying to define humans and non-humans on the same level in the same way.

The Mushroom at the End of the World (Tsing, 2015) significantly contributed to applying noticing when creating the MtH personas. In this book, noticing the matsutake mushroom suggests seeing it as an actor who encounters humans, other species, and habitats on its way through life. The matsutake mushroom is characterised by its ability to survive in different environments, through its needs, and its position in the complex systems of the commodity chain, involving the foragers, cooks, traders, and many others. In the book, noticing all the MtH actors means seeing them through the same lenses and characterising them through similar metrics. This was the general approach when defining the MtH target group.

The meta-insights and the MtH Design Probe prompted the start of defining the personas. The MtH personas were created to present omnipresent stories and processes that often go unnoticed by humans (Tsing, 2015).

4.2.4.1 Secondary Desk Research

When defining the possible users of the service, we conducted secondary desk research (Stickdorn et al., 2018) and consulted online data and statistics about consumer environmental awareness. This secondary desk research served to better define the insights from the user survey, the expert interviews, the field trip and the explorative service safari, as from all these methods, we had the users classified by their expectations, needs and experiences with sustainability-focused educational services, but not so much through their lifestyles or more tangible metrics. Three statistics were used. Deloitte's "The Sustainable Consumer 2023" report (Deloitte, 2023), The Roundup's "Environmentally Conscious Consumer Statistics" (Ruiz, 2023), and "Global Consumer Trends 2024" from Euromonitor (Euromonitor, 2024).

Findings from the different reports were taken and added to the Figma board when defining the target group to provide a more holistic understanding of the user.

The important findings from Deloitte (2023):

- Consumers expect businesses and institutions to lead in promoting environmentally sustainable habits.
- Interest in sustainability is growing beyond consumer goods to include services.

The important findings from Euromonitor (2024):

- Over 60% of consumers tried to impact the environment positively in 2023, but scepticism is rising due to persistent climate issues and limited individual impact.
- Consumers prefer organisations to demonstrate their eco pledges, moving away from messages that burden individual behaviour.

- Affordability and distrust hinder further action, with some continuing sustainable choices and others reducing efforts.
- Consumers will shift towards experiences which show the results of their contributions.

The important findings from "Environmentally Conscious Consumer Statistics" (Ruiz, 2023):

- Consumers across generations differ in their willingness to adopt sustainable practices. Baby Boomers are the least likely to make changes, followed by Gen X. Millennials are the most open to adapting their lifestyles for sustainability.

These statistics confirmed the wishes expressed in the expert interviews, service safaris, and user surveys, such as the freedom to explore sustainability in their own, unique ways, the accessibility of sustainability (psychological, financial, action-based), the aversion to pressure and green-washing, and pieces of advice about living sustainably that often feel disconnected from the real world. On the other hand, the respondents of our user survey were primarily Millenials, so this presents a limitation to the variety of the data.

From where our data met these online statistics, we came up with several conclusions to specify the users' approach towards sustainability and employing sustainable habits in their lives. These conclusions are reflected in the MtH personas.

4.2.4.2 MtH Design Probe Analysis

As mentioned before (see Chapter 4.2.1), we conducted additional desk research after filling out the MtH Design Probe based on our knowledge and assumptions to use it correctly. We also

consulted scientific literature to evaluate the truthfulness of our assumptions (Metcalfe, 2015). This desk research, framed through the probes exercises, would then be transferred into general insights about the non-human actors and some additional insights about the human ones to communicate the parallels and relations between all the MtH actors.

The insights identified from the MtH Design Probe

Honey Bees

1. The accessibility of nectar and pollen plays a key role in the honey bees' nurturing of themselves and their larvae.
2. For Honey bees, being part of the community and fulfilling the roles they are assigned in life are a must. The overall goal is community survival.
3. They feel a shared responsibility for all of them, and they can all unite for this one goal: feeding every one of them.

Plants

1. Plants can adjust their growth and development in response to environmental cues. For example, a plant in the shade might grow taller and thinner to reach more sunlight, while a plant in a windy location might grow shorter and sturdier.
2. Their slow growth allows them to invest in attracting pollinators (bright flowers attract honey bees) or creating fruits for animal seed dispersal. They rely on other species for reproduction and prosperity.
3. Plant responses to environmental changes are slow compared to animals. This can make them vulnerable to rapid changes.

Earth Worms:

1. The survival of worms is dependent on the soil and environmental conditions.
2. Worms and plants nurture each other – worms create the earth's structure for plants to grow on, and plants provide organic matter.

Even though we filled out the probe for human actors, we did not analyse it with that much detail. However, humans are always a starting point because we can always relate only to our human interpretation of other species' characters. It is inevitable to anthropomorphise (Allen and Bekoff, 2000). Ideally, we would have included an expert, such as a biologist, conservation scientist, or environmental expert, when filling out the probe and forming the insights to prevent misinterpretations (Metcalfe, 2015).

4.2.4.3 First iteration - User Mindsets and the MtH Design Probe

The first version of the target group was an attempt to summarise the data efficiently and with tools that would showcase the data in an orderly manner (Figure 25). This first attempt would define the human users of the service, mainly through user mindsets and partially through the MtH design probe. At the same time, the chosen non-human actors, honey bees, plants, and earthworms, would be classified through the MtH design probe only.

Figure 25: First iteration of the MtH personas

User mindsets are a recent tool introduced by a Danish agency, Designit (Bazoli and Lino, 2020), focusing on defining the scope of attitudes and emotional responses that people create with different contexts and experiences. This tool challenges the scope of more traditional and static personas and seeks to induce how users relate to complex subjects or life experiences (Bazoli and Lino, 2020). As the data about our users revealed many of their opinions on environmental awareness and sustainability, which are complex issues, user mindsets offered many useful metrics to define the users.

After juxtaposing the tools next to each other, nevertheless, the contrast and inconsistency between them did not comply with the MtH approach we had been trying to employ throughout the thesis, meaning representing all the MtH actors relationally as valuable parts of the ecosystem, defined on the same level (Clarke et al., 2019; Metcalfe, 2015; Rosén et al., 2022). Using two separate tools

to define the MtH actors and express their needs suggested the duality, the division between humans and nature (Gonzales & Gonzales, 2010), which this design process was trying to confront. As the next step, we decided to merge the tools.

4.2.4.4 Second Iteration - Synthesis

The second iteration merged the data differently, combining all the metrics of user mindsets and the MtH Design Probe into one tool that would define the MtH actors through the same lenses (Figure 26)

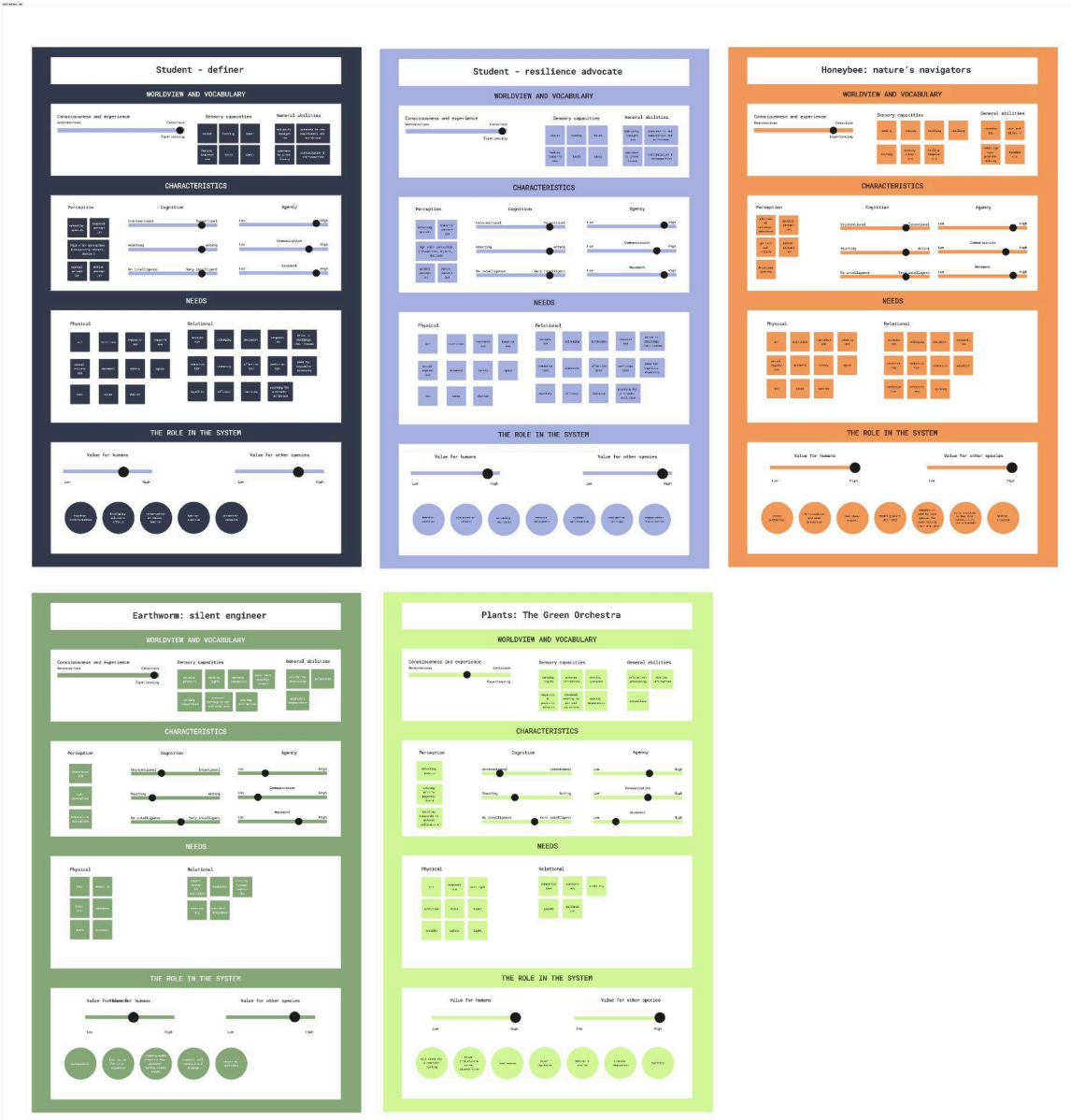


Figure 26: Second iteration of the MtH personas

User mindset metrics:

- Inspirational name
- Characteristics
- Needs
- Type of relationship and support they need or expect from the service

MtH design probe metrics:

- Worldview and vocabulary
- Characteristics
- Needs
- The role in the system

Merging some metrics, such as characteristics or needs, was straightforward. When merging the needs, we had to develop sub-metrics to define them - physical and relational. The relational needs were a tweak of the “type of relationship and support they need or expect from the service” metric from the user mindsets. The relational needs, therefore, classified the type of support the MtH actors would seek from their environment and possibly from the service. Those two metrics allowed us to categorise the needs of all the MtH actors.

Using two human actors, honey bees, plants, and earth worms, and merging two complete tools into one resulted in robust figures. For that reason, we decided to synthesise those figures.

4.2.4.5 Third iteration - MtH Personas

To make the robust figures created by merging the user mindsets and the MtH design probe more digestible, we renamed some metrics using the non-human persona framework (Tomitsch et al., 2021). That also allowed us to step back and re-evaluate which information was relevant to the service. The outcomes were the MtH personas (Figure

27). Even though we initially created two user mindsets to represent the human users, we decided to concentrate on just one segment of users for the final MtH personas, to be able to come up with a service offering that would cater their highly defined needs (Verdino, 2010).

STUDENT 'RESILIENCE ADVOCATE'

CHARACTERSTICS

- Actively engaged with sustainability.
- Values understanding global problems and taking individual action.
- Appreciates and actively enforces the spiritual aspect of actions.
- Inspired by call-to-action initiatives.

LIFESTYLE & BACKSTORY

- Lives in balance with the environment, embracing practical and spiritual dimensions of sustainability.
- Seeks knowledge, and actively adopts sustainability into daily life.
- Chose a university with a green focus, finding motivation in collaborating on sustainable projects with classmates.

NEEDS

- Deeper understanding of global problems and actionable solutions.
- Craves community to share ideas and feel the impact of collective actions.
- Seeks tools and guidance for implementing sustainable practices in daily life.

FRUSTRATIONS

- Difficulty connecting aspects of sustainability practically.
- Feeling overwhelmed by complexity without clear guidance.
- Limited exposure to diverse perspectives.

TYPES OF RELATIONSHIP THEY NEED FROM THE SERVICE

- Supportive community for sharing ideas and guidance.
- Exposure to diverse perspectives and inspiration.
- Guidance and resources for implementing sustainable practices.

THE ROLE IN THE SYSTEM

- Contributes to a supportive community through active engagement.
- Seeks and shares knowledge, tools, and resources for sustainability.
- Provides feedback to enhance service offerings and inspires others through resilience and commitment.

HONEY BEE "NATURE'S NAVIGATORS"

CHARACTERSTICS

- **Sensory capacities:** seeing, hearing, touching, tasting, sensing vibrations, feeling temperature, and smelling.
- Perception: ultraviolet radiation detection, polarised vision, spatial and gravity perception.

LIFESTYLE & BACKSTORY

- Social insect, resides within a hive community, with specific roles and responsibilities.
- Communicates about food sources through dancing movements.
- Plays a crucial role in cross-pollination, fertilisation, and seed production.

NEEDS

- **Physical**: Air, water, and nutrition. Reproduction and sexual expression, movement, safety, shelter and adequate temperature regulation.
- **Relational**: Acceptance, support and belonging within the colony. Cooperation, communication, nurturing, safety.

FRUSTATIONS

- Decreased availability of diverse and nutritious food sources.
- Exposure to pesticides and pollutants impacting health and navigation.
- Disruption of natural behaviours due to human interference and habitat fragmentation.

MOTIVATIONS

- Seeks sustenance for nurturing and fulfilling the needs of the hive community.
- Strives for safety, shelter, and adequate temperature for colony well-being.
- Engages in sexual expression and movement.

THE ROLE IN THE SYSTEM

- Cross-pollinates and fertilises, contributing to maintaining plant diversity and ecosystem stability.
- Produces beeswax and honey, serving as food source for other beings.

PLANTS "THE GREEN ORCHESTRA"

CHARACTERSTICS

- **Sensory Capacities:** sensing direction and intensity of light, chemicals, vibrations, pressure changes and temperature.
- **Stimuli:** Responds to positive stimuli like sunshine and negative ones like extreme temperatures.

LIFESTYLE & BACKSTORY

- Experience life through senses and slow growth. Throughout the year, they adapt to the seasons:
- Spring: Sense increasing warmth, focus energy on rapid growth.
- Summer: Soak up sunlight and convert it into nutrients.
- Autumn: Prepare for winter, storing nutrients.
- Winter: Minimise energy expenditure.

NEEDS

- **Physical**: clean air, water, temperature, soil type, nutrition, safety, light.
- **Relational**: Communication to each other through chemical signals,stable environmental conditions and diversity, pollination which requires assistance from bees and butterflies.

FRUSTRATIONS

- Unpredictable environment
- Nutrient deficiencies, lack of essential minerals in the soil.
- Competing with other plants sunlight and space.
- Disease: Fungal or bacterial infections
- Habitat disruptions due to human activities.
- Exposure to pesticides and harmful chemicals.

MOTIVATIONS

- Survival: Focus on acquiring resources and defending against threats.
- Reproduction: Produce flowers, seeds, or spores to ensure the next generation thrives.

THE ROLE IN THE SYSTEM

- Produce oxygen
- Habitat and shelter
- Soil conservation
- Water cycle and climate regulation
- Food and medicine

WORM 'SILENT ENGINEER'

CHARACTERSTICS

- Uses touch to communicate and influence each other's behavior
- Essential decomposer, feeding on decaying plants and organisms.
- Sensory capacities include sensing pressure, light, vibrations, temperature, chemical sensing, and chemoreception.

LIFESTYLE & BACKSTORY

- Resides in moist, loose soil environments where darkness prevails.
- Thrives within organic matter-rich habitats, contributing to microbial breakdown and soil health.
- Plays a vital role in ecosystem stability and nutrient cycling.

NEEDS

- Physical: Food in the form of organic matter, moisture for hydration and to maintain physiological functions, loose soil for movement and habitat construction, darkness.
- Relational: dependence on organic matter breakdown for nutrition and soil health, desire for stability and consistency in habitat.

FRUSTRATIONS

- Facing habitat disruptions due to human activities.
- Struggling with degraded soil conditions.
- Exposure to pesticides and harmful chemicals.

MOTIVATIONS

- Seeking organic matter for nutrition.
- Striving for stability and consistency in their habitat.
- Communication within their peers for mutual benefit.

THE ROLE IN THE SYSTEM

- Decomposition
- Food source for other organisms.
- Creating earth structure that promotes healthy plants growth.
- Soil aeration and drainage.
- Recycling nutritients.

Figure 27: Third iteration: MtH personas

Our approach to the MtH personas was still innovative, as we adhered to the criticism of the traditional personas framework (Nielsen, 2009). The critique of the traditional personas tackles the redundant focus on the persona's demographics, the unnecessary use of static stock photos, and fictionalisation, for example, giving the personas fabricated names (Nielsen, 2009). To comply our personas with this criticism, our MtH personas do not use any of the criticised metrics but stick to the suitable characteristics from the user mindsets (such as the inspirational name), the MtH Design probe (such as the role in the ecosystem), and take new coherent characteristics from the non-human persona (such as motivations and frustrations).

4.2.4.6 Reflections

Defining the MtH personas was a complex and challenging process. It highlighted the discrepancy in balancing the human and non-human elements equally. We focused too firmly on keeping the holistic and relational worldview (Albarrán González, 2022), which recognises the needs and emotions of all beings in the same way, and attempts to treat all beings as persons (Gonzales, 2015). The intention to represent all the MtH actors on the same level, while maintaining the legibility of all the collected data, underscored the nuanced difficulties in ensuring an inclusive and equitable MtHC design process. After the first and second iterations and merging the tools and metrics differently, we needed to take a step back, and that is where the non-human personas became useful.

On the other hand, exploring the different service design tools for MtH purposes was enriching, as it allowed us to experiment with the nuances of the user mindsets, service-oriented personas and MtH actors.

4.2.5 User Journey Maps

A user journey map is a common tool for illustrating the story of a specific actor in a sequence of steps; the primary focus is on the actors' experience (Stickdorn et al., 2018). Based on the data gathered during the service safaris and the field trip in the previous Discover phase, we created research-based current-state journey maps (Stickdorn et al., 2018) to visualise existing sustainability-focused educational services. We used the user journeys to visualise students' experiences during the workshop at Aalborg University (Figure 28) and the Growing Green Skills course in Avnø (Figure 29). This tool allowed us to define essential moments and find opportunities and pain points. The user journey maps can also be found in Appendix I.

Student at Avno's Growing Green Skills course

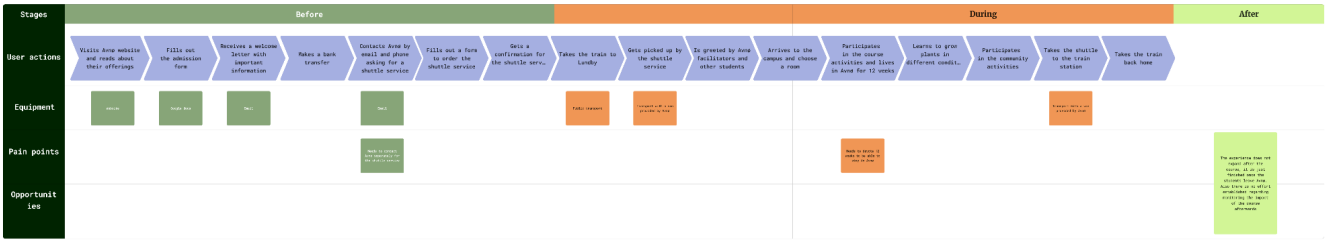


Figure 29: User journey of the student at the Growing Green Skills course

Student at Aalborg University workshop

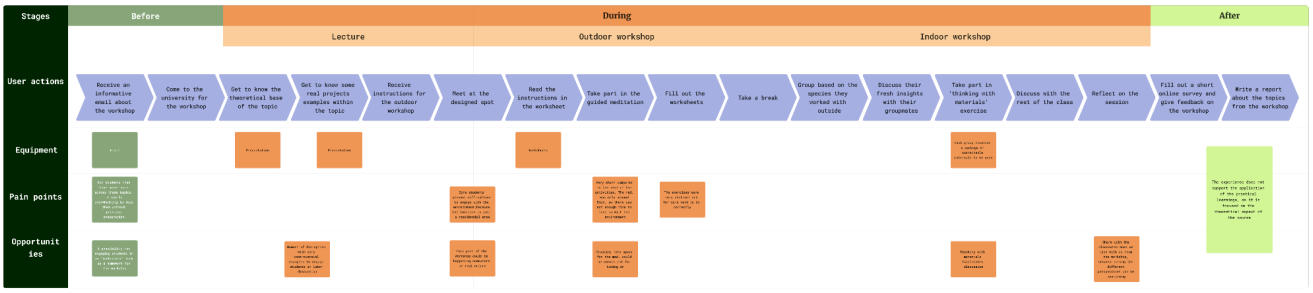


Figure 28: User journey of the student in the course at Aalborg University

Opportunities from the Explorative Service Safari User Journey Map

- Conducting an educational activity in nature.
- Hands-on experiences facilitate learning.
- Group experiences are valuable because they can learn from each other and share ideas.

Pain points from the Explorative Service Safari User Journey Map

- Difficulty connecting with the environment in a residential area and overwhelming noises from a construction site.
- Time was very limited with many of the activities, so they had to be done in a rush.

Opportunities from Avnø's field trip

- The educational course does not consider what happens after the students leave the ecovillage. There is an opportunity to expand the learning moments after the course to ensure the student has the necessary support to apply and gain knowledge in their daily lives.
- No effort has been established to monitor the course's impact afterwards. Establishing a connection with the students after they leave Avnø would also benefit Avnø, as they could measure their impact.

Pain points from Avnø's field trip

- Avnø is not reachable by public transport, the students need to take public transport to the closest town and reserve a shuttle service separately from booking the course.
- The booking system needs to be simplified. It requires the students to take several steps to complete the course purchase at different times.

4.2.5.1 Reflections

Our intention with the user journey maps was to include details of what we experienced during the service safaris. The user journey from the explorative service safari was created shortly after we participated in the workshop, and at that time, we still had the initial design brief in mind. It also focused excessively on the course content, which was not in our scope. Mapping the user journey of Avnø's student was, therefore, more on point and revealed valuable opportunities for improvement.

The user journey of Avnø's student identified opportunities that resonate with the findings from the in-depth expert interviews presented (see Chapter 4.1.5). These interviews highlighted the need for a course with lasting impact, as experts noted that students often struggle to retain the relevance of newly acquired knowledge upon returning to their daily routines.

4.2.6 Preliminary Reflection

During the Define phase, we narrowed the scope of our project and defined a MtH target group along with meta-insights, which served as the service's foundational pillars; this allowed us to focus more precisely on the upcoming ideation phase. The MtH Design probe (Rosén, 2021) was the most design-related noticing tool we encountered in this thesis and allowed us to characterise the non-human actors more profoundly. Even though noticing is an internal process, the MtH Design probe allowed us to externalise it.

Our time commitment to certain parts of the Define phase was superfluous. Specifically with the ecosystem map, the insights analysis, and defining the MtH personas. The ecosystem map was a

challenging tool as it required us to make many decisions on approaching the MtH actors' systemic relations and which value exchanges to map between them. During the insights analysis, we attained in our effort to cluster many raw quotes with the affinity diagram, which could have been more time efficient using other tools, such as colour coding. Colour coding might have allowed us to arrive at the clusters and identify the patterns more systematically.

Defining the MtH target group as MtH personas proved particularly challenging due to our strong intentions to maintain the relational approach (Hromek, 2020), communicating all the MtH personas on the same level and through the same metrics. In the end, we took a step back and used the framework of the non-human persona (Tomitsch et al., 2021) to mix its metrics with the previous iterations when defining the MtH target group.

Moreover, user journeys have proven to be powerful tools, helping us identify opportunities and pain points we could address and improve in the subsequent ideation phases.

4.3 Develop

In the Develop phase, we focused on applying noticing when ideating and designing the concept of a sustainability-focused educational service based on the meta-insights, the MtH personas, and the user journey.

The tools and methods used were the following:

4.3.1 Ideation Workshop

4.3.2 Ideation Session

4.3.3 Scenarios

4.3.4 Service Concept

4.3.5 Preliminary Reflection

4.3.1 Ideation Workshop

It was decided to conduct an ideation workshop (Harley, 2017) with service designers and relevant experts. The goal of the ideation workshop was two-fold: Firstly, we wanted to inject a diversity of less biased perspectives into the beginning of the ideation, allowing a richer diversity of ideas. Secondly, having multiple service designers and relevant experts with different skills noticing together increased the chances of sparking different nuances and using them for service development (Rosén, 2022). Organising the workshop also allowed us to gather immediate feedback. All the materials from this workshop can be accessed in the Appendix J.

4.3.1.1 Preparation and Goals

We contacted our network to gather participants who would be service designers or experts related to the MtH actors. We adopted the convenience sampling method to gather the participants, choosing people who were easy to contact and responded promptly (Bjørner, 2015). The workshop was prepared so the participants could experience noticing through different prompts and create space for noticing to impact their ideas. The prompts were also made to allow the participants to notice from an analytical point of view, like in the Mushroom at the End of the World (Tsing, 2015).

This workshop had several goals:

- Generate ideas with experts and service designers on how the value exchanges between the different actors could frame the service offering.

- Use the concept of human spokespeople for non-human actors (Metcalfe, 2015).
- Using Multispecies Design Cards from Metcalfe (2015) to evaluate and reflect on the ideas.

4.3.1.2 Execution

The workshop was conducted outdoors because an open and natural setting was needed to facilitate a good environment for noticing (Figure 30). The session was designed for four participants, but at the last minute, one of the participants cancelled, so one of us took all the facilitation tasks, and the other became a participant. We initiated the workshops by thanking the participants and encouraging them to feel safe, establishing a “there is no right or wrong answer” atmosphere.

Figure 30: Ideation workshop setting

Noticing exercise

The first exercise was a mixture of sense-based, global and focal noticing (Livio et al., 2019) and an exercise Detaching meaning from the Noticing Entanglements Podcast tool (Nicenboim, 2023). We played the exercise on a speaker and suggested that the participants move freely while listening to it (Figure 31).

Figure 31: Ideation workshop - Noticing exercise

Quotes from the participants after the exercise:

- “Relaxing, close to mindfulness.”
- “I noticed many details that I would have never noticed if I did not stop and thought about it.”
- “I noticed some things that I usually do not notice.”
- “In the beginning, it was a little bit hard to focus, it took some time for me to slow down and get into that observing mode.”

- “It felt almost like an effort I had to make, and your hand wants to go for the phone all the time.”
- “It is crazy that we feel more connected to technology than nature.”

Icebreaker game: What if the world was dominated by bees?

This activity aimed to broaden the participants’ mindsets and encourage creativity while introducing them to the MtH approach. The outcomes were the following:

- The participants diminished humans' roles to inferior ones; one participant even suggested that humans would be working for bees.
- Everyone thought that the world would be better with bees dominating it (Figure 32). Is that a bias based on the fact that we give bees a lot of importance? How would that icebreaker turn out if we asked, “What if the world was dominated by worms?” It is possible that the halo effect (Thorndike, 1920) impacted the outcome of this icebreaker.

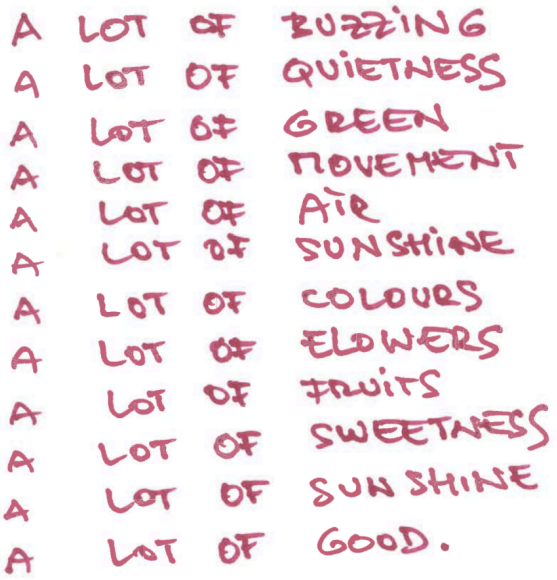


Figure 32: Ideation workshop - Ice breaker exercise

Ideating as spokespeople

First, the MtH personas (see Chapter 4.2.4) were handed out to participants, and they were given time to review them. They took notes to better understand and process the information. Then everybody was asked to become the actor's spokesperson (Metcalfe, 2015) and present themselves to the others as if they were that actor (Figure 33), for example, “I am a bee, and I need to pollinate to feed my hive community”.

Figure 33: Ideation workshop - Ideating as spokespeople

Some participants gave human names to their actors, so we worked with Jimmy, the human, Bob the bee, Plants of Denmark, and Jo the earth worm. Giving the names was not part of the instructions, it was something that the participants did to connect even better with the specific actor, to humanise it.

After that, we presented the participants with three strategic prompting questions (Hyman, 1979). The questions were formulated to suggest contemplating the interconnectedness of the different actors

and their roles in the system (Tsing, 2015; 2021) and assist the participants in gaining a deeper understanding of them (Livio et al., 2019).

a) Which connections are you aware of between the species?
b) Which activities could enhance the value of these connections?
c) Which challenges could appear?

a) Which connections are you aware of between the species?

Here, participants visualised the connections and discovered that everything is connected. At the same time, they could easily map the connections. The outcomes were two different visualisations of the connections (Figure 34).

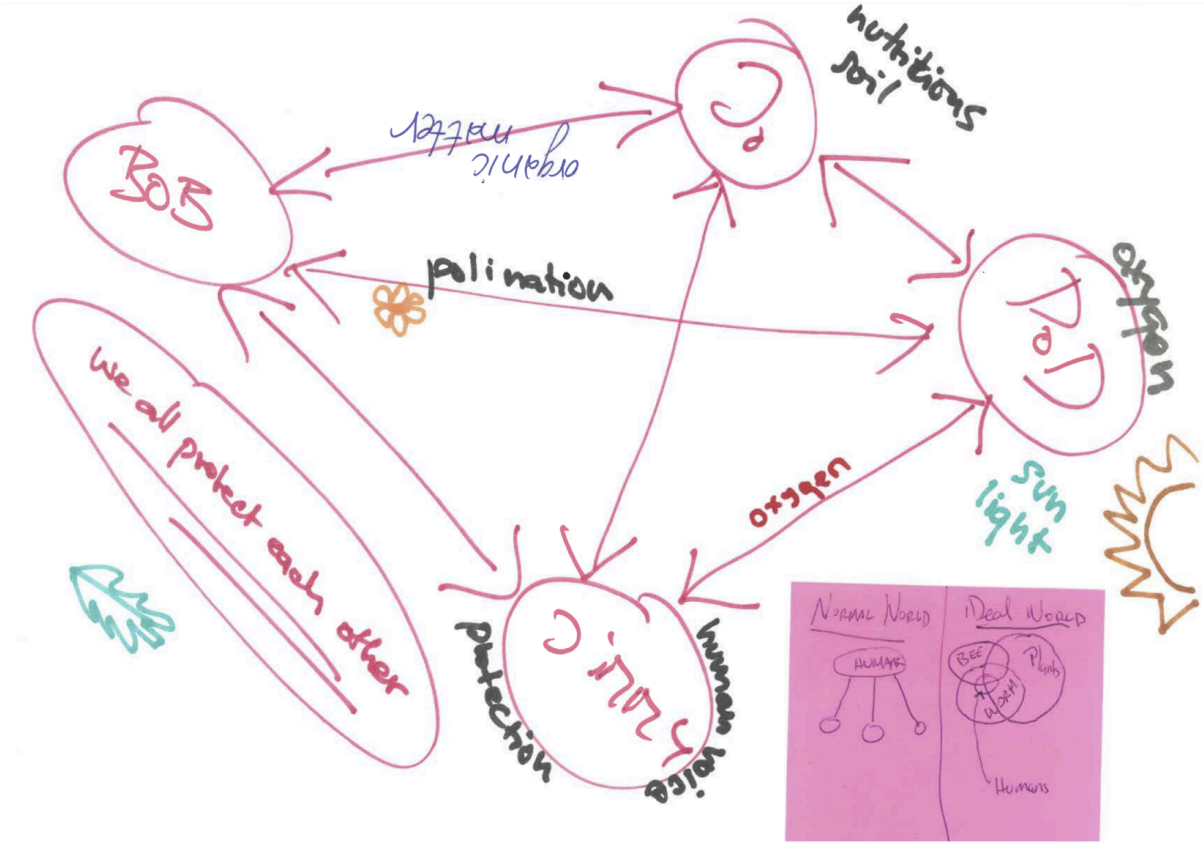


Figure 34: Ideation workshop - Connections between the species

b) Which activities could enhance the value of these connections?

The answers from the participants:

- “Bring humans and nature together.”
- “Educate people to grow their own veggies.”
- “Organise activities among young generations, use tools to communicate like TikTok.”
- “Organise a market showing the benefits of organic veggies.”
- “Create stories that make us like other species.”
- “Integrate people's interests with nature. For example, with cooking and nature, people could collect veggies and create recipes. Not everybody is interested in sustainability/nature, but everyone has hobbies or things they like. So the approach could be to integrate things they already like with sustainability. People of different ages. Find other ways. Part of an activity that they already like. Inject the awareness into some part of their life.”

c) Which challenges could appear?

The answers from the participants:

- “People are busy or have a lack of interest.”
- “Maintaining the connections among the actors. You might be aware of them, but when you just do not see them or work on them, they are easy to forget.”
- “Making sustainability part of people’s careers, for example, one of the participants mentioned she had a lecture on sustainability at her work, but they only showed them videos, and she would have liked to do something more hands-on.”
- “After watching a video, the impact does not stay for long. You can watch a video on how to be more sustainable, but you watch it, feel bad for twenty seconds, and then go back to your

normal life and forget. But experiencing something personally is different."

- "I think working with the connections, drawing them out, is great because now we see the connections. Normally we do not see them; even if we know about them, we keep forgetting them. The connections need to be more visible, and more reminded of. The awareness just really needs to be maintained."

Evaluation Cards

The last exercises required the participants to use cards with topics chosen from the Multispecies Design cards (Metcalfe, 2015). These cards aimed to stir the discussion and make the participants evaluate their ideas (Figure 35).

Figure 35: Ideation workshop - Evaluation cards adapted from Multispecies Design cards (Metcalfe, 2015)

What is missing in human habitat for the given non-humans to thrive?

- "They are not lacking in anything; we are lacking in changing our mindsets. We need to solve the problem: a lack of awareness."

- “Education, I manage to be more empathetic when I read about them.”
- “What is missing is the acknowledgement of people to the importance of nature.”

Avoid domestication.

- “We should approach them with respect and create a supportive environment.”
- “We should support them and not try to interfere, but respect the natural processes.”

Respect the actors’ needs as well as their wild nature.

- "They also have needs and all kinds of senses like I do. Now we know that we need to do more.”
- “The personas are a good way to humanise the actors, to realise how much we have in common with our needs and frustrations.”
- “If we find the connections, we can generate awareness. The first step to awareness is having this connection.”

4.3.5.3 Outcomes and Reflections

During the workshop, we intended to guide participants to notice from a broad perspective to a more specific one. All the reflections mentioned how valuable it was to do the ideation session outside.

The first activity, the noticing exercise, curated the tone of the workshop and guided the participants to slow down, look around, and reflect. We received positive feedback on this activity, serving its purpose of tuning with the environment. However, some participants mentioned they would have liked to spend more time on it. We decided to do this activity in a short time frame, as it was their first encounter with noticing, and we wanted to ensure all

participants felt comfortable with it. The outcome of the activity could have been different if they had had the opportunity to engage more in the noticing exercise; perhaps they could have mapped stronger connections, or different ideas could have arisen.

The purpose of the icebreaker was to create a transition between the noticing exercises and ideating as spokespeople. The participants tried seeing the world through MtH lenses. Interestingly, all participants imagined the “new world” as better. They thought bees would bring better conditions for other species as well.

At the beginning of the “ideating as spokespeople” activity, we gave the participants time to examine and process the personas. It was a smart choice because they had the time to truly apprehend them. Even though the participants were asked to become the spokespeople and stuck to their roles, their backgrounds played a crucial role in approaching this activity. The service designers went directly to creating an ecosystem map, while the expert represented the connections.

Overall we received positive feedback on the ideating as spokespeople and the personas, as well as on the strategic questions. With the third prompting question about possible challenges, the participants automatically ideated about the possible challenges of humans implementing sustainability into their lifestyles. However, the outcome was about something other than noticing the challenges between the actors. It would have been interesting to guide them to ideate about the challenges of the actual interconnections. That would have been useful for digging deeper into the core issues of the chosen entanglement.

The ideas from the ideating as spokespeople activity would be used during the next steps of the process.

4.3.2 Ideation Session

A two-hour ideation session was conducted among us as a starting point to create the first conceptual ideas for the service. The session was divided into two sections, exploring different ideation methods. During the session, we went through a convergent moment where we opened up the scope to many possibilities to a more convergent moment where we selected the more feasible ideas and tried to drive the concepts into more concrete service encounters. The foundation of the ideation session comprised the meta-insights (see Chapter 4.2.3.4), insights from the MtH Design probe (see Chapter 4.2.4.2), the opportunities and pain points identified through the user journey (see Chapter 4.2.5), and ideas from the ideation workshop (see Chapter 4.3.1).

4.3.2.1 Brainwriting & Brainstorming

In brainwriting, participants write their thoughts or observations on paper individually and silently. This quiet and reflective process aims to produce diverse concepts (Stickdorn et al., 2018). Brainstorming is a group exercise that generates diverse ideas quickly. It is beneficial for creating a starting point for work (Stickdorn et al., 2018). Combining these two methods, we aimed to develop as many ideas as possible.

We spent thirty minutes writing down all the ideas that came to us on post-it notes. We then shared our ideas and brainstormed one after another to elaborate on and build on each other's ideas (Figure 36).

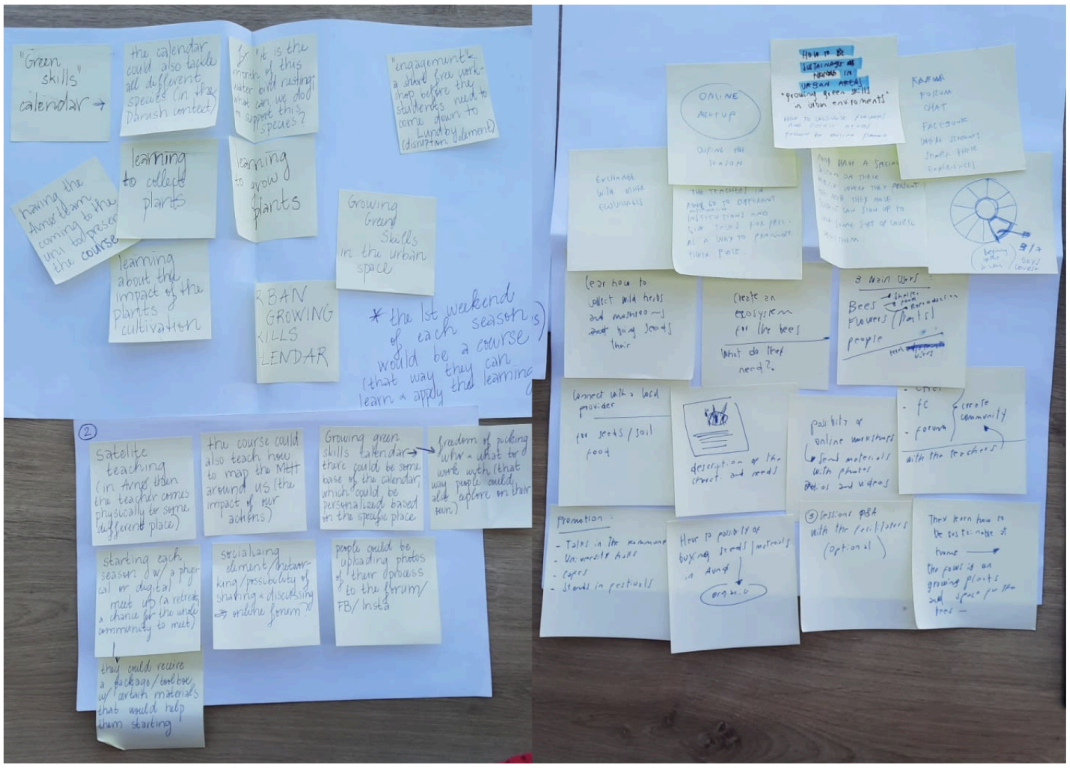


Figure 36: Ideation session - Brainwriting & Brainstorming

4.3.2.2 Idea Portfolio

We initiated a more divergent process, recognising the need for a tool to cluster and analyse the collection of ideas, laying the groundwork for well-informed decisions. An idea portfolio is an analytical selection method that offers a fast and reliable approach to sorting ideas or concepts. This method involves classifying ideas on a graph based on two variables that target different needs (Stickdorn et al., 2018).

We selected two insights from our meta-insights (Figure 37) that were the most suitable for analysing the two variables: accessibility and holistic approach. Accessibility, which we define as the ability to be reached, makes information and activities meaningful and usable for as many users as possible. From our data,

the holistic approach considers the user experience as an interconnected series of moments, emphasising the importance of understanding how these moments influence each other.

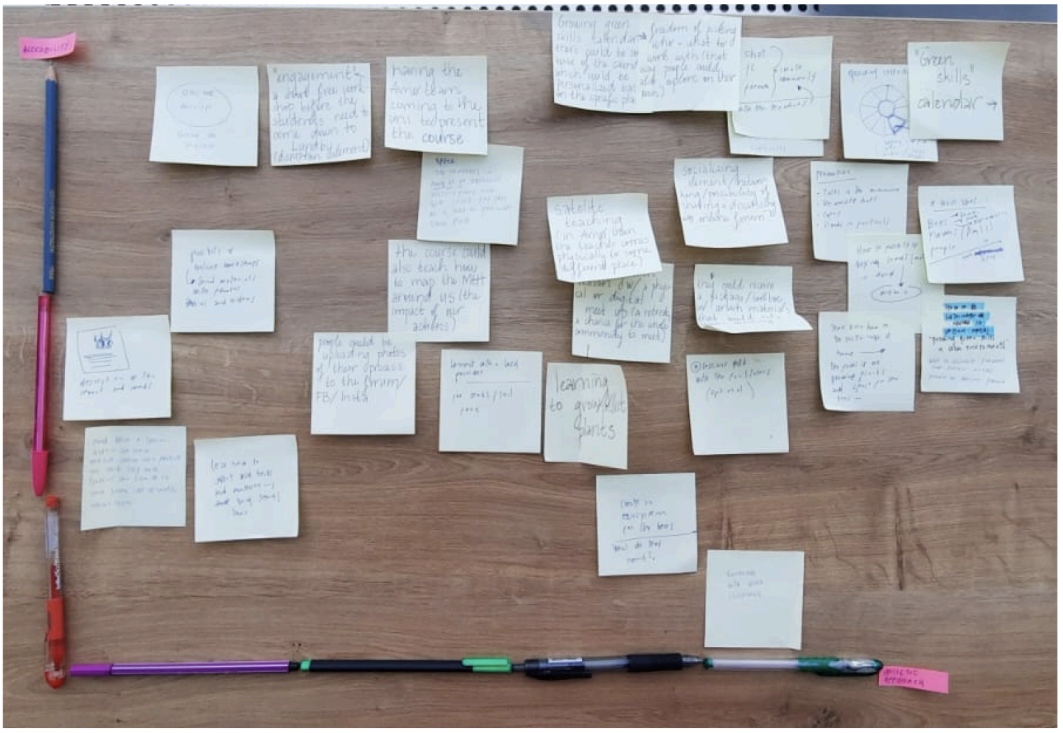


Figure 37: Ideation session - Idea portfolio

After placing all the ideas along the axes, we identified those at a higher level and categorised them based on their potential chronological order (Figure 38). This process enabled us to develop a concept containing various touchpoints.

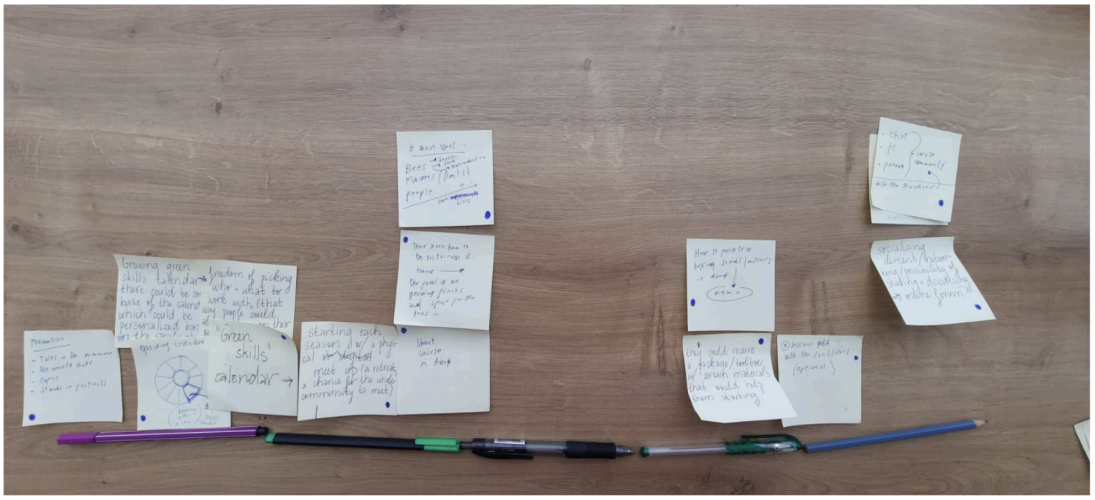


Figure 38: Ideation session - Organisation of chosen ideas

4.3.2.3 Outcomes and Reflections

The following ideas were evaluated as promising and divided into groups based on their position on the timeline:

Before the course:

- A calendar, which the user accesses when choosing a course. It would contain information on different courses' content related to different seasons. That suggests that the courses would have season-specific content. For example, the Growing Green Skills course would show different plants to cultivate in the different seasons.
- A quiz, through which the users can examine themselves to determine the type of sustainable educational course most relevant to them. The quiz allows users to personalise their learning about sustainability, which manifests the freedom to explore and learn in their unique ways.

During the course:

- Socialising elements - networking, possibilities of sharing and discussing.
- Having the possibility of buying organic materials in Avnø. So students have what they need to apply the knowledge when they return. Also, ensure they buy exactly what they need and what the plants and earth worms need.
- Connection with Avnø's local farmers, they provide the materials.
- Growing plants that attract bees. Plants that are rich in nectar.

After the course:

- The students cultivate plants while creating an environment for honey bees and earth worms to thrive.

They also possess more knowledge of the connections within the ecosystems surrounding them.

- Avnø engages the students in their online community or possibly within the eco-villages online networks.
- Sometime after the end of the course, bi-weekly Q&A sessions with Avnø facilitators start so that the students feel supported or can get advice while creating their small gardens.

4.3.3 Scenarios

The first representation method used to demonstrate the new service concept was scenarios. Scenarios are visions of possible situations, encompassing a range of moments throughout the service's touchpoints or potentials for transformations that could impact the system being studied (Unep. Division Of Technology, Industry And Economics, 2009). They can narrate how a service works by portraying the interactions between a user and the service (Carroll, 2000). We used the scenarios equally as an ideation tool to refine the service concept.

To communicate the scenarios, we chose written user stories (Stickdorn et al., 2018). We involved noticing in the two scenarios by suggesting the relations between the different actors, and developing narratives that acknowledged the different actors' needs.

4.3.3.1 Student

Andy is interested in practising eco-conscious living in all aspects of her life, educating herself on the spiritual aspects and daily practices. She has already participated in events focused on sustainability and feels motivated to make changes in her life, but she is still determining where to start. While studying in the

library, she sees flyers for Avnø and the promotion of their education on sustainability. She feels intrigued and takes the flyer to check it later. When she opens Avnø's website, she reads about the eco-village and sees its various courses. She is not sure which course to take. Then she is the 'Sustainable-me' quiz. She fills it out based on her interests and her experiences. She gets the result saying she should focus on plant care and cultivation. Then she accesses the Nature-inspired Calendar. In the calendar, she sees the eight different seasons and how the course focused on plant care and cultivation varies through the different seasons. She feels relieved because she sees she can join in any of the seasons and choose what interests her the most. She wants to learn how to grow tomatoes at home, but the calendar shows the season has passed. However, she can still sign up for the course and learn how to plant tulips or pansies. She can talk to people with similar interests and learn the basics for starting her small garden in front of her house. She signs up through the website, reserves the shuttle service and makes the payment. Excited, she embarks on her journey to Avnø for a weekend stay. Arriving at Lundby by train, she is warmly greeted by the shuttle driver. As she arrives at Avnø, she meets the local community and other participants, instantly making her feel welcomed. During the weekend, she participates in workshops, learns about different plants, and gets hands-on experience growing and caring for them. She learns about the roles of the different plants in the ecosystem and the importance of their cultivation for other species, such as earth worms and honey bees. She is very excited about coming back home and applying these new skills. On the last day, she buys seeds and gardening equipment at very convenient prices. She feels good because she supports the local farmers.

A couple of days later, she starts to plant the seeds she received at home, applying the knowledge she got during the weekend course. A

couple of weeks later, she is a bit unsure if her plants are prospering, so she shares her worries in the community forum, and luckily, she gets answers from Avnø members that everything is fine. Two weeks after the course, she participates in an online meeting with the course facilitator and the other participants, where they discuss and share their experiences. Two weeks later, there is one more online meeting, but she doesn't have time to attend. Some weeks later, she notices her garden is full of bees and flowers. She thinks of returning to Avnø for a course at the beginning of the next season, which according to the calendar, happens in two months.

4.3.3.2 Honey Bee

The bee flies around the neighbourhood, searching for pollen and nectar to feed the larvae in its hive. This is important now; winter is coming, and the community needs reserves for the cold months. It finds Andy's garden, with some flowers, and the bee starts to collect as much nectar as possible and dances straight upward to call the other bee workers. They collect all the nectar, return to the hive, and feed the larvae. After a week, they return to this garden and see more flowers, so they collect nectar again. They return to the hive and are ready for the winter.

4.3.3.3 Reflections

Generally, the scenarios were very efficient tools for defining specific moments of the service concept. They also organised our ideas chronologically and allowed us to understand if they were coherent in time. They allowed us to define what happens throughout the different touchpoints. Even though we adhered to the critique of personas and did not give them human names (Nielsen, 2009), we decided to use a human name in the scenario for readability.

After creating the scenarios, however, we had to acknowledge that they present a very idealistic perspective of the service, and they might need to offer more flexibility and efficiency to communicate the interconnectedness and dynamics of the MtH actors. Trying to involve noticing created another level, at which we tried to apply the data from the MtH personas to the scenarios.

4.3.4 Service Concept

This chapter explains how the service concept addresses meta-insights, insights from the MtH Design probe, and opportunities and pain points from the user journeys.

Meta-insights:

1. **Accessibility:**
    - The timeframe of the course is accessible and manageable because the original course lasts 12 or 24 weeks, so everyone cannot join.
    - Making the shuttle service integrated into the booking process (previously, the students had to fill out an extra form for it)
    - Avnø advertises the courses in public libraries, university halls, cafes, municipalities, festivals and public events.
    - The digitalisation of a part of the course makes it more accessible.
2. **Actionable knowledge:**
    - The students can apply the knowledge in their daily lives.

- The users consider actionable knowledge to be relevant to their context.
- Hands-on experiences in the course.

3. **Exploratory mindset:**
    - The calendar and quiz allow users to explore something about themselves regarding sustainability.
4. **Holistic approach:**
    - Provide sustainable materials from local farmers to buy after the course so they can start growing when they arrive home. Finding organic products in some places is difficult, so they get them in Avnø.
    - Even though the course in Avnø lasts 4-7 days, the learning process with the community does not end when the students leave Avnø. It expands to digital feedback sessions after the physical course.
5. **Freedom and flexibility:**
    - The Nature-inspired Calendar: Students can enrol in different courses according to their interests and schedules. The courses are offered with different starting dates throughout the year.
    - Flexibility to continue the course where they live. The follow-up meetings are not mandatory.
6. **Slowness and connection:**
    - A course in nature.
    - The course lasts several days and therefore allows the participants to immerse fully.

MtH Design probe

The service allows the students to buy organic materials that optimise the habitat for their well-being. The service educates the students on the importance of these species and creates a safe

environment for them. The service promotes nurturance between the different species.

Honey Bees

For honey bees, supporting and fulfilling their community roles is crucial. The service concept supports these needs by expanding their habitat and food resources. By doing so, they can feed themselves and their community, a goal they all unite for.

Plants

With the Nature-inspired Calendar, we ensure that the service users grow plants that make sense for each season, respecting their growth, development, and responses to environmental conditions.

Earth Worms:

The service supports the users by creating a habitat in which they thrive.

4.3.5 Preliminary Reflection

During the Develop phase, we aimed to formulate a service concept grounded in the insights gleaned from prior phases. To achieve this, we conducted an ideation workshop involving service designers and a relevant expert, and an ideation session among ourselves.

In the ideation workshop, we encouraged participants to notice their surroundings outdoors, utilised MtH personas as practical visualisation tools and introduced the concept of spokespeople (Metcalfe, 2015), which proved successful. After trying the spokespeople roles, the participants stated they felt more empathy

for the different actors than before. However, participants also tended to anthropomorphise the MtH actors, contrary to our intentions to avoid such humanisation, though it seemed inevitable.

In our efforts to address all the insights and MtH needs, we left behind the possibility of innovation when ideating on the service concept. Our ideas tended to be pragmatic and focused on fostering holistic interactions among the actors, potentially limiting our creativity. We prioritised creating a service that facilitated value exchanges between the MtH actors.

In considering how we addressed the needs of each non-human actor, we may have given less consideration to the needs of earth worms, perhaps due to their less visible nature. While we noticed plants and bees during various exercises, earth worms were only noticed during the field trip to Avnø, potentially influencing our approach to addressing their needs in the service concept.

4.4 Deliver

The final stage of the Double Diamond model is the Deliver phase, during which the ultimate concept is translated into tangible service design deliverables. Various representation methods were employed to communicate the service effectively from diverse viewpoints.

Tools and methods used:

4.4.1 Deliver Approach

4.4.2 Storyboard

4.4.3 Actors Map

4.4.4 User Journey

4.4.5 Service Blueprint

4.4.6 Preliminary Reflection

4.4.1 Deliver Approach

To present the outcomes of the service concept in this thesis and for Avnø's representatives, we defined an approach to explaining the service in different levels of detail. Multilevel service design (Patricio et al., 2011) guided us in this Deliver phase to define the service offering across three layers: service concept, service system, and service encounter. Various representation methods were explored to communicate different levels of detail and to communicate the potential of the relationships and roles among the actors involved (Clatworthy, 2017)

To comprehend the value of the concept and its steps, we drew a storyboard (Stickdorn et al., 2018), focusing on illustrating the concept from a user's viewpoint during the booking process. An actors map was employed to provide a comprehensive overview of the involved actors, considering perspectives from MtH viewpoints. This approach facilitated an understanding of how various actors and stakeholders may hold different levels of relevance to each other within the service system. For a broader understanding of the concept, a user journey from the student perspective was utilised to map out an overview of the steps and touchpoints involved in utilising the service. This journey was more detailed using three service blueprints of the three main stages of the service - before, during, and after, which provide the most thorough understanding of the technical aspects of interactions between the user and the service.

4.4.2 Storyboard

A storyboard (Stickdorn et al., 2018) was chosen as a convenient tool to demonstrate the new flow of the booking process

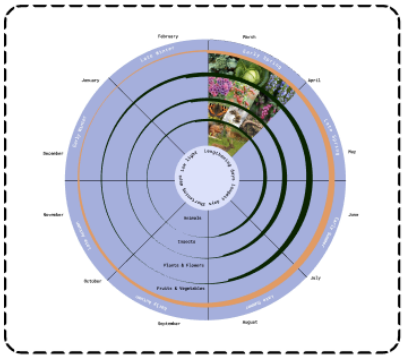
with all its details, the Sustainable-me Quiz and the Nature-inspired Calendar (Figure 39).

Andy goes to Avnø website.

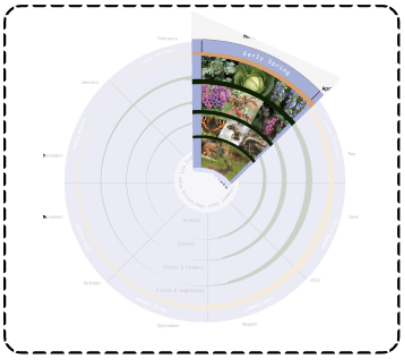
She sees the options of the courses, but she also sees The Sustainable Me Quiz.

She fills out the quiz.

She gets the result.

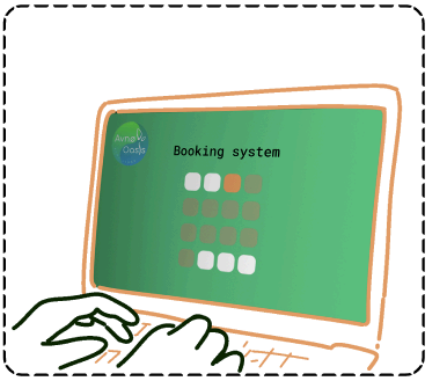


She accesses the Nature-inspired Calendar and explores it to decide when to join.



She clicks on the early spring season.

Reads about the courses, facilitators, and non-human actors for each season.



She opens the booking system.

She verifies the course does not interfere with her university classes.

She books the course with the shuttle service.

She receives an email with a welcome letter.

Figure 39: Storyboard - Student booking the service

4.4.2.1 Outcomes and Reflections

The storyboard portrayed a high level of detail and allowed us to illustrate the specific interactions of the students with the digital touchpoints. It was an ideal tool to illustrate a moment of the service where visualisation is very important. By utilising images, we consider the booking steps better represented than simply utilising words.

4.4.3 Actors Map

The second representation method, the actors map, shows a system's high-level network of actors and components (Morelli & Tollestrup, 2007). It enables the categorisation of actors based on their roles within the service. We used the same MtH actors which we mapped in the ecosystem map (see Chapter 4.2.2). Within this tool, we combined the outcomes of our noticing, previously translated into the MtH personas, communicating the networks of relations that the different actors cultivate between each other (Tsing, 2015).

Each MtH actor was situated at the centre, with other service actors arranged around them. We opted to develop a separate map for each MtH actor to discern their varying influences and levels of importance and represent the service from MtH perspectives. The three levels of the actors map are service level, cooperators, and support entities. The service level represents all the actors that have a direct influence on the MtH actors that are in the centre. The cooperators level consists of actors who are not under the direct control of Avnø but still impact and support the service operations. The support entities suggest a network, and they are not intertwined with the direct functioning of the service, even though

they can have an impact. They control which activities can be done in the area to ensure ecosystem conservation and support the service funding.

Actors map - Plant (Figure 40)

For the plant, local farmers are cooperators because they provide the growing materials to the students, organic and without pesticides, that allows plants to have a safe environment to grow. At the same time, the local farmers are not under Avnø's direct control, they are equally cooperators.

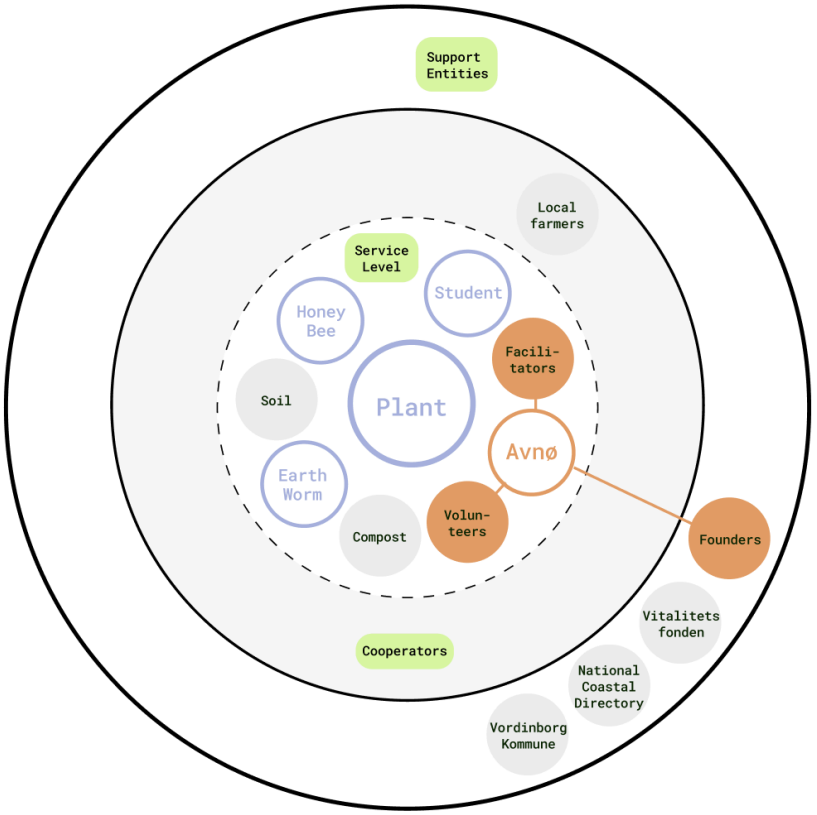


Figure 40: Actors map - Plant in the centre

Actors map - Student (Figure 41)

The student, as the service user, has the most actors involved. The plant is part of the service level as it interacts with the student directly, while the honey bee and earth worm are cooperators. The student has the bank as an extra support entity.

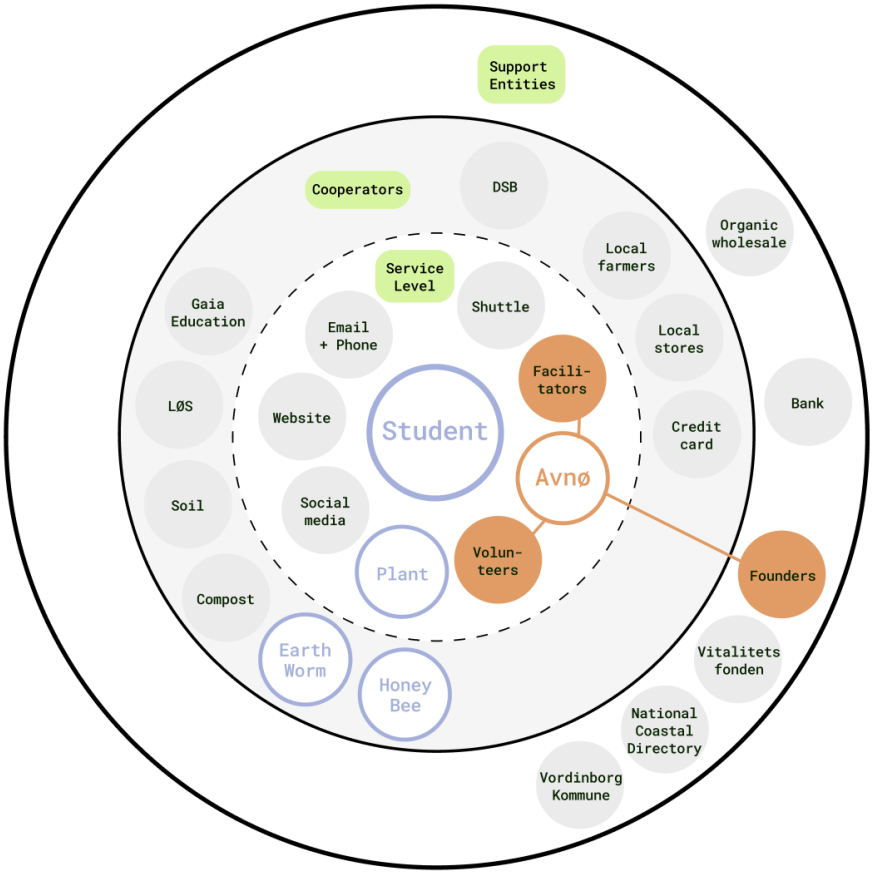


Figure 41: Actors map - Student in the centre

Actors map - Earth Worm (Figure 42)

The earth worm and plant actors maps are very similar, which reflects their intricate relation and dependence.

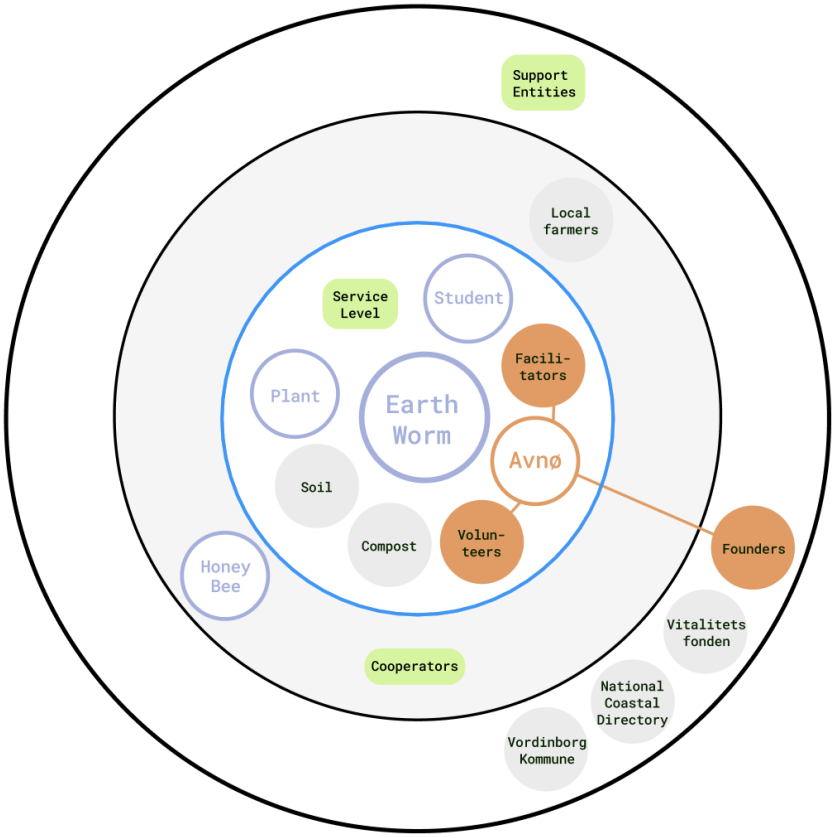


Figure 42: Actors map - Earth worm in the centre

Actors map - Honey Bee (Figure 43)

The map of the honeybee was the most different one, as probably the actors with whom we had less influence over it. It is possible to see that the honey bee and earth worm do not relate too much. They do not have direct interactions, but the connection is visible through the plant actor because they both need the plant.

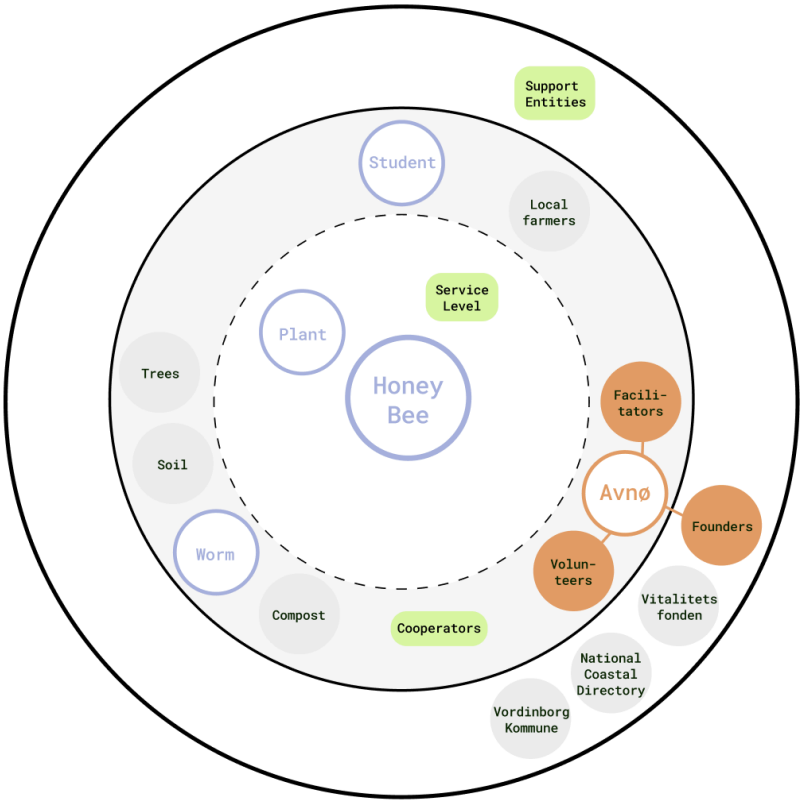


Figure 43: Actors map - Honey bee in the centre

4.4.3.1 Outcomes and Reflections

The four different actors map allows one to compare the service system from the MtH standpoints and conclude several findings.

Firstly, it is apparent that the support entities are identical for the non-human actors but generally comparable for all the MtH actors. What changes is the position of the MtH actors in each other's map and the number of actors. The actor maps also analysed the roles and contributions of each actor within the service system. However, it also produced challenges in the alignment among the actors, and occasionally, it was almost speculative to decide to which level the actors belonged.

The actors map helped establish a categorisation clarifying the relationships and interactions between different actors. The student plays a crucial role for the plant and the earth worm, while for the honey bee, it is a cooperator. That is because the student supports the creation of an ecosystem for the honey bee, as well as the local farmers and Avnø's facilitators.

4.4.4 User Journey

To show the general flow of the service from the user's perspective, a user journey was created (Stickdorn et al., 2018) (Figure 44).

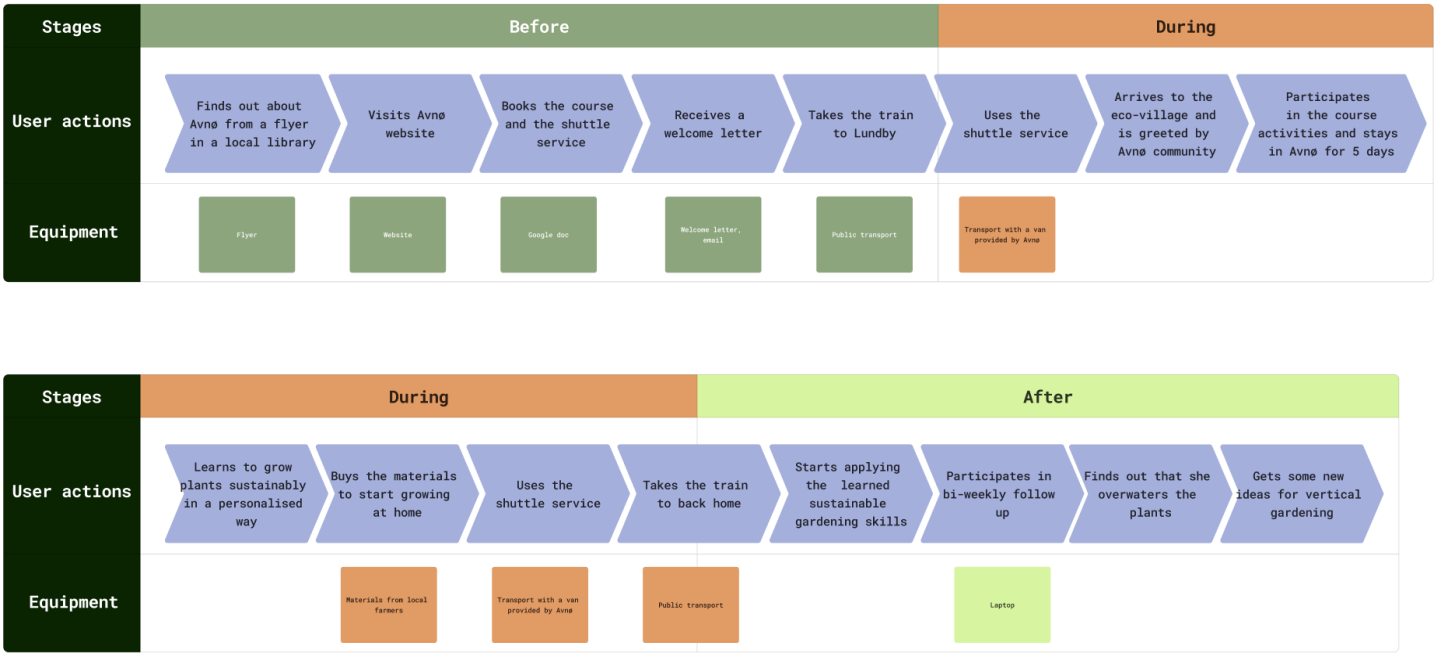


Figure 44: User journey of student

4.4.4.1 Outcomes and Reflections

The user journey map was an assertive tool for visually narrating the students' experiences and touchpoints across sequential steps. It helped us have an overview of the different touchpoints across the service offering chronologically and set the basis for creating the blueprint.

4.4.5 Service Blueprint

The service blueprint presents the most detailed level of interactions within a service, visualising both front-stage and back-stage interactions (Shostack, 1982). It portrays detailed insights into the specific interactions over time, ensuring a comprehensive understanding of the service offering and actors' roles within specific steps.

With the service blueprint, we aimed to map the various stages of the service, including touchpoints, user actions, frontstage activities, backstage operations, and supporting processes. The scope of this blueprint spans from the student's initial encounter with the service to the final interaction. For illustrative purposes, three blueprints depict distinct stages: Before the course (Figure 45), during the course (Figure 46) and after the course (Figure 47).

Before the course

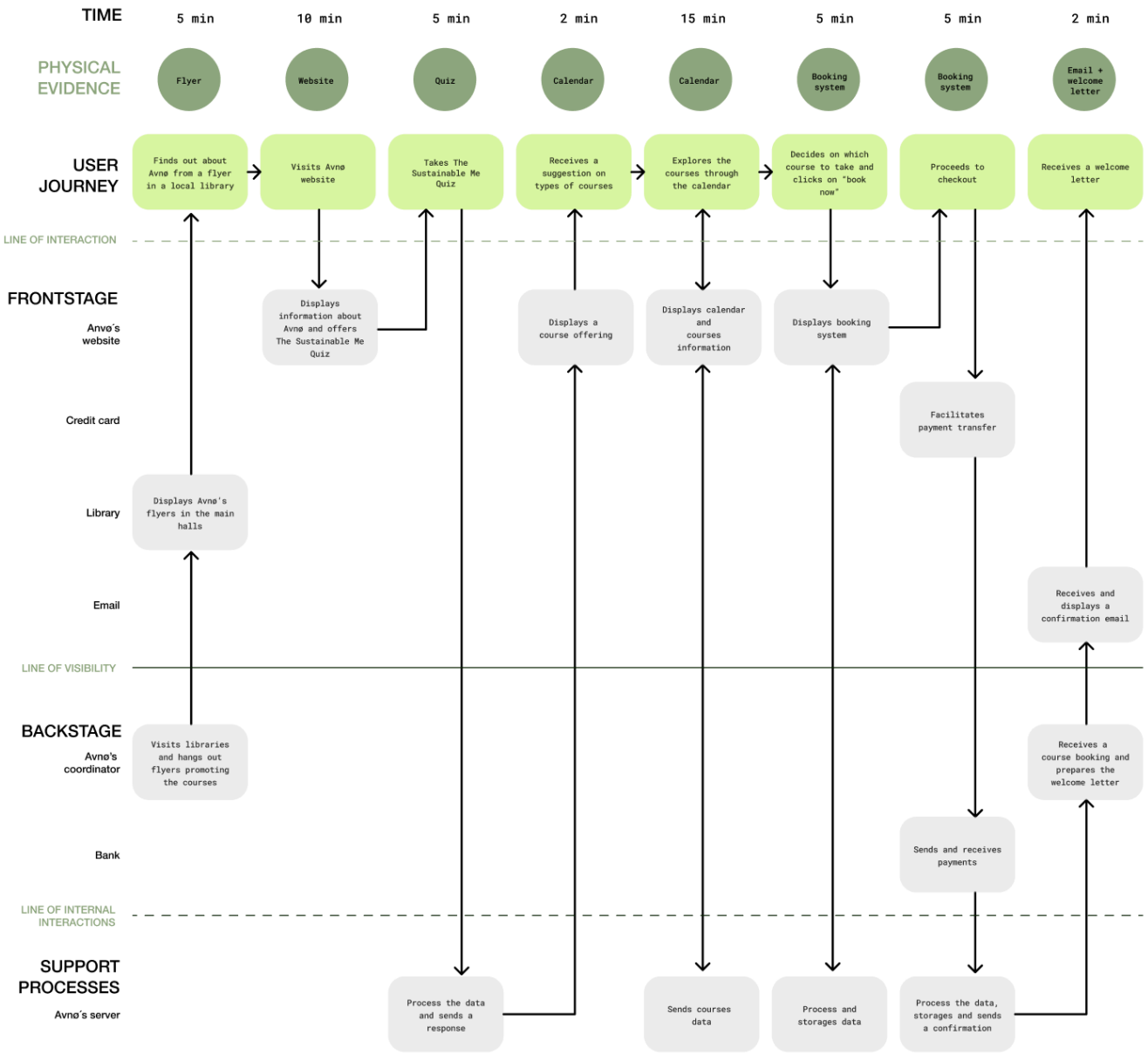


Figure 45: Blueprint - Before the course

During the course

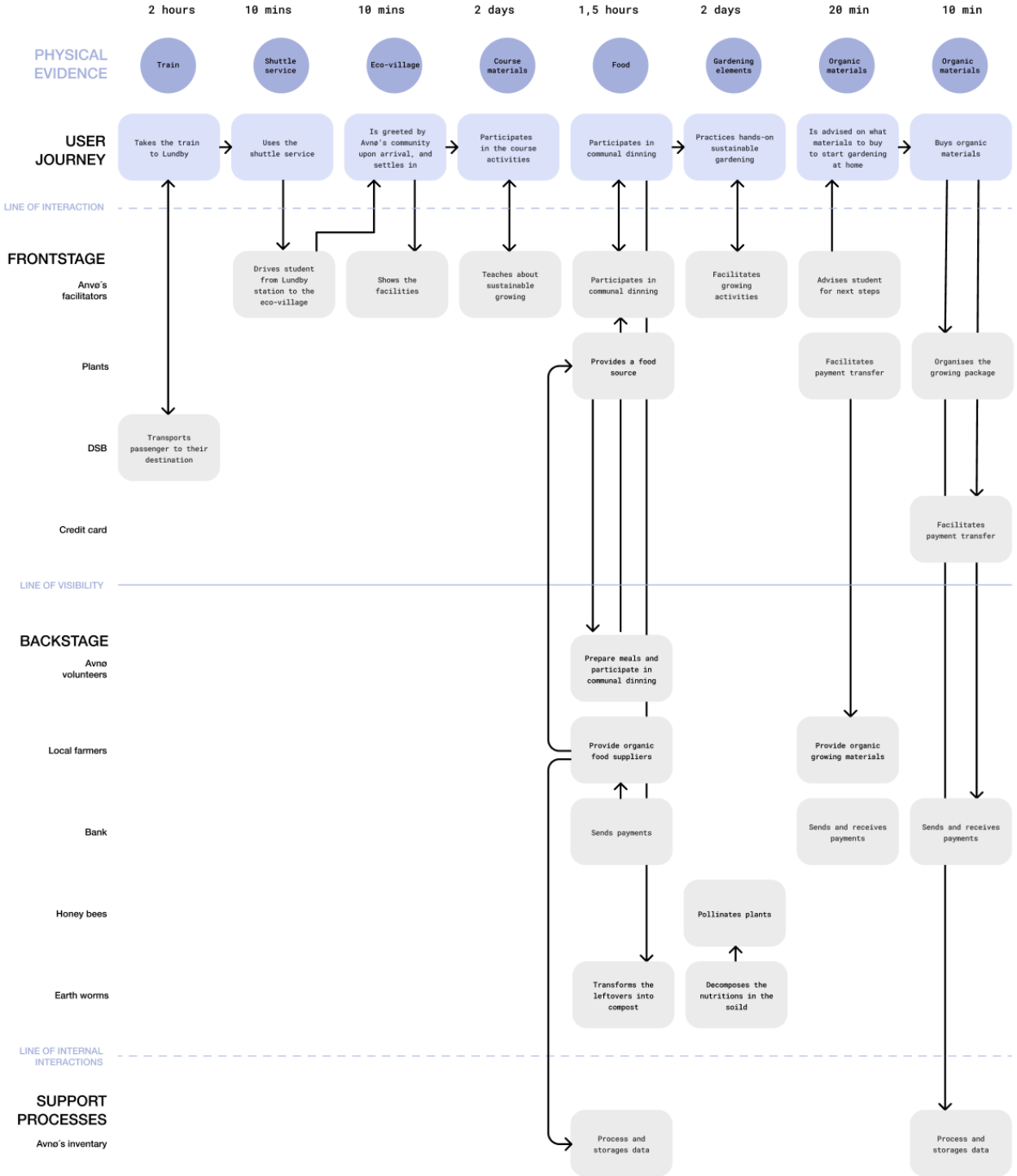


Figure 46: Blueprint - During the course

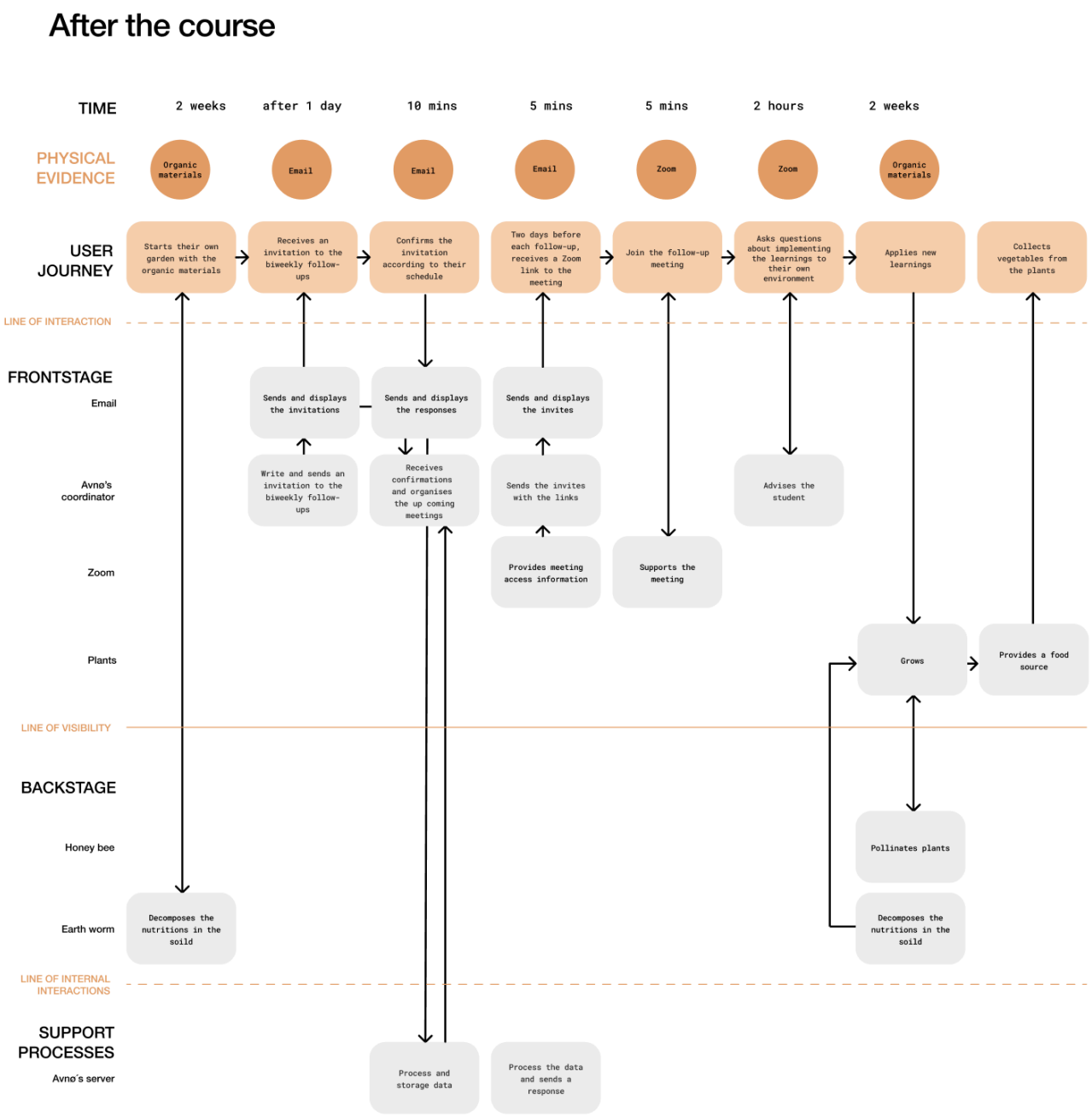


Figure 47: Blueprint - After the course

4.4.5.1 Outcomes and Reflections

Through the service blueprint, we mapped out the various stages of the user journey, from initial touchpoints to final interactions.

This process supported the communication of the roles of different actors, ensuring their roles in the system were clear and necessary. Achieving accuracy in the service blueprints posed a challenge, particularly when adding non-human actors. That might be because service blueprints are great for depicting clear, linear steps (Shostack, 1982), which MtH actors and their interactions cannot assure. Service blueprint aligns the organisational processes of the service resources, and it seems irrelevant to place natural processes, such as bee pollination, into a service blueprint. Further research would be required to find suitable tools to communicate service delivery from the MtH approach.

4.4.6 Preliminary Reflection

The involvement of the MtH actors in the Deliver phase was very complex, and the tools opened space for many interpretations. The service design tools and their concrete metrics, such as the systemic levels of the actors' maps or frontstage and backstage processes in the service blueprints, required negotiation between the interpretations of the MtH connections. This phase's traditional service design tools did not allow us to profoundly improve the service offering but focused on accurately displaying the MtH relations and interactions.

Noticing was not crucial in this phase, as it was used only for the actors map, where we worked with the nuances of MtH connections. The use of noticing for certain service design tools, such as user journey and blueprint, did not seem relevant and natural to apply because of the technical character of the tools. It can be because of the intangible nature of noticing, making it challenging to use in such concrete and systemic tools.

5. Discussion

This chapter discusses the key findings and reflections regarding the academic research question and the design process.

The subchapters are:

5.1 Reflections on the Research Question

5.2 Reflections on the Design Process

5.3 Reflections on the Learning Objectives

5.1 Reflections on the Research Question

The research has contributed to the service design field by utilising the MtH approach and, more concretely, the practice of noticing as a tool and mindset to acknowledge and map the needs of the different actors. Our objective was to render noticing applicable to service design projects to enable service designers to engage MtH actors effectively. Noticing the MtH actors' needs was interpreted to orchestrate their possible value exchanges through different service design methods and assemble a service where the actors could fulfil each others' needs while educating the human users on sustainability-related topics.

The research question is:
How can the practice of noticing, as an awareness approach, be utilised in service design to involve MtH actors?

5.1.1 Noticing as an Awareness Approach towards MtH Needs

The first theme to reflect on is one of the key thoughts of the research question: noticing as an awareness approach to involving MtH actors and working with their needs in a service design process. Our thesis intends to work with the MtH actors according to the post-anthropocentric paradigm, which requires designers to become engines and facilitators of new environmental needs. Those needs harness ambiguity and uncertainty, are parts of intricate ecosystems (Meyer & Norman, 2020; Norman & Vredenburg, n.d.), and might offer a multiplicity of worldviews and knowings (Escobar, 2018). In this thesis, awareness acts as the bridge between the designer and the existence of diverse perspectives that might go unnoticed. The post-anthropocene demands designers facilitate a space in which

those different perspectives on the natural world co-exist next to each other without one dominating (Escobar, 2018).

We intended to use noticing and the acquired awareness to communicate the troubled voices and interests of possibly marginalised MtH actors (Tsing, 2015). The MtH actors of our service, human student, honey bee, earth worm and plant, were approached as a network, which laid the basis of the service concept. That was enriching and restricting at the same time; being aware of all the chains of MtH needs while trying to integrate them with the conceptual pillars of the service, the service concept had many criteria that we had to fulfil to emphasise the value exchanges. However, we fully immersed ourselves into our roles of facilitators of the MtH needs in the service design.

Service designers might have the methods and tools to facilitate staying with the trouble (Haraway, 2016), fostering interdisciplinary collaborations, and paying attention to the interconnectedness of things. However, many service design tools still need to be adapted to tackle the MtH challenges and representations, as in this thesis, they still operate with some uncertainty.

5.1.2 Impact of Noticing in the Service Design Process

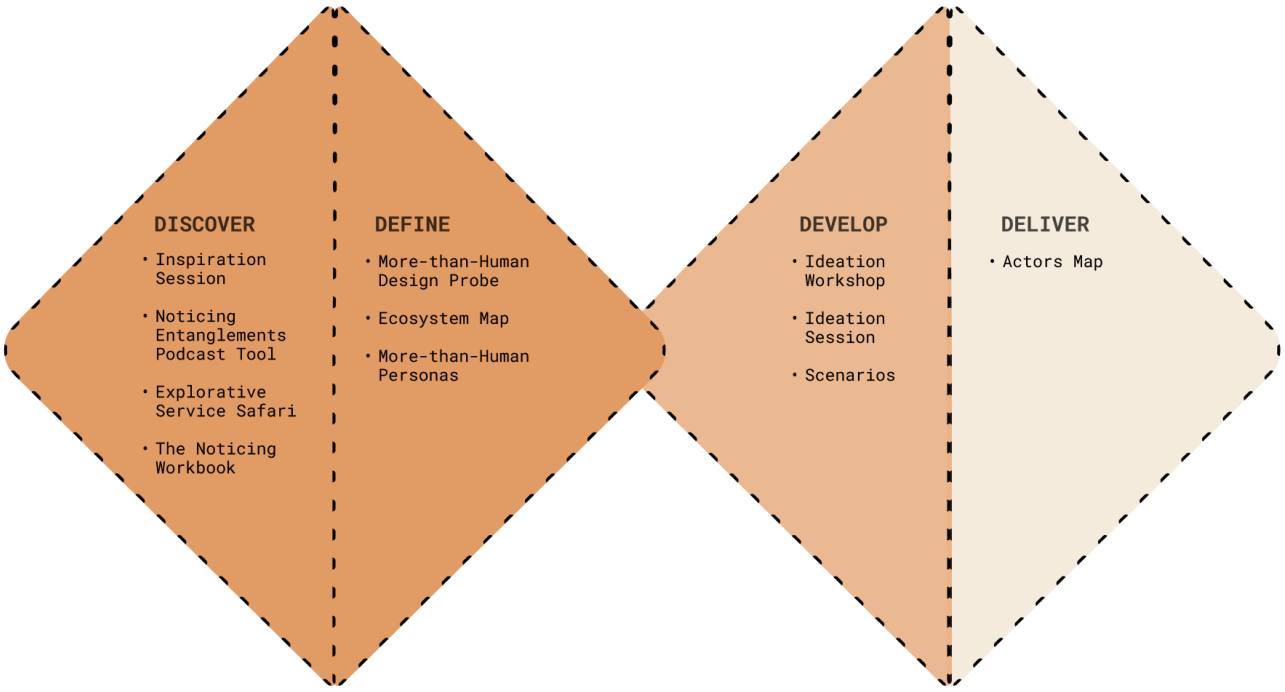


Figure 48: Impact of noticing in the service design process

Noticing impacted the development of this thesis from different angles and differently in the various moments of the design process (Figure 48). Firstly, noticing was approached as a mindset that guided the research. However, the Double Diamond methodology sometimes constrained the possibilities of noticing. Noticing is not a fixed methodology, and it can be used as a tool, but it can still be approached differently for every use. It is a fluid process that can be mingled with the steps of a design process diversely. Our findings suggest that noticing is well-suited for Discover and Define phases. These phases emphasise exploration and understanding of the design challenge. Different types of noticing, such as temporal, focal and global (Livio et al., 2019), facilitated the identification of relevant insights and needs in the Discover and

Define phase. However, the impact of noticing seemed to diminish during the subsequent phases of the Double Diamond, particularly in the Deliver phase. This can be attributed to the inherent subjectivity of the noticing process. Translating its outcomes into tangible service design deliverables can be challenging; it is a theoretical concept that happens in our interiors, is formed by our emotional states or biases, and, therefore, might yield different results for everybody's practice.

We formulated three key findings about the impact of noticing in a service design process (Figure 49).

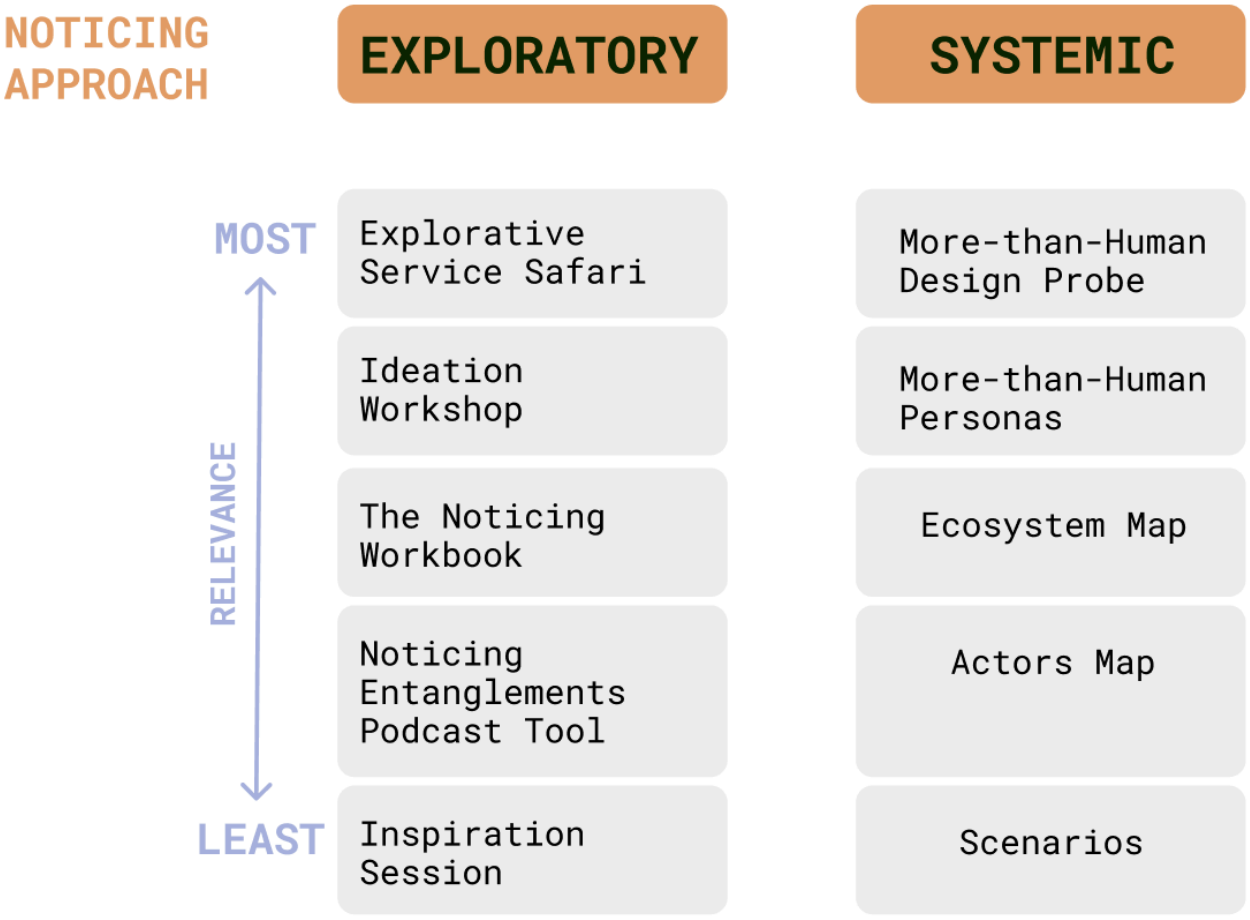


Figure 49: Noticing findings

The first key finding is that noticing can make more impact in the initial stages. The Discover and Define phases proved the impact of the MtH approach and noticing. It created awareness of the MtH actors around Avnø's course in the Discover phase. It guided the Define phase by mapping and specifying their needs, motivations and frustrations, and roles in the ecosystem, where the most useful noticing tool proved to be the MtH Design probe, as it prompted tangibilising of the noticing outputs into design decisions. In the Develop phase, noticing proved useful as a tool of awareness in the ideation workshop, where service designers with relevant experts employed noticing by themselves and then through the MtH Personas. However, in the Develop and Deliver phase, the impact of noticing was decreasing, as it was nearly speculative to translate the MtH interactions into traditional service design tools.

The second key finding emerges from the first one: the noticing approaches in this thesis' design process, which can be classified as exploratory and systemic. The exploratory approach to noticing revealed relevance in the Discover phase, while the systemic approach revealed relevance in the Define phase.

The third and last key finding is that the exploratory and systemic approaches to noticing complement each other, expanding the possibilities of noticing to practice awareness and tangibilising this awareness into design choices.

5.2 Reflections on the Design Process

We have started the design process with an initial design brief:

How might we design a sustainability-focused educational service while applying a more-than-human approach to strengthen awareness and acknowledge human interconnection with nature?

This brief targeted the sector of sustainability-focused educational services. Its goal was to support any sustainability-focused education while applying the MtH approach. However, the number of conceptual ideas encountered in the Discover phase led to the necessity of selecting a design case to work on.

New design brief:

How might we design a service, while applying a more-than-human approach, that educates students on sustainability and human interconnection with nature by exploring the case of Avnø?

The new design brief allowed us to settle in a specific company context and gave us a frame to work within. However, the concept of sustainability-focused education is still very broad and might be much more multifaceted; sustainability can be approached from different perspectives and is influenced by educators' worldviews. Avnø was chosen as a place most suitable for the MtH approach and noticing, and also because it offers both knowledge acquisition and skill development in sustainability.

The interplay between noticing and the MtH approach during the design of a sustainability-focused service presented a unique challenge. At times, the research focused on noticing the needs of MtH, and the design brief seemed to converge, leading to ineffectiveness. Disentangling these elements and clearly defining which aspect received primary focus at a given stage proved

time-consuming. This is because the application of noticing would have differed significantly if the service under development was not inherently nature-related or ecological in scope.

Alternative approaches to the design process could have been used. One possible approach would have involved upfront service design, followed by ecosystem mapping to identify complementary roles for non-human actors. We approached the process with a relational approach, mapping all the possible MtH actors. Still, another option would be to go through a traditional, user-centred process and then iterate the service to make it MtH to see how the service affects them. Even though our chosen approach demonstrably achieved our goal of facilitating MtH relationships, starting the process with the service design might have yielded a more innovative solution.

5.2.1 Reflections on the Methodology

Research through design is particularly relevant when understanding new design contexts (Zimmerman & Forlizzi, 2014), including the MtH approach and the MtHC Design. The methodology of research through design supported the goal of this thesis, which was the inclusion of MtH actors in a service design process. That required communicating and translating the roles of the MtH actors to ensure their positions in the service into academic work.

The Double Diamond has proved to be a rigid framework when working with MtH approaches, such as noticing. It follows a linear progression, suggesting clear endpoints for noticing. Noticing as an MtH approach, in its original meaning by Tsing (2015), is an iterative process that suggests discoveries throughout the design case. The Double Diamond emphasises the user's perspective as the central, while the MtH approach encourages attentiveness to the

complex interplay between human and non-human actors, encompassing the entire entanglement.

Because of these conflicts emerging from the methodology, the Discover and Define phases were the most heavily loaded. By the Develop phase, we presumably gathered a significant amount of data through previous noticing in Discover and Define, which led to a perception that further noticing might not be as crucial. In the Deliver phase, using the traditional service design tools from the MtH perspective became demanding and speculative.

Our analysis of the Double Diamond framework within this thesis revealed a potential emphasis on the initial stages of exploration and actors research. This focus, while valuable, could necessitate the development of a complementary half-diamond to refine the generated findings into tangible service offerings.

5.2.2 Reflections on the Service Concept

The service concept was formulated to comply with many criteria: the MtH personas, the meta-insights, and the opportunities and pain points identified in the user journeys. The service touchpoints were approached as moments of possible value exchanges between the MtH actors. However, we developed a concept building on top of the Growing Green Skills course, with the possibility of implementing other courses into the Nature-inspired Calendar, giving the concept some space to expand.

Orchestrating all value exchanges within a MtH service concept presented a potential hurdle to fostering genuine service innovation. Our initial approach prioritised a comprehensive understanding of the ecosystem and the needs of all participating human and MtH actors. This involved defining MtH needs, mapping the

surrounding ecosystem, and ideating the service with these prerequisites.

The Nature-inspired Calendar is a touchpoint that manifests the human connection with nature by representing time from different species' perspectives. The Nature-inspired Calendar was a demeanour of honouring the Andean agro-festive calendar (Altamirano et al., 2021) and was an important outcome of the MtH approach, contextualised for Denmark. The calendar should support the pluriversal perspective (Escobar, 2018), adapting the courses to the natural cycles and their relevant species, perceiving them through their perspective of time, however, still anthropomorphised into human comprehension of time to become a touchpoint in the service. The research has shown that it is inevitable to anthropomorphise the MtH actors in a service design process. The anthropomorphisation, even though it constitutes possibilities for misinterpretation, seems necessary to evoke empathy and necessary change of mind on an individual level (Meadows, 1999).

Other touchpoints of the service also embody the users' values, which lead to awareness and connection with nature; the quiz touchpoint represents the possibility of free and personal exploration, which proved crucial for the users. The holistic approach to the concept, define through the research, was applied. It includes the lengths of the courses in Avnø, which in their original duration might not be accessible for everyone. In the new service concept, the duration of the physical course in Avnø is reduced to a couple of days, after which the students can receive online follow-ups if needed. The holistic approach to sustainability-focused educational courses manifests through the use of organic materials in the course, the possibility of purchasing them after the course, and the inclusion of relevant actors, such as local farmers.

Based on the pain points identified from the user journey map of Avnø students, we suggested improvements by simplifying the booking system and adding possible promotion channels mentioned by Avnø's facilitators as necessary to develop. These channels include universities, libraries, public cafes, municipalities, etc. The service concept was created to support all the MtH actors; however, validating it with Avnø's representatives and the users would have been preferable.

5.3 Reflections on the Learning Objectives

This chapter reflects on the official and personal learning objectives.

5.3.1 Reflections on the Official Learning Objectives

The knowledge acquired during the service systems design program provided a solid foundation for new explorations. This master's thesis allowed us to engage in the exploration and discovery of novel approaches within the field of service design. This exploration integrated established methods and theories with newly identified tools and frameworks. These novel discoveries encompassed applying relevant, previously unexamined theories and tools and developing bespoke methodologies and instruments tailored to the specific problem context. The thesis has underscored the critical importance of adapting methodological approaches and facilitation skills in response to the context. This adaptability has been demonstrated as a valuable skill that will undoubtedly prove instrumental in navigating the dynamic nature of the contemporary world.

5.3.2 Reflections on the Personal Learning Objectives

Our personal learning objectives included a shared aspiration for a brighter future and advocacy for exploring innovative paradigms within the realm of service design. They also mentioned making the involvement of MtH actors more tangible in a service design process and spreading awareness about human connection with nature.

The human connection with nature was the benchmark of this thesis. It was manifested in the overall approach, the design brief, and the academic research question. This theme was simply present in all the layers. We believe our service has the potential to spread human reconnection to nature and the environment and facilitate the understanding of how the MtH approach and service design can tackle the wicked challenges. We believe we combined the service design methods and the MtH approach innovatively. However, translating the learnings into an innovative solution would have required more human resources, for example, we only involved the experts once in the process, but it would have been ideal to do in every step.

6. Conclusion

This chapter concludes three key findings from applying noticing on the Growing Green Skills course case's service design. It also presents the limitations and possible future research. In this thesis, noticing was applied in various service design methods to investigate where noticing could create an impact, and involve MtH actors. The approaches to noticing within service design process were classified as systemic and exploratory (Figure 49). This chapter also presents the limitations and possible future research.

We drew several conclusions when evaluating the impact of noticing the different service design tools. In the Discover phase, we explored two noticing tools: the Noticing workbook and the Noticing podcast tool. To gain knowledge on applying noticing in general, we also explored the Noticing workbook and the Noticing podcast tool. These tools helped us to notice our environment. However, certain tools helped us to not only notice, but also systematise the outputs of our noticing, such as the MtH Design probe, MtH personas, and the ecosystem map. The MtH Design probe was one of the most impactful noticing tools in this thesis, as it allowed us to notice and then prompted our noticing into the tangible probes.

Limitations identified throughout the thesis are summarised as follows:

- Limited fieldwork and research in the place of the actual service. We only had one chance to visit Avnø because of the distance and poor public transport accessibility. It would have been ideal to conduct the ideation workshop there. We also did not have an opportunity to get feedback on the service concept at the time of the hand-in.

- Participants' availability. The sample size and diversity of the data affect the generalizability of the findings. At the stage of defining the MtH target group, we decided to focus on a specific segment of the possible users, which might limit the findings.
- Time constraints: Due to the limited time scope, we did not have the opportunity to validate and test the service concept properly. The concept still improves Avnø's offering; however, testing, validating, and conducting the necessary iterations would have been beneficial before the implementation.

Future research could explore the application of noticing to different service contexts and investigate the tools and techniques best suited for integrating MtH actors into diverse service design projects.

Areas of possible further research have also been identified for the service solution. The Sustainable-me Quiz offers the unexplored potential of classifying users based on their sustainability mindset. To attract the most possible clients and offer the most suitable educational services, would require defining different ways of approaching sustainability according to the users' preferences. That would allow Avnø to adapt the scope of the courses to what the students desire as well as Avnø's possibilities.

It was the first time we worked with the MtH approach, and we still consider its great potential to tackle the post-anthropocentric challenges. We believe our service has the potential to spread human reconnection to nature and the environment and facilitate understanding of how the MtH approach and service design can tackle wicked challenges.

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