Design in the Anthropocene,
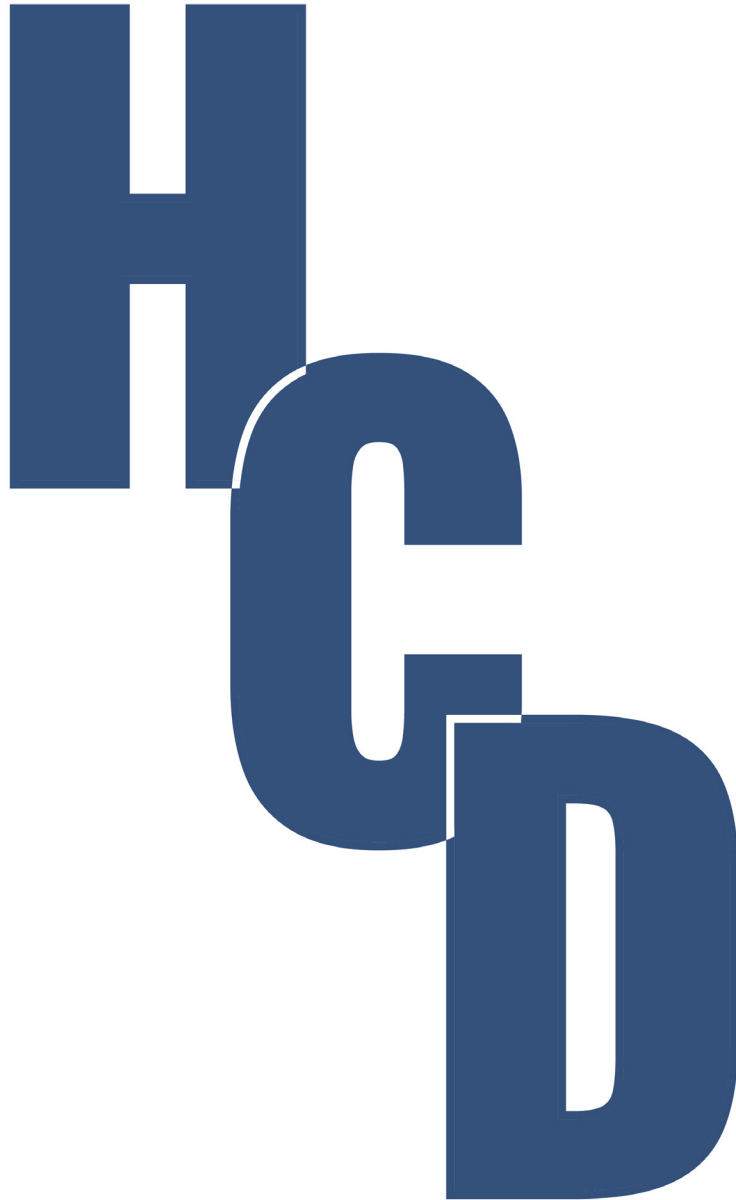# Broadening Human-Centred Design

Shreya Sood | Masters' Thesis

Creative Sustainability, Aalto University

Design in the Anthropocene, broadening Human Centred Design

Author: Shreya Sood

Master's thesis

15 November 2021

Pages: 72 + 13, English

Creative Sustainability programme

Department of Design

School of Arts, Design and Architecture

Aalto University

Supervisor: Nuria Solsona

Advisor: Emilija Veselova

Abstract

Service design innovations have the potential to contribute to systemic change towards some of the most pressing problems of modern society such as climate mitigation and equitable integration of the disadvantaged sections of the society. Although there are many theories and frameworks guiding the transition towards environmental and social sustainability, implementing them into practice could be challenging. To understand these challenges, I am reflecting on three service design projects done as part of the academic curriculum in 2020. By reflecting on my learning experiences, I intend to translate my learnings to other creative practitioners to broaden the current human-centred paradigm of problem-solving towards a wider lens of systems thinking towards the collective good. After mapping out three milestones of the projects — project briefing, reframing, intervention point, I indulged my teammates and experts to share their perspectives on the role of designers to reframe and intervene the wicked challenges towards systemic innovation. Through this process, four takeaways were generated. First, it was observed that there were benefits in terms of clarifying the semantics of concepts and terms, exploring hidden assumptions, and building a unified meaning of the context. Second, the need for systems mapping before stakeholder mapping is identified. Third, emphasis is laid on the underpinning role of service designers as visionaries of the project who propose the scope of sustainability in the form of manageable and strategic goals. Lastly, accentuating the culture of monitoring the impact of the outcome generated. As a result of this study, a list of recommended questions is generated that could be pondered upon at different stages of the design process starting from project briefing to reframing to intervention to outcome delivery. The recommended questions are conceptualised to help service designers, especially entry-level designers who might get weighed down by practical tasks such as making visuals and conducting workshops to reorient their role in the team as strategic thinkers and visionaries towards solving complex problems. The set of recommendations could also be used to probe their teammates to keep the bigger picture in mind.

Acknowledgement

Contents

Introduction

With the rising global temperatures, humankind is facing the greatest challenge of all times. Enough scientific evidence proves that since the 1800s, human activities have been the main driver of climate change, primarily due to burning fossil fuels like coal, oil and gas (What Is Climate Change? | United Nations, n.d.). Widespread human practices such as massive deforestation, increasing landfills, motorized transportation, changed land use pattern has led to the last decade (2011-2020) to be observed as the warmest on record (What Is Climate Change? | United Nations, n.d.). As a consequence of these unbalances, we are witnessing rampant diversity loss, natural disasters of all sorts and an ongoing global pandemic.

As agreed in the Paris Agreement, it is vital we strive to stay within the 1.5ºC limit (The Paris Agreement | UNFCCC, n.d.). Global temperatures are predicted to rise by up to 4.4°C by 2100 if we continue the current path of carbon emissions (Thuiller, 2007). According to a UN report, while a growing coalition of countries is committing to net zero emissions by 2050, about half of emissions cuts must be in place by 2030 to keep warming below 1.5°C (What Is Climate Change? | United Nations, n.d.). In the midst of such urgency and the ticking clock towards global catastrophe, I have been anxious to find out where my role as a sustainability-oriented designer fits in to address such a severe issue.

About 9 years of being a design learner and practitioner, and 27 years of existence on the planet, the one thing that has troubled me the most at a personal and professional level is the anthropocentric ideology of Human Centred Design—from here within HCD. As Latour (2018) sharply points out that we are not on the earth, but we are of the earth. Though from the spiritual point of view, we are just a speck of dust in the universe and our individual existence is for a minuscule time frame in the larger context. However, our collective existence, particularly in the last five decades has caused irreversible change on

the surface of the earth. I agree with the opinions of Ben Reason in his article "Designing in the Anthropocene" where he mentions that we need to adapt to the idea that we are so powerful that anything we do, at scale, has a potential long-term impact on ecological systems (Reason, 2020).

During a conversation with Eeva Berglund, Adjunct Professor of Environmental Policy taking several courses for the Creative Sustainability program at Aalto University, she mentioned how academia could really be a haven for slowing down and taking risks. Hearing this from an experienced professional reasserted my contemplation to take the opportunity of writing a thesis for my own personal learning based on my previous experiences. Hence, here I am, going against the grain of the popularly accepted and seldomly questioned approach of HCD to conduct a creative inquiry from the perspective of an emerging sustainability professional in the field of design.

1.1 Research purpose and scope

The purpose of the study is rooted in a personal pursuit for discovering and strengthening my own knowledge as a soon-to-be graduating designer in sustainability studies. It is an independent, non-funded thesis that seizes the opportunity of exploring the intellectual freedom of diving into topics of personal interest within the practice of designing for sustainability. It builds on topics of personal interest such as systems thinking, service design for sustainability and HCD to attain theoretic knowledge on the current state of design in practice.

To fulfil the goal of shaping myself as a well rounded sustainability-oriented practitioner, I took a reflective approach by revisiting three service design projects that I worked on during the spring semester of the academic year 2019-2020 and autumn semester of 2020-2021 during my masters' study in Creative Sustainability. All three projects were done in small groups with fellow masters' students from different backgrounds and in

collaboration with a real partner. However, each of these projects were diverse in nature of the client, their timeline and utilisation of the double diamond design process.

Project 1 was a part of the Design for Government (DfG) Course conducted in collaboration with the Ministry of Environment, Finland; project 2 was conducted as a part of Europe wide Student Service Design Challenge (SSDC) in collaboration with IBM and Philips; project 3 was a part of Design for Services (DfS) course conducted in collaboration with the Municipality of Espoo city.

While project 1 had direct sustainability targets related to just transition towards carbon neutrality, project 2 was more embedded towards social sustainability of the marginalised sections of society and project 3 was also focused on socio-economic sustainability by inclusion of highly educated international students. As it is seen that all three projects had a common thread among them was their intentions rooted in solving social concerns.

Similarly, the timeframe and approaches for each of the projects was varying. Project 1 was over the period of 12 weeks, project 2 was over the period of 20 weeks and project 3 was over the period of over 6 weeks. Similarly, the predominant approach of project 1 was to develop a solution that emerges from an understanding of systems perspective combined with human perspective, whereas for project 2 the approach was more focused on the integration of the involved stakeholders and coming up with a business model to sustain the developed solution. Lastly, the approach of project 3 was to orchestrate the existing solutions and make it one unifying service that can facilitate inclusion and network building.

Since the projects have distinct approaches, I am going to analyse them based on the aspects related to approaches instead of analysing them based on the tools or methods that were used to navigate the problem statements. To elucidate these approaches, I have mapped out the projects into three sections namely— initial design brief, reframed design

brief, and lastly, design intervention. The overview of the three projects is summarised in table 1. In the table, the initial project brief refers to the goal that was received by the team from the project clients, reframed brief refers to the advanced brief based on meetings with clients, team discussions and preliminary desktop and field research as we obtained clarity on the context of the problem at hand. And lastly, intervention type refers to the lens or the leverage point within the context that would intercede the proposed solution that would inform the final deliverables. The goal of this thesis is to carry an auto-ethnography on these projects to compare and contrast the varied ways in which the double diamond design process was utilized to identify moments of problem reframing, deriving the design intervention and evaluating the impact of the proposed solution.

Table 1: Overview of the three projects

	Initial project brief	Reframed brief	Intervention type	My Dilemma
Project 1	Finland has an ambitious target to become carbon neutral by 2035. However, oil is still commonly used for central heating in single-family homes and these account for 130,000 homes across the country. The Ministry of the Environment is assessing measures to ensure a fair and just transition in the matter (Projects Announced for DfG'20! | DfG, 2020)	As we learnt that most residents are willing to transition to a different mode of heating to save cost in the long run but they lack certainty and trust towards the existing solutions. Hence the goal was to provide feasible and viable support to single-family homes in Finland in order to reduce their CO_2 emissions.	Selected intervention points: from the different Styles of government interventions by Siodmok (2017). Selected intervention points: 1. Champion: Build a case for change and alliances for action 2. Grants and subsidies: Incentive behaviour changes through Grants and other incentives. 3. Choice architecture: 'Nudging' behaviour so that the default is both attractive and easy.	Knowing the urgency of the climate crisis, not being able to take drastic measures to transition felt paralysing.

(continued)

Table 1: Overview of the three projects *(continued)*

Project 2	How can we improve the access to care for people in Europe that are 'invisible', neglected, under-served, forgotten or overlooked? (Student service design challenge,2020)	Create a way to ease Roma people's sickness journey by providing access to information in one place and by the ability to coordinate on referrals, appointments, and the status of temporary ID among key stakeholders including Roma people, healthcare providers and social service workers.	The service concept RO+ creates a hassle-free journey for Roma people. On the platform Roma, healthcare providers and social service workers can access information in one place and coordinate with each other on referrals, appointments and the status of temporary ID. The service can solve Roma's problems, including language barriers, by simplifying the processes.	As we had learnt about Roma people, we realised that the root of their problem was lack of integration in society leading them to limited employability and education opportunities. Despite having this knowledge, choosing to create a digital application service felt like putting a bandage on the problem but not rectifying it from the root.
Project 3	How can the city of Espoo support the building of work-life contacts for international degree students at Aalto and Hanken University? What kind of Information and services should the city provide and to whom in order to facilitate employer contact for students?	To create solutions for not only students but also recruiters, especially SMEs and emerging start-ups, so that the gap in hidden networks is bridged from both ends.	In the current system, services are scattered. Hence, our intervention was to orchestrate these services so they can complement the efforts of multiple organisations involved and work at their maximum efficiency.	Given the research developments on validating the benefits of reverse migration and work from home, attracting talent to live in urban hubs felt counter-intuitive towards the ecological balance. Additionally by developing services for highly educted migrants felt like contributing towards racial capitalism.

During this research, I engaged in conversations with my teammates of each project to open up conversations on whether they felt similar dilemmas during the projects as I did. Additionally, I spoke to industry experts in design research and design for sustainability to understand the state of service design practice towards planetary needs. For the workshops with the teammates, I built the conversation by sharing (Abson et al., 2017)'s map as illustrated in fig.1 that draws relation between 12 leverage points by Meadow's (1999) and the four characteristics. While for the experts, I based the conversation by sharing Design for Sustainability (DfS) evolutionary framework by Ceschin & Gaziulusoy (2016).

Donella Meadows (1999) introduced twelve leverage points ranging from shallow to deep to intervene in a system towards sustainability. The first-level "the power to transcend paradigms" is the deepest one and would cause the largest change in the systems; meanwhile, the 12th level "parameters (such as subsidies, taxes, standards) is the shallowest level to interact with and would create the least change in the system overall. The leverage points could be classified into four categories in an order of shallow to deep as parameters, feedback, design and intent (Abson et al. 2017). By characterizing the leverage points into four classifications, Abson et al. (2017) elaborate on their characteristics. The shallowest characteristic is referred to as parameters containing modifiable instruments such as taxes, incentives or the flow of materials of exchange (Abson et al., 2017). The second characteristic is referred to as feedbacks that focuses on reinforcing feedback loops to increase the effectiveness of existing models (Abson et al., 2017). The deeper characteristic is referred to as design which focuses on the structures of organisations and information flow between them (Abson et al., 2017). Lastly, the deepest characteristic is referred to as intent that caters to the values and mental models that govern the interests that the system is oriented towards.

Although the need to transform the intent of economic and political institutions towards sustainability while ensuring stability is the deepest leverage characteristic towards radically sustainable transformation, the design thinking approaches to examining the

root cause of insufficiency and identifying approaches to transformative change that are solution-oriented are suggested to be at the deeper end as well. One of the most widely used frameworks for innovation is the double diamond design as shown in fig.2. The double diamond framework is of particular relevance to the thesis because that is the framework that was utilised in all the three projects that I am reflecting upon. By analysing the projects with teammates using the leverage point models towards systemic intervention in combination with the main checkpoints in the projects as guided by the double diamond process, the subsequent goal of the study is to find an intersection between systems thinking and design thinking as a part of service design practice. With this objective, I intend to summarise best practices from personal learning experiences that could be helpful to other budding service designers as well.
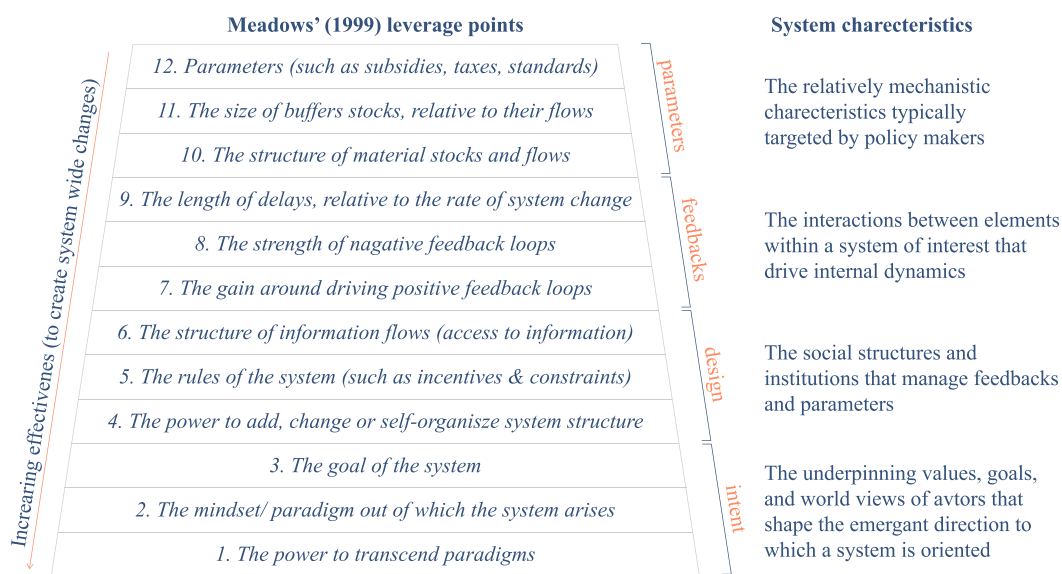
Figure1: Relation between 12 leverage points by Meadow's (1999) and their relation to characteristics in a system as illustrated by Abson et al. (2017)

Though many variations of the double diamond model of the design process are available with overlapping and differentiating interpretations, I am using the one that the British Design Council has conceptualised in 2005. The British Council is an organisation that

works as an advisor for the government on design. As a part of this model, the four Discover phases in the double diamond are stated as — discover, define, develop, and deliver (Design council, 2005). The first stage is Discover that guides the identification of the problem that needs to be addressed to build knowledge of the context by using tools like user-journey map, user diaries, user shadowing (Design council, 2005). The second phase is called Define. The discovery phase's findings are synthesised to explore opportunities using tools like user-persona, how might be statements, and brainstorming activities. The third phase is called Develop, where ideas are generated, detailed out and iteratively tested with target users by using tools such as service blueprinting, prototyping, and development of business model canvas (Design Council, 2005). The last phase is referred to as Deliver, where the product or service is launched by using tools such as scenario building and feedback mechanisms to ensure the best user experience (Design Council, 2005).
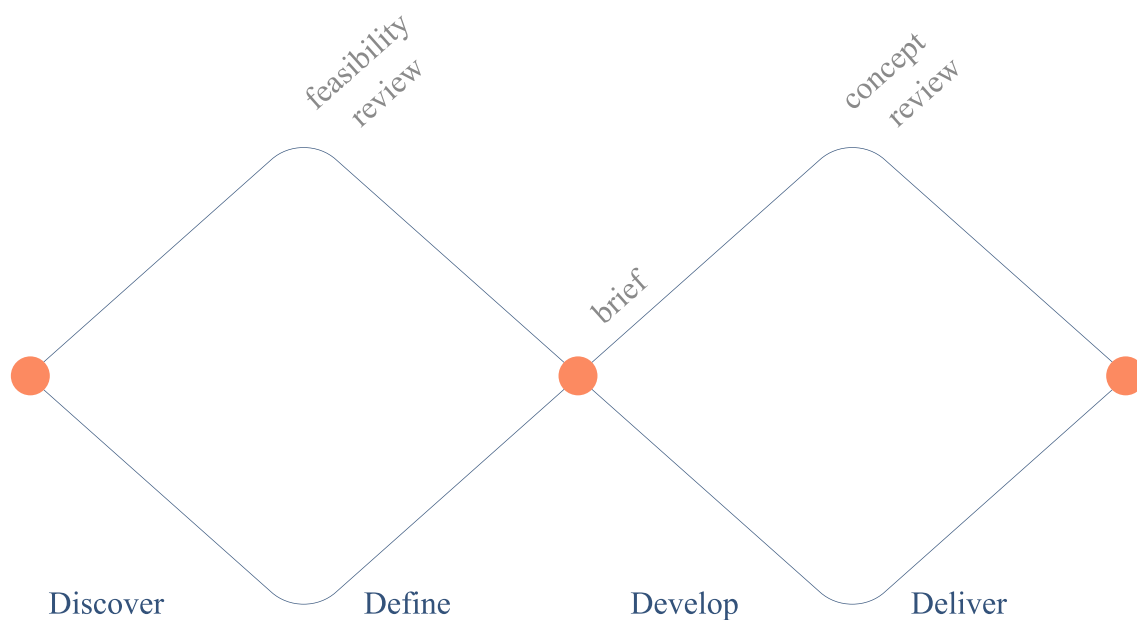
Figure 2: Double diamond design process. Adapted from Design Council, 2005

1.2 Research Context

In the Design for Sustainability DfS framework by Ceschin & Gaziulusoy (2016) design approaches are classified into four levels starting from Product Innovation level, Product-Service System, Spatio-Social to Socio-Technical System, as shown in table 2, from an insular to systemic level with a shifting concern from technology to humans. The framework is depicted in Figure 3. Even though the approaches are not mutually exclusive, they are interrelated and overlap with each one.

Table 2: Summary of the four levels of design for sustainability as proposed by Ceschin and Gaziulusoy 2016

Levels of Innovation	Characteristics of the levels
Product Innovation Level	For improving existing or developing completely new models by approaches such as green design, ecodesign, emotionally durable design, design for sustainable behaviour, cradle to cradle design, biomimicry design, design for the base of the pyramid.
Product-Service System level	When the focus is beyond individual products and expands towards integrated combinations of products and services. The level takes the approach of Product-Service System Design with a focus either on eco-efficiency, sustainability or the bottom of the pyramid.
Spatio-Social innovation level	When the context of innovation is on human settlements and the spatio-social conditions of their communities. The approach takes the shape of either design for social innovation or systemic design.
Socio-Technicals system innovation level	When design approaches are focussing on promoting radical changes on how societal needs, such as nutrition and transport/ mobility, are fulfilled, and this approach is to Design for system innovation and transitions to new socio-technical systems.
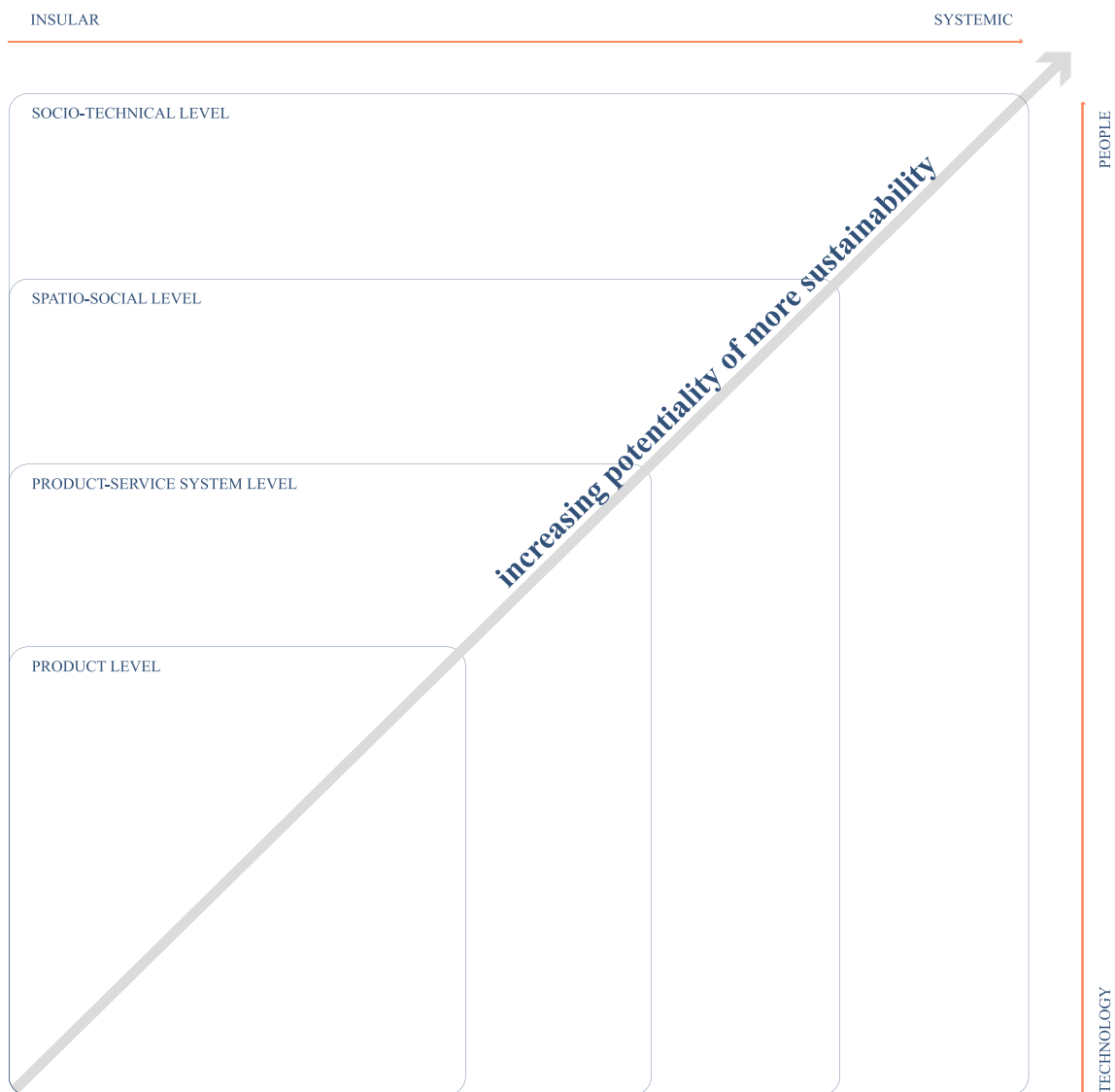
Figure3 : The Design for Sustainability evolutionary framework (Ceschin &
Gaziulusoy, 2016)

Ceschin & Gaziulusoy (2016) point out the need for further research methods of
developing ways of improving design education and professional practice to support
social innovation, the aim of my reflective study is to contribute towards this gap. In order
to do so, the thesis attempts to answer the following research questions:

RQ1. What is the current state of project briefing and reframing in service design?

RQ1.1 What is the scope of sustainability in design briefing?

RQ 2: How has design towards social and environmental sustainability evolved?

RQ 2.1 What are the gaps? How could design be more systemic?

RQ 2.2 What are the concrete factors in design practice that need to change to address more systemic change?

RQ 3: How are service designers addressing systemic change?

RQ 3.1What are the concrete factors in design practice that need to change to address more systemic change?

From here on, the thesis is structured into 4 main sections. Section 2 identifies the literature relating to the anthropocene, role of design in sustainability , practices of service design, value of design , need for critical thinking and relevance of systems thinking in service design. Section 3 presents the methodology used to answer the research questions. Then, section 4 overviews the key findings from theoretical background and empirical research. In section 5 , I synthesise the findings into discussion points that could serve as the outcome of this thesis as an attempt to widen the HCD approaches by combining it with the approaches of design thinking and systems thinking. Finally in section 6 I conclude by mapping a set of questions that practitioners of service design towards systemic change could ponder upon at different stages of design projects.

2. Theoretical Background

The Anthropocene — Human induced global environmental changes

"It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, hydrosphere and biosphere have occurred." (IPCC,2021, p.6). For the longest time, it was known that only catastrophic events such as meteors or hurricanes and alike can only do severe damage to Earth's ecosystem. However, "industrial activity has grown to the point where it may be having irreversible effects on the global environment, including impacts on climate, biodiversity, and ecosystem function." (Hart and Milstein, 2003, p.58). Over the past 50 years, humans have changed the world's ecosystems more rapidly and extensively than in any other comparable period in human history (Sttefen et al, 2016). Figure 4 depicts how the global surface temperatures have risen at an unprecedented rate in the last 2000 years relative to
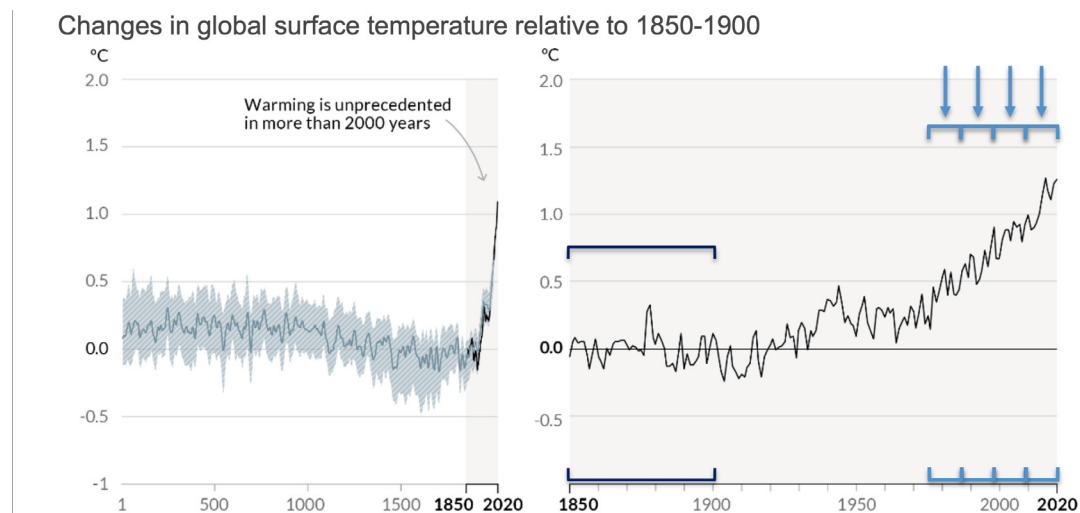
Figure 4: Changes in global surface temperature relative to 1850-1900 (IPCC_ AR6_WGI_Headline_Statements)

the overshoot from 1850-2020 and the quick acceleration specifically in the last 50 years. To be able to understand how as the most intelligent species on the planet, we landed ourselves in such a situation, it is important to look back into history. Although other researchers provide different time frames, this thesis uses the periods framed by Steffen et al. (2007) in their paper titled 'The Anthropocene: Are humans now overwhelming the great forces of nature'. According to them, the industrial era (1800-1945) was the first stage of the Anthropocene as the human population rose to billions and the dependence on fossil fuels started becoming inevitable (Steffen et.al. 2007). However, the study suggests that the pervasive shift in human-environment relations began in the second stage of the Anthropocene (1945-2015), when the population grew to nearly 6 billion and globalization condensed the world into a well-connected village. This phase also witnessed events such as World War I, the Great Depression, and World War II leading to an exponential surge in atmospheric CO_2 concentration. Such human-induced stresses called for stringent actions to keep the global temperatures from rising more than 1.5 degrees. This embarked on the beginning of the third stage of the Anthropocene where global and local forces started developing stewardships to ensure the sustainability of earth's ecosystems by curbing the human-induced fatigue on the natural resources and life cycles by political, social, economical and technical advancements.

2.1 From anthropocentrism to ecocentrism

According to Rockström et al. (2009), Holocene — the previous epoch, is the scientific reference point for a desirable planetary state. This reference point had led to the emergence of the planetary boundaries which determine the safe working space for human activities within the biophysical and biochemical earth system (Rockström et al., 2009). In order to backcast this transition, it is rather crucial to determine mankind's relation to nature and other elements of the ecosystem (Rockström et al., 2009).

In contrast to the tenets of anthropocentrism is ecocentrism, among many others such as biocentrism, ecocentrism, planet-centrism, cosmocentrism, and life centrism. However,

within the scope of this thesis, I am particularly focusing on ecocentrism as a non-anthropocentric alternative as depicted in Figure 5 below. According to Chambell (1983), the term 'anthropocentric' was first used in the 1860s, during the debate over Darwin's theory of evolution, to refer to the notion that humans are the centre of the universe. In Anthropocentrism, humans are the most important form of life, while other forms of life are only important as far as they can be useful to humans (Kortenkamp & Moore, 2001). On the contrary, "Ecocentrism sees the ecosphere – comprising all Earth's ecosystems, atmosphere, water and land – as the matrix which birthed all life and as life's sole source of sustenance. It is a worldview that recognizes intrinsic value in ecosystems and the biological and physical elements that they comprise, as well as in the ecological processes that spatially and temporally connect them"(Gray et al.,2018, p.130). By understanding the components of ecocentrism, I am able to distinguish my own point of view as a designer on the alternatives, and thereby compose a speculative extended HCD framework.

Ecocentric:
the whole planet

Anthropocentric:
mankind

Egocentric:
one individual
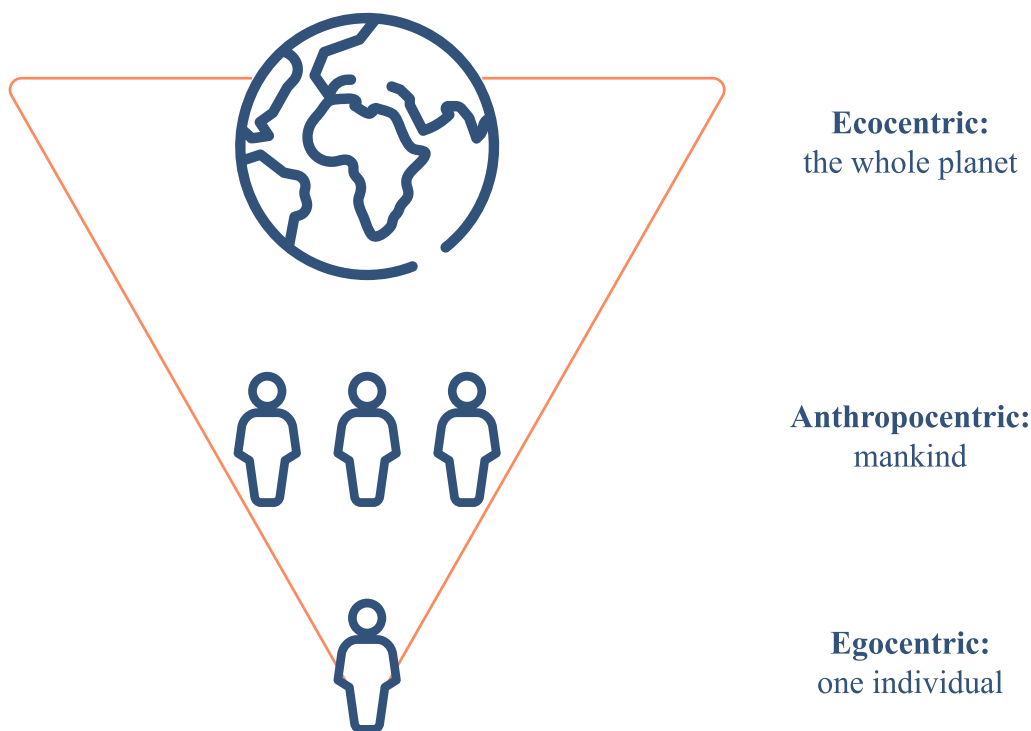
Figure 5: Spectrum of ideologies around sustainability. Adapted from: Schaubroeck (2014)

The term sustainability is quite broad and could be interpreted in project briefing and reframing differently depending on what needs to be sustained. The popular definition of Sustainable Development by Brundtland (WCED,1987), stated as "the development that meets the needs of the present without compromising the ability of future generations to meet their own" is fundamentally anthropocentric in nature. It is concerning because it has been articulated from the interests of one class or group that assumes its interest represents the true interest of humanity (Brown,1995). Additionally, there is criticism similar to Schaubroeck (2014) which states that the definition reinforces the goal of humankind to protect the environment in order to sustain themselves as nature provides vital services to them. This in turn perpetuates the mindset that mankind's survival has priority over nature's maintenance.

As Brown (1995) correctly recognises the need of transitioning from a scientific way of atomic, reductionist and value-free operating model towards an ecological way of holistic and value-laden way of operating. He further adds that radical egalitarianism of egocentrism is dangerously close to nihilism and can, like anthropocentrism, be used as the foundation of oppressive ideologies (Brown,1995). To elaborate this, he positions himself in a scenario of valuing the life of a family of rats over a child in a ghetto and explains the role of evolutionary imperative in the instinct to choose one's own species interest over the other (Brown,1995).

To further explore how we as humans perceive our reaction with other elements of the ecosystem, a study was conducted by Kortenkamp and Moore (2001) to understand the relation between moral reasoning and ecological dilemmas. One of the narratives of experiments to measure ecocentrism and anthropocentrism in adults' reasoning was as mentioned below and illustrated in Figure 6 below. A detailed description of the dilemma could be found in appendix A titled 'Anthropocentric, non-anthropocentric dilemma through a story'.

-The remaining 2% old growth forest in North America which are a home to many rare species would be lost and a new parking lot would be built

If agrees

If disagrees

- Recently laid off
- Gets to know about the new project in town that will take place by chopping off the old growth forest to create more jobs
-Needs to give a vote on either agreeing to the project or not

-Would remain unemployed and broke
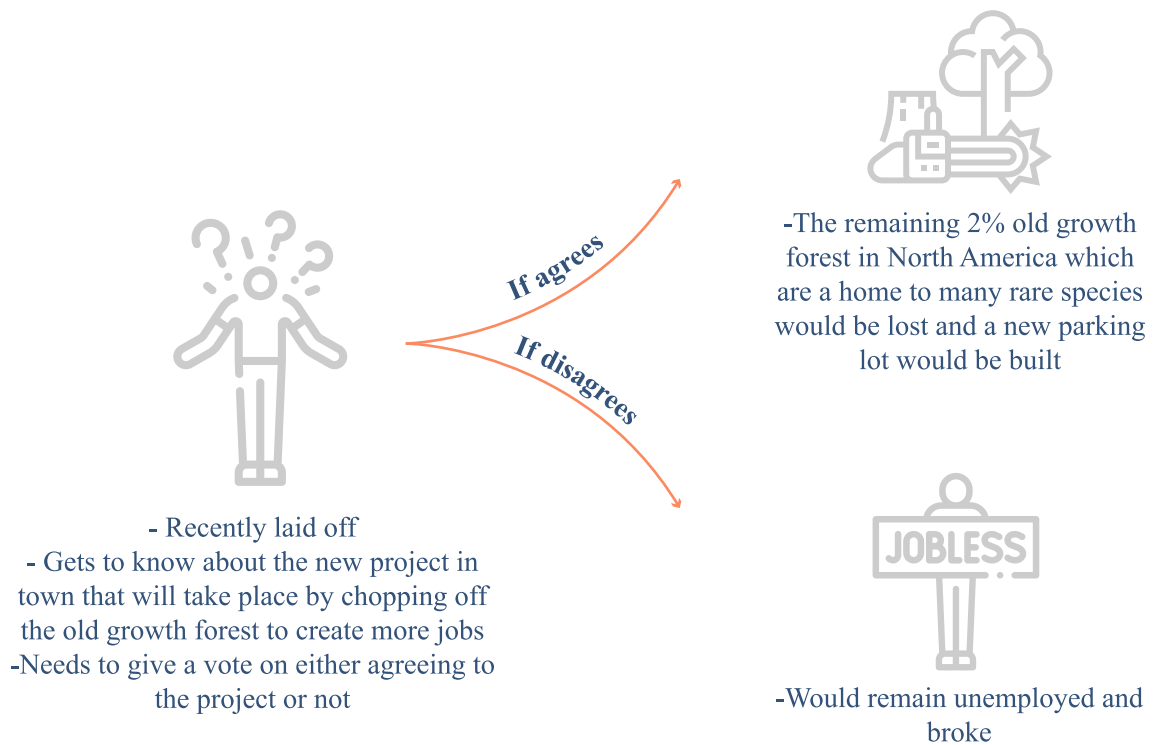
Figure 6: Anthropocentric, non-anthropocentric dilemma through a story. Visualised from Kortenkamp and Moore (2001)

Even from an idealistic point of view as an environmentally concerned individual, it creates an immense dilemma while contemplating basic human needs over the obvious mistreatment of the environment. The experiment drew conclusions that the way people think about the environment (ecocentrically or anthropocentrically) is influenced by situational variables and certainty on the measure of impact. Smith and Baker(2009) propose that in order to achieve the most ethical relationship between human life and the environment, a harmony or meshing of the two competing theories must be continually and actively pursued by human beings, for when considering the question of moral standing, humanity, and nature cannot be dissociated.

Upon reviewing the ideas of human-centeredness (via anthropocentrism) and considering

the moral placement through the evolutionary lens, the thesis will explore the extension of the current practice of Human-Centred Design to be holistic towards harmonising the needs of humans and the environment.

2.2 Role of Design in sustainability

What is design?

(Buchanan, 2001, p.9) points out the twenty-first century understanding of design as a servile activity and further defines design as "the human power of conceiving, planning, and making products that serve human beings in the accomplishment of their individual and collective purposes." He maps out the four orders of design as shown in figure 7. It has been witnessed by Nylén et al. (2014) among many others that design has increasingly ventured into addressing problems of wider scope and thereby into Buchanan's third and fourth order of design. However, this does not disdain a designer's ability to visualise symbols or create artefacts that belong to the first and second order, but recognizes the potential to be more reflective of the value of design by merging them in the living experiences of human beings (Buchanan, 2001).

In the third and fourth-order, the focus is on action through experiences and the ideas that organise the system around it (Nylén et al., 2014). This has paved the way for an increasing relevance of service design as a useful methodology in solving problems in the third order. However, even within the service design, the typology of problems can vary from simple, complex to wicked (Suoheimo et al., 2021). For example, to design for online pizza delivery is simple service design, whereas to design a trouble-free flight on-boarding experience is more complex in nature. However, challenges such as designing for shared mobility service is referred to as a wicked problem.

The realm of wicked challenges encompasses issues that are significant to society at

large. As Blizzard and Klotz (2012, p. 456) describe, "these may include challenges such as shortages of energy, natural resources, water, and food; war and political instability; rising levels of poverty, homelessness, and disease; and slipping quality of education and infrastructure". While these challenges may seem audacious and too complex to be struck down by the evolving methodologies of design approach, and, one may believe that policy and regulations play the most significant role in creating a momentum for radical change. To this, Tonkinwise (2014) clarifies that coming up with visions of alternative economies is not the job of a designer. And further adds that the role of a designer is to find social innovations not just by speculations, but by devising intents to constitute different futures, especially ones that seem currently impossible (Tonkinwise, 2014).

	Symbols	Things	Action	Thought
Symbols	Graphic Design			
Things		Industrial Design		
Action			Interaction Design	**Domain of wicked problems**
Thought				Environmental Design

Figure 7: Four Orders of Design visualised by Buchanan (2001)

23

In the third and fourth-order, the focus is on action through experiences and the ideas that organise the system around it (Nylén et al., 2014). This has paved the way for an increasing relevance of service design as a useful methodology in solving problems in the third order. However, even within the service design, the typology of problems can vary from simple, complex to wicked (Suoheimo et al., 2021). For example, to design for online pizza delivery is simple service design, whereas to design a trouble-free flight on-boarding experience is more complex in nature. However, challenges such as designing for shared mobility service is referred to as a wicked problem.

The realm of wicked challenges encompasses issues that are significant to society at large. As Blizzard and Klotz (2012, p. 456) describes, "these may include challenges such as shortages of energy, natural resources, water, and food; war and political instability; rising levels of poverty, homelessness, and disease; and slipping quality of education and infrastructure". While these challenges may seem audacious and too complex to be struck down by the evolving methodologies of design approach, additionally, one may believe that policy and regulations play the most significant role in creating a momentum for radical change. However, Tonkinwise (2014) clarifies that coming up with visions of alternative economies is not the job of a designer. And further adds that the role of a designer is to find social innovations not just by speculations, but by devising intents to constitute different futures, especially ones that seem currently impossible (Tonkinwise, 2014).

Practice of service design

Considering my thesis examines three projects in the practice of service design, I would like to discuss what service design entails. Odekerken-Schröder (2016) summarises the key characteristics of service design to be co-creative, human-centred, iterative and holistic. First, as a co-creative practice, it involves various stakeholders from the context to be mindful of different perspectives (Odekerken-Schröder, 2016). Second, by focusing

on enhancing the experiences of the humans involved at the individual, organizational and societal level, it functions in a human-centred approach (Odekerken-Schröder, 2016). Third, by visualising complexities into bite-sized segments that could be tackled one at a time and be iterated based on feedback. Fourth, it considers the service as a whole throughout different touch-points of the user journey, making it holistic (Odekerken-Schröder, 2016).

Even though the above-mentioned characteristics broadly describe the key characteristics of service design, it is important to note this is not adequate. As Manzini (2016) reminds us that design is not just a collection of methods and tools, and the role of design experts cannot be reduced to this formula. Manzini (2016, p.54) further explicates,"before being a technique, design is a capacity for critical analysis and reflection, with which design experts produce knowledge, visions, and quality criteria that can be made concrete in feasible proposals." Before discussing the increasing significance of bringing a critical lens into the practice, I would like to share my understanding of the value of design.

Value of design

Julier and Hodson (2021) describe the value of design as an 'elephant in the room' in the neoliberal paradigm of the last 40 years in the indispensable need for call of action towards climate chaos, biodiversity loss, demographic imbalances and inequalities, to name a few. Even so, many including Ehn et al. (2014), by building on the works of Brown (2009) and Mau (2004), advocate the potential of design to tackle major societal problems at the fundamental level. Ehn et al., (2014) further raise a concern about the lesser discussed segment relating to measuring the success of innovation beyond the market needs. Julier and Hodson (2021) suggest the measurement of success to be relying on meeting the social and environmental goals rather than measuring it in economic terms of "deliver[ing] more for less". This further builds towards the dilemma shared by Julier and Hodson (2021) on "What to value and how to value."

Unfortunately, the applicability of design has remained limited to its potential to boost economic growth by using it as a tool to 'add value' so that companies no longer compete for consumer attention based on the lowest price but instead based on what their products and services offer (Julier and Hodson, 2021). As Weaver (2020) points out the reason for this rapid ascension of design to the extent of routinely being used by companies to differentiate themselves lies in design's anointed operating model of Human-centred design. Hence, emphasising the need for critical thinking towards designing services.

Need for critical thinking

The need for service design practice to be more critical could be understood by visiting the popular service design case of Uber. This kind of service model lies in the Product-Service System-level as structured by Ceschin & Gaziulusoy (2016). The business model was conceived on a postulation that the problem of human transportation related to congestion could be by applying human-centred design (Weaver, 2020). Hence, a shared mobility service was divided where passengers can request an on-demand driver at an affordable price, conveniently from the comforts of their home/ office/ anywhere using the application. On one hand, it is undeniable that the service is gaining immense success globally, on the other hand, it has led to several social and environmental consequences related to efficiency, equity, and sustainability of urban development (Jin et al., 2018).

While there are several benefits such as first-mile and last-mile connectivity to distant neighbourhoods with features to track and rate the ride making it safe and credible (Jin et al., 2018). The service also paves a path for micro-entrepreneurs to work flexibly at their own time and convenience (Jin et al., 2018). However, on the downside, criticism and evidence have been built around Uber rising congestion during peak hours due to the demand for more cars for personal use, despite the carpool feature (Jin et al., 2018). The affordability factor has also contributed to risk for higher emissions of greenhouse gasses as drop-in modes of the first mile and last mile connectivity such as walking or cycling

has dropped (Jin et al., 2018). From a social lens and a sustainability lens as well, the service has raised worries on creating a digital divide as it does not cater to those who lack a smartphone, have access to mobile data and online banking (Jin et al., 2018). Moreover, it only creates low-security employment as drivers receive minimal job security benefits such as health insurance, paid leave and reimbursement for fuel for the vehicle (Jin et al., 2018).

This exemplifies the dangers of reductionist problem-solving approaches towards multifaceted problems to be abysmally inadequate (Weaver, 2020). While designing for social innovations could be a playground for designers to take roles of active imaginers, it is crucial to emphasise on the need for design to be critical of the systemic repercussions (Weaver, 2020). Hence, the need to evolve our innovation model from being straightforward to more critical in nature.

Tapping into world views

Circling back to the urgency of orienting from anthropocentric paradigm to ecocentric paradigm, I would like to share Weaver (2020)'s analogy of comparing big social problems such as hunger, poverty, climate change, environmental degradation to be much like wildfires. These problems are multifaceted and there is no silver bullet to solve them. Just like wildfires, trying to curb one side of it may accelerate the havoc on the other side (Weaver, 2020). However, only if we use radical solutions such as rainstorms, the problem could be eradicated without shifting the burden (Weaver, 2020). Thus, in the need to find methods that address the problem from all sides, there is a recognised need to evolve from the myopic lens of the HCD approach to a big picture approach (Weaver, 2020). One way to go about this is by consciously looking into the mental models that are influencing the patterns of events around us.

Ceschin & Gaziulusoy (2016) reaffirm that there is a need for a radical transformation

in the way human society works. This transformation is not only liable to technological intervention but also social, cultural/behavioural, and institutional organizational change (Ceschin & Gaziulusoy, 2016) . One way to map out the belief systems guiding the events around us is by using the iceberg model (fig 8). By mapping out the evidence of the problems leads to understanding the patterns that are leading the problem to resurface. The patterns are in turn influenced by the systems and structures that are a consequence of the deep-rooted mental models that define success, barriers and aspirations. Tapping into mental models to tackle environmental problems is crucial because they serve as the backbones for influencing decisions made around us either by politicians or managers or consumers (Rosner, n.d.). As Meadows (2001) suggests everything we know is a model. She encourages us to challenge our assumptions individually and collectively to help us understand the systems around us are flexible and could be shifted by redesigning the structures that are built on them (Meadows, 2001).
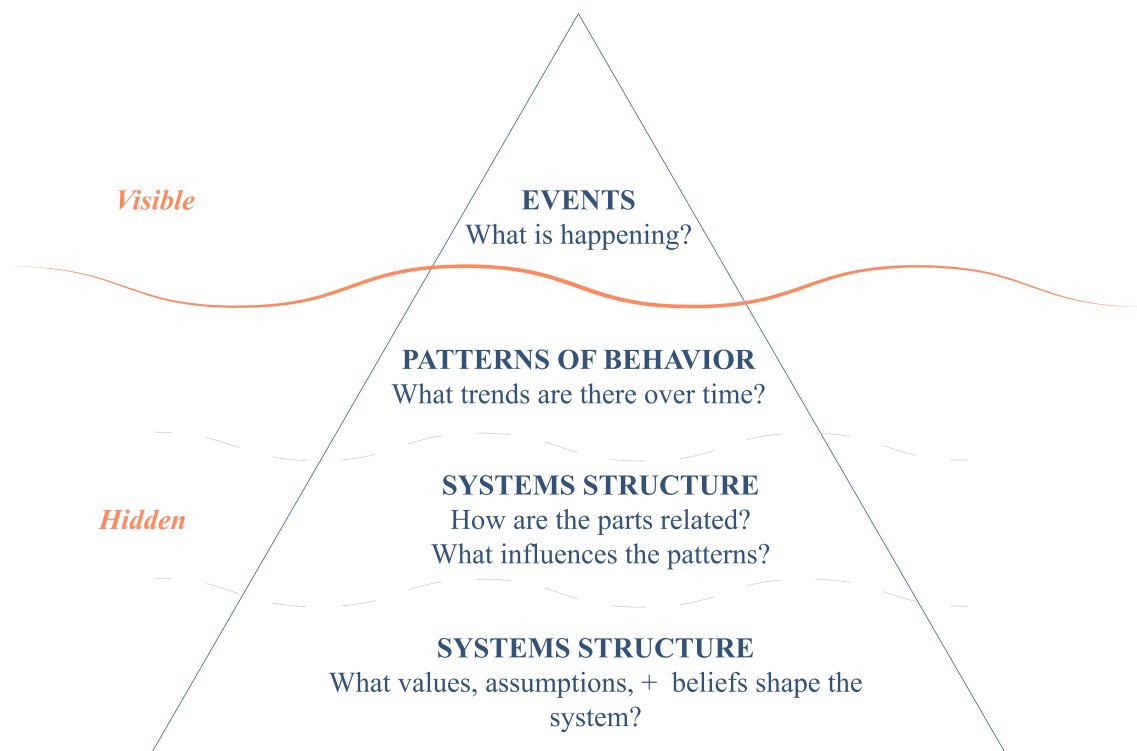

Fig.8 Iceberg model adapted from the Academy of System Change (2017)

28

Systems Thinking towards sustainability

Rupprechet et.al.(2020) also refer the popular discourse of sustainability to be reductionist, as it emerges from hegemonic industrialist and imperialist human centric worldview, and suggest to hold forth advancement of integration of more-than-human needs in the processes of making the world where nature is not just viewed as only as a resource. Rupprechet et.al.(2020) further suggest that the reductionist viewpoint of sustainability is in fact making its approaches unsustainable and recommend integrating the indirect actors and stakeholders that are both human and non-human to be identified and represented in the decision making processes so that value to them is not compromised. One of an alternative to the anthropocentric model of sustainability is multispecies sustainability, described by Rupprechet et.al.(2020, p.7) as, "multispecies sustainability means meeting the diverse, changing, interdependent, and irreducibly inseparable needs of all species of the present, while enhancing the ability of future generations of all species to meet their own needs."

In order to be able to intervene into the dynamics of the complexity of the world, Steman (2002) emphasized on the significance of systems thinking. Sterman (2002) describes the problem that we witness in the world today to be often the unintended consequence of the solutions that were devised yesterday. To be able to avoid such unanticipated consequences, Sterman (2020) orients the solution towards systems thinking by identifying high leverage points that allow making decisions that are aligned with the long-term interests. By utilising systems thinking as a way to understand the connections and relations between everything, effective change could be guided. As the field of design is moving forward to addressing the wicked challenges, the intersection of systems thinking in design thinking has increasingly been observed (Buchanan,2019).

Buchanan (2019) also emphases on the relevance of defining systems that serve as commonplace elucidation while working in multi-disciplinary teams. As an endeavour

to share common interpretations of systems, Buchanan (2019) classified them into four groups namely, arrangement, set, group, and condition. He further built examples based on a scanario of students gathered in a classroom to demonstrate the distinct interpretations. This has been abridged in table 3. By making such a classification, Buchanan expresses the connection between different descriptions of a classroom as a system and its implication on furthering the objectives of the systems.

Table 3 : Summary of common interpretations of systems with description and examples as classified by Buchanan (2019)

Common interpretations systems	Description	Example
Arrangement	Of interacting parts or bodies combined under the influence of related forces	Classroom as an assembly of seating arrangements that are guided by educational requirement that is possibly a reflection of external forces such as economic requirements of workforce or a cultural practice towards setting norms
Set	Of things arranged and related to form a unity	Classroom as a set of selection of subjects decided by the professor that evolved by the diverse perspectives and interests of students
Group	Of units or elements that form a whole and work in unison	Classroom as a social organisation for performing roles such as teaching and learning of certain discipline and/ or level
Condition	Of harmonious, orderly interactions	Classroom as an idealistic expression of a space of searching for truth about the subject that is under discussion

Since systems are dynamic, approaching to intervene in their complexity towards practical actions could be unnerving. Therefore, Buchannan (2019) further suggests envisioning

possible. Reason (2021) suggests the first step to shifting the paradigm towards inclusivity in the colloquy of sustainable futures is to take first steps to be inclusive towards humans of all races, genders, and ages which can then be effectuated towards non-humans as well.

2.3 HCD over the years

Evolution of ISO's HCD and approaches in design

As per the International Organization for Standardization (ISO), which is the worldwide federation for preparing international standardisations, the definitions of HCD have evolved in the last few decades. The standards on HCD are formed by the consensus of the international board of researchers and practitioners in the field (Jokela et al., 2003). To understand the constant evolution, I am sharing the definitions of the two standardisations, one from 1999 and the other from 2018.

ISO standard on HCD from the year 1999 as cited by (Steen, 2011, p.45) :

"the active involvement of users for a clear understanding of their behaviour and experiences; the search for an appropriate allocation of functions between people and technology; the organisation of iterations, within a project, of conducting research and generating and evaluating solutions; and the organisation of multi-disciplinary teamwork."

Latest ISO standard on HCD from the year 2018 from official site:

"the active involvement of users for a clear understanding of their behaviour and experiences; the search for an appropriate allocation of functions between people and technology; the organisation of iterations, within a project, of conducting research and generating and evaluating solutions; and the organisation of multi-disciplinary teamwork."

While latest definition has evolved in its disclosure to be more holistic than the previous one which was primarily focused on usability, the context of humans remains confined as a user who has specific goals, in the given environment and designing is required to

maximise the effectiveness, efficiency and satisfaction of their experience (Jokela et al., 2003). There were some iterations between the last one — ISO 13407 and the most recent one — ISO 9241-210, but all of those unequivocally express the synonymous usage of the terms: user and human (Kleef et.al. 2005) .This was argued to be particularly concerning as it limits the perception of humans to a consumer of goods and services and forms a foundation for standard practices on ways to innovate technology to the needs and wishes of narrowed down objectives of humans (Kleef et al., 2005). This limitation is daunting in the context of the climate crisis as the guidelines are strictly towards the enhancement of human experience in relation to tasks the intended users will perform on computer-based interactive systems. Therefore, justified the pressing need for the international standardisation that establishes approaches in design practice for organisations at large to be adhering to the complexity of the socially, environmentally, and technologically entangled world.

In the 1998 definition, we can see the emphasis on prioritizing users' patterns of behaviour and experiences to correspond to technological developments. Even though the definitions have evolved as a result of drifting away from innovations from a techno-centric perspective, they are still limited as they dehumanise people as mere users even though that is not the intention (Steen, 2011). It is indisputable that catering to user's needs and preferences is important for innovations to succeed and ensure user satisfaction but limiting design practices to minimising market failures is limiting the role of designer (Steen, 2011). According to Kleef et al., (2005), this approach heavily relies on gaining deep understanding of the consumer's opinions on the functionality and desirability of the product by user testing to gain a green flag on launching the product or further iterating it till it is deemed desirable. Investing in this kind of customer research makes business sense because the cost of product failures are manifold and this serves as a preventive expense (Kleef et al. 2005).

While this evolution is beneficial and keeps up with the urgency pragmatism towards

sustainability, it still raises inherent conundrums among sustainability-oriented designers. As (Steen, 2011) discusses, the first is the need to balance users' knowledge with their own ideas and the second is to balance the approach of successfully ongoing practices and the one for the envisioned alternative for the future. These worries came from field-based evidence that during user interviews, they may not be able to articulate their needs or there could be instances where the designers get biased by their personal opinions or findings gained from a limited number of users at an early stage (Steen, 2011). Therefore, it becomes important to not only find solutions together but to have a collective vision that serves as the foundation of collaborative creativity (Steen, 2011). Furthermore, Hekkert and Van Dijk (2001) believe if too much attention is given to what users say in the initial phases, it could result in diluting the designer's creativity and vision. This calls for frequently practised self-reflections periods for designers to realign the specific goals of the context and the goals at large as suggested by Steen (2011). For instance, (Steen, 2012) direct attention towards a common tendency among designers to build a specific purpose of an interview or workshop that may end up overlooking aspects of the problem they are trying to solve because it may come across as off-topic at first glance. Table 4 summarizes views of Steen (2011) on different approaches of HCD with an example each to build a relation to which are the best approaches to find a balance between users' and design researchers' ideas and concern of what it is and what it could be as illustrated in Fig. 9.

In order to gain an in-depth understanding of people and their problems, designers often have to take up roles of facilitators to initiate conversations between key stakeholders. Manzini (2016) calls the practice of adding to process to help interviewees voice out their opinions, pain points and wishes as "post-it design" and raises concern regarding a barrier towards proposing new qualities from a role of designer as visionary agents. Hence, Manzini (2016) emphasises on design culture to step out from bring reductive approaches that require designers to be administrators of polite conversations around the table that

produce visualised information for collective understanding to transition towards experts in dialogic approaches where they can propose their own ideas and visions that are bolder and towards the greater good rather than in the interest of hand-full.

Table 4: Five HCD approaches as described by Steen (2011)

Approach	Purpose	Example
Participatory design	In this approach, users are treated as experts and the goal is to create mutual learning between users, designers and researchers so they can jointly create desired outcomes	UTOPIA project where future workshops were conducted that intended to implement future alternatives by brainstorming on the current situation
Ethnography	In this approach, designers go into the field to study users;s non-verbal needs in real-life contexts to generate inputs for product developments	Lucy Suchman's study on usage of xerox copier to document the product usage by those struggling to help engineers understand users' experiences for improved products
Lead User Approach	In this approach, lead users are invited by companies in the interest of their commercial turnover to gain help to develop modifications or customisation on their own products or services	Inviting passionate people to improve design for their own outdoor or extreme sports equipment
Co-design or co-creation	In this approach, designers can invite people who have never met before to generate collectively produced ideas	eimagining the green open space project by the city of Lancaster where the local government invited different community members to propose ideas for a green community space
Empathic Design	In this approach, designers use techniques such as role-playing or probes to create or evaluate ideas for new products	In order to understand the needs of people with limited or no vision, designers blindfold themselves

Concerns for what could be, a design orientation

Empathic Design

Co-design

Lead user approach

Move of researchers and designers towards users

Move of users towards researchers and designers

Ethnography

Participatory Design

Concerns for what it is, a research orientation
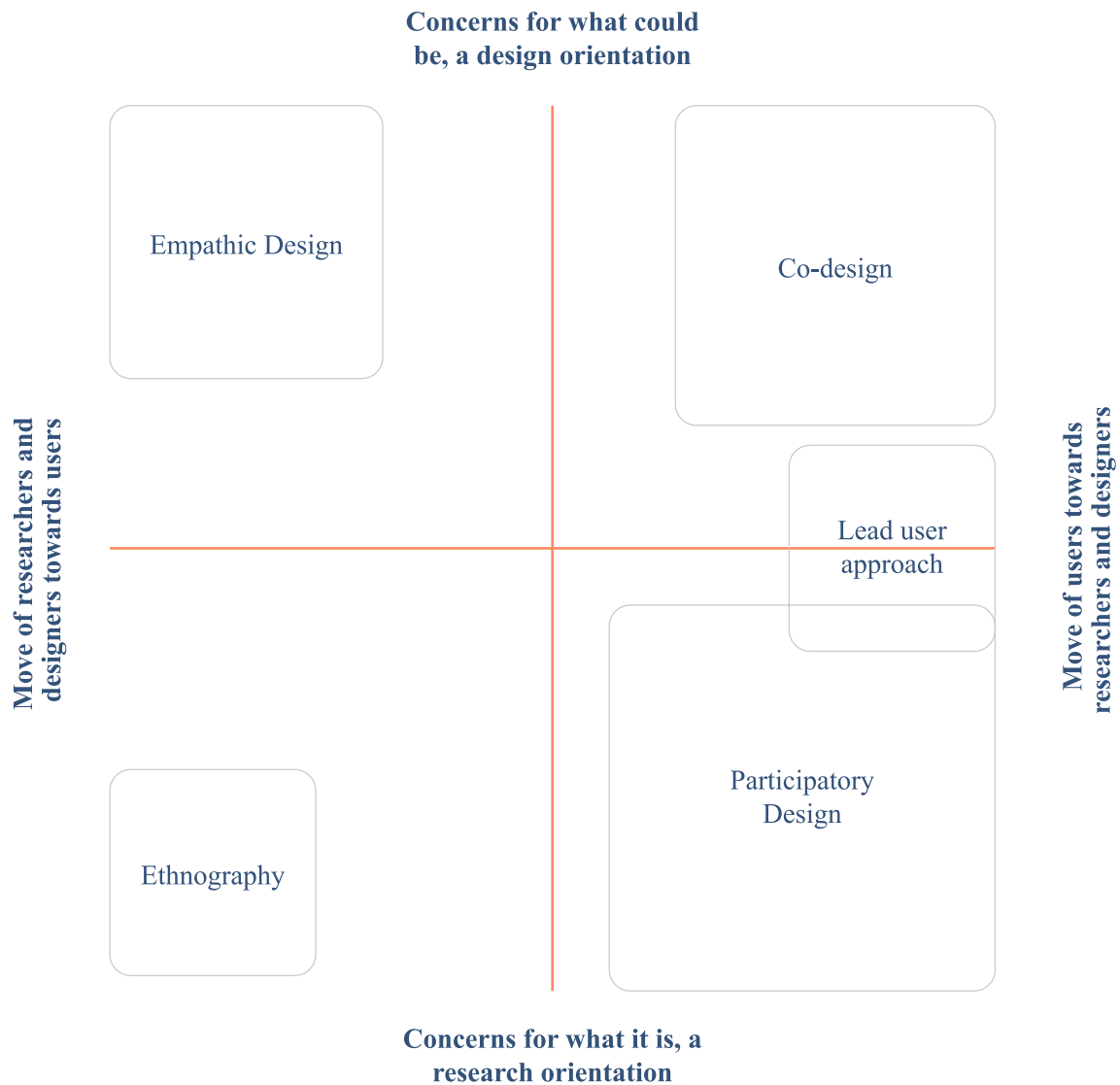
Figure.9: Adapted from Steen 2014 to depict different HCD approaches, with different starting points and emphases

Upframing HCD in service design

Service design community is gaining attention for creating value in different sectors, this reinforces the need for service innovators to strengthen and widen their methodologies to increase relevance in the interest of innovating for the collective wellbeing of humanity (Patrício et al., 2018). In the context of prevalent complexities, Patrício et al.(2018)

highlight the need for service providers to align their operating models towards creating value networks in the ecosystem that are beyond just managing the relationship with the customers. Patrício et al. (2018, p.11) suggest that "if service design has initially applied human-centred approaches to touchpoints, customer journeys and service systems at the organisational level, it now has to broaden its scope to value constellation and service ecosystem."

Prendeville and Syperek (2021) draw attention to the need of balancing human flourishing and ecological protection and propose the need towards the aptness of framing in design for sustainability discourse. Prendeville and Syperek (2021) describe framing as a generative process that interrogates the fundamental questions and patterns of responses towards conceptual opportunities that could be turned into working concepts. Prendeville and Syperek (2021) also draw attention towards interrelation between ideologies and frames, and further raise a concern about the limited critical considerations on the worldviews of the involved designers that have formed or reformed the frame for the design brief. Prendeville and Syperek (2021) recognise Le Dantec (2016) views on the need for critical retrospection in framing that they create building blocks for the entrenched structures and consequently endorsing those systems by unquestionably designing towards them.

To gain insights on ways of consciously forming frames that are conducive to generating greater value, Dorst (2015) explains what constitutes a designerly way of problem-solving being abducted in nature. Dorst (2015) builds an equation of what and how leading to an outcome where 'what' constitutes elements of the situation, 'how' represents the pattern of the relationship of the elements and 'outcome' as the observed phenomenon as depicted in fig. 10. Within abductive patterns of reasoning, Dorst (2015) classifies it into two types, one being normal abduction and the other being design abduction. In normal abduction, the outcome ie. the value that needs to be achieved is known and so are the patterns of relationship that will create the known value (Dorst, 2015). In such a situation, the only thing left to be figured out is the objects and service that needs to be created in order

to channelise the pattern of relation to achieve the outcome (Dorst, 2015). However, in design abduction, the only known thing is the nature of the outcome (Dorst, 2015).
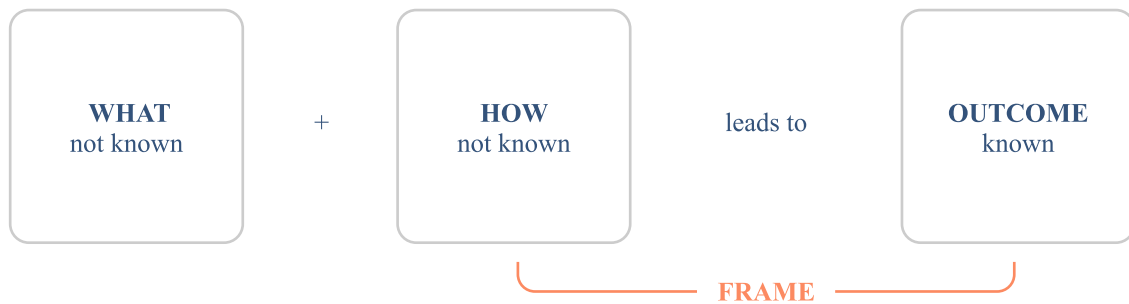

Fig. 10: Designerly approach on creating outcomes. Visualised from Drost (2005)

The difference between normal abduction and design abduction could be explained by Dorst (2015) by building a scenario case that intends to create a surge of energy before starting the workday. While in normal abduction, the 'how' would be already determined, for instance, by having a cup of coffee and the only thing that is left to be determined is the method of brewing that could either be drip, french press or moka pot (Drost,2015). On the other hand, in design abduction, the only known thing is the outcome to be achieved ie. to get an energy search to kickstart the workday but no definite process pattern is fixated upon (Drost,2015). Thereby, given the opportunity to frame the outcome by creating other opportunities such as by a meditation session, a walk-in nature or having an inspirational conversation (Drost,2015). This exemplifies the backcasting methodology of design abduction first, choosing the most interesting frame and then designing the elements for the execution of the proposition. This simple scenario demonstrates the value of framing as the key factor for a designerly way of problem-solving as it allows them to play around with different possibilities for frames, relationships and solutions (Dorst 2015).

Lakoff (2010) builds evidence on the gravity of including the environment as default in framing. Lakoff (2010) describes frames as structures that could also be referred to as 'schemas' that are a part of a larger system. He also draws attention towards their nature as unconscious reasoning parameters that need active attention to be chosen and activated by using logic, metaphors and narratives (Lakoff, 2010).

3. Methodology

Empirical research was conducted in the form of auto-ethnography of the three service design projects that I worked on in the spring semester of 2020 and autumn semester of 2021. This synopsis built the base for reflecting on the design process that was followed in the project and revisiting the dilemmas that I faced. Based on these self-reflections, I held workshops with teammates of each of the three projects and also interviews with design experts to further my insights. I chose to carry out empirical work by using the combination of auto-ethnography, workshops, and expert interviews instead of building insights solely based on theoretical research because in my experience putting theory into practice is rather challenging. While theoretical knowledge serves as a good knowledge base towards approaches and guidance to learn from the best practices, practical knowledge contributes to building this knowledge. Since their relation is intertwined, I wanted to position my research methods at the cusp of both approaches.

In the particular context of this thesis, doing an auto-ethnography was the first step to address the reflective study because it serves as a foundational ground to seek analyses of personal experiences in order to understand the experiences (Ellis et al., 2011). Since working on these three projects were not my independent experiences that were formed in silos, I wanted to further the reflection by using ethnographic design research tools such as reflective workshops. I used collective ethnography (Clerke & Hopwood, 2014) as a means of collective reflection to explicate on the similarities and differences on the dilemmas that surfaced through auto-ethnography and the research questions that emerged from this thesis. Therefore, I involved the teammates of the projects who had undergone the same learning journey to analyse the experiences from multiple perspectives to avoid implications of personal biases overshadowing the findings of the thesis. In order to ensure that the reflections remain contextual to the projects, I mapped out the exact project briefs given by the clients, reframed briefs created by teammates and the intervention points that

influenced the solution building.

Once I had the collective reflection with my peers, I approached industry experts in service design to build qualitative findings as described by Bogner et al. (2009) a method that could be used to further evaluate these personal and collective narratives of service design towards systemic change in the context of current industry trends towards sustainability transitions. The findings from the workshops and interviews ended up becoming part of the process and the product outcomes of the thesis.

During the planning phase of the thesis, I was taking into consideration other creative methods of conducting empirical research. One such idea was to create a unanimous online forum where I planned to approach students and professionals in the field of service design to describe the situations in their experiences where they found themselves in a conundrum to address a problem at hand. To be able to use such an approach of collecting data methods, I would have sought qualitative and quantitative reflections from nearly 30-50 participants. However, the empirical research was conducted during the pandemic when a majority of people were working remotely via online platforms and hitting the saturation of screen time during their spare time. Therefore, under logistical consideration, I chose to conduct auto-ethnography, followed by collective ethnography and expert interviews to avoid uncertainty on behalf of data collection.

3.1 Autoethnography

To carry out the auto-ethnography I revisited the project files, reports, public blogs and miro boards in all three projects. The goal was to reflect on the design process that the team followed and reflect on the practices that were involved. By opting for an auto-ethnography research method (Jones et al., 2016), I hope to find answers to my professional curiosities, nagging issues and intense emotions felt during and after the project completion.

Project 1: Just transitions to post oil heating homes (Design for Government course, 2020)

Project Background:

In order to execute Finland's ambitious target to become carbon neutral by 2035, the Ministry of Environment wanted to assess measures to ensure a fair and just transition from oil heating to more sustainable solutions. Given that oil is still commonly used for central heating in single-family homes, accounting for 130,000 homes across the country. Therefore, moving away from residential oil heating is much more than a technical question of energy systems and substitutes. This requires knowledge and understanding of the citizens living in the oil-heated housing: what hinders the transition, what are the effective means and measures and how the state can now effectively support the transition? This project looked at offering feasible and viable support to single-family homes in Finland, including regulation of their lifespans and residential lifestyles in order to reduce their CO2 emissions.

Intervention type:

After immersing ourselves to learn about the human and systems perspective through workshops with the client, expert interviews, and gaining around 2000 responses on the survey shared with the independent house owners, our team's most important insight was that most residents are willing to transition to a different means of heating to save cost in the long run but back certainty and trust regarding the available options. When we started to formulate our proposal based on the ideation, we sought guidance from the different styles of government interventions by Siodmok (2017).

Selected intervention points:

1. Champion: Build a case for change and alliances for action

2. Grants and subsidies: Incentive behaviour changes through Grants and other incentives.

3. Choice architecture: 'Nudging' behaviour so that the default is both attractive and easy.

Solution Summary:

Based on this, our proposal is for the Government to initiate a regional pilot by providing customized solutions to the special needs of different user types. We wanted to encourage the transition by boosting social norms and offering as much support as possible. Energy efficiency improvements could be a part of the solution, including, but not being limited to, reducing or completely getting rid of using oil.

Based on our research, we believe that aiming at maximizing the energy-efficiency of oil heated houses is a just and natural milestone towards a complete post-oil heating transition and eventually, towards a carbon-neutral society.

Reflection and takeaways:

In the early stages of the project, we learnt that 'Just transition to post-oil heating in homes' is not just a technical matter but even first and foremost a social and financial matter with strong local and household level variation. Serving as a precursor, this helped us in leveraging a human-centred approach for systems change. At a personal level, the project has been quite substantial in the formation of my understanding of how closely social sustainability and environmental sustainability are intertwined. The most valuable finding from the project has been the research finding for the client. But using a student team, the ministry was able to approach its citizen in a relatable manner. This experience made me feel like an empowered student to bring meaningful impact to the world.

The dilemma in Project 1:

The project was directly aimed towards environmental sustainability riveting it to my personal interests and aims as my personal expectations rose to make an impact towards curbing climate change. I was highly geared to finally have this opportunity to work with a national level ministry and work on a transition driven project. However, soon by getting into the research phase by talking to stakeholders and empathizing with their situation on how a switch to renewables is not possible in a matter of days, weeks or even months, I was cast down to lower the gear towards making rapid change. Similar sentiments towards the

slowness of climate action has been shared by Biesbroek (2021) and Bramwell (2015). This was a dilemma that sored high in context to the global pandemic stuck around the same months of working on the project. While climate scientists have repeatedly warned us about rising temperatures and related threats, getting to know the slowness of change-making towards climate change became a concern for rocketing climate anxiety. The course was a bitter-sweet reality check towards climate change, as on one hand, it made me feel empowered that making systemic change by design methodologies is possible, on the other hand, I realised that no matter how pressing the environmental needs are, they cannot be achieved without putting people first. This learning experience has been quite valuable for me and I could not have asked for a better teaching team and colleagues of the course.

Project 2 : Healthcare inclusion for the marginalised (Student Service Design Challenge, 2020)

Project Background:

The project aimed to improve the access to care for people in Europe that are 'invisible'. The need rises from the grim reality that there is a split in society whereby the most disadvantaged (the jobless, homeless, poor, uneducated, etc.) do not receive the health services they require whereas the more advantaged do. In the EU however, one of the defining principles of its health care systems is equity of access according to need. This means that no matter who you are or where you come from you deserve to be treated to the same standards as anyone else. Therefore, the project aimed to improve the access to care for people in Europe that are 'invisible', neglected, under-served, forgotten or overlooked.

Intervention type:

After identifying our target audience to be Roma people based on evidence such as Roma being almost entirely marginalized and many live in conditions below even the most minimal for survival (World Bank, UNICEF 2007), we explored more about their lifestyles and place in society by talking to experts and empathising with few representatives of the community by distributing cultural probes that were required to be filled for a week. Based on this research we learnt that preventive care is not a solution for Romas' problems and bridging the gap between responsible organisations for the wellbeing of Roma is crucial. Therefore, we resorted to creating a platform that unifies the actions and efforts of the responsible organisations to operate fluently when any Roma personal needs medical attention so that they do not have to worry about referrals, appointments and records of diagnoses. By strengthening the caregiver's ability to coordinate on referrals, appointments, and status of personal identification; we hoped that healthcare providers and social service workers would be able to ease Roma into their sickness journey from beginning to end.

Solution summary:

Our team explored the healthcare experience for the marginalised Roma people in Finland. Roma people have a hard time getting adequate access to healthcare due to a lack of strong identification methods, lack of trust in authorities and low literacy rates. We conceptualised a solution to help the Roma community get better access to healthcare while generating trust in the system and leading healthier lifestyles.

This is how the service concept RO+ was built up to create a hassle-free journey for Roma people. On the platform Roma, healthcare providers and social service workers can access information in one place and coordinate with each other on referrals, appointments and the status of temporary ID. The application-based service can solve Roma's problems, including language barriers, by simplifying the processes.

Reflections and takeaways:

Working on the project have been the most enriching experience of my service design career. The project not only solidified my foundation in the design process but also in design research and service design. The project's objective stands out from the popular image of design being a service for the rich and the privileged. I was so happy to gain the opportunity to design healthcare accessibility for the invisible population of Finland. Our team had scepticism about designing something so customised for a small stakeholder group such as around 300 Romas in Finland, but through our research, we found out that other immigrant populations such as those from the Middle East can also benefit from such an organisational change.

Furthermore, as we gained more systems understanding on the structure of society, capability and limits of organisations and digital consultancies.

The dilemma in project 2:

While this project has been the most concrete learning experience in shaping my practice of empirical research and working in teams, it raised strong emotions that questioned the extent and limit of design in making a difference. Since the aim of bringing equity in healthcare was positioned as a design project that would be turned into an in-house project by Philips, a tech company that brings human-centred innovation in healthcare and the living domain, it felt a bit restrained to come up with a mobile application-based solution. Although, there were discussions in the team to reframe the project as a project for or with government organisations such as Migri, Kela for providing humanitarian residence permit to the travelling population and them equal members of the society. But it felt a bit out of scope to make such a proposal. This opened my curiosity on the ways such matters are dealt with outside a classroom and whether designers have the position to probe clients to diversify their stakeholder engagement and scope of creating a solution.

Project 3 : Building work life contacts for international degree students (Design for Services, 2020)

Project Background

The brief given to us aimed at enabling the City of Espoo to support international degree students at Aalto and Hanken University to build work-life contacts. Additionally, the client wanted to explore what kind of information and services the City of Espoo should provide and to whom to build an employer's contacts for students.

Intervention type

Followed by initial conversations with the client and provo-type, we reframed the context of the problem to make it well-integrated for not only students but also the small scale enterprises, SMEs and emerging start-ups in Espoo, so that the gap in hidden networks are bridged from both the ends. We also aimed to tackle the mental models of the recruiters for seeing the value of diverse employees in the work culture. In order to bring these organizations to work in a synchronized manner, we wanted to explore what role could the City of Espoo take to help the degree students to not only be recruited but also retained in the Espoo job market. Additionally, the goal was to be able to attract an increasing number of recent graduates to continue living in Espoo.

Solution summary

We proposed CAREer (care for your career) as a unified collective service of existing, enhanced, and new services that would help the international students right from the orientation week till they graduate. The service for the students consists of current services and some suggestions to upgrade the existing services. The first one is our upgraded services proposal of Sisu+, a student tool used at Aalto University to keep track of course enrollments that would have an additional career planning section. Second is JobTeaser+, an upgrade to the existing career service where we propose employers could also create

their own profiles as well and update detailed information on job openings. And third was a proposal of creating a new portal — industrial projects[+], where the classroom projects done with clients could give an equivalent short-period work experience certificate. We also proposed other new service touchpoints including a portfolio showcasing website, meeting point provided by the City of Espoo, and peer-support group for students. Besides the improvements from the university's end, we also suggested for the city of Espoo to curate an employers' community to let them communicate with each share about their best practices of employers' & international employees' collaboration. In addition, the city was also suggested to offer financial instruments, like paying part of an internship voucher, so that start-ups and SMEs are encouraged to recruit international talents.

Reflections and takeaways:

This project was significant in reinforcing that the role of a service designer is not always to create new services. Perhaps orchestrating the scattered services could be of great value to complement the existing service providers to work at their fullest potential by actively collaborating. The project was significant in sharpening my knowledge of design tools such as journey mapping, holding co-creative workshops in-person and online.

Dilemma in the project:

As the project team was from different disciplines of design, each of us brought experiences from our varied domains. As a sustainability-oriented designer, I have been trained to think in systems and sometimes that requires me to wear my cautious and careful thinking hat while introspecting the problem at hand. Throughout the continuance of the project, I had deep unsettling thoughts in my mind regarding the impact that attracting people to the urban hubs have on the natural ecosystem. These emotions were on surge given the context of the covid19 pandemic. While the new trend was shifting towards working remotely and reverse migration, I felt unsettled to create opportunities to concentrate people in the urban hubs. In addition, I felt the necessity of systems mapping to understand the demographics challenges in Finland (Finnish Government Communication Department, 2021).

Additionally, the project brought sentiments related to 'commodified inclusion' (Harsha Walia, 2020) of highly-educated migrant students to serve the interests of racial capitalism that serves into the economic interests of the migrant's capacity to produce monetary worth. in the form of taxation. After the completion of the project, I also got familiarised with the differences in terms such as migrant, immigrant, and expat. This differentiation opened up perspective on each of the terms' hidden connotations that may influence social stigma. I feel these would have been relevant themes to interrogate to be able to tap into the mental models of recruiters.

In my opinion, the project could have focused on creating opportunities in the city with concrete action steps to pay the way for remote working. I feel in that sense, the client could have taken a pioneering role in creating new work cultures. We could have utilised the project to visualise these scenarios for international students who leave the country once their student visas expired and for companies who are unable to hire talents due to limitations on sponsoring a work visa. Perhaps opening possibilities to allow remote working would make access to recruiting talent easier.

Considering the fact that universities are a place for radical thinking, I feel the project could have shaped in coming up with completely out of the box practices for inclusivity and diversity. This is an interesting topic in general in the global scenario of work-culture, diversification and implications on climate mitigation. I hope that if I get an opportunity to work on these complementary themes again, I could suggest to my team and clients to think in systems and be bolder in the interventions.

3.2 Methodology of Workshops with teammates

Upon mapping out goals, problem reframing, and intervention type, I prepared a structure for online workshops that were held over the miro board — an online collaborative

tool. The workshops were conducted with my teammates of the three projects. At first, I introduced the workshop participants to my thesis and research goals. Then, I gave them the project recap to freshen up their memories on the process that we followed. In order to do so, I shared the project brief, reframed brief and the intervention points. This was followed by the interactive activity using Abson et al. (2017)'s diagram of relation between 12 leverage points by Meadow's (1999) and their relation to characteristics in a system as shown in fig. 1. I have been greatly influenced by the work of Donella Meadows during my studies in the creative Sustainability programme at Aalto and that was the reason for choosing this as an evaluation method of the projects. I used this to probe my teammates for alternative ways for approaching the projects and understand the hindrances or limitations faced towards taking bolder action steps. Teammates were encouraged to reflect based on their overall work experience and knowledge as professionals and not just as pupils of the project course. As the last step of the workshops, I opened up the research questions of the thesis directly with them to gain in-depth insights from their multidisciplinary perspective.

As the workshops were retrospective in nature and I wanted participants to be able to express their true emotions, concerns, high points and low points during the projects, I created a safe space for them to open up. I took their consent for recording the meeting for personal use only and promised to maintain anonymity on their comments and suggestions that surfaced during the workshops. The recordings were useful for me as I could then listen back to them and synthesis the findings.

3.3 In-depth interviews with experts

Initially, I had intended to engage in in-depth interviews with the project client and project mentor of each of the projects. However, due to a lack of synchrony in time availability, I was only able to contact the mentors of project 2 and project 3. Due to high confidentiality concerns, I will not be utilising the findings from one of these interviews. However, I

managed to get in contact with two industry experts. One of them has led the project on developing a planet-centric toolkit as an in-house project for a Finnish consultancy. The second one is a lead design researcher at IBM, Germany. Here is a more in-depth summary of their expertise and my reason for choosing them for my research.

About interviewee 1

The first interviewee has been in the design industry for thirty years. He started his career by working with IDEO, a renowned design agency at a global level which is popular for its contribution towards developing the HCD approach. The interviewee has been familiar with HCD approaches from the time when it was famously applied to product design, well before the digital era. During his time working with IDEO for over a decade, he has witnessed several changes in the design discourse. To address the changing dialogue in design practice, he wanted to acknowledge his role as a socially and environmentally responsible future maker. During the interview, he expresses, " It is shocking that no one during my early career ever asked me to consider the environment. The only model that we had was desirability, viability, and feasibility. This is pretty limited when it comes to designing for more than human needs because it does not address more than anything but human needs." He further adds the approach to be self-centred and cautioned himself to come across as cynical. However, as a designer, I have also experienced these emotions to be perceived by other as a bitter person rather than critical. Due to these limitations in the popular discourse of design practice, he dedicated his career to purpose-driven design. He has worked as an in-house design lead for tech companies, in emerging market contexts, and service design. With all this experience, he has now been working to create a planet-centric toolkit for the last couple of years. This development has also undergone several iterations and rebranding.

For all his experiences, and latest contribution towards more than Human-centric design, in combination with his active involvement in academia as a guest lecturer, he was a clear choice for me to be involved in my thesis process.

About interviewee 2

The second interviewee is a lead design researcher at IBM, Germany. His expertise is in the field of data ethics and sustainability in digital services. He was also the industry mentor of Project 2, this made it easy for me to reach out to him and build relatability to the dilemmas faced. Besides working in a tech company, the interviewee also maintains a connection with academia by mentoring design students and as a jury member for thesis presentations at the masters' and bachelor's levels. Additionally, he is the board member of the Deutscher Designer Club, Germany that advocates for design discipline to innovate in the public and social sector. Due to close involvement of working with him earlier and relevance of his work in ethics in design, I was interested in interviewing him to collect insights.

While I did not reflect on the projects with the experts in a workshop format, the nature of these interviews was semi-structured so that I can engage in conversations that I did not perceive in advance to open up. Therefore, after introducing my thesis to them, I asked them broader questions on approaches to sustainability in the industry, the ability to make a change in a company as a designer, and methods of practising systems thinking within teams and clients. After gaining a perspective on such questions, I opened up my research questions to them directly.

4. Findings

4.1 Methods to analysis

After holding the above-mentioned interviews and workshops, I first wrote the summary of each workshop and transcribed the interviews. I then analysed the similarities and differences in the participant's responses to the research questions. I then formalised common themes that emerged from the discussions and theoretic background to be able to further expand in my discussion section the most common and interesting best practices that I would personally like to consider the takeaways for my future practice as a sustainability-oriented service designer.

The commonly surfacing thoughts and the ones that were particularly interesting for me were inscribed as the findings of the thesis. Some participants also shared interesting metaphors and examples of eminent companies that I will be sharing in the findings section. First, I will share the workshop activity and then in Table 5, I have represented the emergence of key findings from different interactions that contributed to each of the research questions.

Workshop with Project 2 teammates

During the evaluation of the impact created during the project, teammates were uncertain whether the client took any of the suggestions proposed during the course into action. However, it was speculated that perhaps the interactions with the client during the classroom project brought some confidence in the client to implement monetary measures. These findings are based on quantitative data-gathering through the survey and literature review.

There was a consensus among the team members to not have diverged much from the initial brief. The identified reason for that was because the brief was already so well defined that our team ended up just bringing more detail to it. It was also agreed that the course structure enormously contributed towards such clarity and not wandering off. Teammates agreed that due to general awareness among residents and clients regarding climate change, working at a deeper leverage point related to the intent of the system that relates to paradigm shift was made possible in the form of implementing access to information on a variety of most feasible options that residents could opt for. The pink post its in figure 11 represent the leverage point and systems characteristic that was utilised during the project. The mostly interesting finding of this exercise with the team was the realisation that we were able to intervene with subsidies because the intent of the house-owners to make the transition was in place that did not require us to make direct interventions to instill values that cater towards planet's wellbeing.
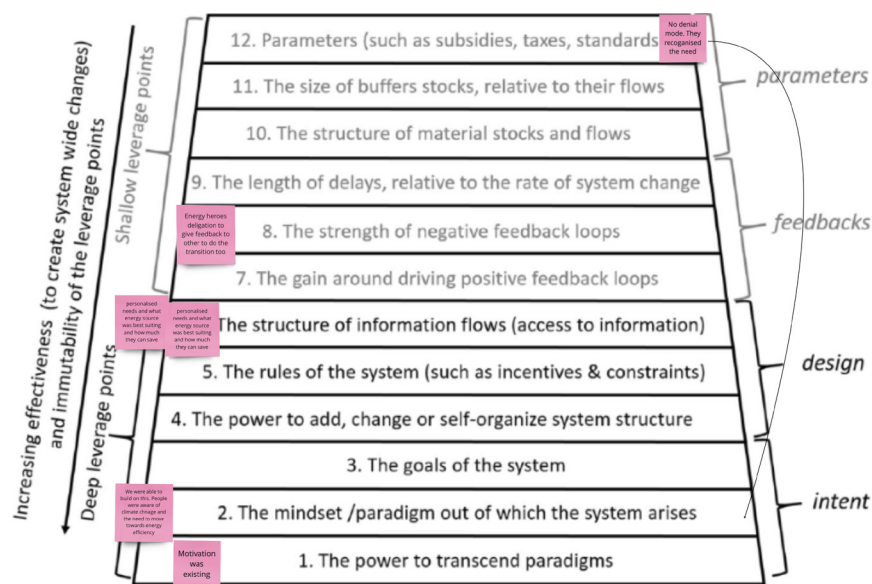

Figure.11: Map indicating leverage points during the project in pink for project 1

Workshop with Project 2 teammates

During the evaluation of the second project, teammates were able to clearly identify several missed opportunities as deeper leverage point interventions. This created a busy cluster of many unexplored interventions related to the paradigm shifts that underpins the values and goals of the intention of the system. Some of the commonly suggested deeper leverage points included creating opportunities for vocational training and employment opportunities in addition to improving migration policies towards marginalised populations. The workshop-style reflection session was helpful because it helped in mapping out the tendency of first ideas conceived by the team to be at shallow leverage points and how the final ideas that shaped into outcome proposals were at deeper leverage points, if not the deepest. Speculation raised on the hindrances of choosing the deepest leverage point was that the nature of the brief provider — IBM and Philips which is a tech company led the team to choose designing an application as the focus instead of working on other creative solutions on developing inclusivity through education, immigration services or employment opportunities.
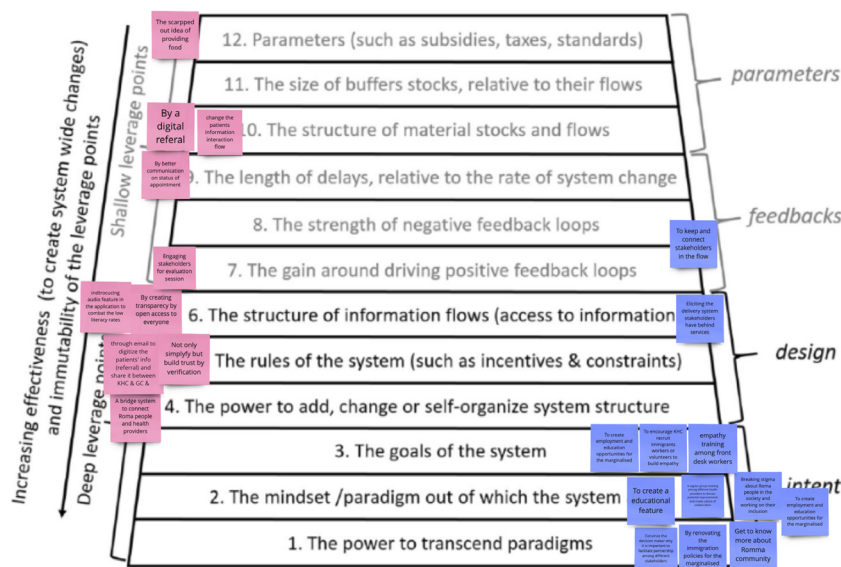

Figure 12: Map indicating leverage points during the project in pink and possibility of deeper leverage in blue for project 2

54

Workshop with Project 3 teammates

During the analysis of the intervention type in this project, we noticed that much of our value proposition was clustered around the feedback segment of medium leverage points in the Donella Meadows' diagram of place to intervene. In retrospect, the team could imagine other potential ways that could have called for deeper leverage points. One such is proposing the city of Espoo to facilitate remote working for international talents and be the pioneers in recruitment processes in the post-pandemic world. Other options included developing anonymous recruiting services that do not rely on hidden job markets in order to offer fair, equal opportunities to all recent graduates.

Table 5: Representation of key findings from different interactions

Research Questions	Work-shop 1	Work-shop 2	Work-shop 3	Inter-view 1	Inter-view 2
RQ 1: What is the current state of project briefing and reframing in service design?		✓			✓
RQ 1.1: What is the scope of sustainability in design briefing?	✓	✓			
RQ 2: How has design towards social and environmental sustainability evolved?	✓			✓	✓
RQ 2.1: What are the gaps? How could design be more systemic?	✓	✓	✓	✓	✓
RQ 2.2: What are the concrete factors in design practice that need to change to address more systemic change?	✓ ✓		✓	✓ ✓	✓
RQ 3: How are service designers addressing systemic change?	✓	✓	✓	✓	✓
RQ 3.1: What are the concrete factors in design practice that need to change to address more systemic change?	✓	✓	✓	✓	✓

RQ1 Findings

RQ1 What is the current state of project briefing and reframing in service design?

RQ1.2 What is the scope of sustainability in design briefing?

By talking to teammates of project 1, it may be said that if the initial brief is too broad, there are chances that it creates a lot of uncertainty toward setting achievable goals to enable qualitative outcomes. If the brief was too broad in relation to the timeline of the project, it may result in a lack of clarity or sometimes even resorting to low-hanging fruits in order to reach the solution phase. On one hand, it is believed that a broad brief

may provide room for creativity, on the other hand, while dealing with complex problems ina limited timeline, it could possibly result in accumulating uncertainty. Whereas there was an indication of increased possibilities for creative problem-solvers to probe clients to raise the ambition level and take bolder steps that are rooted in deep leverage points when the initial brief is well-defined. In addition to a well-formed initial brief, the three contributing factors that could be suggested to deepening the leverage points of intervention are — creative confidence, evidence-based justification, and clear communication. First, the skills and knowledge of designers in their own creative process to elevate the project's goal could play an important role. While this confidence and credibility can come from experience over the years; for apprentices, the confidence could be built up by building evidence to the success of their approaches by sharing success stories in the same context and including scientific or hard evidence to justify the need. Finally, communicating in a language that resonates with the shared value system of the brief provider could be useful in accelerating the process of persuasion towards colossal goals.

In the context of sustainability in design briefing, it was suggested by the participants of project 3 that environmental sustainability in service design is not a default but given the climate crisis that we are facing, it is deemed important to be considered a default. By the same team, the need for systems mapping was suggested to make environmental factors a part of creating value in the early phases of the design process. However, the project timeline remains a concern. It may be said that limited time duration could not only lead to finding solutions that are likely to serve as a bandage on the problem. Due to short timelines, one of the experts has observed the tendency of trading off designer's role in society to create futures that are driven towards prosperity, equity, harmony and coexistence; with the role of producing traditional outputs such as seamless interfaces, pleasing visuals, and convenient services. Therefore, there seems to be a need for sustainability to be a part of working culture and core values in organisations. This culture could be inculcated by putting forward the hard questions on the table and raising the hidden consequences of the services that are being developed in the early stages of goal setting. Teammates of

project 3 also observed that it could be the case that bigger consultancies are now able to have a bigger agenda than merely profit-generating as they recognise the need to be the agents of change. However, there seems to be uncertainty on understanding the full scope of sustainability and ways to measure its impact. The discussion on sustainability being a fuzzy term came up in almost each of the interactions.

Another shortcoming of traditional service design briefing that surfaced during the discussions is possible that the current practices or frameworks are evolved to solve problems that generate value in projects such as enhancing the shopping experience or immersing in the digital world that can put the brain to sleep, for example, social media. To exemplify, one of the experts shares Amazon's next day delivery as a great service but disastrous to feeding into the 'I need it now' mindset of humans as it could feed into the worst side of human nature. By no means we can stop services like that from existing but as designers, we could develop ways to give people choices to compensate for such resource-intensive service. The interviewee further suggests that in order to give those choices, we need to understand the bigger picture because any of our actions today will impart consequences on other parts of the ecosystem. However, this is not just a designer's responsibility to think in systems but it is the challenge of the company.

Similarly, teammates of project 2 observed that when it comes to designing services for the forgotten sections of society, the challenges could be even higher because we possibly lack bolder methodologies of intervening. Although research methods such as participatory workshops, design probes such as diary keeping have proven useful, the scope of output perhaps needs to be more sensitive to their circumstances and capabilities, and not just the capabilities of the project owner. It is believed that the silver lining in the design process to bridge this gap is the phase of reframing the project brief together with the client to make more ambitious goals that can even challenge the existing deep-rooted mindsets in the system.

In order to recommend ways to broaden the brief, the expert interviewee has developed ways to build on top of the richness of HCD. One way he has indicated this is by developing a matrix of three factors — people, nature, and business which sit next to each other. Using this matrix, he likes to open up a dialogue with clients to define their goals with the three variables. They then evaluate how to reframe the brief so that they ensure all the three segments are balanced. Although this is a simple way to get started, it is effective in awakening opportunities that were never considered before. The interviewee added that it could be the case that even if win-win alternatives are not conceived, opening up conversations on the impact of service on the environment are believed to create a wider playfield of reframing the scope of sustainability as it is likely that the client did not have an opportunity to think of climate change in context to their business. The interviewee further suggested the limited concrete tools for designers to engross clients and teams in such conversations.

Another expert interviewees categorised the kinds of design briefs in a digital consultancy into four types. The first one is when there is an existing product that needs to be redesigned, second is when there is a new idea that needs to be built up from scratch, thirds is when there are several products in the same area that needs to be merged and last but not the least is when an external company reaches out with a brief to be solved. However, in all four of these project brief segments, reframing is done by the design team in close collaboration with customers and other people in the team to avoid friction and miscommunications.

The interviewee suggested that in order to build a consensus on a reframed brief, three things are conceivably significant to turn the vision into a plan. Those are commitment, patience and consistency. Since change towards sustainability tends not to happen in silos and requires a multi-disciplinary team behind it, it could be in the form of tech or financial support or even from a specialist in communication. Therefore, good teamwork and commitment are assumed to be essential. The second most important thing believed to be

is patience because making any form of change could take time. And lastly, consistency ie. to repeat making the efforts consistently as we are witnessing with the Fridays for Future movement where people are sitting outside the legislative buildings to make their voices heard.

RQ 2 Findings

RQ2 How has design towards social and environmental sustainability evolved?
RQ 2.1 What are the gaps? How could design be more systemic?
RQ 2.1 What are the concrete factors in design practice that need to change to address more systemic change?

To reflect on these research questions, I used gaziulusoy et.al.(2016)'s DfS evolutionary to build the discussion on the evolution of design towards systemic change. Regarding the differentiation between holistic and systemic, one of the teammates Project 1 shared an interesting analogy to differentiate between holistic and systemic. She suggested that systemic could be defined as seeing not only the whole forest but also ways in which the trees and other elements interact with each other, while holistic could be described as a birds'-eye view of the whole forest.

One teammate of project 1 who was from non-design background surfaced a recurring common frustration moment encountered while following the design brief. It is the tendency in the design process to sometimes get too invested in building individual user personas. Since it is needed to engage with customers to gain some information, involving only one segment too soon is believed to result in precipitous findings. He further believed that by focusing on only a few stories could lead to biased insights and might risk alienating the ones that are not so visible in the system. This kind of hasty approach is believed to lead towards understanding the system by focusing only on a few interest groups. In retrospect, the approach in project 1 appears to be sophisticated as the

team first understood the systems perspective and later investigated deeper into individual perspectives. The participant recommended exploring stakeholder salience theory to learn more about broadening the perspective of the intervention scope that serves a larger crowd rather than just a handful.

Participants of project 3 also recognised the holistic design approach to be driven by human-centred needs whereas they associated approaches of systemic design towards larger interests than of a handful. However, they were concerned that the knowledge of systems thinking could remain theoretical and they seem to lack ways to apply it in practical cases. Similar to participants of project 1, teammates of project 3 grasped the need for multi-stakeholder involvement in order for solutions to be systemic in combination with a high level of knowledge from designers as mediators between a diversity of stakeholders and professionals across disciplines.

My teammates of project 2 shared the same apprehension as teammates of projects 1 and 3 that a holistic design solution could cohere as taking care of the nitty-gritty of creating an output that is flawless towards the users, while systemic tends to go far beyond managing the micro needs of the target audience. A teammate suggested that a workable way of implementing a systems approach could be by looking at the frameworks of degrowth for reimagining economics.

While trying to suggest ways to bring systems thinking into use cases for practical projects, an expert surfaced the congenial drive among designers to make a positive impact. Due to this nature and demonstration of ability to make an impact, there is every hope that design discipline has now made its relevance into the political and economic domain of social transformation as opposed to the previous notion of the discipline's ability to only be able to produce eye-catching artefacts. He further credited this transition to the inherent nature of designers to ask questions to make sense of the world around them. In relation to the constant positive and negative events happening around us, creative professionals tend to have the urge to contribute towards them and by interlinking the awareness of global

needs in our niche practice, by simply asking why, we have the capability to proactively make a change of big and small impact. The interviewee further adds that as designers yearn to make a difference to the complex challenges of society, they face the dilemma of being perceived as playful and child-like. He refers to their role in the company as similar to the court jester in the king's palace who was appointed as a playful critic to the king who acted as a mediator between the public and authorities by creating a light-hearted atmosphere. By using humour, the court jester would gauge the acceptability of new bills among the citizens and convey any criticism that surfaced to be conveyed to the king. He further suggested that the role of designers is quite similar to that of a designer when testing ideas with people where they assist people to either agree to the idea or get the sceptic involved in shaping it further.

The industry expert who has dedicated his career to advocating for building the context of planetary needs in service innovation mentions that the biggest hurdle he faces as an exponent of planet-centric design is the unfortunate fact of money being a prime driver in the business world that we currently operate in. That is the challenge he faced while proposing planet centric design to clients as to when he was proposing to think beyond humans, but condemned. Therefore, planet centric evolved to be rebranded as Good Growth. Even though, in essence, it was conveying the same thing but having the right term — growth, made it easier to bring the discussions that were beyond meeting the goals of monetary interests. He remarks growth as a great terminology to work with because the word 'degrowth' despite its principles is not very compelling in the business world. On the other hand, 'good growth' has a positive connotation. However, he gauges the credit for this success in aligning the client's goal is not solely to rebranding but also to the market change by large in recent years due to legislative mandates such as carbon-neutral goals, EU's new green deal.

To exemplify the need for sustainability approaches to be strategic, he shares the case of the consumer company Marimekko that has its own brand expectations as a fashion retail

company. The company is pursuing 100% transparency by tracing the tailor of the dress, the origin of its fabric, the distance it has covered, the chemical processes it has gone through and the possibilities to recycle it. Therefore, to assist such progressive companies to thrive by achieving their sustainability goals while not compromising the profits and diversifying their care agenda, using sustainability as a strategy for operating at each step is believed to be crucial.

RQ 3 Findings

RQ3 How are service designers addressing systemic change?
RQ3.1 What are the concrete factors in design practice that need to change to address more systemic change?

Teammates of project1 suggest that one of the ways that are informing systems thinking in design projects is the practice of visualising the systems map before jumping right into the double diamond design process. This practice could prevent narrowing the scope of intervention prematurely as it may tend to limit the value of the outcome. Another key finding that has emerged from participants' work experience is that often it could be the case that the role of a designer in the team is restricted to a certain phase of the project. Another observation is that strategies developed during the intervention phase may not be implemented once the contract is over. Hence, it is suggested to have continuous engagement with client one the project outcome starts unfolding.

In conversations with teammates of project 2, several interesting suggestions emerged for making service design practice that is driven towards systemic change. One of these suggestions was to seek opportunities to build connections or reduce friction between the existing stakeholders instead of creating further avenues. One way to do so is believed to be opening up conversations among the often fragmented stakeholders by indulging in a participatory and collaborative manner. The second suggestion is to get to the root of the

problem by the 5W1H (5 whys and one how) method. Such a practice is suggested to help employ a change in mental models if the deeper incentives of breaking away from the existing practices are recognised. The third suggestion is regarding involvement of nature as a default stakeholder and not only concentrating on human factors. This is believed to help in gaining a big picture view and developing solutions with a longer timescale in mind that cascades for environmentally sound solutions.

Similarly, teammates from project 3 unanimously agreed on the need of organisations to be environmentally and ethically sustainable in their business model including the operating model and work culture. One participant from the team suggested that uptaking such an approach by organisations could perhaps even be a part of their customer-centric agenda as customers are also active citizens and there is a growing awareness among citizens for a product, service providers to be ethical. However, participants also observed that at present, such a proactive approach among organisations could be niche and it is suggested to create awareness about the scope of design thinking towards a systemic approach.

Reflecting upon the rising urgency of making radical changes, one expert interviewee discerns the system around us is designed for people with monetary wealth through companies that exploit the stakeholders for the advantage of shareholders. He further adds that in such neoliberal economics, the government is almost paralysed to create any market-based pressure. Therefore, he recognises a vital need for transformation in finding a revitalised social,economical, and political evaluation of success that encompasses holistic sustainability goals. However, he believed that this could be a precarious task because the concept of sustainability is wide-ranging. So, he suggests positioning sustainability as a core value and defining its interpretation within the teams and organisation. He further added that change-making towards collective sustainability starts with people even if we use a planet-centric approach because there is no way to talk to the trees, land, water or air but by working with people and being inclusive towards a

diversity of human stakeholders who might be responsible for the trees, land, water or air, we can thoroughly integrate the context of environmental sustainability.

One of the ways to encourage clients to be bolder in their mission is suggested to be the introduction of 'wedding cake, birthday cake and cupcake model' as developed by IBM. Often as the outcome of a brainstorming exercise, it is observed that clients and teams end up coming with utopian ideas that may feel too big and unattainable to implement, making participants feeling overwhelmed. However, at this stage, it is suggested that to break down the most appealing idea to its minimal viable form — the cupcake model that could immediately be worked upon. The cupcake model could be described as the minimum viable outcome that gives the whole experience of a bigger cake but it is more manageable to implement. The evolved versions could be identified as birthday cake or wedding cake models that could be actualised as the project progresses in the coming months or years.

In order to address systemic change as a part of design-led problem solving approach of either brainstorming exercises or co-design workshops, it is believed that the competence of the workshop facilitator to break down the visions into manageable goals without compromising the mission plays an important role. The expert further believed that a proficient designer could not only contribute towards project planning but also in sustaining project collaboration. Considering that the nature of contracts with the clients are towards pre-decided time periods with an expectation for viewing concrete results. Therefore, by defining clear goals, it gets easier to accomplish them, measure their impact, and further propose bigger goals.

5. Discussion

It is indisputable that human activities have changed the surface of the earth and there is a need for a radical transformation in the way human-made systems of society, economics and politics operate. Service design in particular has a role to play in carrying out this transformation. This could be achieved by either working in the public sector, private sector or academia. While retrospecting on the three service design projects, I came to realise that projects could be classified into two categories. The first one is those that are explicitly informing environmental and social sustainability and others that implicitly have an impact on the larger schema of social and environmental sustainability. The reason for such a classification is rooted in the fact that "environment is not just about the environment. It is intimately tied up with other issue areas: economics, energy, food, health, trade, and security (Lakoff, 2010, p.76)." This seems to be the paradox of current times that in our conceptual structures we have separated ourselves from nature and we need to remind ourselves that we are not separate from nature.

However, it may not be easy in reality to make the transitions. Therefore, it needs to be approached strategically. As I spoke to the industry experts and reflected the findings with the theoretical background of the thesis, I came to realise that it is actually the Capitalocene that is the root cause of the climate crisis. Moore (2020), describe Capitalocene as an operating model that attributes capitalistic methods of cheapening nature in a combination of the systemic class divide, and class patriarchy as the contributors to the climate apartheid. Given the fact that the world around us is hierarchical towards humans, and there is a stark difference, it might be inappropriate to blame all humans for depleting the earth. Thus, the HCD frameworks remain valid, but by accepting the limitations, the scope can be widened. The simplistic recipe of innovation as a sum of feasibility, desirability with a limited understanding of sustainability is driven by the capitalistic model of making money and exploiting the planet's resources. The problem is that by advocating design as a discipline to creative innovation, it appears to have become merely

a cog in the large capitalistic machine. Therefore, it is imperative to question the impetus of the projects one is working on and be wary of strengthening hidden motives.
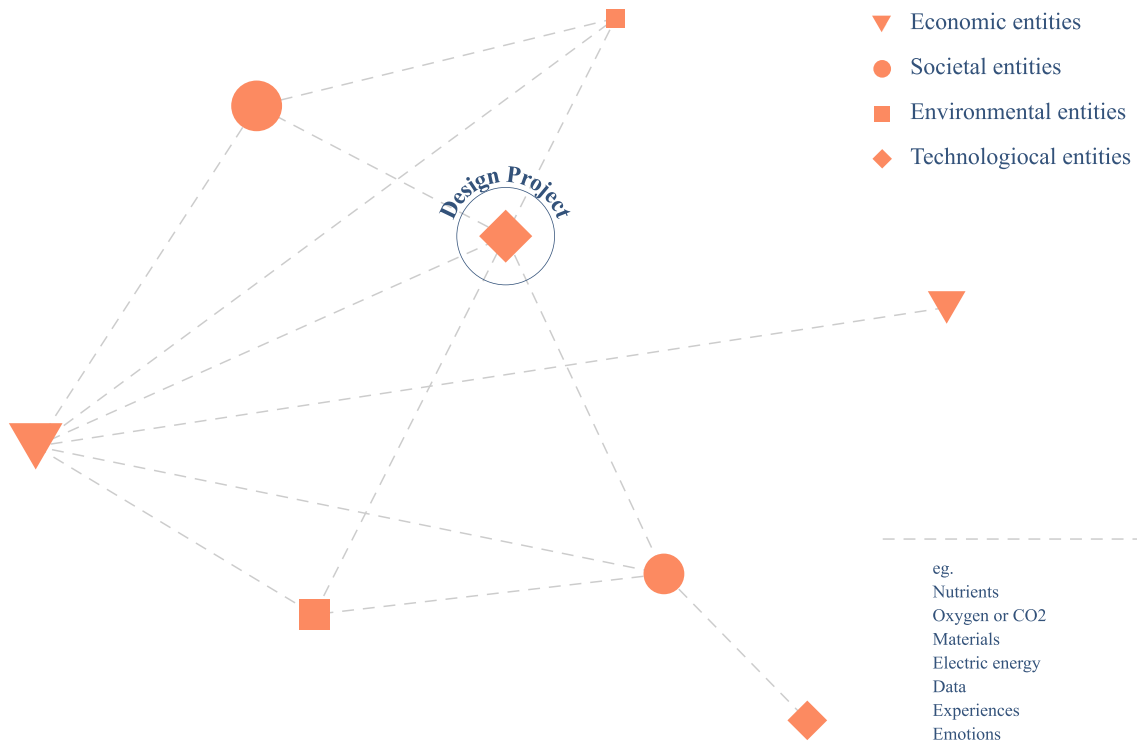

Fig 14: Map presenting how every design project promotes or hinders sustainability. Adapted from Veselova (2021)

The findings of this thesis have led to the development of five clusters, one general and four thematic, as captured in figure 15, of recommendations that can help service designers develop a practical outlook for making sustainable transformations within their projects. The four themes that emerged to integrate systems thinking in design thinking lay out a practical guide to approach wicked problems from an extended human centric viewpoint. By anchoring the discussions on the keys points of each themes, I ensured the accuracy of their description. I have also coupled the four themes with the most relevant methods that came up during theoretical and empirical research to allow practitioners to apply the findings of this thesis at different stages of the design process.

Figure 15: Affinity mapping of discussion themes

I. Set the scene

When projects have a limited timeframe, it may seem urgent to solve the problem at hand and find a solution. Opening up discussions on the semantics of keywords or factors might get overlooked, however, in the rush to find the silver bullet to the problem. The issue is important because different people define terms differently. The term "sustainability" is one of those fuzzy words that could mean something completely different depending on who you ask. The purpose of this is not to say that one discipline or individual defines better than its counterpart, but rather to open up conversation and build a collective understanding of the context through the use of overlapping and clashing ideas. Although it might seem like a futile task, it can help to keep team members building collective

understanding and establish a well-informed approach to problem-solving in the longer run.

This type of exercise is also useful for mapping out the perspectives and opinions of diverse team members involved in the project. Moreover, open up discussions beyond semantics to reveal the impetus of this project to be able to reduce ambiguity in design projects and avoid a reductionist approach to addressing a problem through the sustainability lens. Design thinking exercises like the five whys or iceberg models can be useful for this. In this way, a fuller picture of why the problem is perceived as it is might emerge and the mental models and worldviews that contribute to the recurrence of concerning events could be identified. Meadows (2001) suggests that everything we know is a model. She encourages us to challenge our assumptions individually and collectively in order to realize that the systems around us are flexible and could be shifted by redesigning the structures that are based on them.

II. Map it out

Based on the conversation with the teammates and experts, it could be said that in order to derive radical change, mapping the systemic view and interrelation is crucial. Throughout the theoretical research, workshops, and expert interviews of the thesis, this has been apparent. Along with emphasizing the importance of systems mapping, I would like to relate it to stakeholder salience mapping in order to link the systems perspective with the human perspective. As part of the double diamond design process, the divergent phase is a way to explore new possibilities for value creation that are inclusive of non-human variables and to the humans that may indirectly get impacted if overlooked. Considering the fact that complex challenges are multifaceted, implicit factors may easily be overlooked,

thereby perpetuating the negative loops. So, by widening the lens and understanding the fundamentals of their continuance, one can enhance the capacity of reducing the burden rather than shifting the burden from one factor of the ecosystem to another. Broadening the systems perspective can result in incorporating larger interest groups within the scope of value creation.

According to Julier and Hodson (2021), the scope of where design value is prompted is also determined by who is included on stakeholder maps. Activities such as getting the skeptic involved can open avenues for involving inconspicuous stakeholders. Furthermore, it is important to be mindful of choosing the representatives of the stakeholder groups while engaging in in-depth interviews. We could end up with biases or premature insights if we focus on a few stories only. As service designers, it is important to know how much to listen to users and how to build a middle ground that serves all stakeholders over the long term. Therefore, service design is capable of bringing greater benefits to society when it expands its dimension and understands its dynamics.

III. Envision and act boldly

It has been observed that design is expanding into new industries like never before. This could be attributed to the discipline's potential to contribute towards a company's economic growth by creating visually pleasing digital experiences and administrative facilitators to execute user testing of prototypes to save costs. However, it might be suggested that using design only as a ladder for economic gain is a limited way of implementing the skillsets of a service designer. As the scope of designers' abilities in educational institutions is observed to have grown and intertwined with the social sciences, economics, and even politics, designers are consequently observed to be evolving as T-shaped professionals with a diverse knowledge base and a specialized ability to visualize. As a result of this

70

change, designers are believed to be no longer just dreamers but also envisioners of futures that are equitable, just, and in sync with nature. In order for designers to effectively share their visions and get teams and clients involved, it is suggested for them to embrace more leadership skills to turn their visions into goals and actions.

Even though the change in capabilities of service designers might sound quite idealistic and promising, it is believed to be only realised if there is a change within the work culture of companies so that designers of all levels are able to contribute at their best potential. In the meantime, some practical methods that could be used to instigate thinking towards the bigger picture include practices such as 'show, don't tell' mindset, where designers can build evidence to take bold actions by showcasing hard evidence based on success stories. Another useful tool is IBM's cupcake, birthday cake and wedding cake model where the often overwhelming actions could be broken into bite-size action steps without leaving behind any crucial consideration. Other sophisticated tools include Abson's characteristics of leverage points to help deepen the intervention type.

It seems that developing interpersonal skills is crucial for designers who wish to influence others towards collective good. However, due to the tendency of inertia to leave the comfort zone and break free from business as usual, it is suggested that designers need to adjust to be comfortable with the fact that their radical ideas might be met with cultural resistance. It has been observed to be emotionally draining to advocate change towards sustainability, but sustainability-minded designers are suggested to keep their morale high by learning to distance themselves and not letting the resistance deter them from their mission. Through thinking tools and defining the scope, designers can compel teams to prioritize the problems that require immediate attention, while utilising framing as a generative tool to broaden the scope of impact. When designers organically unravel the sustainability goals, communicate transparently and stay persistent, there is every hope that they can inspire others to intervene boldly.

IV. Monitor the progress

In my experience of working on service design projects, I have observed that designers are involved in the project until an idea is conceived. Sometimes, it might go one step ahead of involving designers even to the point of executing the outcome of the creative collaboration. Based on this observation, after conducting the workshops with project co-workers and speaking to the experts, the need to keep the involvement past the concept development phase through the execution phase too was recognised. In order to continue the engagement after implementation, it is suggested to first define what accounts for success. Once that has been established and the results have started unfolding, success could be tacked. With such dynamics, if the outcome is unfolding in an unforeseen manner, then it is assumed the solution could be adjusted to align to the goals.

This kind of extended business model seems to be similar to what's followed in user interface design. For example, design consultancies in User Experience (UX) take maintenance fees if some icons or codes are not working, similar accountability agreements need to be arranged for intangible outcomes as well. By involving such practices, the feedback scope is not limited to be gained only from the targeted audience but also from the ones that might be indirectly getting impacted. As Jacqualyn L. Blizzard (2012) states that by developing feedback loops that are flexible, resilient and adaptable, the future options to tackle complications could be evolved.

Summary of discussions

There are several tools that came up in each of the four recommendations that were gained as insights of the thesis. Each of these tools have been illustrated to their recommendation in fig.16 . Additionally, the versions of the tools that I find the most suitable have been linked up in appendix B. To turn these insights into practice, I have further interlinked it to the widely used double diamond model as it is illustrated in fig.17. This model resonates with the systems thinking model developed by Design council (2021). Therefore, to integrate this, I am using the latest version of the double diamond that encompasses four phases namely explore, previously discover; reframe, previously define; create, previously develop; and catalyse, previously deliver (Design Council, 2021).
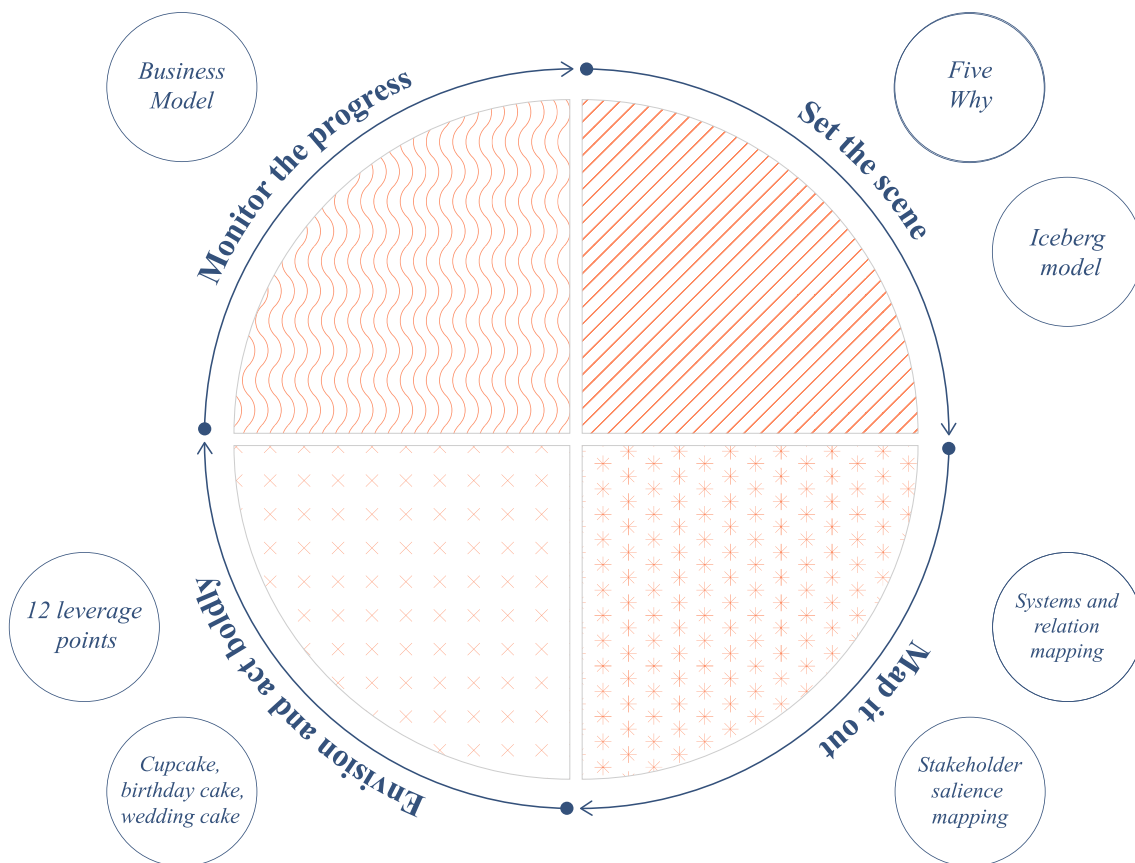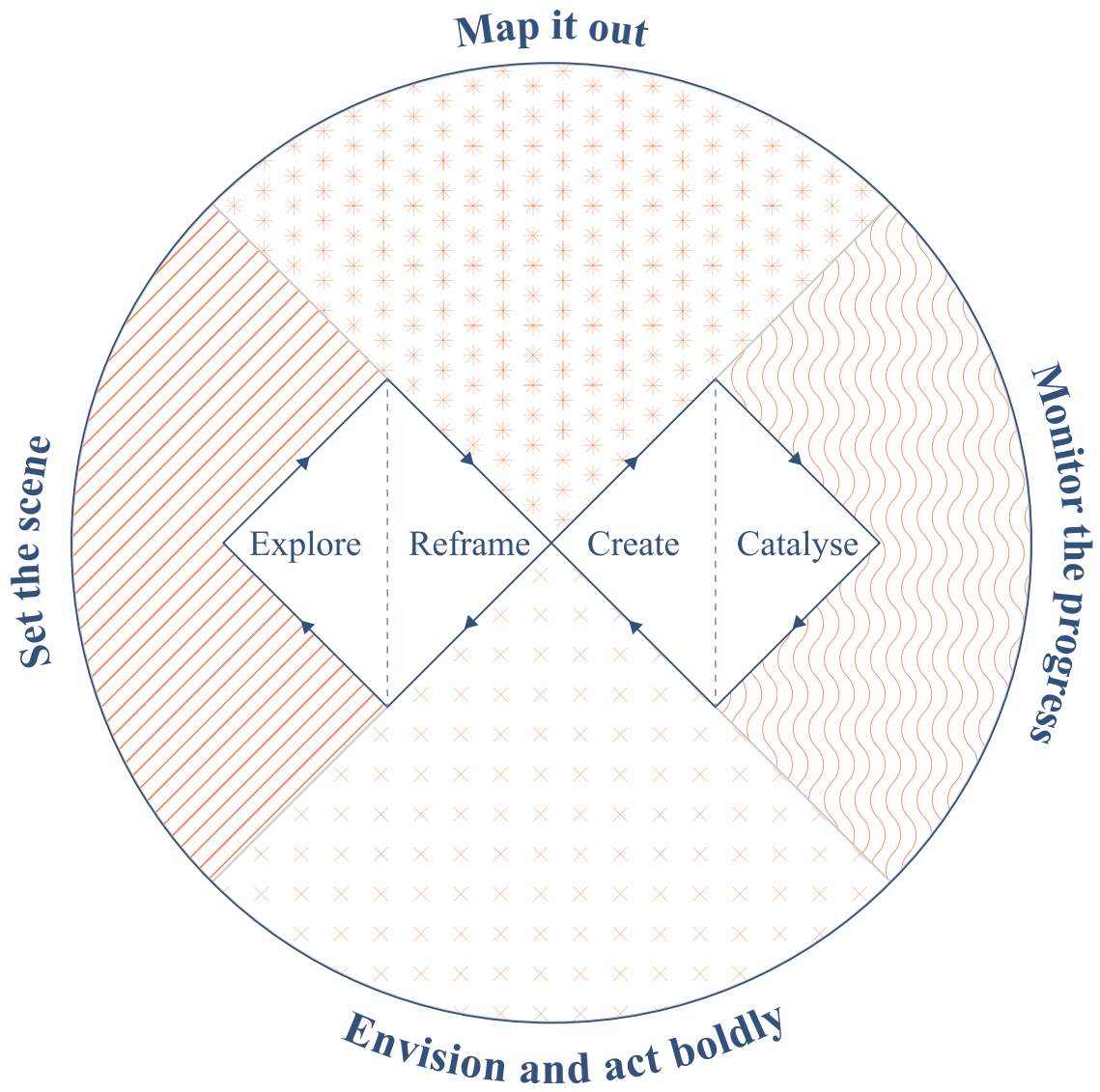

Fig 16:

Fig 17: Interlinking design thinking with systems thinking

6. Conclusion

Design, as we know, is increasingly shaping into a discipline that navigates through the wicked problems of the world. By creating frameworks in the shape of design thinking toolkits, it makes its creative and collaborative approach accessible to learners and experts of several disciplines. However, under the urgency of the climate crisis, the scope of problem statements has evolved. This inturn seeks to also broaden the tools of problem solving. Therefore, by combining systems thinking to design thinking is gaining relevance to guide actionable steps towards deep rooted problems faced by individuals, communities and the planet at large.

Systemic change is a difficult undertaking that cannot be accomplished in one project. But change begins somewhere, and service designers play a key role. However, by involving systems thinking into design thinking opens up avenues of practical work towards a larger context. With this self-reflective study, I have developed the awareness that the scope of reframing, establishing an intervention, and creating an output could possibly be dependent on two main variables that are context and scope. The context is influenced by the background of the client, nature of their work. And scope is generated by involving various stakeholders while reframing and intervening.

Certainly, it is quite overwhelming for designers to get overworked to go beyond the human context to solve problems involving communities and non-human variables such as waste, carbon emissions, life cycle assessments, value chains, and the list goes on. However, by developing project management skills related to planning, communicating effectively and making accountable decisions, designers' practices can navigate collective welfare more constructively. As entry-level service designers, the stakes of being agents of change could be even higher due to their limited experience and credibility. As a result of this reflection study, as well as from learning from my teammates, interacting with my

advisor, and interacting with industry experts, I would like to ask myself these questions while working on my next projects and probe my teammates to ponder upon them. I have clustered them as follows:

In the research phase

- Are there any implicit assumptions in this project brief?
- How can I open up a dialogue with the client, stakeholders and my teammates to delineate the hypothesis?
- Are there any personal biases that are limiting or strongly influencing my thinking? What can I do to address them and challenge them?

In the reframing phase

- What is the economic imperative behind it? What would accelerate or decelerate if I contribute by innovating towards it?
- Could the nature of project direction be aligned towards the greater good?
- Are there any hidden stakeholders including human and non-humans that I am excluding currently? How can I involve them?

In the intervention phase

- What unintended consequences could our intervention create?
- How would our outcome unfold its impact on society and environment? Am I harming unintentionally perpetuating any symptoms of inequality, injustice in society or straining land use, waterways, air quality by proposing the solution? If so, how could I reframe the brief or change my intervention?
- How would my 10 year old self have thought of addressing this problem?

In the delivery phase

- What kind of feedback mechanisms need to be implemented?
- How do I create opportunities to reflect with the client once the outcome is out and about?

- Are there any further opportunities that the outcome creates to make the goals more ambitious towards social and environmental sustainability?

Research limitations and further research

Since the study attempts to explore the broadened horizon of the current Human Centred Design, its findings are limited as it did not compare the parallel discourses that are being developed and discussed by other learners and experts such as life centred design, design for multi-species, and eco system design. However, as a future scope of this research, I would like to further dwell into the emerging alternatives to analysing the overlaps and differences between the alternatives. Additionally, to further the research on monitoring the progress, I recommend checking management tools to establish longer lasting relationships with clients.

The thesis is also limited in its analysis as it glorifies systems thinking without taking into consideration the critique that pragmatic scope of systems thinking is facing. Controvertibles have been shared by academics such as Buchanan (2019) and Sterman (2002) regarding the ironic reductionist approach of systems thinking because of the complexities and present approach to simplify the dynamic, and ever evolving interconnections into static and narrow interpretations. Beside this, the concept of capitalocene emerged in the discussions of the thesis, this has opened new doors of curiosity for me. Upon discussing this with my advisor, she shared perspectives on me regarding capitalocene being a sub part of anthropocene and if capitalism as a mode of operating did not exist then it would have been something that also builds on exploitory practices to the planet. However, this is a vast and a new segment for me to venture into. Perhaps, the topic could further be explored under the title 'design in the capitalocene' where the economic paradigm and the history behind it could be studied.

References

2022 student service design challenge—Design a service that disrupts the current ownership economy. (n.d.). 2021 Student Service Design Challenge. Retrieved November 10, 2021, from https://servicedesignchallenge.com/

Abson et al. - 2017—Leverage points for sustainability transformation.pdf. (n.d.). Retrieved October 27, 2021, from https://link.springer.com/content/pdf/10.1007/s13280-016-0800-y.pdf

Anthropocentrism and Ecocentrism. (n.d.).

Beyond Net Zero—A Systemic Design Approach.pdf. (n.d.). Retrieved November 10, 2021, from https://www.designcouncil.org.uk/sites/default/files/asset/document/Beyond%20Net%20Zero%20-%20A%20Systemic%20Design%20Approach.pdf

Blizzard, J. L., & Klotz, L. E. (2012). A framework for sustainable whole systems design. Design Studies, 33(5), 456–479. https://doi.org/10.1016/j.destud.2012.03.001

Bogner, A., Littig, B., & Menz, W. (2009). Introduction: Expert Interviews — An Introduction to a New Methodological Debate. In A. Bogner, B. Littig, & W. Menz (Eds.), Interviewing Experts (pp. 1–13). Palgrave Macmillan UK. https://doi.org/10.1057/9780230244276_1

Buchanan, R. (2001). Design Research and the New Learning. Design Issues, 17(4), 3–23.

Ceschin, F., & Gaziulusoy, I. (2016a). Evolution of design for sustainability: From product design to design for system innovations and transitions. Design Studies, 47, 118–163. Scopus. https://doi.org/10.1016/j.destud.2016.09.002

Ceschin, F., & Gaziulusoy, I. (2016a). Evolution of design for sustainability: From product design to design for system innovations and transitions. Design Studies, 47, 118–163. Scopus. https://doi.org/10.1016/j.destud.2016.09.002

Ceschin, F., & Gaziulusoy, I. (2016b). Evolution of design for sustainability: From product design to design for system innovations and transitions. Design Studies, 47, 118–163. https://doi.org/10.1016/j.destud.2016.09.002

Ceschin, F., & Gaziulusoy, I. (2016b). Evolution of design for sustainability: From product design to design for system innovations and transitions. Design Studies, 47, 118–163. https://doi.org/10.1016/j.destud.2016.09.002

Clerke, T., & Hopwood, N. (2014). Ethnography as Collective Research Endeavor. In T. Clerke & N. Hopwood (Eds.), Doing Ethnography in Teams: A Case Study of Asymmetries in Collaborative Research (pp. 5–18). Springer International Publishing. https://doi.org/10.1007/978-3-319-05618-0_2

Creating sustainable value. (n.d.).

Design methods for developing services.pdf. (n.d.). Retrieved November 9, 2021, from https://www.designcouncil.org.uk/sites/default/files/asset/document/Design%20 methods%20for%20developing%20services.pdf

Doi:10.1016/j.foodqual.2004.05.012 | Elsevier Enhanced Reader. (n.d.). https://doi. org/10.1016/j.foodqual.2004.05.012

Ehn, P., Nilsson, E., & Topgaard, R. (2014). Making Futures Introduction (pp. 1–13).

Ellis, C., Adams, T. E., & Bochner, A. P. (2011). Autoethnography: An Overview. Historical Social Research / Historische Sozialforschung, 36(4 (138)), 273–290.

Iceberg. (n.d.). SDToolKit. Retrieved October 6, 2021, from https://www. strategicdesigntoolkit.com/iceberg

IPCC_AR6_WGI_Headline_Statements. (n.d.).

Jin, S. T., Kong, H., Wu, R., & Sui, D. Z. (2018). Ridesourcing, the sharing economy, and the future of cities. Cities, 76, 96–104. https://doi.org/10.1016/j.cities.2018.01.012

Jokela, T., Iivari, N., Matero, J., & Karukka, M. (n.d.). The Standard of User-Centered Design and the Standard Definition of Usability: Analyzing ISO 13407 against ISO. 9.

Jones, S. H., Adams, T. E., & Ellis, C. (2016). Handbook of Autoethnography. Routledge.

KeesDorst_2015_3LessonsFromDesign_FrameInnovationCreate.pdf. (n.d.).

Kortenkamp, K. V., & Moore, C. F. (2001). ECOCENTRISM AND ANTHROPOCENTRISM: MORAL REASONING ABOUT ECOLOGICAL COMMONS DILEMMAS. Journal of Environmental Psychology, 21(3), 261–272. https://doi.org/10.1006/jevp.2001.0205

Lakoff, G. (2010). Why it Matters How We Frame the Environment. Environmental Communication, 4(1), 70–81. https://doi.org/10.1080/17524030903529749

Latour, B. (2018). Down to earth: Politics in the new climatic regime (English edition). Polity Press.

Manzini, E. (2016). Design Culture and Dialogic Design. Design Issues, 32(1), 52–59. https://doi.org/10.1162/DESI_a_00364

Manzini, E. (2016). Design Culture and Dialogic Design. Design Issues, 32(1), 52–59. https://doi.org/10.1162/DESI_a_00364

Nordes-2021-Proceeding_150821.pdf. (n.d.). Retrieved October 13, 2021, from https://conference2021nordes.org/wp-content/uploads/2021/08/Nordes-2021-Proceeding_150821.pdf

Nylén, D., Holmström, J., & Lyytinen, K. (2014). Oscillating Between Four Orders of Design: The Case of Digital Magazines. Design Issues, 30(3), 53–68. https://doi.org/10.1162/DESI_a_00278

Odekerken-Schröder, G. (2016, February 18). 7 key features of new service design – SERVSIG [Research Community]. 7 Key Features of New Service Design – SERVSIG.

https://www.servsig.org/wordpress/2015/02/7-key-features-of-new-service-design/

Papachristos, G. (2014). Towards multi-system sociotechnical transitions: Why simulate. Technology Analysis & Strategic Management, 26(9), 1037–1055. https://doi.org/1 0.1080/09537325.2014.944148

PhD-ThomasSchaubroeck.pdf. (n.d.).

Projects announced for DfG'20! | DfG. (n.d.). Retrieved November 10, 2021, from http:// dfg-course.aalto.fi/2020/projects-announced-for-dfg20/

Reason, B. (n.d.). Design in the anthropocene. https://www.liveworkstudio.com/articles/ designing-in-the-anthropocene/

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S. I., Lambin, E., Lenton, T. M., Scheffer, M., Folke, C., Schellnhuber, H. J., Nykvist, B., de Wit, C. A., Hughes, T., van der Leeuw, S., Rodhe, H., Sörlin, S., Snyder, P. K., Costanza, R., Svedin, U., … Foley, J. (2009). Planetary Boundaries: Exploring the Safe Operating Space for Humanity. Ecology and Society, 14(2), art32. https://doi.org/10.5751/ ES-03180-140232

Rosner, W. J. (n.d.). Mental models for sustainability. 15.

Rupprecht, C. D. D., Vervoort, J., Berthelsen, C., Mangnus, A., Osborne, N., Thompson, K., Urushima, A. Y. F., Kóvskaya, M., Spiegelberg, M., Cristiano, S., Springett, J., Marschütz, B., Flies, E. J., McGreevy, S. R., Droz, L., Breed, M. F., Gan, J., Shinkai, R., & Kawai, A. (2020). Multispecies sustainability. Global Sustainability, 3. https://doi.org/10.1017/sus.2020.28

Steen, M. (2011). Tensions in human-centred design. CoDesign, 7(1), 45–60. https://doi. org/10.1080/15710882.2011.563314

Steen, M. (2012). Human-Centered Design as a Fragile Encounter. Design Issues, 28(1), 72–80. https://doi.org/10.1162/DESI_a_00125

Sterman, J. (2000). Business Dynamics, System Thinking and Modeling for a Complex World. Http://Lst-Iiep.Iiep-Unesco.Org/Cgi-Bin/Wwwi32.Exe/[In=epidoc1. in]/?T2000=013598/(100), 19.

Suoheimo, M., Vasques, R., & Rytilahti, P. (2021). Deep Diving into Service Design Problems: Visualizing the Iceberg Model of Design Problems through a Literature Review on the Relation and Role of Service Design with Wicked Problems. The Design Journal, 24(2), 231–251. https://doi.org/10.1080/14606925.2020.1838696

Systems Thinking and Design Thinking: The Search for Principles in the World We Are Making—ScienceDirect. (n.d.). Retrieved November 10, 2021, from https://www. sciencedirect.com/science/article/pii/S2405872618301370

The Anthropocene are humans overwhelming. (n.d.).

The Harmony Amidst the Anthropocentrism and Non-Anthropocentrism Debate. (n.d.).

The Paris Agreement | UNFCCC. (n.d.). Retrieved October 4, 2021, from https://unfccc. int/process-and-meetings/the-paris-agreement/the-paris-agreement

Thuiller, W. (2007). Climate change and the ecologist. Nature, 448(7153), 550–552. https://doi.org/10.1038/448550a

Tonkinwise, C. (2014). How We Intend to Future: Review of Anthony Dunne and Fiona Raby, Speculative Everything: Design, Fiction, and Social Dreaming. Design Philosophy Papers, 12(2), 169–187. https://doi.org/10.2752/14487131 4X14159818597676

van Kleef, E., van Trijp, H. C. M., & Luning, P. (2005). Consumer research in the early stages of new product development: A critical review of methods and techniques. Food Quality and Preference, 16(3), 181–201. https://doi.org/10.1016/j.

foodqual.2004.05.012

Weaver, J. (2020, November 24). Design Won't Save the World. Medium. https://

hairyelefante.medium.com/design-is-not-going-to-save-the-world-8985870471a5

What Is Climate Change? | United Nations. (n.d.). Retrieved October 4, 2021, from https://www.un.org/en/climatechange/what-is-climate-change

Lin, D. (2016, December 11). Design Thinking (Part 2 of 2): Think Bigger and Adopt a Beginner's Mind. Think a Cloud. https://thinkacloud.wordpress.com/2016/12/11/design-thinking-part-2-of-2-learn-practice-and-adopt-a-beginners-mind/

Method & Tools. (n.d.). Vincit. Retrieved November 15, 2021, from https://planetcentricdesign.com/method-tools/

Millennials Are Killing Capitalism: Harsha Walia's Border & Rule on Racial Capitalism, Border Imperialism and Global Migration. (n.d.). Retrieved November 15, 2021, from https://millennialsarekillingcapitalism.libsyn.com/harsha-walias-border-rule-on-racial-capitalism-border-imperialism-and-global-migration

New report explores demographic challenges and opportunities in the 2020s. (n.d.). Valtioneuvosto. Retrieved November 15, 2021, from https://valtioneuvosto.fi/en/-/10616/new-report-explores-demographic-challenges-and-opportunities-in-the-2020s

Stakeholder mapping as a transdisciplinary exercise: Lessons learned from the CONVIVA Brazilian Team. (2021, June 30). Conviva. https://conviva-research.com/stakeholder-mapping-as-a-transdisciplinary-exercise-lessons-learned-from-the-conviva-brazilian-team/

What is 5 Whys? (n.d.). The Interaction Design Foundation. Retrieved November 15, 2021, from https://www.interaction-design.org/literature/topics/5-whys

Appendix A:

Scenario of Anthropocentric, non-anthropocentric dilemma:

"Up until recently a large area of old growth forest has been set aside as parkland in a small town in British Columbia. Now the local lumber company, which owns the forest land, is planning a clear-cut harvest of the old growth trees. It has been a low period for the town and this new project means jobs and income for a number of years. Marie has lived in this town all her life. Most of Marie's friends and previous co-workers are very excited about the new harvest and want to see the project happen. Both Marie and her husband were recently laid o¡ by the company and will be rehired when this new harvest begins. [However, she has learned that about 98% of old growth forests in North America have already been destroyed and that the unique old growth ecosystem is home to many rare species that cannot survive in other habitats. /However, she has learned that the jobs created by the harvest will only last until all the trees are cut, a few years, at which time Marie and her husband will again be laid off]Should Marie actively support or oppose the harvest?" (Kortenkamp & Moore, 2001)

Appendix B:

Recommendation	Tools	Link
Set the scene	Five Whys	https://www.interaction-design.org/literature/topics/5-whys
Set the scene	Iceberg Model	https://www.academyforchange.org/?s=iceberg+model
Map it out	Stakeholder salience mapping	https://conviva-research.com/stakeholder-mapping-as-a-transdisciplinary-exercise-lessons-learned-from-the-conviva-brazilian-team/
Map it out	Systemic Touchpoint	https://cdn2.hubspot.net/hubfs/6362597/Oppaat%20EN/Planet%20Centric%20Design%20toolkit%20-%2025.11.2019.pdf?_
Envision and act boldly	IBM cupcake, birthday cake, wedding cake model	https://thinkacloud.wordpress.com/2016/12/11/design-thinking-part-2-of-2-learn-practice-and-adopt-a-beginners-mind/
Envision and act boldly	12 leverage points by Donella Meadows' and charecteristics by Abson	https://sustainability-governance.net/2016/07/01/now-published-leverage-points-for-sustainability-transformation/