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Utilising sharing economy to address impact-centred approach in design education

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Abstract: To confront the growing uncertainties and challenges on a global scale through design, this paper recommends using the sharing culture as a starting point. It establishes a connection between the sharing economy and impact-centred design by examining the components and scope of the sharing economy in existing literature. Exploring how this framework can be integrated into design education, the paper offers a comprehensive account of a course on impact-centred design, grounded on sharing economy. Throughout four years, this framework was applied to explore design solutions for addressing themes related to crisis response, disaster management, and collaborative consumption. We provide methods and deliverables to illustrate how the sharing economy and design thinking collaborate to uncover systems-level exchanges and interactions among stakeholders. Our discussions focus on the transformative influence of such design contexts on the role of the designer, the scale of the design's impact and the designer responsibility.

Keywords: impact-centred design, sharing economy, sustainable development goals, design education

1. Introduction

In the face of growing uncertainties and challenges worldwide, the pressing demand for pragmatic changes to create a future that lasts; and hence, the need for new approaches, processes, and methods to address these ever-increasing and complicating challenges are echoed in literature. Especially, design-related disciplines have started to deal more and more with wicked problems of great scale and complexity, addressing humanity's most critical issues, such as climate crisis (Walker, 2023), displacement (IDEO, 2018), democratic participation (Mejía et al., 2023), and so on.

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Actually, design-related disciplines have always been associated with actively considering positive impact on people; yet, the last decades have yielded diverse manifestations of how design's impact has been tackled—starting from positive impact during a user's experience (Desmet & Pohlmeyer, 2013) or overall impact on societal and environmental transformations (Davis & Dubberly, 2023; Fokkinga et al, 2020). Moreover, the growing recognition of design's potential impacts is fuelled by global conferences and emerging design movements like social design, value-sensitive design, persuasive technology, and so on, aiming to provide deeper insights into the ever-expanding scope and accountability of designers. The ongoing expansion in the repertoire of design intentions sparks vibrant discussions concerning the role of designers in product development, and their responsibilities in terms of practice and education. All these show a shift towards impact-centred design. Fokkinga et al. (2020) have depicted the common pathways designers explore to attain their impact-centred goals. This starts with product properties that trigger user-product interaction, which in turn create an impact on the user regarding behaviour, attitude, experience, and knowledge (i.e., human impact). At the end, there is also a more indirect and long-term impact in the form of life quality and societal impact. When practising impact-centred design it is possible to follow a reverse trajectory, by considering the ultimate quality of life and society, and reasoning all the way down to achieve a design with specific properties. So, being impact-centred means design processes that intentionally and explicitly consider the less immediate and longer-term broader impacts beyond the individual. Yet, there is no concrete means to address neither the overall impact, nor the product properties that may lead to that broader impact. Wu et al. (2023) highlight that although impact-centredness exists as a concept, more relevant models and methods for its execution should be developed. Impact-focused approaches are also found important to support developing design solutions in alignment with the United Nations' Sustainable Development Goals (SDGs) (Qureshi, 2019).

This paper establishes a connection between 'impact-centred design' and 'sharing economy' paradigms, dwelling on the components and scope of the sharing economy in existing literature. The intention behind this connection is that the components of the sharing economy can provide more concrete means and framing to define the product properties and experiences, as well as the broader societal and environmental impacts to be achieved by sharing practices and culture. Sharing economy is commonly described as a socio-economic system that fosters a mediated network of transactions, facilitating the exchange of goods and services among individuals and organisations (Muñoz & Cohen, 2017). Therefore, it has the potential to create a positive impact on individuals, societies, and the planet.

By putting the 'sharing economy' at the centre, and exploring its integration into design education, this paper offers a comprehensive account of a course on impact-centred design. Throughout four years, this framework was applied to explore design solutions for addressing themes related to crisis response, disaster management, and collaborative consumption in an industrial design department. The subsequent sessions will provide

current literature on sharing economy and design, followed by a detailed presentation of the course which utilised sharing economy to address impact-centred approach in design education. Within this scope, methods and deliverables will be presented to illustrate how the sharing economy and design thinking collaborate to uncover systems-level exchanges and interactions among stakeholders. Finally, discussions will focus on the transformative influence of such design contexts on designers' roles, the scale of the design's impact and the designer's responsibility.

2. Sharing economy, sharing impact and design

Sharing has a longstanding history in human culture, with people across the globe utilising various methods to fulfil their needs through sharing and cooperation; yet, it has traditionally been confined to geographical and neighbourhood boundaries. It used to revolve around small-scale social and local networks, often involving acquaintances (Acquier et al., 2019; Katrini, 2018; Smith et al., 2015; Teubner, 2014). This conception has undergone a drastic change, signifying a fundamental shift in how consumers value, acquire, and interact with the products and services (Smith et al., 2015). Especially in recent decades, amidst a world characterised by chaos, crises, and resource depletion on one side, and significant technological and infrastructural advancements like the Internet, mobile technologies, and social media on the other (Katrini, 2018; Smith et al., 2015), the act of sharing through digital platforms has gained more and more recognition as a crucial tool for addressing complex issues related to environmental impact, excessive consumption, income disparities, and so on. So, the act of sharing has transcended local scales and intimate networks, implying even stranger sharing with a distributive character (Acquier et al., 2019; Frenken & Schor, 2017; Teubner, 2014).

Sharing economy nowadays is mostly referred to as a socio-economic system that cultivates a mediated network of transactions involving the exchange of goods and services among individuals and organisations, with the overarching objective of enhancing efficiency and optimising underutilised resources (Muñoz & Cohen, 2017). According to Katrini (2018), the sharing economy concept is highly confused with 'on-demand economy'. The on-demand economy is not invariably linked to sharing; it is more accurately characterised as economic activity enabled by online marketplaces and platforms. While online platforms can facilitate sharing and, in that context, can be seen as a component of the broader on-demand economy, not all instances of the on-demand economy inherently involve sharing and sharing culture. In effect, the value of sharing would reside in addressing a 'sharing culture'. Hereby, the main goal is to co-produce, manage, and share resources, services, knowledge, information, skills, time, and support based on solidarity and reciprocity rather than a more dominant emphasis on economic profit, as in the case of widely exemplified Uber and Airbnb. So, many sharing culture practices could be bottom-up approaches and grassroots innovations that emerge in relation to everyday human needs and innovative ways conceived by people to satisfy them (Katrini, 2018; Light & Miskelly, 2015). It addresses

collaborative consumption that occurs outside of the commercial economy. It is opposed to conspicuous consumption during which people emphasise ownership, whereas collaborative consumption addresses access over ownership, i.e. using rather than owning (Smith et al., 2015). Codagnone and Martens (2016) classify sharing platforms into for-profit versus not-for-profit and peer-to-peer (P2P) versus business-to-consumer (B2C) activities. In a similar fashion, Acquier et al. (2019) differentiate P2P intermediation versus centralised resource pooling and economic versus extended value creation.

Katrini (2018) states that collaborative practices can extend to different sectors of everyday life, offering a taxonomy rooted in common habits and routines to categorise specific activities. These are about food, shelter, work, caregiving, knowledge, well-being, resources, mobility, leisure, and services. The most successful endeavours within the sharing culture are those whose practices and activities tend to organically transcend and influence multiple categories. She emphasised the underlying principles of sharing culture are sharing, co-management, social relationships, sustainability, resourcefulness, social incentive, local economy, accessibility, and physicality (Katrini, 2018). Likewise, Matofska (2016) mentioned that the building blocks of the sharing economy should be about people, planet, production, value and systems of exchange, distribution, power, shared law, communications, culture, and future. Accordingly, the sharing economy is composed of five major components (Matofska, 2016). *Categories* are about what is being shared. This encapsulates tangible and intangible assets (e.g., homes, goods, skills, time, responsibility). *Subsets* are the broad spectrum of the sharing economy (e.g., crowdfunding, social enterprise, volunteering, microfinance, mentoring). *Mode* is how the sharing happens in practice (e.g., borrow, repair, peer-to-peer, co-create, crowdsource). *Characteristics and values* are the attributes of the sharing economy (e.g., sustainable, transparent, inclusive, fair). *Impact* is why people share and the social impact created (e.g., poverty reduction, social mobility, environmental protection, equality, community, wellbeing).

The sharing economy has also yielded many challenges. Firstly, due to the non-profit nature of some sharing practices, finding sustainable working models might be a challenge, which would result in problems in scaling when needed. So, endurance and growth of sharing communities can be at risk (Acquier et al., 2019; Fedosov, 2022). Secondly, some sharing communities or platforms can adopt a facade of pseudo-sharing, wherein underlying capitalist motives and the potential for exploitation may be concealed beneath the claims of sharing (Acquier et al., 2019). Thirdly, due to diverse economic models and exchanges in the sharing economy, the prevalence of hierarchical structures, power asymmetries, casualisation of workers, de-unionisation, and lack of necessary legislation regulating and protecting users, owners, and workers are mentioned (Katrini, 2018; Light & Miskelly, 2014). Moreover, it can sometimes pose a threat to traditional sectors, depending on who manages sharing, intentions behind it, and if these are mainly based on the economic benefits of certain parties. Accordingly, the physical concentration of homogeneous online communities in localities where those systems are offered can give rise to concerns about gentrification and physical segregation (Katrini, 2018). Furthermore, online sharing platforms may

sometimes lead to the exclusion of populations that do not have easy access to technological resources. Segregation may also occur since many online sharing platforms and services depend on user profiling and reputation, either for branding or for increasing trust. Finally, the risks of stranger sharing, trust issues, ethical concerns, regulation and legislative processes, and selective publicising for branding and positioning (e.g., shared ride services mentioning their value by comparing their environmental impact to private car ownership rather than utilisation of public transportation), and maintenance of shared products are the other issues highlighted in relation to sharing economy (Acquier et al., 2019; Frenken & Schor, 2017; Smith et al., 2015).

It can be seen that the literature on the roots of the sharing economy, its definitions, advantages and disadvantages is immense, which was also supported by the systematic review of Arcidiacono et al. (2018). They have found out that academic research on the sharing economy has expanded considerably since 2013. In parallel, design-related disciplines have started to focus more on the approaches and means that would foster sharing culture. For instance, Manzini (2015) addresses a wave of social innovations where grassroots organisations seek collaborative ways of dealing with everyday problems. Baek et al. (2018) proposed a framework for composing service design goals and strategies to enhance collaboration within a community, having implications for service design in a sharing economy. Fedosov et al. (2019; 2022) devised a toolkit to assist designers in evaluating sharing economy organisations (focusing on their supporting technologies) and crafting new physical and digital products and services. It is also highlighted that design students should be exposed to courses, lectures, and projects where they learn to design for the unique challenges of the sharing economy (Smith et al., 2015). These show that grounding on ‘sharing economy’ could be beneficial to centre impact within the scope of design education, an exploration of which is presented in the section below.

3. Utilising sharing economy as a means for impact-centred design learning

This section presents an undergraduate elective course titled ‘Design for User Experience, which was developed by the authors and has been offered at the Industrial Design Department of TED University in Ankara, Turkey. TED University is committed to the SDGs by aligning its research and teaching efforts with impact indicators. The course has 5 ECTS, involving 3 hours of weekly conduct for 14 weeks and hands-on project development. It is offered as departmental elective for industrial design students and free elective for others, but all students take the course in the same section and form mixed groups whenever possible.

Originally, the course content and methodology were structured based on the ‘Double Diamond’ design framework (Design Council, n.d) and an experience-focused, user-centred design methodology (Preece et al., 2015). The course content includes lectures on theories

and models of user experience, user-centred design methodology, user research methods, data analysis, and ideation methods. A corresponding design project is conducted in teams following consecutive stages of desk research, user research, data analysis, ideation, prototyping, user feedback, and detailing. The official learning outcomes of the course encompass being able to: comprehend the definitions and models of user experience, distinguish the concept of user experience from traditional human factors and usability, classify methods of user experience research, transfer user insights into actionable design directions, and apply design thinking and user-centred design methodology in the development of interactive products and systems.

3.1 Adapting the Course to the Sharing Economy Framework

The course was developed in the 2017-18 academic year and has been offered every Spring semester since then. Table 1 summarises the number of students who completed the course, their backgrounds, and major adaptations made to the course over the years. In 2019-20, the instructors revised the course structure by integrating an overarching 'design for sharing' theme for the design projects. Respectively, the students were expected to structure their project proposals according to the sharing economy model to afford sharing experiences among various stakeholders. A lecture on the sharing economy and an assignment on analysing existing sharing platforms based on Matofska's (2016) categorisation were added to the course content and activities (Figure 1). Incidentally, that semester was disrupted by the lockdown measures due to the COVID-19 pandemic, which created a live laboratory for students to observe and speculate about various forms of 'sharing' within the context of crisis response. In the following years, the sharing economy and collaborative consumption component was pursued, allowing explorations of its potential for impact-centred design practices. From the 2020-21 conduct of the course, remote-friendly user research methods were included in course lectures to support user research while complying with the social distancing measures.

Table 1. Summary of course adaptations and participants

YEAR	**SIGNIFICANT EVENTS**	**COURSE ADAPTATIONS**	**PROJECTS & STUDENT PROFILES**
2019-20	Announcement of the COVID-19 pandemic and beginning of lockdown measures five weeks into the semester	Added a lecture on Sharing Economy, Integrated Sharing Economy model to desk research (analysing existing sharing platforms	***Kit2Kid*** (3 ARCH, 1 IAED) ***S.O.S.*** (2 ARCH, 1 IE)
2020-21	Social distancing measures continue Normalisation period begins	Added a lecture on Remote-friendly User Research Methods (later integrated into the lecture on Methods of User Research)	***ToyAgo*** (4 ID, one of them is a guest student from another university)
2021-22			***SheShare*** (3 ID, 1 ARCH, 1 CENG)
2022-23	Twin earthquakes in southeastern Turkey immediately before the semester All departmental students for the first time	Added a lecture on Disaster Management Adapted the desk research framework Removed some of the UX sensitisation activities since all students have the same academic background	***MediLink*** (4 ID) ***Co.Edu*** (4 ID) ***PetAid*** (4 ID) ***Foresight*** (4 ID) ***ReliefDIS*** (4 ID)
Abbreviations: **ARCH** (Architecture), **CENG** (Computer Engineering), **IAED** (Interior Architecture and Environmental Design), **ID** (Industrial Design), **IE** (Industrial Engineering)			

NAME	BRIEF DESCRIPTION	CATEGORY What do we share?	STAKEHOLDERS Who are the actors?	MODE How do we share?	IMPACT Why do we share?
FreeRice	Donating grains of rice with improving or improvising your english skills. With each right question, grains of rice will be donated to people in need by WFP.	Charity/Solidarity	UN World Food Programme(WFP), Invidual learners/users/donors, People in need,Ad givers	Donation	GOAL 2: Zero Hunger
KitapDostum	It is an app for swapping books.	Goods	Users who are done reading the books or want new books	Swapping books	GOAL 12: Responsible C
WorkAway	It is a platform where people can stay in anywhere in the world in exchange for volunteering for the tasks that are given by the host.	Space	Hosts,Volunteers,World Nomads Explorer(covers insurance)	Exchanging living space for doing tasks.	GOAL 17: Partnerships to
Just Park	technology platform that matches drivers with parking s	Space	Users with car, parking space ow	Sharing Information	GOAL 17: Partnerships to
Be My Eyes	A free app that connects blind and low-vision people with sighted volunteers and company representatives for visual assistance through a live video call.	Health & Wellness	Individuals: Blind or low-vision person and sighted volunteers	Peer to Peer	GOAL 10: Reduced Inequ
Vint	Aim to make buying and selling fitness services easier for everyone. Therefore, Vint is a platform where trainers and gyms can connect with clients in their neighborhood.	Health & Wellness	Trainers and individuals	Peer to Peer	GOAL 3: Good Health an
Cohelao	Cohealo is an equipment sharing for health systems platform. It saves health systems money by sharing equipment between facilities, increasing equipment availability, eliminating rentals, and reducing capital expenses.	Health & Wellness	Hospitals, ambulatory surgery centers, medical office buildings and more	Borrow	GOAL 3: Good Health an
LeftoverSwap	An app will let you share your leftovers with strangers	Food	Individuals	Peer to Peer	GOAL 2: Zero Hunger
KitchenSurfing	Aim to help cooks who are Kitchen Surfing for products choose not only the best but the most suitable and safe products for their cooking needs.	Food, Knowledge	Platform team, chefs and people	Knowledge and help	GOAL 17: Partnerships to
Filld	End-to-end technology platform and service provider emphasizing the software and hardware needs of mobile fueling companies, regardless if they are direct to individual, commercial, fleet, and/or enterprise vehicles.	Mobility	Private institutions	Rent	GOAL 9: Industry Innovat
Bla Bla Car	The platform connects people looking to travel long distances with drivers heading the same way, so they can travel together and share the cost.	Mobility	Individuals	Collaborate	GOAL 11: Sustainable Cit
Flywheel	Flywheel drivers and the technology that supports them ensure that every ride is smart and secure. With flywheel pick-ups will be quick, payment is easy and one can have the confidence that drivers know their way around town.	Mobility	Private institutions, individuals	Rent	GOAL 11: Sustainable Cit
NAHIL	It enables women to produce their own solutions by mobilizing their life experiences and expertise with selling their handicraft products.	Charity/Solidarity	Individuals, volunteers	Donate, co-operation	GOAL 8: Decent Work an
Doctor on Demand	Doctor On Demand lets people avoid the hassle, wait and cost of a walk in clinic, urgent care or ER. They can chat virtually through video with a doctor 365 days a year–weekends and holidays included.	Health & Wellness	Doctors, patients	Sharing medical records with doctors or information	GOAL 3: Good Health an

Figure 1 A snapshot from the collaborative student analysis of existing sharing platforms. The analysis framework was adopted from the "building blocks of sharing economy" by Matofska (2016).

Before the start of the 2022-23 Spring semester, Turkey was shaken by the twin earthquakes that hit south-eastern Turkey, resulting in tens of thousands of casualties. This led the authors to incorporate a 'disaster management' theme into the sharing economy framework since the aftermath and immediate response to this emergency situation became the major agenda in all regions of the country. The project theme was identified as 'community participation in disaster management', the goal of which was to create bottom-up public participation opportunities by design in emergency preparedness, response and recovery for effective disaster management. A lecture on disaster management and community participation was added to the course content while the assignment on analysing existing sharing platforms was replaced with an analysis of community response solutions to emergencies (Figure 2). The detailed course design, including adaptations, is outlined in Figure 3. Although structural components of the course design are shown in isolation, this is mostly to be able to communicate the dominant emphasis in the course flow; in reality, they were in interaction with each other, without always clear-cut boundaries.

SOLUTION	WHY? Define the need	WHEN? Define the cycle	WHO? Define the community	WHAT? Define the participation	HOW? Define the solution
deprem.io	to create a communication and collabration between helpers and who seeks help.	Response	both people in need and helpers use this website	observing people in need of many requirements - helping them individually or with group of people or with companies & organizations. depremio collected all the benefitial websites which victims seek help.	filling the form to help or seek help.
Kurtaran Ev kurtaranev.org/afet	to provide a warm home to earthquake victim dogs and cats	Response, Recovery	it's used by both Kurtaran Ev workers and adopter, vets	After the earthquake, survived cats and dogs are treated with the help of vets and permanently adopted by Kurtaran Ev.	after filling the form, Kurtaran Ev workers start to communicate with the adopter.
Bridgefy	It is an application that allows people under collapsed buildings to communicate with people outside.	Preparedness, Response	Volunteers, victims, search and rescue teams, people help to find others	First of all, both parties who will use the application must download it. Then, it enables you to talk offline with anyone within 100 meters by turning on bluetooth.	To reach earthquakevictims who could not be reached due to problems such as internet and line disconnection.
Evim Evindir	The need for temporary accomodation following a disaster	Response, Recovery	Victims and people can open their houses to victims. Public participants.	To be a host, you register on the website and add your house to this list. To be a guest, you enter your personal info and review the appropriate home addresses.	Speeding up the accommodation process. recovering the need of somewhere to rest, eat and live.
https://www.ushahidi.com/	to monitor and respond to events such as natural disasters, political unrest, and other crises.	Preparedness, Response	The public and the victims consisting volunteers, other organizations.	The platform includes tools for creating surveys and forms, collecting data via SMS and social media, and analyzing and visualizing data using maps and other tools from large amount of people.	Helping users to quickly and easily collect and manage information about events, incidents, and other types of data.
https://www.ibuild.global/products/disaster-assessment-recovery	Due to a loss of habitable living space and unusual tendencies after the event of a disaster.	Recovery	Contractors, lenders, governments, workers, engineers and consumers.	A platform of connectivity and collaboration that builds capacity and streamlines the disaster recovery and reconstruction process.	Digitize and organize the thousands of assessments that flood in after a catastrophe.
https://www.rapidresponse.org.in/	Solutions for water purification, health education, hand pump repair and manual well drilling to developing countries.	Preparedness	Donors and volunteers	To provide immediate, effective and sustainable support for the victims of natural disasters.	Help people to survive and rebuild their lives through food, medical, education, shelter and livelihood programs.
depremihtiyac.com	To gather requests for aid shared on traditional and social media to ensure aid organizations and attendants have access to verified information	Response	Volunteers	Those in need can only request assistance for supplies, equipment and clothing. Authorities, people can help by tweeting announcements or communicate with people in need through their personal information.	Easily request assistance on the website. Also anyone who has suggestions or authorized people can contact the site directly.
Globhe https://www.globhe.com/	Quick and affordable identification of the damage-prone or damaged areas, info provided by drones through a single platform.	Mitigation, Preventation, Response	Drone operators, NGOs, Governments	Anyone around the world with a drone/ drone operator certificate can join their platform and provide local information through the use of their own drones.	Drones save time, have 1 cm / high resolution, nearly limitless data types, automated + customized and sustainable. They also provide a platform for information gathered by drones and process them.

Figure 2 The revised version of the collaborative student work to analyse community response solutions to emergencies. The analysis framework included identification of the step of the disaster management cycle (Khan et al., 2008) and the participating communities adopted from Handmer and Dovers (2008).

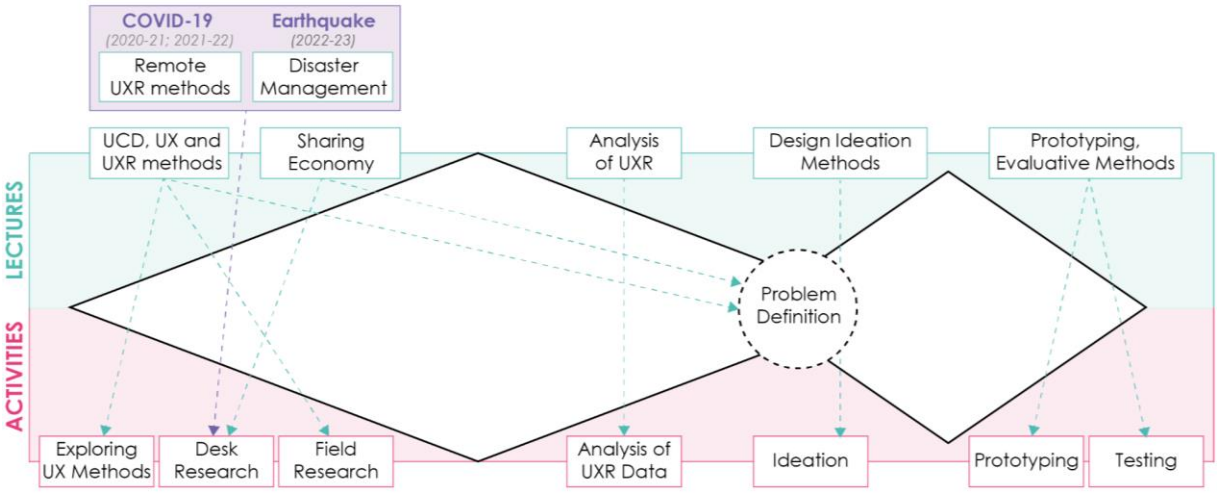


Figure 3 Outline of the course design

A total of 36 students have completed nine sharing-themed projects in teams between 2019 and 2023 (Figure 4). The teams were introduced with the following components adopted from Matofska (2016) to structure their projects according to the sharing economy framework:

- **WHAT?** Categories of sharing**:** Things to be shared or exchanged among stakeholders. E.g., goods, time, skills, space, transportation.
- **WHO?** Sharing stakeholders: Relationships between individual and institutional actors, within which acts of sharing occur. E.g., volunteers, experts, businesses, public institutions, non-governmental organisations.
- **HOW?** Modes of sharing: Forms of sharing or exchanges between stakeholders. E.g., donate, crowdsource, repair, peer-to-peer, co-create.
- **WHY?** Impact of sharing: Reference to the UN's Sustainable Development Goals (SDGs), establishing the target sustainability impacts the project would contribute to.

PROJECT	SERVICE DESCRIPTION	CATEGORY	STAKEHOLDERS	MODES	IMPACT (SDG)
Sharing Economy + Crisis Response (2020)					
S.O.S	A system to connect the individuals and institutions involved in taking care of stray animals during lockdown	goods, time, responsibility, skills and knowledge, currency	volunteers, veterinary doctors, donors, animal shelters	donate, crowdsource, collaborate, care	15 LIFE ON LAND
KIT2KID	An online sharing platform that supports the continuity of children's preschool education in a time of crisis	skills and knowledge, time	children, caregivers, development and education specialists, schools	crowdsource, on-demand, subscription	4 QUALITY EDUCATION
Sharing Economy + Collaborative Consumption (2021 & 2022)					
ToyAgo	A platform that motivates and coordinates toy sharing and fixing behaviour among families	goods, skills and knowledge	families, charities, toy companies, delivery companies, municipalities	swap, donate, repair, sell, peer-to-peer,	12 RESPONSIBLE CONSUMPTION AND PRODUCTION
SheShare	A sharing platform for women to enable a positive menstrual experience	goods, skills and knowledge	menstruating individuals, NGOs, gynaecologists, workplaces, sanitary product producers	donate, borrow, peer-to-peer	5 GENDER EQUALITY
Sharing Economy + Disaster Management (2023)					
medilink	System design that aims to improve healthcare services provided in disaster areas by supporting communication and coordination of professional communities	goods, skills and knowledge, responsibility, transport	health professionals, medical students, volunteers	donate, collaborate, peer-to-peer, co-operate	11 SUSTAINABLE CITIES AND COMMUNITIES, 3 GOOD HEALTH AND WELL-BEING
Co.Edu	Online platform that brings together those in need with volunteers to ensure continuity of education after disasters	goods, skills and knowledge, time, space, transport	children, caregivers, development and education specialists, volunteers, NGOs	donate, borrow, collaborate	11 SUSTAINABLE CITIES AND COMMUNITIES, 4 QUALITY EDUCATION
PET AID	A platform that supports the coordination of meeting the basic needs of animals after a disaster and temporary/permanent adoption	goods, skill and knowledge, responsibility, space, transport	pets, caregivers, volunteers, NGOs, veterinary doctors, first responders, municipalities, transportation companies, donors	donate, care, collaborate	11 SUSTAINABLE CITIES AND COMMUNITIES, 15 LIFE ON LAND
FORESIGHT	Disaster preparedness platform that provides training, planning and implementation at individual, household and community levels	knowledge, responsibility, time	general public, households, schools, workplaces, professional volunteers, NGOs	co-create, co-operate, collaborate, peer-to-peer	11 SUSTAINABLE CITIES AND COMMUNITIES
ReliefDis	Social platform aiming to coordinate humanitarian aid efforts in disaster response and recovery processes	goods, food, knowledge, homes, employment	people impacted by disasters, donors, NGOs, public institutions	donate, collaborate	11 SUSTAINABLE CITIES AND COMMUNITIES

Figure 4 Summary of the concluded student projects.

3.2 Discovering and Defining the Design Problem from User Perspectives

The teams start with a project proposal composed of a theme, motivation and justification as to why this theme is worth studying (i.e. the impact), potential participants to be involved in the user research phase, research methods for involvement, and expected contribution of the user involvement to the design project (Figure 5). Students are encouraged to create alternative proposals to discuss, elaborate on and decide together with the instructors. The supporting course activities for preparing project proposals are the collaborative analysis of existing sharing platforms and lectures on user experience, user-centred design, and user research.

THEME: Sanitary pad and knowledge sharing for girls

JUSTIFICATION: Stereotypes about menstruation are still exist which leads to wrong information or wicked experiences. Also, sanitary prices are as expensive as most people cannot afford. It is the first need that people can give up. Therefore, a platform which enables peer to peer sanitary, experience sharing and community based information sharing can help girls.

	Participant group	Name of the method	Why do you think this method is appropriate for your project case? What will it help you to learn about users?
1	Volunteers	Traditional Interview Techniques	Identify a group of volunteers to help for sharing pads.
2	Girls	Diary	In order to learn about their needs anonymously and to identify their existing knowledge.
3	Non-governmental organization	Traditional Interview Techniques/Focus Group	Getting knowledge from non-governmental organizations about girls's needs.It provides an intermediary role in identifying and guiding problems.
4	Pad Brands	Archives/Traditional Interview Techniques	To get information in terms of cooperation with the brand and to learn the areas where they can help.

Figure 5 The original project proposal of the SheShare team.

The project proposal is intentionally open-ended for challenging assumptions and giving room for discovery of the design problem from the users' point-of-view. Therefore, it serves as the starting point for developing a detailed user research protocol. The protocol is a step-by-step plan of the user research to be conducted with each user group. It includes an informed consent form, the target user characteristics and number of participants, data collection procedures and materials, how the data will be recorded, and division of labour within the team. Considering that the teams are composed of undergraduate students who have limited research experience, instructors closely supervise and provide feedback during the protocol preparation process. Semi-structured interview has been the most popular data collection method that has been utilised by all teams so far, though it is often complemented with other methods such as online surveys (MediLink, ReliefDIS) and self-documentation techniques like diaries and cultural probes (S.O.S, Kit2Kid, ToyAgo). In the 2023 conduct of the course, which focused on community participation in disaster management, the use of secondary data collection was also encouraged due to the complex nature of the phenomena and the importance of following existing policies, practices, and regulations. MediLink, Co.Edu, and Foresight teams made use of such secondary data to complement user research.

The collected research data is analysed with affinity diagramming (Kolko, 2007) to identify emergent design-relevant themes. Students prepare affinity diagramming by documenting small notes from interviews, surveys, research notes, etc. without reflecting their own judgements. They utilise Miro, an online collaborative space, to create small sticky notes and search for patterns by discussing and organising them (Figure 6). These patterns constitute the themes and sub-themes, which lead to the formulation of a 'How Might We (HMW) Question' (D.school, n.d.) and a list of design requirements. While formulating the HMW questions, students specify the target users, the design contribution, and the goal to be achieved through the design intervention. To quote a few examples: *"How might we enable, motivate and coordinate toy sharing behaviour among families?"* (ToyAgo), *"How might we support efficient operational systems between health specialists in order to improve health services in disaster areas for impacted people?"* (MediLink), *"How might we improve sustainable cooperation between individuals and organisations before and after natural disasters for pets' basic needs?"* (PetAid). Reframing the design problem in HMW question format is completed with a list of design requirements that the prospective design solution should meet, which functions as a bridge between the problem and solution spaces.

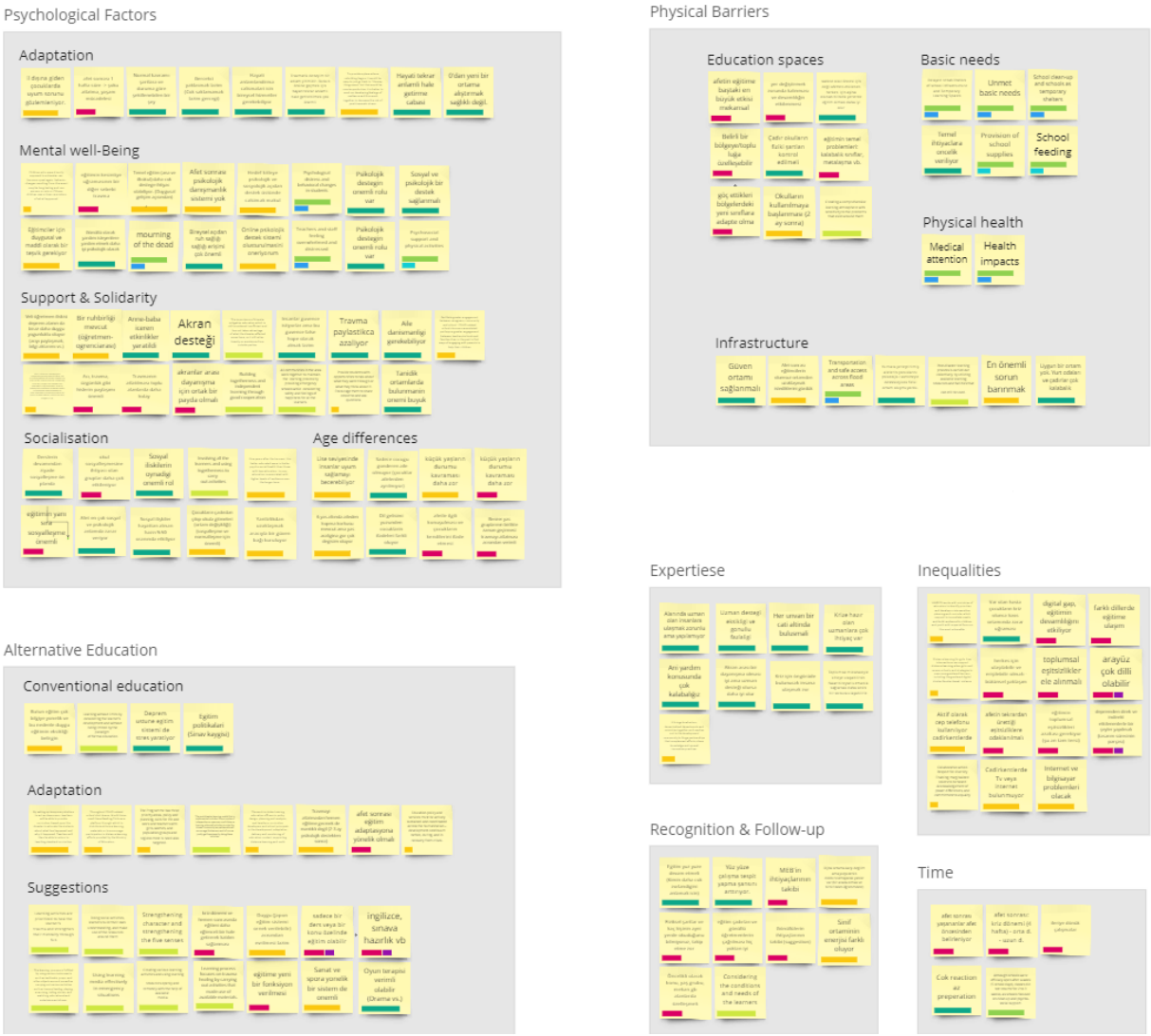


Figure 6 Co.Edu team's research analysis and emerging themes.

3.3 Developing and Delivering Multi-Stakeholder Solutions

In this phase, the students collaborate towards a design solution addressing the problem definition and design requirements. This process is supported by the delivery of lectures on design and evaluation methods. An ideation workshop with consecutive divergent and convergent steps is organised to synthesise the research insights. Divergent techniques include free brainstorming or structured ideation methods like SCAMPER (Serrat, 2017), while convergent techniques used are affinity diagramming or dot votes. The goal of the ideation workshop is to kick-start the design process by exploring potential features, stakeholders, and interactions of the system. Naturally, the outputs of this stage are rarely sketches as is in product ideation. Instead, it is based on dialogue and results in flow diagrams, lists of functions and system components (Figure 7).

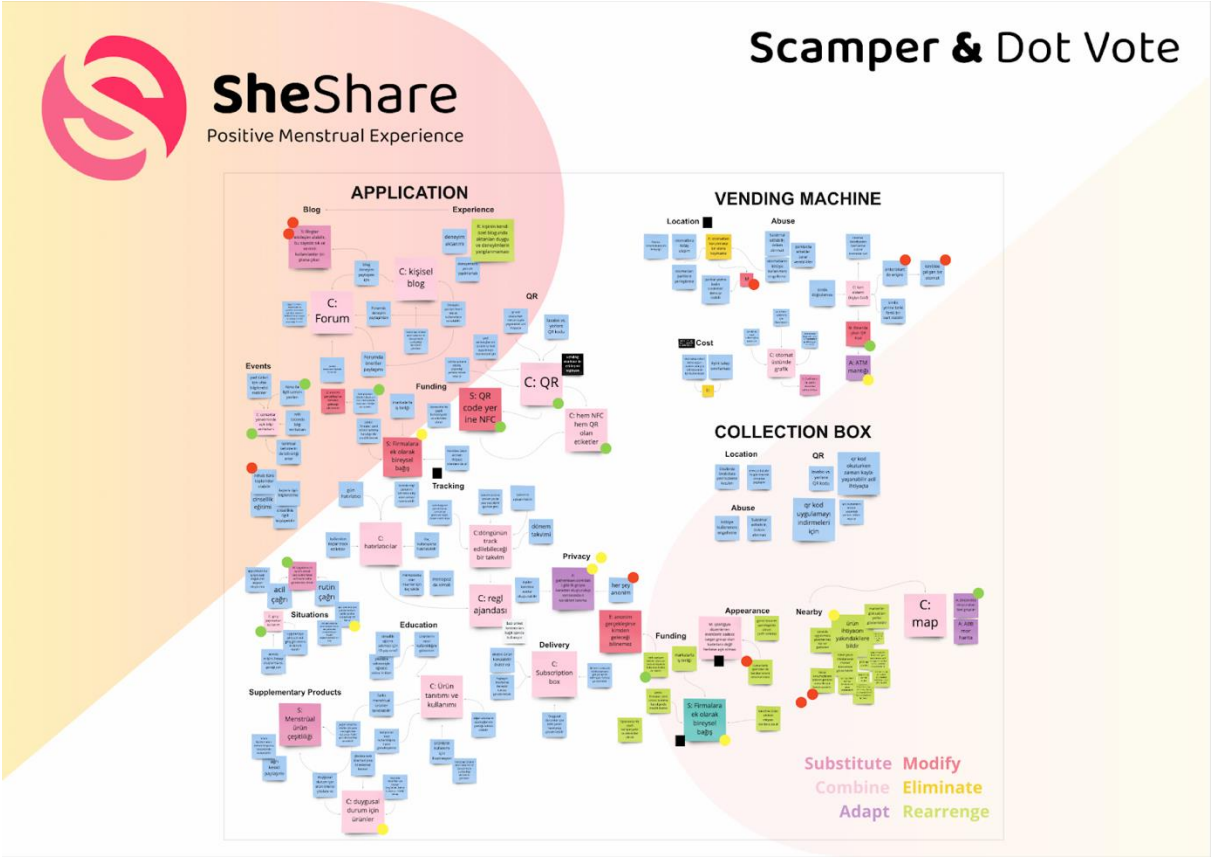


Figure 7 SheShare team's ideation workshop output.

After the initial ideation, students have approximately four weeks to develop a low-fidelity prototype (wireframes) of the digital product and an initial version of a system map for user tests, planning and executing design revisions, and preparing for the final presentation. Design revisions and iterations based on instructor and user feedback inform final design decisions, which are presented with a system map, high-fidelity prototype, and storyboards. The system map is a multi-faceted service visualisation method to represent relations between system components (Segelström and Holmlid, 2011), such as stakeholders, activities, exchanges, and interactions (Figure 8). The interactive prototype of the digital product shows the main features and interactions of the system. The user interface may need to be customised for different user roles, such as individual or institutional users, if different system features, user roles, and responsibilities are appointed for them. Although most of the designed systems involve a mobile app as the main interface, some teams specify limited features for use in other devices. For example, the ToyAgo team designed a web interface with a donation feature to access potential donors by eliminating the need for downloading the app or setting up an account. The Foresight team offered web and tablet PC interfaces for accessibility and easy consumption of training materials, videos, and news coming from their disaster preparedness communities (Figure 9). Finally, the teams deliver storyboards to communicate the context. The storyboards include where and under which conditions the activities and interactions between stakeholders take place, and what mediates the interaction (Figure 10). For example, the SheShare system involves a dispenser

for menstrual products that are located at the public toilets. The dispensers can be located and operated with the mobile application. Without the storyboards, the planning and presentation of the user's journey would be incomplete.

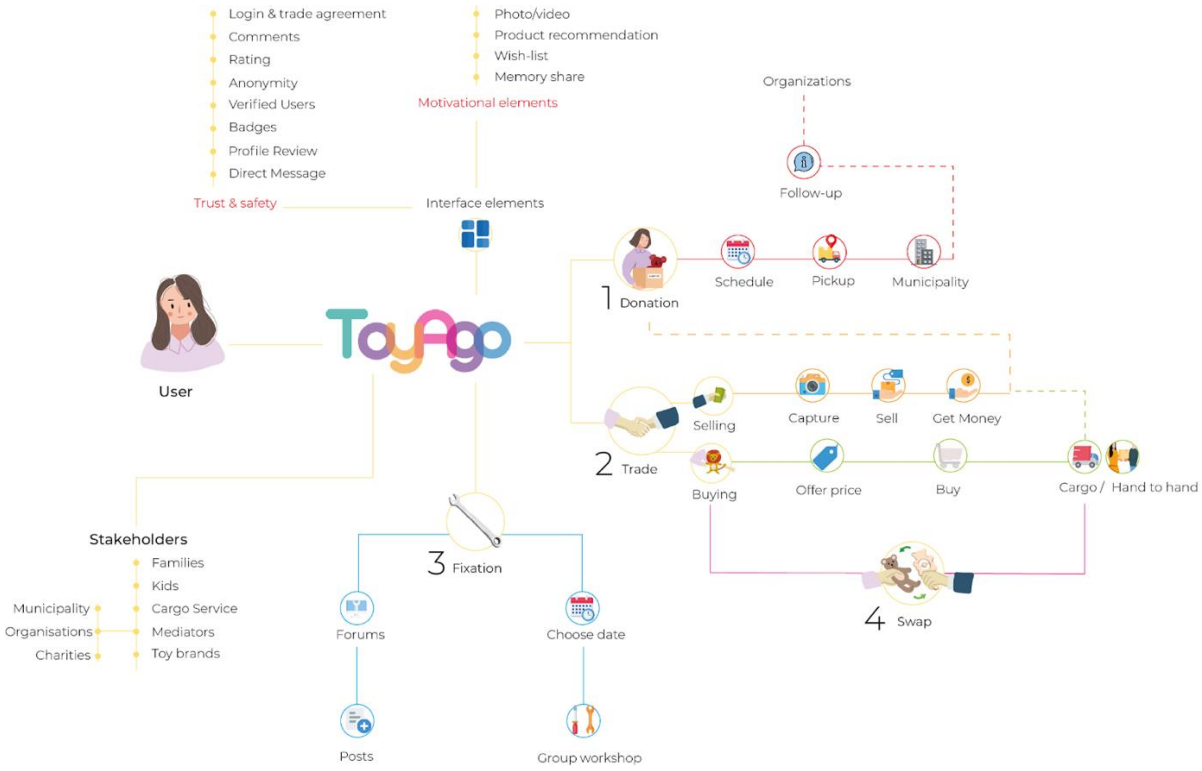


Figure 8 ToyAgo team's final system map.

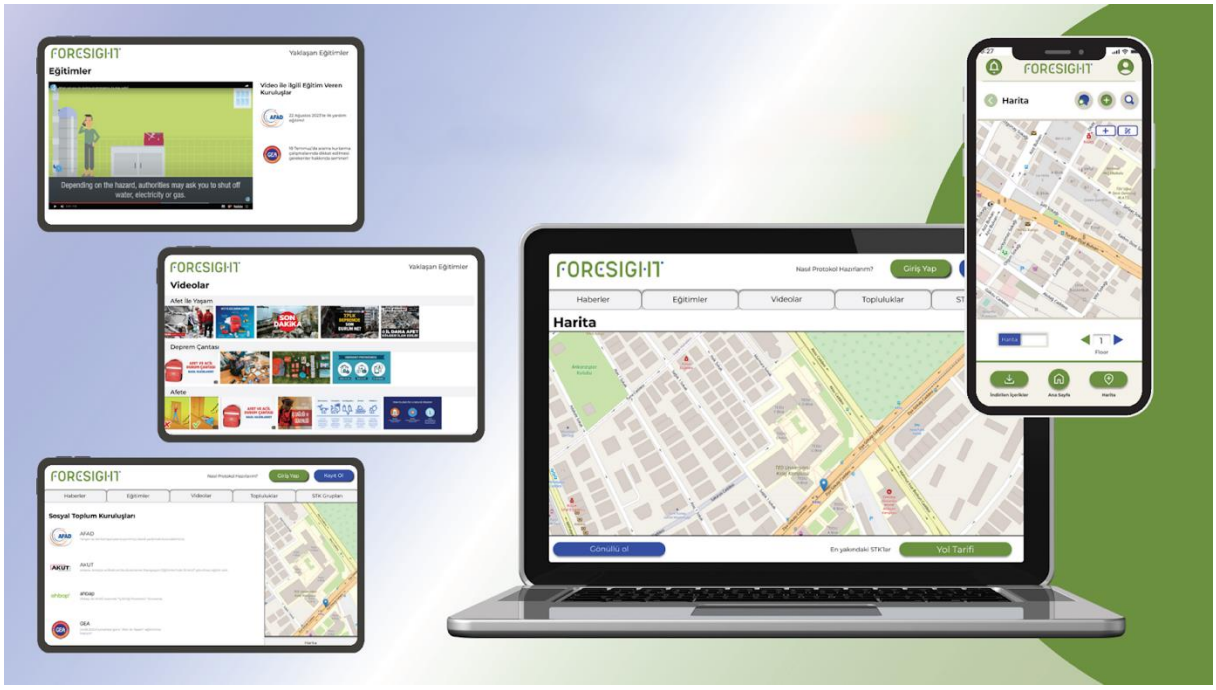


Figure 9 Alternative user interfaces designed by the Foresight team for disaster preparedness communities.



Figure 10 Storyboard for the S.O.S project illustrating the roles and interactions of the volunteers, donors, and veterinary clinics for sharing the cost and responsibilities of animal care.

4. Discussions

Possessing an impact-centred lens is proposed in the literature to address different levels of impact that designers can create (Fokkinga et al, 2020). Also, design education should address urgent humanitarian and planetarian needs to increase awareness, knowledge, skills, and positive impact. Putting the impact at the centre, considering both the individuals and the planet, we thought that 'sharing economy' could come to the forefront, as it is a socio-economic system that cultivates a mediated network of transactions involving the exchange of goods and services among individuals and organisations, with the overarching objective of enhancing efficiency and optimising underutilised resources (Muñoz & Cohen, 2017). To address impact-centred approach in design education, this paper presented the exploration of utilising sharing economy framework to teach and learn impact-centred design.

Alignment of the course structure with a user-centred project development process has provided the groundwork for the accurate identification and prioritisation of users' needs in relation to crisis response, collaborative consumption, and disaster management. Yet, the novel exploration and fresh approach of the course has stemmed from the integration of the sharing economy framework to address impact-centred design, as it has paved the way for overlapping the 'community participation' layer with diverse types of projects and instilling sharing culture. It is important to clarify that certain sharing economy modes such as crowdsourcing, citizen science, and so on, can denote particular activities in a design process. For instance, designers or design companies sometimes collect large-scale data by asking users to provide input with the aforementioned means to improve their products as in the case of *LEGO* has used crowdsourcing via an online platform both to select new product ideas and provide its most loyal supporters an outlet to share their creations (LEGO Ideas, 2008-2024). However, what sharing economy/culture addresses mostly is in the design solutions themselves that leverage sharing culture with their usage. Platforms could be designed to help people crowdsource, exchange, and co-create the needed resources and spread a collaborative culture, reducing negative impacts. To illustrate, *Needs Map* (TR.

İhtiyaç Haritası) is a social cooperative platform that brings people and institutions together; and creates and mobilises communities on a neighbourhood, regional, or city basis (Needs Map, n.d.). Its content and interactional properties allow people to express their own needs, and enable supporters to recognise and support the current needs of people. Thus, the course presented in this paper firstly uses the sharing economy as the latter, enabling students to design solutions that involve sharing culture to create positive humanitarian, societal, environmental, and/or planetarian impact. At the same time, considering the design processes in the course, it also has a strong link to participatory design processes as sharing culture entails a bottom-up approach and collaborative processes.

Our exploration has brought about important discussion points on the transformative influence of such design contexts on designers' roles, the scale of the design's impact, and the designer's responsibility.

4.1 The Transformative Influence on Designers' Roles

The course has incorporated lectures, methods, and deliverables to stimulate students' thinking on how the sharing economy and design thinking collaborate to uncover systems-level exchanges and interactions among stakeholders. The scope of the project briefs that intentionally highlight the multidimensional exchanges between diverse stakeholders, coupled with the criticality of the defined emergent contexts (e.g., pandemic, disaster), have naturally brought forth transformation of the designer roles. Students have become more aware of the positive impacts of creative decisions to significantly address the increasing complexities in today's world (e.g., economic inequalities, access to healthcare, insufficiencies in the presence of disasters), which are scrutinised in relation to the SDGs. Thus, it can be asserted that adopting a sharing culture approach has been fruitful in triggering more considerate and impact-centred designerly responsibilities.

Nevertheless, as the projects have been carried out within the confines of a course, it has not been entirely possible for the students to engage with diverse stakeholders. They primarily reached the core actors, but often did not have the chance to include an extended circle of stakeholders that hold significance within their proposed system, such as non-governmental organisations (NGOs) and public or private institutions. Even though these stakeholders and their possible roles, relationships and interactions are identified, these are hypothetical roles assigned to them by the students based on their anticipations. Whether or not these roles would be assumed by the stakeholders in real-life scenarios cannot be fully predicted.

Moreover, students'/designers' assigning hypothetical roles to diverse stakeholders might raise critical questions—who is a designer, or what is the role of the designer? These yield discussions on power hierarchies and designers' possible patriarchal stand. Community participation and bottom-up approaches are powerful in sharing culture (Katrini, 2018); however, when designers oversee roles emphasising participation, collaboration, and collectivity, this would conflict with the notion of collectivity, still connoting a top-down

viewpoint. Again, this was partly due to being within the confines of a course; yet, it should be considered that dealing with complex challenges needs transdisciplinary practices, which should go beyond the science-expert directions and involve blurring disciplinary boundaries, community agency, and a combination of sciences and arts. As Mejía et al. (2022) suggest, the evolving design mindset could include synthesis, modelling, speculation, facilitation, and implementation. We also add that these come with orchestration skills and perhaps being sometimes relevant to meta-disciplinarity. In literature surrounding interdisciplinarity, multidisciplinarity, or transdisciplinarity, diverse levels of knowledge transfer, exchange or integration across disciplinary, sectorial or civil boundaries are at issue, to develop knowledge for science and society (Hoinle et al., 2020: Peruccio et al., 2019). However, the projects during the course have shown that designers and other stakeholders are sometimes being stripped away from their traditional roles to adapt to their emergent roles during emergent conditions as in the case of pandemics or disasters. To illustrate, a designer would shape the flow between a doctor and an individual affected by a disaster, during which the doctor would not be bound to institutional limitations, assuming a role akin to that of a field volunteer. Hereby, the designer could orchestrate and monitor the networks, which are significantly associated with community-building, and the flow of exchanges between them to a certain extent. This is because when the designer leaves a physical object in the world after designing it, it might not require significant intervention afterwards. Thus, this requires the sustainability and resilience of the communities and the culture of sharing, during which the role of the designer would be ongoing more vividly in the background compared to the traditional role. Even legally, the role of the designer in this living system should be reconsidered.

4.2 The Scale of the Design's Impact and the Designer's Responsibility

The act of sharing is not a new phenomenon. However, sharing was historically confined to trusted individuals such as family, friends, and neighbours. With the mediation of technology, today's sharing platforms facilitate sharing among actors who do not know each other. Thus, 'stranger sharing' entails a degree of risk, which aims to be partially mitigated by strategies like rating and ranking systems (Frenken & Shor, 2017). Aligning the design approach with the sharing economy framework naturally brings forth a potentially wider impact on the design solution, including its risks. The designer's responsibility to provide a safe sharing experience for the users is fundamentally different from traditional product design practice. The latter implies protecting user well-being during immediate and long-term user-product interaction; thus, the designer's responsibility is largely focused on the physical, cognitive, and emotional experience that the product features mediate.

The peer-to-peer nature of sharing experiences necessitates recognition of safety risks that may arise by the way the users are connected, the information made available to each other, and the third parties. Although data privacy has not been a priority within the course, it should be addressed, especially considering the fact that in emergent situations such as disasters, trust issues are sometimes temporarily overlooked due to prioritisation of more

urgent needs. Additionally, the issues that designers want to tackle might be related to intimate experiences (e.g., menstruation). Therefore, designers should be aware of the consequences of enabling widespread interactions and exchanges.

Throughout these four years, we observed our students address trust and safety issues with community building and verification strategies, as well as casting roles for the institutional actors. For example, although SheShare enables peer-to-peer interactions among women, instead of opening the entire system features to an extended global or national network, the menstrual product exchange can only be done within communities consisting of individuals who are part of a certain institution, such as schools and workplaces. Information exchange such as recipe recommendations for soothing remedies can be shared globally, though articles that require expert knowledge are verified by certified, volunteering health professionals. Students who worked on the disaster management projects paid particular effort to both user and information verification because the expected beneficiaries of the exchange are extremely vulnerable (injured, uprooted, lost usual support systems), and the urgency of the need makes the users susceptible to safety risks. Verification of users in expert roles during registration via professional associations and government databases was a common strategy of authorisation or vouching users to improve trust and safety. Another strategy we observed was gatekeeping who will access the vulnerable users and beneficiaries, and how the exchanged information is verified for both user safety and system efficiency. These roles were usually delegated to the NGOs, governmental institutions, and related trusted individuals.

Apart from the extended reach of sharing culture and stranger sharing, having a potential to extend both the scale of the impact and the risk, it should be noted that the nature of the designed object would have a stake in this. The structure of the course, which shapes the design projects according to the sharing economy model to afford sharing experiences among various stakeholders, and its processes grounding on experience-focused and user-centred design methodology, has reinforced the efforts to develop service-focused or systemic solutions instead of singular tangible products. Relatedly, most of the solutions have tended to focus on applications. Also, in the course, it is not expected that the solutions will work in real life. Hence, both the role of the designers and the impacts of the designs remained limited compared to the real-life processes. However, some teams have applied for start-up funding and hackathons, and some got research funding (e.g., SheShare) to further develop and realise the solutions. It is acknowledged that in reality, the designed objects should be shaped collectively with diverse stakeholders including the core ones and the extended circles, having a more positive and continuous impact due to ingrained community values and resilience.

All aforementioned points signify that putting the impact and sharing culture at the centre would require flexibility during the construction and application of theoretical and methodological decisions. Grounding on user-centred approaches, but supporting these with other approaches and methods when needed, such as carrying out archival research and

consulting governmental documents and policies, is significant to be responsive and resilient within the scope of emergent sharing culture needs.

5. Conclusion

In conclusion, utilising the sharing economy framework has many potentials to address impact-centred design in an educational context. It could provide knowledge, skills, and/or values to address the world's increasing complexities and diminishing resources. Even the discussions with students about their processes and projects regarding the transforming role of designers, scale of impact, designers' responsibilities, and so on, might raise awareness on the consideration points while centring impact and sharing culture. The components of the sharing economy framework could be used in diverse phases of the design project (e.g. analysing the current solutions, design ideation, developing targeted solutions for specific SDGs, communication of the output, etc.). In short, sharing economy can provide more concrete framing and means within the scope of design education to define the product properties and experiences that would address sharing practices, and hence, ultimately operationalise positive societal and environmental impacts to be achieved by sharing culture. As the current course also aims to instruct on user experience and user-centred design approach, integrating detailed content on these inevitably shortens the time allocated for the practice. Future work on alternative design studios could explore leveraging the sharing economy framework to teach impact-centred design by weighing the project side further, more proactively engaging multiple stakeholders across diverse stages in a transdisciplinary way.

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