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Circular Futures: how can design nurture more sustainable production and delivery systems for social micro enterprises?

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In the face of environmental degradation, increasing economic volatility, and societal inequalities, transitioning to a more sustainable future—environmentally and socially—is a pressing demand. European Union policy aims to be at the forefront of this transition, placing the circular economy and social innovation at the center of policymaking. While the need for social micro-SMEs to uptake environmental measures arises, institutions still struggle in providing direction and tools for a systemic transition that considers both environmental and social innovation. This paper presents an ongoing framework to investigate how designers can inspire product, process, and business model changes in micro-enterprises to sensitively intervene in local urban production and consumption systems. The framework emphasizes the use of designerly thinking and crafting to promote practices that create social and environmental value alongside the economic one. Specifically, the paper reflects on the framework's first application in a studio course of the Master in Product-Service System Design at the Politecnico di Milano. The studio partnered with La Scuola dei Quartieri (SdQ), a social innovation program from Milan's Municipality, prompting students to twin the challenges of some of its projects in a parallel innovation journey. The in-progress framework is a starting point for understanding how design for social innovation can help social micro-SMEs consider their environmental impact and create environmental value alongside the social one. Here, designers become activists, sharing and cultivating visions while strategizing how to weave initiatives together to favor the consideration and possible introduction of these new business practices.

Keywords: circular economy; social innovation; micro-enterprise; design for social innovation

1 Introduction: social micro-SMEs, the circular economy, and design

The prospect of sustainability has pushed the European Commission to contest its current development model (EC, 2020a) and introduce the Circular Economy Action Plan and the Just Transition Mechanism to ensure a fair transition towards a more sustainable economy (EC, 2019). These two strategies underline the connection between social, environmental, and financial sustainability. Moreover, they also highlight the emergence of two complementary approaches to sustainable development: social innovation and the circular economy.

While there are different interpretations and perspectives on what social innovation is, we can define it as "new ideas (products, services, and models) that simultaneously meet social needs and create new social relationships or collaborations" (Murray et al., 2010, p.3). Meaning social innovations are social in their ends and in their means (Manzini, 2015). Moreover, they aim to make changes at the systemic level (Westley et al., 2014), they enhance society's capacity to act, and create shared value, social and economic at once (EC, 2013). Social innovation business models deliver this shared value by satisfying demands and through service delivery (Terstriep & Kleverbeck, 2018), transforming users into active value co-creators (Komatsu et al., 2016).

Even if social innovation has seen a rapid uptake in European policy and research as an innovation category, we know little about its relationship with sustainability. Researchers posit that the ability of social innovation to change existing and create new social practices can enhance sustainability by building new ways of living (Asenova & Damianova, 2018). These high expectations of social innovation raise questions about its potential to contribute to societal transitions, especially to the circular economy (CE).

As opposed to our current linear economy—based on taking, making, and disposal (EMF, 2013)—the CE proposes a shift to business models that replace the 'end-of-life' concept of resources (Kirchherr et al., 2017). By introducing a closed-loop system that cascades and cycles resources between industries, it unlocks multiple value streams (EMF, 2017). In this sense, the CE focuses on strategies that make design for sustainability approaches crucial in its implementation (Ceschin & Gaziulusoy, 2019; den Hollander et al., 2017; Vezzoli et al., 2021). Moreover, research highlights strategic and service design as promising in grappling with the complexity circular business models propose (Prendeville & Bocken, 2017).

Even though the CE may create more sustainable business models, recent research calls for further contributions covering its societal aspects, including social innovation (Türkeli et al., 2018). Since less exploration has addressed social practices and bottom-up approaches, the application of design for social innovation in the CE is limited (Ceschin & Gaziulusoy, 2019).

While the European Commission stresses the majority of the challenges related to transitioning to a CE revolve around micro, small, and medium enterprises (SMEs), (EC, 2021a; EC, 2021b; EC, 2022), it highlights the Proximity and Social Economy (P&SE) as one of the key industrial ecosystems that will help achieve its goals in decarbonization, digitalization, and overall economic resilience (EC, 2021a).

The P&SE are mostly SMEs, of which a significant part are micro enterprises [1] (EC, 2022). They characterize by short value chains, locally based production and consumption, or by their aim to positively impact local communities. Proximity businesses include small shops, restaurants, and services (EC, 2021a). Here, social enterprises are businesses that link social value creation with the economic one (Markussen, 2017). They serve social purposes by employing, training, and serving disadvantaged individuals and by producing products of particular social value (ILO, 2022).

Even though social micro-SMEs contribute to inclusive growth and social goals (EC, 2021a), they face obstacles that limit their ability to address societal challenges on a larger scale and bring about systemic changes in the wider economy. Additionally, lack of financial and institutional support, technology access, and skill shortages, can hinder their ability to implement environmental measures (ILO, 2022). However, research recognises social enterprises as natural participants in the social innovation process (Selloni & Corubolo, 2017). Moreover, smaller firms have characteristics that allow them to change processes with less effort, becoming a fertile ground for radical innovations (Schaltegger & Wagner, 2011).

Recently, researchers have started exploring how a design-driven approach can support social enterprises to participate in social innovation processes by focusing on social cooperatives (Selloni & Corubolo, 2017). While supporting social enterprises to transition to the CE is crucial (ILO, 2022), institutions struggle in providing direction and tools for a systemic transition that considers both social innovation and the creation of environmental value. Italy, for example, has implemented policies at the city or metropolitan level to encourage and support social micro-SMEs in developing innovation that is socially impactful (Comune di Milano, 2022). While these efforts are effective in maximizing the projects' ability to create positive social change in targeted city areas, they often struggle to achieve similar outcomes in terms of environmental impact.

This paper presents interim findings from an in-progress framework emerging from the following questions:

- How, and to what extent, can a design-driven approach support social micro-SMEs to rethink their current products, product-service systems, or businesses by envisioning applications of CE strategies?
- In this context, what capabilities and knowledge base do designers need?

The framework seeks to support social micro-SMEs in CE development and explores scenarios as a tool to stimulate their creativity so they can imagine circular directions for their production and delivery systems. Specifically, the paper reflects on the framework's first application in a studio course of the Master in Product-Service System Design at the Politecnico di Milano. Titled 'Radical Transformations', the course explored how service design could develop local sustainable product-service systems inspired by social innovation and the circular economy. The studio partnered with La Scuola dei Quartieri, a social innovation program from Milan's Municipality, prompting students to twin the challenges of some of its projects in a parallel innovation journey.

[1] Businesses with fewer than ten employees or a turnover or balance sheet total of less than €2 million (EC, 2021b).

2 Design for social innovation: a promising approach to bring about social and environmental value in social micro-SMEs

Social enterprises often provide innovative answers to unmet social needs by empowering users and involving different social groups (e.g., users and workers) in the entrepreneurial process (Defourny and Nyssens, 2013). Their potential to promote new social relationships and collaborations, keys to triggering social innovation, lies in these two processes.

Here, Manzini (2015) identifies social innovation as a co-design process toward social change. Several social actors lead this process and, when doing so, adopt methods and approaches suited to designing (Selloni & Manzini, 2016). When everybody (experts and non-experts alike) designs, we can distinguish between *diffuse* design, executed by social actors and related to their innate design capacities, and *expert* design, performed by those trained as designers. In this context, design for social innovation (DfSI) encompasses all the expert design actions that can activate, sustain, and orient social innovations while helping them become more accessible and replicable.

When this combination of existing disciplines supports existing social innovations, it does so by making them more visible, accessible, effective, and attractive by designing their communications, products, and services (Manzini, 2015). Strategic and service design play a relevant role in this support process by improving the quality of interactions and by fostering the creation of innovative and unprecedented partnerships (Meroni & Sangiorgi, 2011; Selloni & Corubolo, 2017).

When design lays the groundwork to trigger social innovation, designers become activists: replicating ideas and bringing about new collaborations. Here, Manzini (2015) highlights: when designers operate in activism mode, they focus on provocative ways of being and behaving in some contexts that can trigger fruitful discussions and even action in others.

Design activism, then, develops a counter-narrative for creating and balancing a positive social, environmental, institutional, or economic change (Fuad-Luke, 2009). Selloni (2017) defines this counter-narrative as visions designers can propose to elicit practices that can generate this change. These visions can be speculative ones: showing glimpses of the future to help expand our 'possibility space' in the present (Angheloiu, Chaudhuri, & Sheldrick, 2017) while better understanding it (Dunne & Raby, 2013) to finally orient our design actions (Jégou and Manzini, 2000). In this regard, strategic and service design also seem relevant as they can create future scenarios and manifest them by proposing new behaviours (Meroni & Sangiorgi, 2011).

It is in these three ways—proposing reflection, new behaviours, and partnerships—that a design approach can help social micro-SMEs widen their social impact. The same can be said for their transition to a circular economy, since circular economy processes rely on the close cooperation of various actors (Mies & Gold, 2021).

3 Design research background

This paper's case study revolves around one of Italy's current programs to foster innovation that is socially impactful. The Scuola dei Quartieri (SdQ)—School of the Neighbourhoods—is a free Milan Municipality initiative that supports projects conceived and implemented by city residents to improve neighbourhood living. The multidisciplinary capability-building program focuses on less-privileged city

areas and is design-intensive. Here, *expert* and *diffuse* design (Manzini, 2015) continuously interact in training participants to apply a product-service system design approach. The European Union co-finances the program, which a consortium of partners (including Politecnico di Milano's Desis Lab) implement.

This collaboration between community, municipality, and academia resulted in the development of the 'Radical Transformations' topic for the Final Synthesis Studio (FSS) course of the 2022/2023 academic year. Part of the Master in Product-Service System Design program at the Politecnico di Milano, the studio completes the program's design activities by providing expertise in business management and modelling, enhancing students' capacities to tackle complex issues. The FSS courses follow different topics and develop over a four-month period. To close activities, studio professors organize a final event of public presentation and discussion of the students' work.

In agreement with the SdQ program, the studio's general aim was that of designing a collection of services and solutions that would positively impact Milan's neighbourhoods by combining social innovation and the circular economy. To develop their projects, students grouped into teams of 3-4 participants and selected a specific design question to tackle. These questions reflected the innovation challenge of the social micro-SMEs in the current SdQ incubation cycle. From these questions, students followed the course programme, developing an understanding of the projects and the neighbourhoods they operate in, with support from the teaching team (two of which Desis Lab researchers) and interacting with the groups of innovators.

During the 'Radical Transformations' studio course, students stepped into the shoes of the social micro-SMEs participating in the SdQ incubation program. In developing new product-service systems that would operate in defined city contexts while tackling specific neighbourhood challenges, students became entrepreneurs of sorts. Starting from very similar innovation challenges as the SdQ projects, they followed a parallel innovation journey, building their ideas to work with and around the context-related obstacles the social micro-enterprises of the SdQ face.

After arriving at one sounder idea, the last two phases of the studio consisted in deepening and accurately developing it into a product-service system solution. At this last stage, the majority of the students' projects leaned towards social value creation, struggling to achieve similar outcomes in terms of environmental impact. It was here when we introduced the Circular Futures framework as a course exercise that would help our *simulated* micro-SME teams assess the solutions they developed and rethink them by envisioning applications of CE strategies.

4 The Circular Futures framework

The Circular Futures framework aims to hypothesize a designerly process that could help micro-SME teams review their current product-service systems or products while 'thinking through' new possibilities for their future development. This process is one:

- applied to existing or well-defined solutions as the first step of a (possible) innovation process so to guide and direct it while stimulating the team's creativity;
- where participants are the core team and employees of a social micro-SME operating in an urban setting;

- where design becomes a propositional activity, introducing scenarios as 'visions' so that participants can evaluate their production and delivery systems while imagining new directions for them in the CE context.

Inspired by Wolfgang's (2006) model of knowing, the framework's structure builds on the positioning of two main axes, represented in figure 1. The **x-axis** evidences the line between looking at the existing reality *(how things are)* and letting go of it to envision alternatives *(how things could be)*. On the other hand, the **y-axis** evidences the line between a goal-setting focus (*what do we want to accomplish?)* and a feasibility-viability focus (*how do we accomplish it?)*.

As a result, the framework divides into four main phases. Phases one through three, each with a dedicated set of tools linked to a specific objective, are meant to be tackled one after the other during a workshop format afternoon. The fourth phase, however, is out of scope of the course, since the prototyping process would entail performing a quick test of the rethought solution with real stakeholders to acquire knowledge, start to estimate costs and benefits, and to improve it.

The framework's first phase *(Insight)* is geared towards the analysis of the solution *as is* while the second one *(Explore)* contests it. Finally, the third phase *(Rethink)* demands for new directions and the selection of the most promising one to detail for the course.

The following subsections will show and describe these three phases, their tools, and their design process.

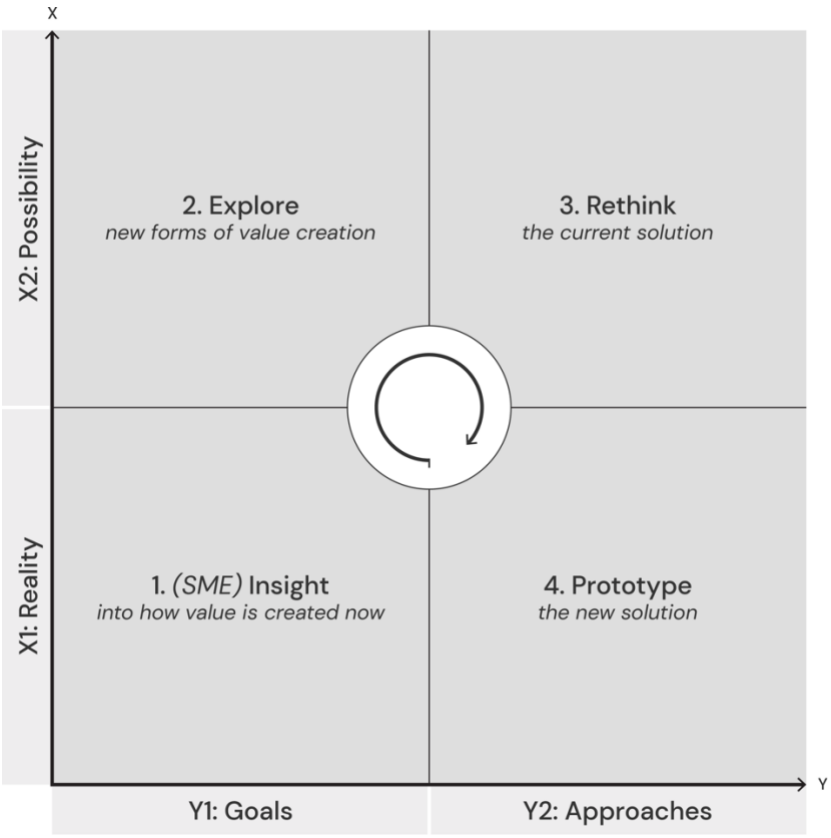

Figure 1. The Circular Futures framework structure and main phases.

4.1 Phase 1: *(SME)* Insight

The *Insight* phase dedicates to laying the foundations to the rethinking process, introducing tools to help the team kick-start collaboration and assessment. This phase intends to gather information needed for the following stages while fostering a shared understanding of the current state of the solution and of the team's expectations for it in the future (i.e., the desired results from the workshop).

Here, two exercises aim to create a coherent picture of the product-service system *as is*. This ensures that, later in the process, the team keeps these elements at the forefront of their thinking when reimagining the system, while also having a base to compare it with the 'rethought' one at the end of the process. The tools would allow participants to delineate their solution from two different angles:

1. The '*Magic Rhombus*' defines how the current solution creates value while helping participants negotiate and outline a set of common goals and intentions for the 'rethought' product-service system.
2. The '*Behind the Scenes*' exercise highlights how the current system of actors creates value for the solution.

4.1.1 The Magic Rhombus

Inspired by the main areas of the Social Innovation Journey (SIJ) model[2] (used by the teaching team as the blueprint to help students define their projects throughout the course), this exercise (figure 2) gathers information on the team's starting motivation and their solutions' *why* (social/environmental value produced and vision for the future)*, what* (value proposition)*,* and *who* (customer segments and stakeholders). The format meant to create an easy-to-fill and read story of the solution (starting from the team's first motivation, passing to the *why*, then the *what*, and finally the *who*).

4.1.2 Behind the Scenes

The *Behind the Scenes* exercise gathers information on the solution's *how* (viability–feasibility) while displaying and categorizing the actors involved in its delivery. Since cooperation and mutualism are mechanisms that can boost social innovation and circular economy processes, the tool puts the solution's actors front and centre, highlighting their links to tangible and intangible resources, and the relationship types the solution depends on and/or creates (e.g., partnerships, suppliers, users as producers).

The tool prompts the selection of a user journey or product and shows several tiles that would represent the steps of the user/product journey. Each tile requires the participants to define the intangible and tangible resources (i.e., knowledge/skills, materials, machinery, infrastructure, etc.) and their respective sources (i.e., stakeholders) for each step. Then, the tool cues the participants into organizing the actors, and the resources they provide, into categories (figure 3).

4.2 Phase 2: Explore

After the participants have taken a dive into their solution, the next process phase (see figure 1) contests it by deploying the '*Crystal Ball*' exercise, which introduces scenarios as both a self-reflection and inspirational tool.

[2] See https://hdl.handle.net/11311/1019969

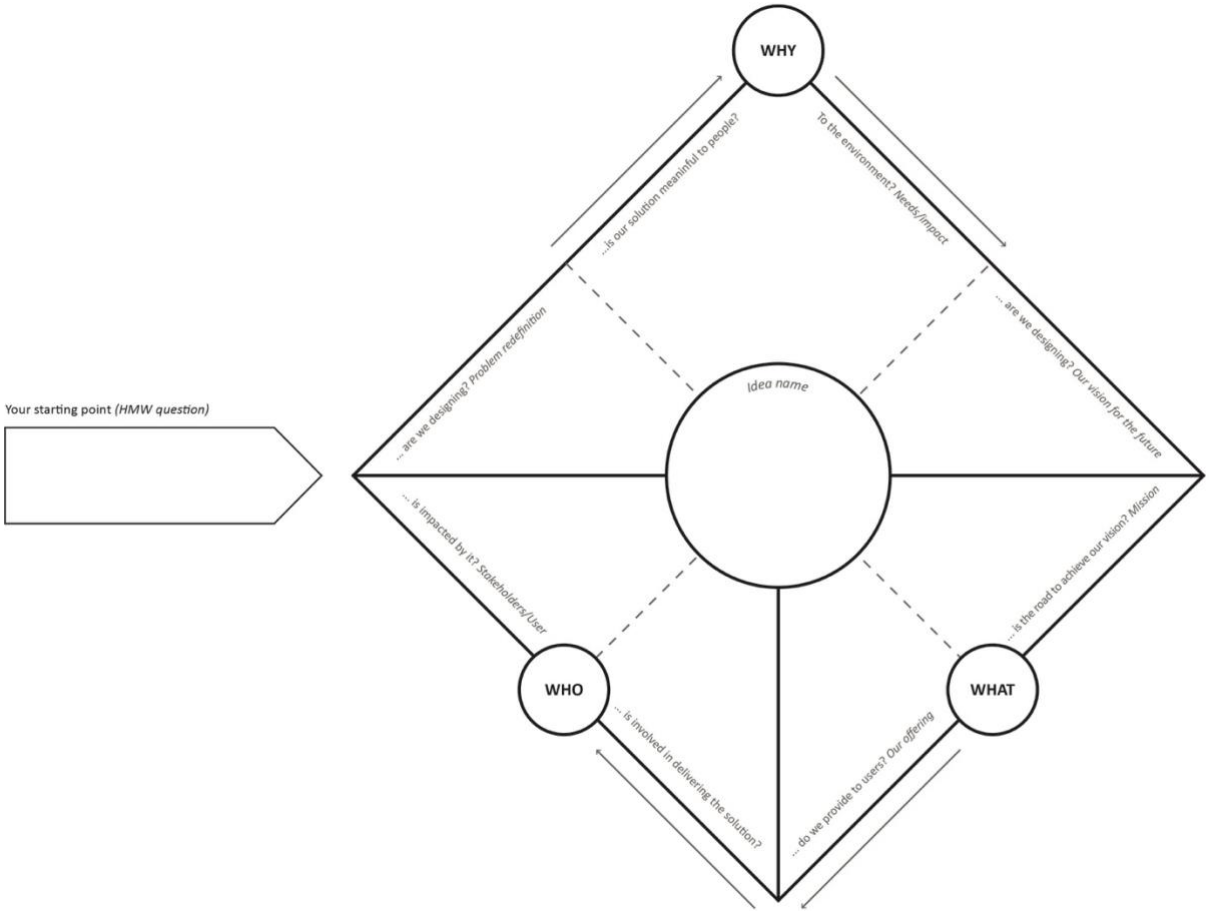

Figure 2. The Magic Rhombus.

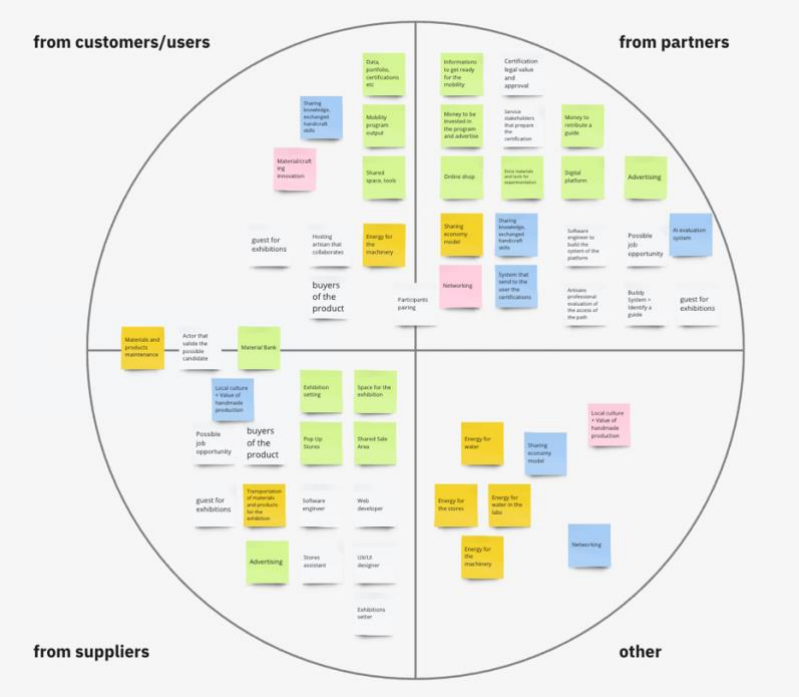

Figure 3. Part II of the Behind the Scenes exercise as completed by Team F. Each post it represents a resource, which are color-coded according to resource category (knowledge/skills, materials, machinery, infrastructure, etc.). Rework from Future Urban Living.

4.2.1 The Crystal Ball

The *Crystal Ball* recurs to prompts and scenarios to ideally engage participants in discussing their solution's strengths and weaknesses in terms of sustainability while expanding their grasp of their solution's 'possibility space' in the present. It builds on the premise that innovation arises when external threats or opportunities occur (Marcus, 1988) and how SME research has shown that climate change pushes firms to innovate, even if they are not directly vulnerable (Alam et al., 2022).

Four scenarios and several prompts make up the Crystal Ball tool, which works by presenting one scenario at a time to then cue participants into a semi-guided discussion through the prompts.

The process to develop the four scenarios based on the 2x2 matrix approach, as follows:

1. Identifying two evidence-based critical uncertainties.
2. Identifying the extremes (low and high) for each one in two axes.
3. Crossing the two axes to reveal a 2x2 matrix.
4. Developing a scenario for each of the four quadrants.

Inspired by Manzini & Tassinari's (2013) sustainable qualities of social innovation, the two critical uncertainties that defined the scenarios were *power* (distributed and centralized) *and globalization* (local and global). *Globalization* is a mega trend that allows to frame discourses of place-making, culture, and technology, while power allows to create narratives around bottom-up and top-down approaches to governance and sustainability. Moreover, these two themes cannot be labelled as simply 'bad' or 'good', which allows for a nuanced storytelling.

The shared socioeconomic pathways (SSPs)[3] provided further content for informing the scenarios since they describe plausible alternative environmental changes (useful to highlight the effects of climate threats on resource use) and societal ones (demographic, economic, technological, social, and governance-related) and include narratives and key variables of development trends on specific world regions, like southern Europe.

Following Lindley and Coulton (2014), the scenarios build on a *reality layer,* referencing elements of the world today as we know it while introducing the *story layer*, which extends facts into plausible fiction. This layering creates a believable context in which to place the *provocation layer*, or the element we want to highlight. In our case, this would be the Proximity and Social Economy Ecosystem with the aim of hinting emerging SME relationships[4] that arise because of climate threats on resource availability/use.

Table 1 provides a summarized overview of the four scenarios.

[3] See O'Neill, B. C., Kriegler, E., Ebi, K. L., Kemp-Benedict, E., Riahi, K., Rothman, D. S., van Ruijven, B. J., van Vuuren, D. P., Birkmann, J., Kok, K., Levy, M., & Solecki, W. (2017). The roads ahead: Narratives for shared socioeconomic pathways describing world futures in the 21st century. Global Environmental Change, 42, 169-180. https://doi.org/10.1016/j.gloenvcha.2015.01.004

[4] The context of these emerging relationships was informed by in-progress research about social innovations developing in the circular economy context.

Table 1. Summarizing elements of the four scenarios

Scenario	Policy	Environment	Society	Technology
Local - Distributed	Policies fail, grass root led restoration through CE	Continued degradation of the environment	Local networks for resource sharing, transparency in production	Low tech, directed towards domestic resources
Local - Centralized	Government-led restoration through CE, tightly watched and enforced	Focus on local environment and little attention to vulnerable areas or global issues	Highly cohesive, tight-nit communities	Low tech, directed towards local adaptations
Global - Distributed	Government-led CE	Highly managed and improved near high/middle-income living areas, but is degraded otherwise	Open source sharing of production, dematerialization of work	High tech and rapid transfer
Global - Centralized	Government-led CE, connected markets, regional production; globally connected elites, policy oriented to benefit business elites	Improving environmental conditions over time	Local networks for resource sharing	Tech development is rapid in high-tech economies and some sectors, and slow in others

4.3 Phase 3: Rethink

Finally,[5] the *Rethink* phase (see figure 1) through a free and then guided brainstorm, demands for new directions and the selection of the most promising one to later integrate to the course work.

4.3.1 *Free brainstorming* session

Following the discussions of the *Explore* phase, a *free brainstorming* session takes place. Here, participants would rethink their solution considering the alternative future scenarios, first individually to then share and converge as a group.

4.3.2 *The Time Machine* brainstorm guide tool

To aid participants in the brainstorming process, this optative tool recurs to prompts to activate considerations regarding the current use of resources in the present and how this would change in the reviewed alternative futures. The tool then presents the same matrix participants filled in *Behind the* Scenes (see figure 3) and invites them to integrate the new stakeholders they discovered from the futures (if any) and to experiment with relationship types with stakeholders (old and new) to obtain the resources they need to operate in the future. It then asks participants to consider if these new interactions could be transported to the present moment.

[5] The fourth phase, *Prototype*, was meant to be implemented individually by each team as part of the course's group work.

4.3.3 *Back to the start*

Based on the two previous experiences, the *Rethink* phase ends by inviting participants to select a new direction for their solutions while reflecting on its impact in their system by reviewing their idea's cornerstones from the *Insight* phase (*why, what, who, how*).

4.4 Workshop design

The student teams applied phases one through three of the Circular Futures framework (see figure 1) in a workshop that mixed individual teamwork and in-class work with a facilitator. To have in-person time with all the groups, half of the teams performed the in-class activity in one day and the other half, on a second day. Table 2 shows the implemented workshop program and its details while table 3 shows details of the student teams and their ideas.

Table 2. The workshop program

Date	**Activity**	**Aims**	**Mode**	**Time**
Free, before the in-class activity	Phase 1 - Insight	Analysis of *as is* solution	Out-of-class, individual teamwork	30 minutes
December 5th and December 9th	Phase 2 - Explore	Contesting *as is* solution	In-class workshop with a facilitator	45 minutes
Free, after the in-class activity	Phase 3 - Insight	Elaborating new directions for the solution	Out-of-class, individual teamwork	45 minutes

5 Findings

Although not a comprehensive design process, the findings from this initial application and tool testing suggest that, with further tests and refinements, the framework could effectively assist social micro-SMEs in evaluating and rethinking aspects of their solutions in alignment with the CE.

5.1 Opportunities and limitations

This subsection details the hits and misses of this first framework test as well as considerations for future iterations.

5.1.1 Alignment of team members

The first phase (*Insight*) and dedicated tools were successful in aligning the teams as to the cornerstones of their idea. In teams with diverging viewpoints, like Team G and Team B, the exercises allowed them to discuss and converge around a common middle ground. This was particularly visible for Teams B, D, and G which were behind in course development and struggling to define their idea. Specifically, they used *Behind the Scenes* exercise as a platform to discuss some of the features of their solution and if these were or not desirable.

> *[the exercise] helped us think of the resources that are behind the project and talk about what matters... like, is printing the photos adding value? Is it so much meaningful that I need to print? (Participant, Team B).*

While the *Explore* phase was useful in having the teams diverge and develop interesting discussions, there was a disconnect when it came to consensus as which path to follow for rethinking the idea. As a result, some groups (Teams A and G) closed the workshop without completing the last exercise.

Considerations for the framework' tools: a *Rethink* phase geared towards a series of converging steps and the evaluation of risks and externalities of the 'rethought' solutions would help participants with useful decision-making.

5.1.2 The fuel for ideation

While the scenarios presented in the *Explore* phase gave way to reflection and discussion, they were still too broad to be useful as a reflection and ideation platform for at least one participant in every team. Yet, in each group, there were consistently individuals with a more proactive and positive approach who steered the team forward. In these cases, the chosen strategy of these *'*steering students' was to come back to the individual case study research they had done earlier as part of the coursework and share it as group inspiration.

While useful to push the discussion forward and to lift team spirits, this strategy in some cases acted as a double-edged sword, since a lot of the case studies shared were depicting situations that could not be implemented by projects of such small scale or that in the specific context of the projects, could not be implemented due to local regulations. As a result, Team A pursued a direction for their solution that, given contextual constraints, was overly ambitious and not entirely realistic.

Considerations for the framework's tools: while the scenarios in the *Explore* phase are geared towards depicting the reality of the P&SE Ecosystem, they could benefit from richer industry-oriented details and social innovation and circular economy models 'at the neighborhood scale' to facilitate the ideation process and better orient the teams' ideation efforts.

5.1.3 Defining safe boundaries

To break with the dominant logic and imagine new possibilities, participants need to (an extent) detach from their projects. The intention behind confronting an alternative future and contemplating the evolution of a service within it was to facilitate this detachment. However, during the second workshop phase (*Explore*), students often became protective of their original concepts, leading them to downplay or even dismiss other alternatives in the subsequent framework stage.

Moreover, in the first and third phases (*Insight* and *Rethink*), students frequently exhibited a narrow perspective when assessing the impacts (social and environmental) of their services, often defaulting to a *'pitch mode'*. The reluctance to modify a nearly finalized idea for the course—especially when deliverables were already prepared—may have amplified these defensive postures. However, the *Rethink* phase also evidenced how students' superficial understanding of exciting new alternatives discouraged them from analysing their potential impacts and practical application.

Considerations for the framework' tools: identifying the social and environmental vulnerabilities of a service not only requires clarity of its cornerstones but an open mindset. When it comes to detailing the solutions' impacts, participants need to pull away from *perceptions* and into reality. Finally, observation from phases two and three of the workshop suggest that teams need to articulate the purpose of their social micro-SMEs (*why*) and define their solution's desired degree of change before exploring alternatives and strategies.

5.1.4 Workshop implementation

Finally, the selected workshop programme (see table 2) limited the time engaged with the facilitator and in the overall activity, since the teams had to perform large chunks of the exercises on their own time.

5.2 Group outputs

While the framework did help the students rethink their ideas by integrating CE strategies (see table 3) —most of them aligning with the scope of their projects, the framework tools failed in helping the participants build a diverse collection of viable (and interesting) concepts. Like discussed in subsection 5.1.2, even though the teams played around with various possible directions for their solutions, a lot of them were out of scope.

Table 3. Teams and workshop outcomes

Team	Ind. Ecosystem	Challenge	Idea	Iteration
A	Cultural and creative industries	How could an 'open-air gym' be organised in Parco Nord, promoting physical activity, opportunities to gather around sport, opportunities to meet and healthier lifestyles?	*Out-of-Office/Gym:* an outdoor co-working and gym space in Parco Nord	Rainwater collection system, shared equipment library
B	Cultural and creative industries	How could a photo workshop be set up in the Villapizzone neighbourhood to create, with everyone's participation, a historical neighbourhood archive using the inhabitants' historical photographs?	CTRL+Z: a service for smartphone users to shed necessary photos from their phones while creating a shared representation of local communities through a democratic selection of photos and videos	N/A
C	Cultural and creative industries	What could a programme of activities in the public spaces of Via Valvassori Peroni look like, involving citizens and local organisations, and helping to redesign public space?	*VIAVAI:* a service-system that motivates people to transform their night routine with physical activity by offering free instructor-led sessions through video mapping, immersive games in public spaces, and a mentoring program through an app and online/offline sessions.	Collaboration with a local provider working with clean energy sources
D	Cultural and creative industries / Tourism	How could a space for art residencies in the Corvetto neighbourhood be transformed into a new place of sociality and hospitality for artists, tourists, and residents?	*act!* an art residence that turns Art into Action through citizen science by collecting data hand-by-hand with the neighbours of Corvetto.	N/A
E	Cultural and creative industries	How to develop a coworking space in the Cagnola neighbourhood for it become a	*conow:* a service that uses a dedicated software to integrate	Collaboration with a neighbouring

		hub for various neighbourhood services?	well-being practices into a co-working space to help create work-life balance for its users.	business for meals
F	Cultural and creative industries	How could an incubator for young people who want to make musical instruments, which would also become a centre of musical culture and a meeting place for craftsmen and musicians, in the Affori district be?	*Double Signature:* a mobility program placing young artisans at the centre of artisan Labs in Dergano and Affori to kick-start innovation processes through knowledge-exchange.	Workshops to learn sustainable practices at the craft production level, shared materials libraries
G	Cultural and creative industries	How could a shared condominium space be transformed into a concierge of innovative services for work, daily life, and leisure in the Affori neighbourhood?	*Folium:* a nursery service for condominiums that teaches 'nature literacy' to tenants, while taking care of their young, their shared green spaces, and the city's pollinators.	N/A

Despite the successful[6] test results, the integration of circular economy strategies into student proposals was mandatory due to course requirements. Moreover, even if the course pushed students to consider context barriers, they developed their ideas in a protected environment that favours experimentation and out-of-the-box thinking. Here, the students can be less cautious about the ideas and strategies they follow since there is no intention to pursue them outside of the course and no other perceived risks other than underperforming.

5.3 Implications for the designer

During the *Insight* phase and the beginning of the *Explore* phase, the designer would me more inclined to a facilitating role, moving the team forward towards convergence and making interesting reflections surface to support the teams' subsequent insights.

As participants move deeper into the *Explore* phase, however, a dialogic collaboration (Manzini, 2015) should take place. While the insights provided by 'steering participants' might sometimes skew final design outcomes, their external perspective introduces fresh ideas, serving as a counterbalance when other participants feel overwhelmed or discouraged. In the case of micro-SMEs, these insights could stem directly from the local context, which can also be valuable if the designer lacks deep familiarity with the environment. Moreover, 'steering participants' tended to present bold concepts that led the teams to fill in the gaps the futures presented, emphasizing the value of *diffuse* design. In our context, these synergies between *expert* and *diffuse* design, were the latter is also called to build their imagined futures and not just act on them, can potentially enhance the final design outcome.

The *Explore* phase would then call on all participants, not just the designer, to take on an *activist* role (Manzini, 2015). Originally, the framework would call on the designer to collect and then present

[6] Success in the terms of integrating CE strategies.

information as *visions*. These visions would then guide teams in evaluating and potentially reimagining their solutions or specific aspects of them. Moving forward, the challenge could revolve around a shared creation of the most suitable visions for a particular social micro-SME, having the social micro-SME team engage in defining what visions are suitable for them and why. This would also help clarify and create consensus around the new directions the team wishes to follow for their solution.

When moving forward to consider the fourth phase of the framework (*Prototype*), fulfilling these 'rethought' solutions would require more than the single micro-SME team choosing to change their business model or even one of their processes, since context changes (i.e., other existing organizations) would be also required (Geissdoerfer et al., 2017). Here, we can imagine the designer taking the role of the *networker* (Jégou & Manzini, 2008), understanding the context in which the social micro enterprise develops to highlight alliances that have the potential to become actual partnerships (Selloni, 2017). While the *networker* needs to immerse in the context (Selloni, 2017), this phase still calls for the involvement of experts in other fields.

6 Discussion and conclusions

Research highlights the problem at hand for social micro-SMEs as needing to uptake circular economy strategies while amplifying their social impact. The *Circular Futures* framework application evidenced how design could contribute to supporting and accelerating these processes.

In this case study, scenarios are used as a self-reflective tool and a platform to trigger new considerations for rethinking an already existing solution in the CE-context. While framework testing revolved around student projects, the results suggest that this approach towards alternative futures can help micro-SMEs explore the positive and negative consequences of their solutions while refreshing their understanding of the possible and plausible directions they can pursue to eventually enact circular economy strategies. These understandings can then set the stage for pursuing future strategies and actions.

The results also emphasize the importance for social micro-SMEs to explore and experiment with building relational capital[7] as a means of transitioning to a circular economy and expanding their social impact. A design-driven approach can play a central role in this process by proposing alternative behaviours (Manzini, 2015) that highlight new potential relationships that the team can later work to activate and build.

Finally, this initial exploration evidenced that adopting a design-driven approach could serve as a viable alternative to the conventional business one for strategy development. Here, design differentiates itself by feeding a social conversation about the future (Manzini, 2015): taking a community and environment centred approach and actively seeking for new ideas that create broader value. Here, engaging with design at a strategic level right from the beginning of an innovation process could facilitate a culture transformation within social micro-SMEs that results in an interest to also pursue a design-led approach for implementing these newfound directions.

[7] Relational capital encompasses the relationships that a company maintains with different stakeholders.

The *Circular Futures* framework and workshop test opened interesting possibilities for further research, as further developments could help position design for social innovation in the circular economy discourse as key to developing more sustainable circular business models. Moving forward, additional research will be conducted through a second framework application with the social micro-SMEs of the Scuola dei Quartieri program.

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