PLATE
Product Lifetimes And The Environment

Enabling Local Circular Economy Practices through Maker Symbiosis: The Case of Istanbul

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Abstract: Pop-Machina H2020 project aims to explore the potentials for local circular economies through collaborative production in seven pilot cities. This endeavour requires initiating a sustainable *maker symbiosis*, through activating links among various maker ecosystem actors. This paper provides a snapshot of the initial steps of this, i.e. the deployment of a series of online participatory design tools engaging citizens and other maker ecosystem actors to collaboratively design pilot activities through the case of Istanbul, the largest pilot city of the project. *Local Future Stories* was developed for İstanbul citizens to envision the future everyday life in a circular neighbourhood and revealed shared city and neighbourhood values in terms of collaborative production and local circular economies. *İstanbul Microsite* was developed to introduce overall project goals, İstanbul priorities and Local Future Stories to maker ecosystem actors, and to invite them to share pilot activity ideas as part of the pilot. These initial activity ideas were then further developed through *online co-design workshops* with various maker ecosystem actors, identifying potentially interested stakeholders, drawing links among them and among activity proposals, and developing the steps for each activity from conception to finalization. This paper presents the major outcomes of the tools used and the process while discussing how they can activate links among maker ecosystem actors to initiate maker symbiosis.

Introduction

Increased availability and accessibility of makerspaces and the advancements in digital fabrication technologies create opportunities for initiating local collaborative production at the city scale. Makerspaces bring people together for knowledge sharing and create an environment for peer-to-peer production. While these places enable localised production, they are connected to other such spaces around the world through open knowledge exchange (Kostakis et al. 2015). As such, they are conceptualized as potential drivers for transitioning to local circular economies (CE) through the improved capabilities of fabrication technologies and engaging citizens and other stakeholders in an accessible way (Kohtala, 2015). However, to initiate this transition, they require support from an ecosystem of relevant stakeholders and infrastructure - which we tentatively call *maker symbiosis*.

As part of the Pop-Machina H2020 R&I project, we are trying to draw the links for a maker symbiosis in Istanbul Metropolitan City, a city of 15+ million residents and 24 active makerspaces with varying fabrication and industry foci, to facilitate CE practices at the local scale. This endeavour involves:

1. developing a circular makerspace,
2. creating secondary raw material markets/venues,
3. engaging citizens to collaboratively envision Istanbul's CE future and co-designing relevant activities accordingly with the local maker ecosystem actors to foster circular production and CE strategies,
4. creating opportunities for knowledge acquisition and upskilling, and
5. continuously engaging citizens and other stakeholders around Istanbul's CE future vision.

We argue that such a holistic approach is necessary to ensure the effective adoption of local CE practices by various stakeholders with varying levels of knowledge, skills and resources; and to put further emphasis on the importance of grasping and reflecting the multitude of interests, expectations and visions to initiate and sustain local maker symbiosis.
This paper provides a snapshot of the processes and outcomes of three participatory
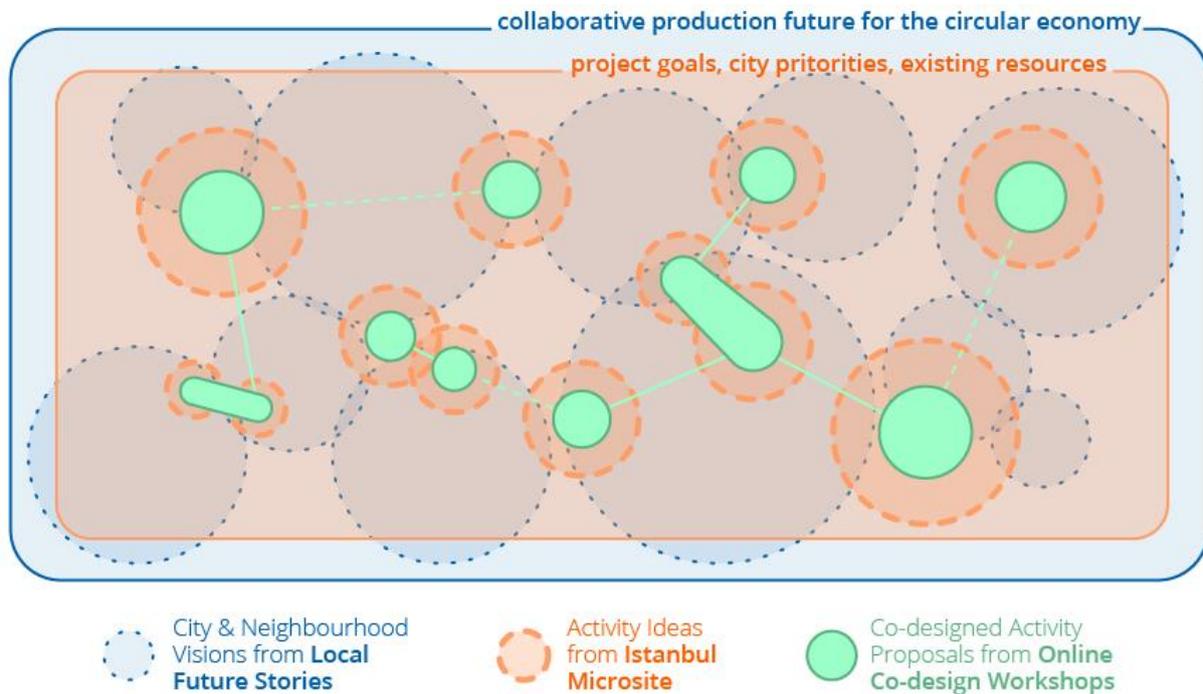
Figure 1. Depiction of deployed participatory design tools and how they respond to general project goals and Istanbul priorities

design tools (Local Future Stories, City Microsites, and Co-Design Pilot Activities, *see Figure 1*). used for engaging citizens and maker ecosystem actors in Istanbul. We further discuss (1) how these tools are positioned within the holistic approach adopted, (2) how they build on and contribute back to other goals listed above, (3) how they facilitate stakeholder engagement and collaborative futuring during and beyond the project timeframe, and finally (4) the implications of their outcomes for initiating local maker symbiosis in İstanbul. We also share our insights into running co-design activities in a challenging context (i.e. pandemic), in a massive city like Istanbul with a lot of stakeholders and complex relations.

Methodology

At the time of writing this paper, collaborative future envisioning and co-designing local circular production activities with local makers are finalized. This process includes the development and implementation of the online participatory tools (Figure 1) to enable remote participation of various maker ecosystem actors. While there are many challenges in facilitating participation through online means

(Bakırlıoğlu, Ramirez & Coşkun, 2020), using online tools presents potentials for widespread participation (Näkki & Antikainen, 2008) that can go beyond the project's timeframe if the digital infrastructure is set up and maintained.

Local Future Stories (LFS)

LFS was a remote activity in which citizens were asked to create stories with a 'futuring' mindset (Fry, 2009). It was developed and deployed to enable İstanbul citizens to envision the future everyday life in a circular neighbourhood. A 'circular neighbourhood' depiction involves a circular makerspace equipped with the necessary tools and equipment that facilitates CE practices (eg. self-repair, community fabrication, recycling, etc.) and the accessibility of citizens to this makerspace. This depiction was introduced to participants through a video voiced by a local maker, with the intention of triggering a speculative mindset to imagine visions for a truly alternative future of local production and consumption.

Following the video, the participants were asked to select one of the 8, largely defined

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themes (i.e. producing, repairing, training, creating value with biological waste, community life, sharing, makerspace's sustainability and collection of materials) and create a story based on that theme. There were 49 stories submitted by İstanbul citizens from 27 different districts, with varying foci and directions. The analysis of the stories revealed shared city and neighbourhood values for Istanbul. All of the stories were included in the next stage of the process in Turkish, without any editing (eg. Figure 2). These single-page stories presented the selected theme, the title of the story, the district (i.e. setting), stakeholders, actions, the future vision, what is required to reach that vision, and steps to that vision.

Figure 2. An example of how LFS are presented in Istanbul Microsites. This is a story on 'Community Life'

İstanbul Microsite

The term 'microsite' is used for purpose-built websites giving more detailed information compared to a larger website (eg. in this case, the project website) (OUP, n.d.). The purpose of the City Microsites was (1) to familiarize the maker ecosystem actors with the Pop-Machina project, as well as with the project goals, city priorities, existing resources and LFS developed by the citizens, and (2) to prime them into sharing their activity ideas for the city pilots.

The microsite was structured in five steps. The maker ecosystem actors were expected to watch an introductory video about the Pop-Machina project and what the pilot activities would entail. Then, they are expected to browse through the general project goals and Istanbul-specific priority areas. In the third step, the LFS submitted by Istanbul citizens are presented - without any edits from the research team - in the form of a slideshow. At the fourth step, the participants were expected to fill out a form

about their activity idea with the following information:

- Activity title
- Brief activity description
- Related Pop-Machina goals
- Related Istanbul priorities
- Related existing resources in Istanbul
- Contact information

Co-design Pilot Activities

The final stage of this process involved a series of online co-design workshops for detailing the collected activity ideas. Miro online collaboration tool was utilized to create various workshop tools and a dynamic environment allowing real-time editing. Zoom online conferencing tool with breakout rooms functionality was utilized to enable sound communication in group work. The online co-design environment pulled the activity ideas submitted through the Istanbul Microsite with the help of a third-party automation service called Zapier, and automatically created 'cards' (Figure 3) – i.e. expandable notecards that normally shows the title of the activity idea, but reveals more information (activity idea owner, description, relation to Pop-Machina goals, Istanbul priorities and existing resources).
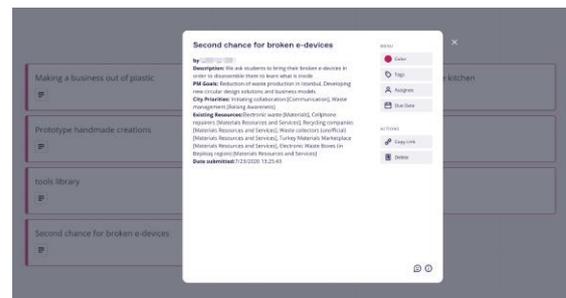

**Figure 3. An automatically generated activity idea 'card' expanded**

The activity idea owners and other maker ecosystem actors were invited to the co-design workshops. To develop an activity idea, a team of maker ecosystem actors (1) reviewed and revised its activity description, (2) identified potential stakeholders and the reasons why they would be involved in the activity, and (3) developed a step-by-step roadmap of the idea from its conception to its finalization. In each session, a team of maker ecosystem actors repeated this process with two or three activity ideas. At the end of each workshop session, the teams placed the activity ideas they developed

on the Istanbul city pilot timeline and discussed how activities can support each other in terms of outcomes, collaboration and sustainability. See Figure 4 for examples of boards used in the workshops.
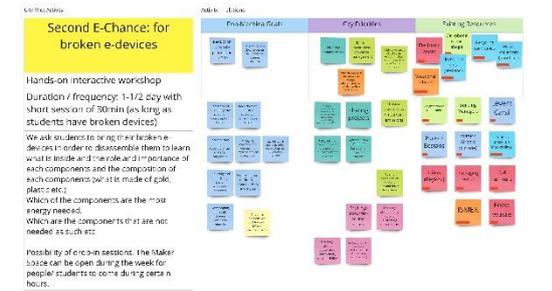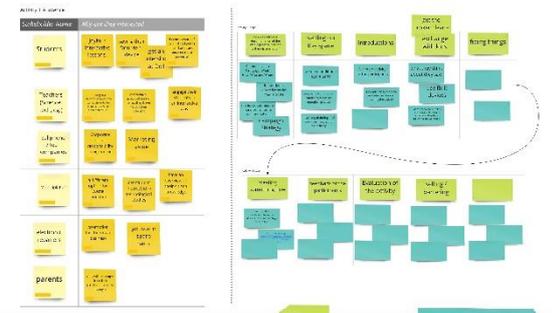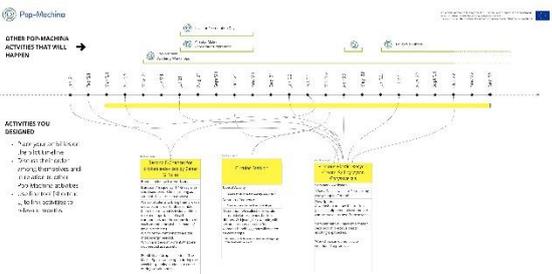

Figure 4. Examples of boards used during the online co-design workshops

Results

This section presents the results of the studies by reflecting on the (1) city visions and (2) maker symbiosis.

Istanbul Visions for collaborative production

In the LFS study, with an open call from the Municipality social media channels, citizens were asked to share how they envision the future everyday life in a circular neighbourhood.

The most popular topic selected by participants during LFS activity was on *neighbouring communities actively participating in the makerspace activities and organization* along with makerspace participants *sharing tools, materials and equipment* and makerspace participants *creating new products collaboratively*. The less selected topics were *makerspace sustainability*, along with *repairing*, *training* and *the use of biological waste*. However, we noticed a tendency to mix and combine topics within the stories, where one main topic is selected, and others were also mentioned or included. Topics that appear as secondary topics in the stories involve *material collection*, *community life* and *training*.

We analysed the stories through open coding to reveal shared visions and values among the stories and links between these values and İstanbul priorities. The preliminary analysis showed the stories referred to the following Istanbul priorities:
- Enabling communication and collaboration among maker communities, municipalities, companies and CSOs.
- Raising awareness of the general public and decision makers on sustainability and CE.
- Technical training for Circular Making.

Also, this analysis revealed various values regarding collaborative production practices for the CE, such as:
- Circular Makerspaces as catalysts for socialization among different people and social groups, and espousing inclusive activities involving women, children and elderly.
- Sharing tools and resources, community repair activities, urban farming and other collaborative CE practices as beneficial for low-income families.
- Utilizing shared gardens and green spaces for community-based urban farming, for community well-being.
- A skills and knowledge inventory in the neighbourhood for the neighbours, strengthening collaboration and knowledge exchange.

The above list of prominent values revealed through the LFS hint at diverse expectations

from future maker symbiosis facilitating collaborative production and CE practices at the city scale in Istanbul. On the other hand, the stories also revealed a need regarding the awareness of citizens about sustainability and the CE. Many stories involved practices to raise the awareness of fellow citizens, through training activities.

Overall, the most interesting aspect of the revealed visions and values is that they do not seem to be directly related to CE practices. The emphasis was put more on sharing not just resources but also knowledge and skills within the community, on the inclusiveness of the makerspace activities, on makerspaces' central role on socialising, and on alternative ways of getting by for low-income families. This is an interesting point as, on the one hand, citizens seem to foresee such wide-ranging potentials in a future circular makerspace in their neighbourhoods. On the other hand, however, these values hint at a cultural and societal transformation that calls for more…everything.

Initiating Maker Symbiosis

For Istanbul pilot activities, a total of 23 ideas were submitted through the Istanbul Microsite, and nearly half of them were further developed during the first series of online co-design workshops (*three workshops with 35 participants in total*). Some of these activities were long-term activities ranging from 3 months up to a year, while others were shorter and/or expected to be carried out in intervals. For the first year of the pilot, 5 of these co-designed activities were selected, considering the city priorities, available resources, and the pandemic measures.

The selected activities mostly focus on the following Istanbul priorities:
- Engaging local community and the general public (4 out of 5)
- Initiating collaboration among maker communities, municipalities, companies and civil society organizations (4 out of 5), and
- Raising awareness on waste management (4 out of 5).

In addition to these, activities also respond to other priorities such as code-of-conduct for making activities, sharing projects, setting up

and sustaining makerspaces, training on tax-related issues in makerspaces, training on cooperation, attribution and responsibility, raising awareness on carbon-emissions and local and demand-driven fabrication, and creating appropriate and accessible spaces for economic activity.

Online co-design workshops were utilized to refine the activity ideas and identify a wide range of stakeholders who would contribute to and/or participate in these activities. Identifying stakeholders proved to be the most important aspect discussed by the participants since most of the activity ideas were dependent on resources, skills and knowledge of other maker ecosystem actors in addition to the activity idea owners'. With the contribution of participants, potential stakeholders (e.g. communities, institutions, companies, etc.) that could contribute to the realization of the activity ideas, the reasons why they would do so, and how to reach them were identified.

As a result, the online co-design workshops served as a basis for drawing the links among various maker ecosystem actors in Istanbul, as well as revealed diverse ways of initiating and sustaining maker symbiosis through the co-designed activity ideas. 'Waste to Urban Gardens' activity scheduled for the first year of the Istanbul pilot can serve as an example. This activity was inspired by an LFS that proposed neighbours receiving training on bio-waste could collect these wastes individually to make compost that is shared with the community. Also, this activity was suggested by a social enterprise developing composting kits for home use and providing training on urban gardening, with the intention of scaling these to the neighbourhood level and sustaining a circular urban gardening practice. They teamed up with a designer and a civil society organization representative during the online co-design workshops, and their discussions revealed a potential site for implementation, potentially interested neighbourhood communities and gatekeepers, maker communities potentially interested in developing the mechanisms required for composting, and a proposal for a demand-driven business model to sustain this local CE practice beyond the timeframe of the activity.

Conclusions

The contribution of this paper lies in the collaborative approach adopted to draw links amongst various stakeholders with the purpose of initiating maker symbiosis for lasting city-level CE practices. We believe the participatory tools presented and the discussion on their implications will inspire further research on initiating and sustaining local CE loops, transitioning towards self-sustaining cities, and the role of grassroots maker communities in such endeavours.

The 'Local Future Stories' revealed that Istanbul citizens – as maker ecosystem actors – expect a more inclusive community of various gender and age groups socialising, while at the same improving the living conditions of low-income families from the neighbourhood-level collaborative production future. This involves societal transformation beyond the existence of a circular makerspace in the neighbourhood enabling local repair, reuse and recycling practices. This implies that circularity at the local level is not an easy concept to be integrated into collaborative making.

The codesigned activity ideas inspired by these Local Future Stories; however, put more emphasis on drawing the necessary links among various maker ecosystem actors in terms of necessary resources, involving citizens, sharing of knowledge and skills, and improving citizens' wellbeing.

The most important outcome of this process was the identification of the various maker ecosystem actors that would contribute to the realization of local CE practices in each activity idea. We regard this as the most crucial aspect of initiating and sustaining maker symbiosis among local stakeholders.

Finally, we responded to the pandemic measures by developing a completely online participatory design process. This created the opportunity for more flexible scheduling of these sessions, which enabled participants who otherwise wouldn't be able to attend. However, this probably also resulted in other groups of people not attending due to e.g. access to technology. Furthermore, as the pandemic carried on, we observed fatigue and reluctance to partake in online activities in the participants. For such an attempt for co-designing activities and activating *maker symbiosis,* lack of

motivation due to such extraordinary situations is a crucial barrier to overcome for research teams.

Acknowledgements

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