



# REMIX EL BARRIO: A CO-CREATION JOURNEY TO FOSTER INNOVATIVE ECOSYSTEMS CRAFTING AND MICRO-FABRICATING WITH FOOD SURPLUS AND WASTE

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Important challenges are about instigating communities to learn, create and manufacture systems with more eco-efficiency and sufficiency, and to raise awareness about local food waste in order to use it as potential resource for material driven design, crafts and micro-fabrication processes. In this paper, we question how to transform and contextualise educational practices based on circular biodesign to raise knowledge locally and co-create with emerging communities. We present and reflect upon the results of the incubation programme “Remix El Barrio”, an on-going action-research in the neighbourhood of Poblenou in Barcelona during the EU-H2020 SISCODE project.

co-creation / food waste / community engagement / biomaterials / biodesign

The accelerated urban population growth, its related intensity of material flows and linear supply chain models are provoking important paradoxes in cities. One of these paradoxes is the fact that one-third of the food produced is being wasted all along the food supply chain (Gustavsson et al. 2011). This brings challenges and opportunities to the management and revalorisation of organic waste as energy, bio-based products, food, and feed, which are better described with the term Bio-economy (European Commission 2018).

Food cycles are about better valuing our ecosystems, creating self-resilience and designing more circularity in the ways of producing, distributing, consuming, and recycling. Those new designs highly depend on the territorial context and the scale of the systems we are acting on as well as on how each system will be connected and will care about the others.

From the perspective of systemic design (Battistoni et al. 2019), cosmopolitan localism (Manzini 2013) and Fab City network (Diez 2018), the Circular Economy (CE) could be described as a web of smaller circular economies where the core development is situated in local areas, like cities or regions, with the active participation of territorial stakeholders (Real et al. 2020). In this context, the new challenges are to transform stakeholder networks so as to enable communities to learn, create and manufacture new systems with more eco-efficiency and sufficiency, raising knowledge about local food waste, reducing it and using it as a resource for the exploration of opportunities for material creation, new forms of crafts and micro-fabrication systems.

This is aligned with the recent works of material designers that consider that the creation of materials from alternative sources is of great interest and could be a means of the reduction of the environmental footprint of conventional materials (Camere, Karana 2018). Circular initiatives such Fruit Leather, Orange Fiber, Veggea, Malai, Piñatex, Ecoplaso and new waves of designers are already transforming food and agricultural waste and surplus into valuable products. Platforms, books and databases (Fabtextiles's books, DIYMaterials, Materiom, Food Waste explorer, Chemarts Cookbook) are being created to share practices, data, recipes and projects, while innovative courses (Fabricademy, Aalto Chemarts, Master in Design through New materials) are already integrating such circular design practices into their curriculum considering product life cycles.

To better sustain those new practices into science and society, efforts remain to incubate the emerging practices into new territorialities and understand their capacity to be deployed in specific contexts. This paper addresses the following research question:

How could co-creation foster the development of innovative ecosystems crafting and micro-fabricating with food surplus and waste?

Our ambition is to present and reflect upon the results of an ongoing action-research that have been carried out in the neighbourhood of Poblenu in Barcelona within the EU-H2020 SISCODE project. Fab Lab Barcelona (Fab Lab Bcn) team members have co-designed and experimented with local stakeholders, an incubation programme, named “Remix El Barrio” that aimed at fostering community engagement using waste streams of urban services for the creation of innovative products, platforms and services.

### **CO-CREATION FOR CIRCULAR NEIGHBOURHOODS: LEARNING FROM REMIX EL BARRIO'S PRACTICE**

The co-creation approach of Remix El Barrio will be described by following the SISCODE1's co-creation experimentation framework (Real et al. 2019) introducing context determinants, gathering elements to characterise the process of activity, highlighting the key structures of the emerging actor network and synthesising the main outputs of the process.

Context. Barcelona is renowned for the original character of each of its 73 neighbourhoods—“Los Barrios”. The barrios are seen by the city as a relevant size and scale to generate societal transformations. Poblenu is one of them. Since January 2019, Fab Lab Bcn has been engaging with local stakeholders in the pilot of SISCODE to create synergies in Poblenu on the topic of food waste and craft. The pilot used a set of design and co-creation methodologies to support a transition towards re-valuing surplus food and bio-waste at the neighbourhood scale (Real, Calvo 2019). In this first year of activities, a collaboration with Fabtextiles has emerged with the organisation of a first learning workshop dedicated to biomaterial innovation with food waste and has been strengthened by an investigation about the potential of collecting eggshells to produce pots and plates for urban gardens and restaurants. Following the interests of the stakeholders, it was decided collectively to focus on the development of local food waste upcycling by supporting the incubation of emerging ideas and practices. This was the starting point to create the incubation programme “Remix El Barrio”.

Process. Remix El Barrio has been created with the ambition to propose a learning place to foster and nestle solutions based on designing with food waste. Through an open call for participation and an invitation of stakeholders from previous activities, 13 participants were invited to start an incubation journey, identifying possible

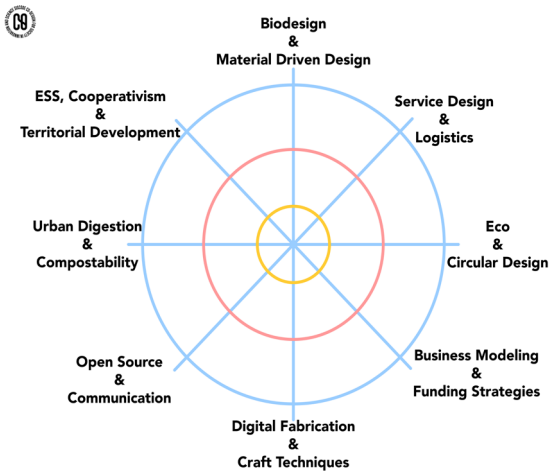


Figure 2. Radar of contents for Remix El Barrio. Source: Authors, 2020.

waste streams in Poblenou services for the creation of new product systems. The participants were provided with materials, fab lab access to machines and experts, online interaction spaces, weekly collective activities and individual coaching both at technical level and community engagement.

During the 20 weeks of the incubation period, the participants and the Fab Lab Bcn team identified eight areas of knowledge for facilitating the incubation of the projects (Fig. 2). The areas of knowledge were: biodesign and material driven design, service design and logistics, eco and circular design, business modelling and funding strategies, digital fabrication and craft techniques, open source and communication, urban digestion and compostability, and social and solidarity economy, cooperativism and territorial development. The first step of learning has consisted in knowing more about the food waste resources and how to design biomaterials. Participants were immersed into the practice of biodesign and design driven material innovation. From recovered waste to materials and materials to product systems, the introduction to digital fabrication supported the participants to learn techniques on how to design and craft products from new types of materials. An important set of skills was also integrated to raise knowledge on environmental impacts with the dissemination of tools and contents on eco-design and circular design principles as well as on compostability and urban digestion. Introduction to



Figure 3. Awareness campaign in the circular barrio. Source: Digue Miguens-Shellskin.

systemic and service design has then permitted the participants to think on how to integrate the user's perspective and concretise logistic issues to run the activities at the neighbourhood level. Finally, for encouraging participants to sustain their project, a public presentation and a series of conversations were created with relevant stakeholders and specialists to learn how to communicate their project with an open-source vision, to better understand the opportunities of social economy and cooperativism in Barcelona, and to find an appropriate business model for future steps of development.

### **Actors**

Remix El Barrio is born in a dense network of stakeholders bringing together various perspectives and cultures and has given stimulus to new collaborations, learnings and organisational transformations in and beyond the existing laboratory ecosystem. Four nodes of stakeholders have been categorised consisting of the group of project participants (the "Remixers"), the Fab Lab Bcn team, the local active communities, and the network of global platforms. Each node comes with a diversity of people, a story, a proper mode of governance and ways of interacting with other nodes. The community of the Remixers. The Remixer's community is now composed by

nine projects with 13 active participants living or working in the neighbourhood of Poblenou, composed by a majority of women (85%), different levels of design expertise (from beginners to advanced people), various cultural profiles (design, graphism, fashion, architecture, catering, restaurant management).

The Support team of Fab Lab Barcelona. Fab Lab Bcn facilitated the Remix El Barrio programme with a dedicated team interacting with other departments to optimise the support and the access of the infrastructure. The team is composed of a trio of “mentors” with different backgrounds, and roles in programme management. The team interacted regularly to synchronise the activities all along the project.

The Local communities in Barcelona. Remix El Barrio also engaged with a series of local stakeholders as a continuum of the first step of the SISCODE pilot. Five active stakeholders, from local community facilitators, urban garden entrepreneurs, to circular symbiosis and digital manufacturing experts, integrated a local co-creation team and have been engaged in Remix El Barrio either to co-define the criteria of selection, to connect with specific projects, or to participate in the cycle of open conversations.

The Global Design Platforms and networks. The last node identified as relevant for the Remix El Barrio’s stakeholder network consists of all the knowledge platforms and EU projects partners allowing the participants to enhance their experience and knowledge during the project while connecting with a wide network of designers. This connexion is facilitated by the local Fab Lab Bcn team.

## Outputs

From materials, products, services and platforms, nine proposals emerged from Remix El Barrio incubation pilot, combining the interests, needs and synergies between participants and local stakeholders. Two projects (Gos Leka and Look Ma No Hands) create edible solutions from mixed leftover food, thus keeping the use within the food industry, creating co-products such as snacks for dogs and 3D printed cookies. The latter can also be combined with culinary experiences and B2B (business-to-business) services of 3D printing food in local restaurants. All participants decided to focus on the collection, processing and design from one specific type of food waste. Participants were collecting or reusing olive pits, avocado pits, eggshells, and orange peels to wasted oils collected in restaurants, cafes, shops, or domestic homes. The proposals range from furniture and interior design, biodegradable textiles for fashion elements, artistic objects, dyeing colours, cosmetics, packaging and educational workshop proposals for the raise of awareness and knowledge transfer (Fig. 3,4). Two projects (Organic Matter and

ShellSkin) developed in the pilot are focusing on the creation of platforms and communication campaigns that seek to connect different stakeholders, further engage and expand the network of the “circular neighbourhood” and reassure the longevity of the project through the promotion of participation.

## DISCUSSION

Among the variety of learnings about co-creation, the practices of Remix El Barrio particularly raised the importance of solidarity and cross-pollination of knowledge in the development of circular food ecosystems at the scale of the neighbourhood. Solidarity. A core and difficult part of co-creation, especially when transiting towards a circular neighbourhood that is regenerative, accessible and abundant by design (Ellen MacArthur Foundation 2015) is about bringing mutual aid and trust within the ecosystem. From Remix El Barrio, and the overall SISCODE Barcelona pilot, several examples of mutual-aid could be described. A shared system of values has been co-created from the beginning of the project with the holding of the “Synergy Soup” workshop, bringing people around principles of circularity, environmentalism and co-creation together to identify potential synergies for collaboration in the territory. Then, both the external stakeholders and the selected participants joined the activities exploring and learning together without specifying particular expectations or asking for direct, short-term reciprocity when offering a service, mentoring a project or proposing a new material. The forms of collaboration have evolved all along the project from the initial possibility to engage in co-creation activities to the opportunities of being part of a local co-creation team, to integrate the programme as participant, to provide services for expertise and coaching. Another moment of solidarity occurred at the level of participants with peer-exchanges and collective support from participants themselves when doubts and difficulties emerged. Whatever on the WhatsApp group or in open sessions, people were caring about each other, regularly shared contents and thoughts dedicated to other participants’ projects.

Cross-pollination of knowledge. The Fab Lab Bcn facilitation team co-developed a framework for the incubation of the projects by initially contextualising the area of research, showcasing the past projects and demonstrating with a hands-on approach the biomaterial crafting process, tools, and materials. Then an experimentation phase was conducted in various iterations, starting with intuitively experimenting and mimicking from the demonstration learnings as a first approach to material crafting, then scientifically experimenting by measuring, testing, observing and finally by creating materials for specific applications. In parallel, individual





## REMIX EL BARRIO PROJECTS CHART



Figure 4. Remix El Barrio Projects Chart. Source: Author 1, 2020

mentorship was also a key element to raise doubts and guidance, foster new learning and identify new opportunities and publicly present their developments. The importance in this process is that within the experimentation phase the Remixers had the opportunity to interact with advanced material designers by sharing the same space, tools and materials and also to interact with beginners from public open workshops. This approach enabled them to observe, learn from the experts and transmit knowledge, gaining confidence, and re-question their practices with the beginners. Thus, they had the opportunity to swap roles, from apprentices to educators, cross-pollinating knowledge (Marcelino, Castro 2013) and contributing to the growth of the local biomaterial crafting community.

Beyond the support of each project to be developed, the programme has empowered participants to find their own paths of development and their own ways of acting in the emerging ecosystems around circular design and biomaterial innovation. A posteriori, four polarities of profiles have been identified looking at the participant's practices and ambitions. Participants could follow their own path, navigating in between profiles—acting as “researchers”, pushing for investigation on new materials and models, as “educators”, wishing to organise collective workshops to transfer their knowledge, as “makers”, designing and prototyping in makerspace or at home, or as future “social entrepreneurs” incubating their project for

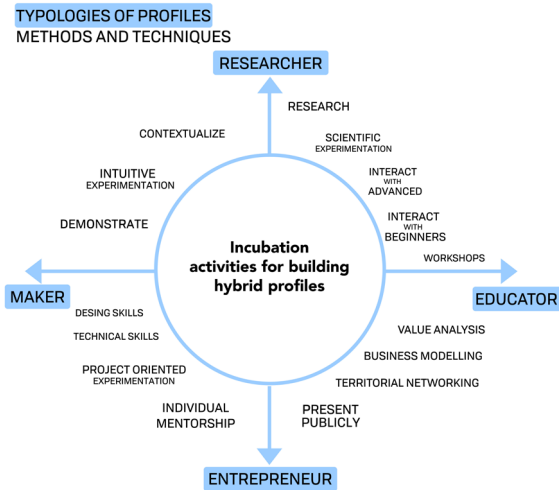


Figure 5. Building Hybrid Profiles for food waste community champions. Source: Authors, 2020.

a concrete territorial development. (Fig.5)

Through the description of the Remix El Barrio project, the paper outlines the importance and complexity of applying co-creation to foster the development of innovative ecosystems crafting and micro-fabricating with food surplus and waste. From a collective learning experience, key outputs were co-developed and are now finding a path for sustainability: the nine proposals of solutions, the implementation of a cooperative of services at the local level and the integration of the incubation programme approach in the wider distributed ecosystems.

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## FOOTNOTES

- 1 SISCODE is a EU funded project aimed at stimulating the use of co-creation methodologies in policy design, using bottom-design-driven methodologies to pollinate Responsible Research and Innovation, and Science Technology and Innovation Policies

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