

# Fab City Hubs: Interfaces for community building and playgrounds for new innovative urban actions

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## Abstract

Guided by the research question “What are the differences between the emerging Fab City Hub (FCH) model and other hub typologies, and how does this new hub typology seek to overcome the gaps and challenges of previous hubs experiences?”, this paper provides a conceptual discussion on the FCH model and empirical qualitative data based on four case studies. First, the article presents a literature review of the current state of the art of Creative and Productive Hubs (CPHs), contextualising the emergence of FCHs within the history and development of CPHs. Second, the methodological approach of the study is presented. Third, four case studies from different geographies are presented, and brief analysis of them is made to show the most recent paths that CPHs are taking towards a new hub typology, transitioning towards FCHs. Fourth, based on the empirical evidence of the case studies, the article establishes a conceptual framework that allows comparing the potential of the FCH model and existing hub models, and allows a preliminary definition of FCHs. Finally, some conclusions are drawn, evidencing how by facilitating innovative practices, new production systems and an enhanced flow of knowledge, FCHs emerge as interfaces/gateways for local (and global) community building and playgrounds for new innovative urban actions.

## Keywords

Hubs, Fab City, community building, ecosystem activators, innovation

## 1 Introduction

There is a growing interest globally around hubs. Their interrelations with topics such as urban regeneration ([Daldanise & Cerreta, 2018](#)), urban and social innovation, or real estate development have been explored in different fields, from urban studies ([Chronéer, Ståhlbröst & Habibipour, 2019](#)), to social

Carolina Ferro, Pablo Muñoz Unceta, Carlotta Fontana Valenti, Ida Jusic, Francesco Cingonali, Tomas Diez Ladera, Mitalee Parikh: Fab City Hubs: Interfaces for community building and playgrounds for new innovative urban actions

sciences and urban economics ([Dovey et al., 2016](#)), among others. Hubs are defined as a way to organise work by bringing together diverse talents, actors, disciplines and skills to intensify innovation (Dovey et al., 2016). A wide range of global approaches is seen in urban and rural areas: from hackerspaces to third spaces, from community hubs to fabrication spaces such as Fab Labs or makerspaces, and from Living Labs to coworking spaces.

The term *Creative and Productive Hub (CPH)* ([Amato et al., 2021](#)) aims at including two main trends within the existing hub typologies: the creative industries and the maker movement. On the one hand, since the beginning of the 2000s, and more intensely after the financial crisis of 2008, many deprived urban areas around the world have attracted creative sector actors such as artists, media agencies, or cultural agents, influencing processes of urban regeneration that captured the value brought by alternative economies based on creativity and innovation ([Cohendet, Grandadam & Simon, 2011](#); [Romein, Nijkamp & Trip, 2013](#)). On the other hand, fabrication-related hubs have been experimenting and reflecting on new economies of production and supply chains based on the assumption that, through accessible technology and open knowledge, citizens could become producers and have an active role in supply chains ([Unterfrauner et al., 2018](#)). Even though the CPH concept assumes an articulation of these two visions towards an integrative view on production, knowledge and innovation, previous studies ([Amato et al., 2021](#)) also observe that most individual hubs tend to focus on a specific aspect, have limited agency to cover several areas, or miss the chance to operate across fields on the same location and, therefore, lack an integrated approach.

In recent years, the need for such a holistic hub approach has pushed organisations like the Fab City Global Initiative<sup>1</sup> and research projects such as CENTRINNO<sup>2</sup> to test yet a new hub model, the *Fab City Hub (FCH)*. This new typology aims to overcome the gaps of previous experiences, leveraging both the influence of creative hubs in the territory and the new economic and supply chain models proposed by the maker movement. It does so by bringing them together with other frameworks such as the circular economy or bio-regional development, and participatory and co-creation practices. Nevertheless, this new model has also created confusion as, for some audiences, it is not yet clear what its differences or added value are in relation to Fab Labs or creative hubs.

This article aims to shed some clarity on the confusion between the FCH model and other hub typologies. To do so, it first contextualises the emergence of FCHs within the history and development of CPHs. Second, it analyses four FCH case studies from different geographies. Lastly, it discusses the results of the analysis and derives a preliminary definition of Fab City Hub, together with a set of principles that underlines its particular approach in relation to other hubs.

## 2 Methodology

The research question that guided our investigation is: What are the differences between the emerging FCH model and other hub typologies, and how does this new hub typology seek to overcome the gaps and challenges of previous CPHs experiences? To address these questions, the study follows a qualitative research approach structured in three steps.

Firstly, a literature review on the current state of the art of CPHs is used to examine their rise and development (mainly in Europe, but with similarities worldwide) during the last forty years. This literature review draws from the work developed in the research project CENTRINNO ([Amato et al., 2021](#)), identifying CPHs' main characteristics and challenges. It is complemented with other evidence ([Diez et al.,](#)

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<sup>1</sup> To learn more about the Fab City Global Initiative, please check [here](#).

<sup>2</sup> To learn more about the European Union funded CENTRINNO project, please check [here](#).

Carolina Ferro, Pablo Muñoz Unceta, Carlotta Fontana Valenti, Ida Jusic, Francesco Cingonali, Tomas Diez Ladera, Mitalee Parikh: Fab City Hubs: Interfaces for community building and playgrounds for new innovative urban actions

[2018](#)) and the experience collected by the Fab City Global Initiative during the last years ([Fab City Handbook](#), n.d.)<sup>3</sup> to understand the connections and similarities between CPHs and the FCH concept.

Secondly, the case studies analyse the experimentation process of four hubs in their transition towards FCHs. The cases were selected based on two main criteria: geographical diversification and their potential to address different gaps identified during the literature review. Finally, the article presents a conceptual framework that allows an explanation and definition of the FCH model in comparison to existing hub models. The analysis also explores the potential of the FCHs in addressing existing gaps and challenges of previous hubs' experiences.

### 3 Fab City Hubs as a new generation of Creative and Productive Hubs<sup>4</sup>

This section provides a historical and theoretical framework to contextualise the development of innovative and collaborative CPH typologies (mainly in Europe, but not only) during the last 40 years. It aims to understand the historical and economic reasons that contributed to the rise of unconventional spatial organisations for workers and citizens to produce, learn and innovate. Finally, the literature review arrives until the emergence of FCHs and introduces this new typology, which is discussed in the following sections of the article.

At the end of the 80s, the cities' urban fabric underwent deep transformations due to a restructuring of the global productive system. Whereas this had diverse consequences in different geographies, central industrial areas and neighbourhoods in European cities were often neglected or partially abandoned. In parallel, the end of the Fordist era, the rise of the cultural and creative industry and the development of digital technologies brought deep changes in the structural and spatial reorganisation of the work and the workforce itself. Initiatives such as the Technology Networks ([Smith, 2014](#)) in the UK during the 80s demonstrated that, contrary to the Fordist model, production could happen in a diffused and horizontal way and is entangled with different forms of knowledge, produced and shared by communities. Workers were considered contributors "who work to distribute and acquire knowledge" ([Le Roux, 2015](#)) instead of simply executors. The creative process was decentralised, left the factory's walls, and circulated among networks of start-ups and smaller units ([Le Roux, 2015](#)). Workers won autonomy over material (flexible workspace) and temporal (flexible hours) constraints.

In the 80s, the term 'third place' was coined ([Oldenburg, 1999](#)) to designate a 'great good place' in between the home (1st place) and the workplace (2nd place). Characterised by an inclusive social atmosphere, these fostered social development and community building, providing 'new models of flexibility for a changing economic climate' ([Carriere et al., 2021](#)). Together with the advances in internet technology, this has fostered the emergence of hybrid and multifunctional spaces since 2000. These often occupied deprived industrial areas<sup>5</sup> and involved new urban functions, leveraging on material (the building) and immaterial (the creative class) heritage ([Dovey et al., 2016](#); [Moriset, B., 2013](#)).

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<sup>3</sup> The Fab City Global Initiative has been collecting experiences in different parts of the world of hubs transitioning into Fab City Hubs. Unfortunately, most of these experiences are yet to be documented. However, it is possible to read about the Barcelona Fab City Hub experience in this [blog post](#).

<sup>4</sup> The following historical overview has been written using, adapting and complementing some parts of the material previously developed for the Creative and Productive Hub Journal ([Amato et al., 2021](#)), authored by some of the authors of this paper and other partners of the European project CENTRINNO.

<sup>5</sup> Schraubenfabrik, in 2002, for example, was the first community centre for entrepreneurs that opened in an old factory in Vienna. It further expanded to "architects or PR consultants, cooperatives, freelancers or micro-enterprises working with laptops and cell phones" ([A brief history of coworking, n.d.](#)).

Carolina Ferro, Pablo Muñoz Unceta, Carlotta Fontana Valenti, Ida Jusic, Francesco Cingonali, Tomas Diez Ladera, Mitalee Parikh: Fab City Hubs: Interfaces for community building and playgrounds for new innovative urban actions

Despite the diversity of names and spatial organisations, coworkings, community spaces, third spaces, thus, creative and productive hubs, answered to similar needs of an emergent working class: access to material (workplace, online connections, tools, machines) and immaterial resources (new open knowledge, professional networking and collaboration, training, mentorship) ([Amato et al., 2021](#)).

Hybridity is a fundamental characteristic of CPHs. Migliore and colleagues ([2021](#)) affirm that the layering process that generates coworking spaces and evolves over time increases their chances of successfully facing contemporary challenges, such as the current pandemic crisis and economic and political precarity. For example, the CPH Darwin, located in Bordeaux, was initiated by a private company that reunited many local actors, all moved by social and ecological values. Together they transformed an old military site into an innovative hub for debate and collective actions on ecological transition. Their incremental approach to bringing the site back to life “focuses on iterative progressive development, in which feedbacks of the system are observed and actions are made to implement new parts based on those feedbacks and user need” ([Amato et al., 2021](#), p. 55).

In Ceinar ([2019](#)), coworkings are described as resilient structures due to three factors: 1) their contribution to regenerative processes in abandoned areas; 2) the synergies stimulated between newcomers and local communities; and 3) the key partnerships established with local communities and administration.

In addition, CPHs uncover a multidimensional concept of production: “at the intersection of three dimensions: networks, institutions, and local relationship” ([Azaïs et al., 2001, p.25](#)). New social relations and forms of governance appear to negotiate with their local environment to make their model sustainable and impactful.

Finally, CPHs are also considered laboratories for city transformation, including living labs, civic labs and third spaces<sup>6</sup> that work as *middle ground platforms*, spaces for dialogue and co-creation between the upperground of researchers and experts and the underground of citizens and artists ([Besson, 2017](#); [Cohendet et al., 2011](#)). Following the logic of open and collaborative urban laboratories ([Chronéer et al., 2019](#)), these hubs make use of open innovation methodologies, creative workshops and forums, or hackathons to reach out to public organisations, private actors, universities, and citizens ([Bergvall-Kåreborn et al., 2009](#); [Ståhlbröst, 2008 in Chronéer et al., 2019](#)) and to prototype future scenarios for their city ([Besson, 2017](#)). They are often described ([Besson, 2017](#); [Juujärvi & Pessa, 2013](#); [Chronéer et al., 2019](#)) as interfaces, innovation platforms or network hubs ([Besson, 2017](#)). Through CPHs, urban planning is thus also reinterpreted as an open access and collaborative process, activated by physical and virtual interactions with a diversified range of actors.

Despite their development in the last 40 years, CPHs did not demonstrate yet the technical and financial capacity to deploy their prototypes and innovative scenarios at the city scale ([Amato et al., 2021](#)). They found difficulties in establishing strong connections between relevant local actors and communities ([Besson, 2017](#)) to have an impact beyond their core community.

According to several authors ([Besson, 2017](#); [Chronéer et al., 2019](#)), appropriate urban policies are still not able to potentially scale up the impact of CPHs, a process which may also entail some risks, such as the institutionalisation of CPHs and, thus, the loss of resilience by weakening CPHs’ progressive,

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<sup>6</sup> Antoine Burret in ([Besson, 2017](#)) provides a more precise definition of third spaces compared to Oldenberg: they are not only places of sharing, socialisation, but also of innovation and entrepreneurship (Burret, 2015).

Carolina Ferro, Pablo Muñoz Unceta, Carlotta Fontana Valenti, Ida Jusic, Francesco Cingonali, Tomas Diez Ladera, Mitalee Parikh: Fab City Hubs: Interfaces for community building and playgrounds for new innovative urban actions

reticular and inclusive character ([Besson, 2017](#)).

In recent years, online networked platforms of CPHs have fostered their visibility and enabled the circulation of knowledge locally and globally ([Besson, 2017](#)). These learning ecosystems<sup>7</sup> work as horizontal and immaterial structures for co-creation that challenge inefficient traditional forms of governance and ownership of urban infrastructure ([Besson, 2017](#); [Jiménez, 2014](#)). City-making emerges as a collaborative and inclusive practice made possible by alliances and by the circulation of knowledge globally, while relying on local networks of spaces and citizens.

The Fab City Global Initiative, one of these global networks, has since 2019 experimented with the *Fab City Hub* concept as part of its agenda to enhance the circulation of data and knowledge globally, while keeping material flows as local as possible ([Diez et al., 2018](#)). Fab City aims to connect distributed networks of hyper-local productive ecosystems to enable the mass distribution of goods and resources globally, while articulating global and local scales through FCHs.

## 4 Case Studies

This section presents a description and brief analysis of four case studies to show the most recent paths CHPs are taking towards a new hub typology, transitioning towards FCHs. For this study, the history and basic characteristics (such as hub typology, productive activities, legal status, and funding scheme) of these hubs will be presented, when this information is available.<sup>8</sup> In addition, a description of the community's involvement, the main outcomes and outputs, challenges and some lessons learned from these experiences will be developed. Two selected case studies are situated in Europe: the Fab City Hub Paris (France) and the TextileLab (Blönduós, Iceland). Both cases are part of the European project [CENTRINNO](#), funded by the research and innovation program Horizon2020. The other two cases are located on different continents: the Seoul Innovation Park (Seoul, South Korea) and the Fab City Hub Yucatán (Mexico). Following the geographical diversification criteria, the authors expect to capture different perspectives of the hub model.

### 4.1 Fab City Hub Paris (Paris, France)

The City of Paris joined the Fab City Network in 2016. In July 2018, the third Fab City Summit was organised in Paris. This edition wanted to be the catalyst event for the local community and the global network. The event was the opportunity to '[sort out from the wood](#)' the concept of Fab City and transform Paris into the leading European capital of innovation and circular production.

In this fervent context, the local association Fab City Grand Paris (FCGP) gained its strength and became the referent network for the most innovative and socially engaged local actors. From there on, FCGP started getting involved in actions and projects<sup>9</sup> to transform Paris into a productive, sustainable and more just city. In the European project [CENTRINNO](#), FCGP, in parallel with eight other pilot cities, is working toward the implementation of spatial typologies, the FCHs, that will operate as models to transform heritage buildings and neighbourhoods into engines for new socio-economic and sustainable

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<sup>7</sup> Some of them are Network of Laboratorios Ciudadanos of Media Lab Prado, Ecoscience Reseaux-Casamate Grenoble or platform projects such as Inteligencia Colectiva or the Fab Lab Network. For more information, see Amato et al. (2021, p. 22).

<sup>8</sup> A template (see Annex 1) was developed to capture the information and build the case studies. The data collection for the European cases was through data gathered from the CENTRINNO project. The Fab City Foundation carried out the data collection for the other two cases through the collaboration of the members of the Fab City Network via filling in the template, which was complemented with online information.

<sup>9</sup> [Reflow](#), [Makers Covid](#), to mention a few.

Carolina Ferro, Pablo Muñoz Unceta, Carlotta Fontana Valenti, Ida Jusic, Francesco Cingonali, Tomas Diez Ladera, Mitalee Parikh: Fab City Hubs: Interfaces for community building and playgrounds for new innovative urban actions

identities. To this end, the local team is working toward the activation of two different sites in the Northeast of Paris.

The first, the [Fab City Hub Paris](#), is a real estate operation managed by a local cooperative, Oasis 21, with the support of the City Council (in charge of the refurbishment of the building) that opened its doors in July 2022. This creative and productive hub of 1000m<sup>2</sup>, including a food lab, a makerspace and workspaces for young entrepreneurs, will give space and voice to SMEs, institutions and civil society organisations operating in the food ecosystem. It aims to become a laboratory for rethinking production in the city. It will do so by curating cultural and networking events, organising training courses linked to craftsmanship and food production, blending tradition with innovation.



Image 1: Fab City Hub Paris' first community event, 'Manger la Ville'. Source: Fab City Grand Paris.

The second, Jardin des Traverses, is a project run by Vergers Urbains, a local association working on urban agricultural practices that, through activities and training courses with local communities, is converting a former railway path into a walkable urban garden for food production.

During the next four years, the local team's<sup>10</sup> objective is to transform the capital into a circular, inclusive and heritage-based place' around the food system. "Local Farm, Logical Foo" is their motto, echoing a period in which French farmers around Paris established an ecosystem of small farms and market gardening that nourished the entire city, using specific techniques to improve soil production.

Today, bringing back local and sustainable production is possible and, foremost, is part of the city's political agenda.<sup>11</sup> It is clear to the local team that transformations do not happen in a blink of an eye. For example, suppose innovative spaces such as the Fab City Hub Paris and the Jardin de Traverses function as ecosystem activators, operating as interfaces to catalyse connections and collaborations among urban actors. Similarly, they need to proceed with a holistic approach and from a multi-layered perspective ([Amato et al., 2021](#)).

With this in mind, they are developing activities, tools and events that aim to involve different actors and embrace the complexity that urban transformations imply: Vocational training courses to shape the hub as a learning ecosystem; the development of a series of digital platforms<sup>12</sup> to give visibility to local

<sup>10</sup> Formed by other partners such as [Volumes](#) and [Sony CSL](#).

<sup>11</sup> Please check Paris' 2018 strategy for sustainable food [here](#).

<sup>12</sup> [Make Works](#), [Kumu](#) and Food Track.

Carolina Ferro, Pablo Muñoz Unceta, Carlotta Fontana Valenti, Ida Jusic, Francesco Cingonali, Tomas Diez Ladera, Mitalee Parikh: Fab City Hubs: Interfaces for community building and playgrounds for new innovative urban actions

producers and to foster connections and sharing of resources, skills and knowledge otherwise dispersed in the urban fabric; and a series of curatorial events, such as the [Fab City Camp](#) and Manger La Ville, to provide space for debate and civic participation.

#### 4.2 TextileLab (Blönduós, Iceland)

Blönduós is a small town (895 people) in the Northwest region of Iceland, home to 7288 people that live in a low-density rural territory. The wool industry and sheep farming are important economic activities in the region, with 90% of the country's wool being processed there.

The Icelandic Textile Centre opened its doors in 2005 in the heritage building Kvennaskólinn, a former women's college in Blönduós. It fosters textile innovation, knowledge building and research around textiles in Iceland, where textile production has been largely abandoned, resulting in a loss of traditional craft knowledge ([Icelandic Textile Centre online resources](#)).

In 2021, the Textile Centre's TextileLab was formally opened. The first of its kind in Iceland, it currently offers access to up-to-date textile equipment and digital technology for makers, students and artists. The project received a development grant from the Icelandic Infrastructure Fund, Lóa Innovation Fund, and it is part of the TextileCenter's ongoing European collaboration in the CENTRINNO project.

The Textile Center is a non-profit institution led by a governing board including representatives from universities, regional municipalities, associations and businesses. Public funding from the Icelandic Ministry of Higher Education, Science and Innovation and European-funded research projects play an important role in TextileLab's funding structure. This source of income is used to foster an agenda on inclusion (gender studies), local collaborations (University of Iceland, Fab Lab Sauðárkrúkur, universities in rural Iceland, Municipalities A-Hún), and connections with global programs (Fabricademy).

The TextileLab is an open space for makers and artisans to experiment and work with textiles. It has an open-door day once a week. Their activities target diverse audiences, including events (Ullarthon award ceremony in connection with the DesignMarch festival in Reykjavík), Open Houses for the general public, or a residency program for artists and makers. Its main target audiences are textile companies, individual textile entrepreneurs, makers, artists and designers, sheep farmers, associations of sheep farmers, the Textile Academy, the Icelandic textile association, and the Icelandic handicraft association, as well as citizens from the region.



Image 2: TextileLab location in Blönduós. Source: Icelandic Textile Center.

Even though TextileLab is not officially labelled as a Fab City Hub, it is part of the CENTRINNO network of hubs experimenting with the Fab City Hub approach. Some of its recent efforts are moving the lab in this direction, from which we could extract three main findings already.

Carolina Ferro, Pablo Muñoz Unceta, Carlotta Fontana Valenti, Ida Jusic, Francesco Cingonali, Tomas Diez Ladera, Mitalee Parikh: Fab City Hubs: Interfaces for community building and playgrounds for new innovative urban actions

First, to be resilient and sustainable, this rural hub expands its actions beyond its walls and local context. The local team organises events and establishes collaborations with national and international actors, increasing their capacity to connect their hub to larger communities, nationally and globally, overcoming their isolated rural environment. These events include the Ullarthon Wool Hackathon (2021) and the TextileCenter's contribution to Design March. Moreover, the international textile artists in residence expand collaborations and exchanges.

Second, it blends its physical space with digital spaces, maximising both performances. Third, even though still in an early stage, the local team is developing a strong digital presence through research projects such as CENTRINNO or SheMakes to connect with international actors and knowledge to enrich their hub and disseminate their experience among other hubs globally.

Last, key partnerships around research projects allow the Icelandic TextileCenter's TextileLab to give visibility to underrepresented groups, such as women in the textile industry. The role of the University of Iceland as an academic partner has allowed the TextileLab team to develop content and reflections that strengthen their already existing approach and local agenda towards textile fabrication with a gender-inclusive lens.

### 4.3 Seoul Innovation Park (Seoul, South Korea)

Seoul is a global city where the dynamic lives of 10 million people coexist. It became a Fab City in 2018. However, even before joining the Fab City Global Initiative, the local government launched the Seoul Innovation Park (SIP) in 2015. SIP is based in an area of 100,000 m<sup>2</sup> that used to host the Korean Center for Disease Control and Prevention (KCDC) for more than 50 years. However, in 2010, KCDC moved to another province. Then, the Seoul Metropolitan Government declared that this site should become a hub to tackle various social problems. Thirty-three large and small buildings comprised the KCDC. Some have been renovated over time based on the ideas and opinions of citizens and experts. Currently, thirteen buildings are being used.



Image 3: Seoul Innovation Park. Source: [SIP](#)

SIP describes itself as a social innovation "platform", the first in the country, where people gather to communicate and collaborate, develop creative initiatives and carry out activities which contribute to solving various social problems. SIP defines all activities that solve societal problems as innovation, and considers that the main actors in solving social problems are citizens, calling them "innovators". Inside the Innovation Park, numerous experiments are taking place to identify problems and present alternatives and countermeasures. There, innovators try to solve the social issues they want to challenge with their own ideas and methods. Therefore, it operates as an experimentation playground where citizens can freely imagine and experience, and as a cradle for innovators to learn, experiment and practice. Experiments ranging from zero



Carolina Ferro, Pablo Muñoz Unceta, Carlotta Fontana Valenti, Ida Jusic, Francesco Cingonali, Tomas Diez Ladera, Mitalee Parikh: Fab City Hubs: Interfaces for community building and playgrounds for new innovative urban actions

plastic, energy conversion, space sharing and veganism to Fab City projects for a sustainable city are changing the lives of citizens into a healthier one. Citizens are welcome to use various open spaces, being the SIP also a public space with a park that is always open. Anyone can become the main actor of social innovation at SIP.

Currently, around 250 groups organisations, companies, cooperatives, for and non-profit) and 1,300 innovators are doing social experiments to make their imagination come true in various fields, including social economy, art, culture, education, human rights, fair trade and so on. Through such networking and collaboration, social innovation experiments and their outputs are becoming part of the everyday lives of local citizens in the region. To support these activities, SIP provides various spatial resources such as conference rooms, lounges, cafes, rooftops, and outdoor spaces. In addition, SIP has renovated the buildings with various themes such as residence, coworking, living lab, fab lab, makerspace, food lab, woodworking, regeneration (upcycling), art, youth groups, space for long-term education, gender equity, education and public service space for the elderly, and the Seoul Metropolitan Archives, among others. As a major output, SIP every year produces innovators who graduate and are active in the field, supporting that more and more citizens are joining efforts to fight the global challenges we are facing.

Even though the SIP does not label itself as a Fab City Hub, in this study, it is recognised as such for its capacity to engage the local community, and the private and public sector, going beyond its walls by activating and prototyping within its surroundings. However, SIP faces challenges in its evolution to becoming a Fab City Hub. One of these challenges is related to being sustainable and generating more impact. It relies on public government funding which, as always, has its good and challenging side. On the one hand, it has a significant annual budget of around 5 million euros. However, on the other hand, it presents the challenge of maintaining the Innovation Park due to the government changes, which sometimes do not understand the need for civic participation. In addition, it misses out on revenue-generating private partnerships and business opportunities. Another aspect that needs development is connecting with the global community and exchanging knowledge.

#### **4.4 Fab City Hub (Yucatán, Mexico)**

Yucatán, the Mexican state, joined the Fab City Network in 2019. The [Fab Region Yucatán](#)'s goal is to foster social transformation in the region, to change the economic, social and environmental dynamics paradigm by providing access to technology, increasing innovative prototyping solutions and promoting productivity in the entrepreneurial sector.

The [Yucatán Fab Lab](#) was established in 2015. The operative organisation of Fab Region Yucatán and their local Fab Lab is the Fab City Yucatan Association, a non-profit civil association, privately owned, established in 2017. Since 2015, the Yucatán Fab Lab has been developing organically into a Living and Educational Lab. In 2021, started the reconceptualisation and transition of the Fab Lab as a Fab City Hub in order to strategically support the roadmap of Fab Region Yucatán. The FCH in Yucatán endorses the goals of Fab Region Yucatán by promoting activities like open source hardware and software production, wood manufacturing, 3D printing and electronic works. Nowadays, the hub consists of the Fab Lab Yucatán, the Center for Innovation, Resilience and Climate Action ([C-Klima](#)) and [Inedit](#), a private for-profit entity.



Image 4: Fab City Hub Yucatán. Source: [Fab City Yucatán](#)

C-Klima functions as a research and development centre, a living laboratory that tests participatory technologies and prototypes in public spaces. While, on the other hand, the Fab Lab serves as the physical learning space that promotes universal educational programs for all citizens, like the Precious Plastic Lab. [Inedit](#), the third component of the hub, operates as a highly specialised consulting company that focuses on sustainable building structures and resilient cities. With these three focus areas, Fab Region Yucatán seeks to position its Fab City Hub as a key entity for the sustainable development of the cities and regions of Mexico.

With a size of 450m<sup>2</sup>, the Fab City Hub Yucatán is located in the historical industrial area of Mérida, surrounded by traditional Spanish architecture. Currently, the hub is mainly visited by students who attend the educational programs of the Fab Lab (approximately 150 students per month), while key public sector actors mostly frequent C-Klima. The future focus is to foster the engagement of citizens and frequently establish meaningful exchanges in the hub.

To support these activities, Fab City Hub Yucatán counts on a hybrid funding scheme, with funds from the public and private sectors. The main revenue of the hub relies on the research of innovative solutions (tools, apps, platforms, training, etc.) that contribute to improving the quality of life in the urban environment and fostering meaningful exchange in communities. The major achievements of the Fab City Hub are environmental applications for urban trees ([Arbolado Urbano](#)), climate action ([Sensacitizens](#)) and public transport ([Movidata](#)). [UN-HABITAT](#) chose these tools as case studies for the [Compendium of people-centred practices](#). The local communities, government agencies and research institutions were involved in the development process of the environmental applications.

One of the main challenges of the hub in Yucatan is to operate self-sufficient research projects. Till now, this barrier has been partly resolved through international subsidies. However, with local key stakeholders, the association is developing a strategy to establish a self-sufficient Fab City Hub in Yucatan. The main lesson of the key actors of the Yucatan's hub is to be reactive to unforeseen chances of the local strategy and quick in the decision-making process to guarantee the continuation of projects. This case is a typical hub moving towards the FCH model, promoting a collaborative and open-source approach to knowledge, production and innovation.

## 5 Discussing the Fab City Hub model: an evolution of CPHs

Each case study analysed in this article sheds light on the FCH model. Based on their analysis, this section presents a conceptual framework that allows an explanation and preliminary definition of the FCH model compared to existing hub models. Two case studies are officially labelled as FCHs, whereas the other two are not, even though they present some FCH characteristics. This section also draws from previous work, such as the CENTRINNO Fab City Hub principles (Amato et al., 2021) and the Fab City Full Stack framework (Diez et al., 2018).

The main difference between CPHs and FCHs is their capacity to become *ecosystem activators* to foster the transformation of their surroundings through collaborations between citizens and other stakeholders. This, in turn, has different consequences on the role of FCH towards their environment.

FCH Paris catalyses interactions and facilitates connections and collaborations among the different actors through cultural and networking events or training courses on craftsmanship and food production. Their physical space is open to its surrounding communities, which also *attracts traditional institutions* (schools, municipalities, and private companies) interested in accessing openness, networking and innovative thinking. The Paris case demonstrates the potential of this new typology of hub to become a *multi-layered space*, both physical and digital, building new forms of collaboration locally and globally. Finally, by providing room for debate and civic participation, the hub *gives voice to citizens* and acts as a platform for bottom-up initiatives.

Similarly, FCH Yucatán also functions as an *ecosystem activator*, especially with the development of environmental applications for urban trees in which the local government collaborated with local communities and research groups. Its flexible configuration and key partnerships (Fab Lab Yucatán, C-Klima and Inedit) make it a *complex organism that enables resiliency* with high adaptability to unplanned situations. Like FCH Paris, FCH Yucatán aims to become a space for expression and debate that *gives voice to citizens*.

The other two case studies also work as ecosystem activators. Still, their different funding and governance scheme, as well as their physical context (especially in the case of the TextileLab), shows different evolutive characteristics toward a new typology from the two "official" FCHs.

The TextileLab (Blönduós) shows how hubs may act as *physical devices for accessing distributed ecosystems*, which is especially relevant in its rural context. It acts as a two-way access gate to the richness, variety and resources of communities, actors and projects in Iceland and globally. Its latest developments and its focus on international research projects show a direction towards becoming a *multi-layered physical and digital space* to share knowledge openly. In the same way as FCH Paris, the TextileLab *gives voice to citizens* through spaces, platforms, and research accessible, focussing on neglected communities and providing visibility to underrepresented groups, such as women in the Icelandic wool industry.

In the case of Seoul, although the Innovation Park was created through a top-down approach by the local government, the *role of citizens is central* in many aspects, from the ideas for renovating the buildings to proposing solutions to societal problems through experimentation. Here also, the SIP functions as an *ecosystem activator*, a platform that catalyses interactions and facilitates connections and collaborations among active actors in the urban environment. Similarly to Yucatán, SIP behaves as a *complex organism that enables resiliency*, staying open to the emergence of new needs, projects, and spatial reorganisation.

Opposite to CPHs, which struggle to work at the city scale or across fields in the same location, and lack an integrated approach, the case studies presented have shown the ability of FCHs to prototype in the neighbourhood scale, to engage policymakers to scale up their impact to metropolitan areas, and to work across fields. For instance, FCH Paris works on food innovation but looks for interrelations and experimentations in the heritage field, or the TextileLab in Blönduós focuses on textiles but looks for interactions with gender studies.

Carolina Ferro, Pablo Muñoz Unceta, Carlotta Fontana Valenti, Ida Jusic, Francesco Cingonali, Tomas Diez Ladera, Mitalee Parikh: Fab City Hubs: Interfaces for community building and playgrounds for new innovative urban actions

The case studies presented in this article are CPHs that are becoming increasingly more complex and global, moving towards a new typology, the FCH model. FCHs aim to be an evolution of CPHs, a more holistic hub model that tests new approaches to innovation, learning and production with impact at the local level, while articulating global efforts.

As observed in all four case studies, FCHs are open spaces for city- or region-making. They work as a physical interface to connect actors within a Fab City prototype (usually a neighbourhood) and foster collaboration and exchange of skills and knowledge between local communities in a given territory. FCHs share characteristics with CPHs: they are third places and meeting points for neighbours, citizens, makers, organisations and businesses, connecting these different local stakeholders with the city and its political power and institutions (e.g., the City Council). Nevertheless, unlike CPHs, these spaces are able to integrate and orchestrate different local agendas in urban areas and regions, such as circular economy, smart cities, digital transformation, urban manufacturing and agriculture, as well as connect them with global networks of innovation in these areas. The Hubs expand the role of Fab Labs and makerspaces as they expand their reach and can connect with other local manufacturers within a neighbourhood, city or region. They are the operational enablers of the Fab City vision.

## 6 Final considerations

Fab City Hubs emerge as a new hub typology, evolving from the CPH model but with some clear differences. They are *ecosystem activators* that connect local communities with stakeholders from the public and private sectors. Nevertheless, unlike CPHs, the regenerative effect of FCHs extends to the neighbourhood, the city at large or the bioregion. Their approach to production, knowledge and innovation is holistic and multi-layered, and they emerge as interfaces for local-global community building and playgrounds for innovative urban actions. Their challenge now is to become a global FCH community to address our times' pressing economic, social and ecological challenges.

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Carolina Ferro, Pablo Muñoz Unceta, Carlotta Fontana Valenti, Ida Jusic, Francesco Cingonali, Tomas Diez Ladera, Mitalee Parikh: Fab City Hubs: Interfaces for community building and playgrounds for new innovative urban actions

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**Annexe 1 - Case Study Template**

**1. HUBCHARACTERISATION**

|                 |                        |
|-----------------|------------------------|
| <i>HUB NAME</i> | <i>Name of the hub</i> |
|-----------------|------------------------|

**TYPOLOGIES** *multiple choice - please underline*

|  |   |
|--|---|
| <ul style="list-style-type: none"> <li>● Fab Lab</li> <li>● Makerspace</li> <li>● Coworking</li> <li>● Hackerspace</li> <li>● Third Place</li> </ul> | <ul style="list-style-type: none"> <li>● Living Lab</li> <li>● Green Lab</li> <li>● Bio Lab</li> <li>● Foodlab</li> <li>● Educ Lab</li> </ul> |
|--|---|

**PRODUCTIVE ACTIVITIES** *multiple choice - please underline*

|  |  |
|--|--|
| <ul style="list-style-type: none"> <li>● Agriculture</li> <li>● Biomaterials</li> <li>● Electronics</li> <li>● Food (<i>production or transformation</i>)</li> </ul> | <ul style="list-style-type: none"> <li>● Metal manufacturing</li> <li>● Textile</li> <li>● Wood manufacturing</li> <li>● 3D printing</li> <li>● Other - <i>please complete the list if needed</i></li> </ul> |
|--|--|

**GEOGRAPHICAL SITUATION** *multiple choice - please underline*

|   |  |
|---|--|
| Country   | <i>Name of the country</i>   |
| City  | <i>Name of the city</i>  |
| <p>City size* <i>please choose by population</i></p> <ul style="list-style-type: none"> <li>● XS (&lt;10k)</li> <li>● S (&lt;500k)</li> <li>● M (&lt;1M)</li> <li>● L (&gt;1M)</li> </ul> | <p>Site specification <i>please underline</i></p> <ul style="list-style-type: none"> <li>● Urban environment</li> <li>● Peri-urban environment</li> <li>● Rural environment</li> </ul> <p>Heritage specification<br/><i>multiple choice - please underline</i></p> <ul style="list-style-type: none"> <li>● The hub is located in a historic industrial area</li> <li>● The hub is located in an historic area under transformation</li> <li>● The hub is located in a historic/heritage building</li> </ul> |

## 2. ADMINISTRATIVE DATA

|  |  |
|--|--|
| Size of the hub  | <i>(m2)</i>  |
| Launch date  | <i>Please write here</i>   |
| Average yearly turnover (budget)<br><i>If data are available, it is suggested to give an average value based on 2018,2019 and 2020.</i>  | <i>in euros (€)</i>  |
| Number of employees - <i>please underline</i> <ul style="list-style-type: none"> <li>● 1-5</li> <li>● 5-10</li> <li>● 10-50</li> <li>● +50</li> </ul>  | Legal Status - <i>please underline</i> <ul style="list-style-type: none"> <li>● Private company</li> <li>● Cooperative</li> <li>● NGO</li> <li>● Foundation</li> <li>● Public institute/facility</li> <li>● Other. Which one? _____</li> </ul> |
| Funding Scheme <ul style="list-style-type: none"> <li>● Public (<i>E.g.: Fablab Lisboa...</i>)</li> <li>● Private (<i>E.g.: Space 10</i>)</li> <li>● Hybrid</li> </ul>   | Profit / Nonprofit <ul style="list-style-type: none"> <li>● Profitorganisationn</li> <li>● Nonprofitorganisationn</li> <li>● Hybrid - <i>if relevant , provide us with detail</i></li> </ul>   |
| Types of revenues <i>multiple choice - please underline</i><br><i>If you have those, please provide details of distribution in percentage of different revenues.</i> <ul style="list-style-type: none"> <li>● Memberships / subscriptions - %</li> <li>● Acceleration / incubation - %</li> <li>● Educational programs - %</li> <li>● Research - %</li> <li>● Consulting - %</li> <li>● Space rental / events - %</li> <li>● Private fundings - %</li> <li>● Public fundings - %</li> <li>● Other - <i>please complete the list if needed</i></li> </ul> |  |

### 3. DESCRIPTIVE DATA

|   |   |
|---|---|
| <b><u>GENERAL DESCRIPTION</u></b>       | <i>What is your hub and what is its story? Please add here a short description of the hub (about 10-15 lines) with its main specificities and activities, the process of its creation, the main stakeholders involved, etc.</i> |
| <b><u>Sources &amp; references:</u></b> | <i>Please list the <b>sources/links</b> and references you used to fill the template. Add all possible websites and news related to the Hub.</i>  |
| <b><u>PICTURES:</u></b>                 | <i>Please upload 2-3 high-resolution pictures in the same folder as this document.</i>  |
| <b><u>Community</u></b>                 | <i>How many people attend the hub? What is the community involvement? Which activities are developed for the community to participate?</i>  |
| <b><u>Outcomes/outputs:</u></b>         | <i>What are the main outcomes, outputs and/or preliminary results of the hub?</i>   |
| <b><u>Main challenges</u></b>           | <i>What are the main challenges you faced or still face and how did you overcome them?</i>  |
| <b><u>Lessons learned</u></b>           | <i>What are the main lessons learned until now and best practices?</i>  |