CENTRINNO

DELIVERABLE 1.2

CENTRINNO FRAMEWORK

Submission date: 31/08/2020
Project start date: 01/09/2020

Duration: 42 Months

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 869595

DELIVERABLE FACTSHEET

Work Package	WP1 CENTRINNO Framework
Deliverable	D1.2 CENTRINNO Framework
Due Date	M12: 31 August 2021
Submission Date	M12: 31 August 2021
Dissemination Level	[X] P – Public [ ] CO – Confidential
Deliverable Lead	IAAC
Author(s)	Pablo Muñoz Unceta, Tomas Diez (IAAC), Amalie Ingemann Henriksen, Sofie Nielsen, Cecilie Schulze (DDC), Jonathan Even-Zohar, Hester Dibbits (AHK), Frenzi Ritter (META), Nanne Brower (WAAG), Cristina Olivotto (OLF), Francesco Cingolani, Carlotta Fontana (VOL)
Point of Contact	Pablo Muñoz Unceta (IAAC), pablo@fablabbcn.org
Reviewers	Monica Maria Moeskær (DDC), Meia Wippoo (Waag)
Status	[ ] Plan [ ] Draft [ ] Working [x] Final [ ] Approved
Abstract (for public dissemination only)	The CENTRINNO Framework sets up the research foundation of the project's experimentation activities. Its purpose is to pave the way so the CENTRINNO approach on industrial historic areas can be replicated in the future by other cities. It provides theoretical and methodological context, an implementation structure and offers examples of tools and methods to be applied in order to operationalise the CENTRINNO approach. It is built on previous project resources, such as the CENTRINNO Whitepaper or the Pilot Planning and Monitoring Framework and it will be updated throughout the project to include and reflect on the findings of pilot cities. This document constitutes the first iteration of the CENTRINNO Framework.
Keywords	Framework, experimentation, methodology, tools, approach, micro mission
Statement of Originality	This deliverable contains original unpublished work except where clearly indicated otherwise. Previously published materials and the work of others have been acknowledged through appropriate citations, quotations or both.

REVISION HISTORY

Version	Date	Author(s)	Organization	Description
0.1	21/06/2021	Pablo Muñoz Unceta	IAAC	Initial ToC and first complete draft, including Annex 1
		Amalie Ingemann Henriksen Sofie Nielsen Cecilie Schulze	DDC	
0.2	21/07/2021	Frenzi Ritter	META	CENTRINNO Cartography (4.2)
		Jonathan Even-Zohar, Hester Dibbits	AHK	CENTRINNO Living Archive (4.2)
		Cristina Olivotto	OLF	CENTRINNO School (4.2)
		Francesco Cingolani, Carlotta Fontana	VOL	Fab City Hub (4.1)
		Nanne Brouwer	WAAG	Pilot Dashboard (4.3)
0.3	30/07/2021	Pablo Muñoz Unceta, Tomás Díez	IAAC	Adjusting Table of Contents, detailing contents for 2.1, 2.2, 4.1, 4.2 & 4.3.
0.4	04/08/2021	Cristina Olivotto	OLF	Contribution Annex 1
	04/08/2021	Carlotta Fontana	VOL	Revision of Fab City Hub (4.1)
0.5	06/08/2021	Pablo Muñoz Unceta, Tomás Díez	IAAC	General edits, finalising 4.4 and Annex 1 before review process.
0.6	19/08/2021	Meia Wippoo	WAAG	Review
	20/08/2021	Monica Maria Moeskær	DDC	Review
0.7	23/08/2021	Jonathan Even-Zohar	AHK	Addressing reviewers' comments for submission to quality manager review
	24/08/2021	Amalie Ingemann Henriksen	DDC	
	25/08/2021	Carlotta Fontana	VOL	

Version	Date	Author(s)	Organization	Description
	25/08/2021	Pablo Muñoz Unceta	IAAC	
0.8	26/08/2021	Armend Duzha	IAAC	Quality check
1.0	31/08/2021	Pablo Muñoz Unceta	IAAC	Final version by the consortium to be submitted to the EC.

Disclaimer

This document contains information, which is the copyright of CENTRINNO consortium, and may not be copied, reproduced, stored in a retrieval system or transmitted, in any form or by any means, in whole or in part, without written permission. The commercial use of any information contained in this document may require a license from the proprietor of that information. The document must be referenced if used in a publication.

The European Commission is not liable for any use that may be made of the information contained herein.

EXECUTIVE SUMMARY

CENTRINNO is a research project that aims at demonstrating how industrial historic sites could adopt an innovative, sustainable and inclusive urban transformation process. The CENTRINNO Framework attempts at creating a common language and terminology for all the project partners to understand each other and share our findings with a wider research audience, being able to explain what, why and how things are done in CENTRINNO.

The CENTRINNO Framework sets up the research foundation of the project's experimentation activities. Its main purpose is to pave the way so the CENTRINNO approach on industrial historic areas can be replicated in the future by other cities in Europe and abroad. It provides theoretical and methodological context, an implementation structure, and offers examples of tools and methods to be applied in order to operationalise the CENTRINNO approach. It is built on previous project resources, such as the CENTRINNO Whitepaper and the Pilot Planning and Monitoring Framework, and it will be updated throughout the project to include and reflect on the findings of pilot cities. This document constitutes the first iteration of the CENTRINNO Framework.

This deliverable intends to provide a structure so that pilot cities can contextualize their activities under one overarching research umbrella, which could later also inspire and be used by other cities that want to implement the CENTRINNO approach to foster innovative, sustainable and inclusive transformation processes of industrial historic areas. This is done by (1) framing the objectives of CENTRINNO within a wider theoretical discussion, as well as (2) providing a flexible framework to contextualize activities and the use of the main project resources (3) offering a selection of tools and methods connected to this framework for pilot cities to test in their experimentation activities.

The content of this deliverable will be updated throughout the life of the project, based on the insights and experiences of pilot cities. For the future iterations of the framework, different possibilities are sketched in this deliverable, including the use of online platforms and process-based interactions with CENTRINNO partners.

TABLE OF CONTENTS

REVISION HISTORY 3

EXECUTIVE SUMMARY 5

1. Introduction 10

1.1. Purpose and Scope 11

1.2. Contribution to other Deliverables 11

1.3. Structure of the Document 12

1.4. Glossary of Terms 12

2. Why a CENTRINNO Framework? 16

2.1. The decay of European industrial areas 16

2.2. Fab City and CENTRINNO 18

2.3. The CENTRINNO approach 20

3. CENTRINNO Framework development 23

3.1. CENTRINNO Whitepaper 23

3.2. Co-creation workshops 23

3.2.1. Workshop 1: Tools and methods 24

3.2.2. Workshop 2: Pilot Cities Approach and Activities 27

3.2.3. Workshop 3: Full Stack Framework 30

3.3. Pilot cities activities 32

4. CENTRINNO Framework implementation 34

4.1. Fab City Hubs 34

4.2. The CENTRINNO resources 36

4.3. CENTRINNO experimentation process 46

4.4. Methods and tools for CENTRINNO Micro missions 49

4.4.1. Mapping and understanding your city’s ecosystem 51

4.4.2. Co-creating your community and co-defining its focus interests 54
4.4.3. Implementing a Fab City Hub 57
CONCLUSIONS AND NEXT STEPS 61
REFERENCES 63
ANNEX 1 - CENTRINNO Initial collection of tools and resources 65

LIST OF FIGURES

Figure 1 - The CENTRINNO Framework 10
Figure 2 - Fab City Full Stack and SAP 19
Figure 3 - The CENTRINNO key concepts 21
Figure 4 - Examples of Tool Cards 25
Figure 5 - Screenshot of the co-creation workshop 1 MIRO board 26
Figure 6 - Example of feedback notes from project partners 27
Figure 7 - Screenshot of the co-creation workshop 2 MIRO board 28
Figure 8 - Prioritization illustration by a pilot city during the workshop 29
Figure 9 - Timeline of sprint 1, connecting activities with tools and methods 30
Figure 10 - Screenshot of the co-creation workshop 3 MIRO board 31
Figure 11 - One pilot city detailed activity using the Full Stack Framework 32
Figure 12 - CENTRINNO main resources associated with each key concept 36
Figure 13 - Fab City SAP and CENTRINNO main resources 37
Figure 14 - CENTRINNO Framework: Action areas for micro missions 39
Figure 15 - CENTRINNO Living Archive location within the Framework 41
Figure 16 - CENTRINNO Cartography location within the Framework 42
Figure 17 - CENTRINNO School location within the Framework 44
Figure 18 - CENTRINNO Network location within the Framework 45
Figure 19 - All CENTRINNO main resources covering all action areas 46
Figure 20 - Three cycles of experimentation in CENTRINNO 47
Figure 21 - CENTRINNO Framework's iterative cycle of experimentation 47
Figure 22 - Visualization of a pilot city using the CENTRINNO Framework 50
Figure 23 - Resources for 'mapping micro missions' in the CENTRINNO 52
Figure 24 - Smart Citizen Kit used in Barcelona 53
Figure 25 - Smart Citizen Platform 54
Figure 26 - Resources for 'community micro missions' in CENTRINNO 55
Figure 27 - Working Wednesdays flyer at Kopli 93 57
Figure 28 - Resources for 'FCH micro missions' in CENTRINNO 58
Figure 29 - Milano Fab City Camp event 60

LIST OF TABLES

Table 1 - Co-creation workshop 01 Summary 24
Table 2 - Co-creation workshop 02 Summary 27
Table 3 - Co-creation workshop 03 Summary 30

ACRONYMS AND ABBREVIATIONS

ACRONYM	DESCRIPTION
AA	Action Area
CB	Community Building
CE	Circular Economy
CENTRINNO	New CENTRalities in INdustrial areas as engines for inNOvation and urban transformation
CMS	Content Management System
EC	European Commission
EN	Emotion Networking
FCH	Fab City Hub
GA	Grant Agreement
He	Heritage
IS	Innovation Spaces
KPI	Key Performance Indicator
LCA	Life Cycle Assessment
ME	Mapping Ecosystem
MFA	Material Flow Analysis
MM	Micro Mission
SAP	Strategic Action Plan
SI	Social Inclusion
SME	Small and Medium Enterprise
SoMe	Social Media
ToC	Table of Contents
VT	Vocational Training
WP	Work Package

1. Introduction

CENTRINNO is a research project which will carry out different activities in nine European cities in order to demonstrate how industrial historic sites could adopt innovative, sustainable and inclusive urban transformation processes. All activities developed in the project, and especially those developed in and by pilot cities, are considered experimentation activities. The partnership is diverse and involves many different types of institutions and organizations, including research centres, educational institutions, social organizations, entrepreneurs, fab labs and makerspaces, or creative industries, among others. The CENTRINNO Framework attempts at creating a common research language and an overarching structure for all the project partners to frame and understand each other's actions during the project, while being able to share and compare their findings and work. Moreover, this common structure will also facilitate sharing those findings with a wider audience, being able to explain what, why and how things are done in CENTRINNO.

The CENTRINNO Framework includes two main components: (1) A common research structure, and (2) an initial collection of tools, resources and methods connected to the previous (Figure 1). The overarching research structure for the project comprises the main content of the CENTRINNO Framework. It includes a glossary of terms, a description of the main challenges that the project addresses, its main objectives and the approach it takes on this problem. It also describes the main resources that will be developed during the project to support experimentation, the process that will be followed, and proposes a general structure to organize the actions taken in the nine pilot cities to facilitate knowledge exchange between them. The initial collection of tools is the smallest part of the CENTRINNO Framework in its first iteration. Nevertheless, its role is key in order to provide an initial set of resources that pilot cities can use in order to address the project's challenge, adapted to their own local context.

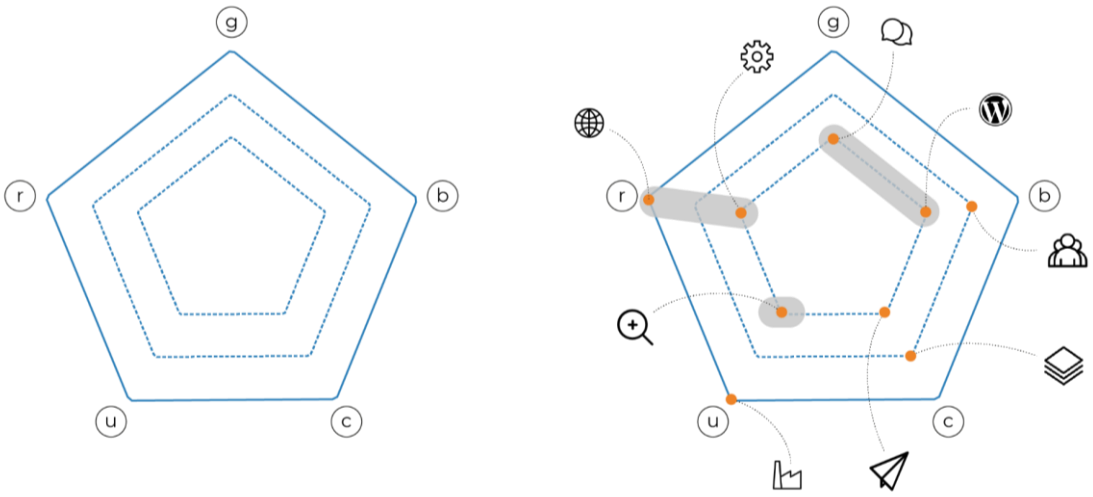

Figure 1 - The CENTRINNO Framework: *A common research structure (left) and an initial collection of tools, resources and methods linked to experimentation activities, in orange (right)*

1.1. Purpose and Scope

This deliverable provides a conceptual, methodological and operational framework for the experimentation activities that are developed in the CENTRINNO project. The CENTRINNO framework is presented hereby for pilot cities within the project (e.g., Amsterdam, Barcelona, Milan, Paris, Copenhagen, Geneva, Blönduós, Tallinn and Zagreb) to adopt it and experiment in their own contexts. It is also open for other cities who aim to transform their historical industrial areas into Fab City Hubs, and adopt and test the CENTRINNO approach in their own environments.

This deliverable contains an overview and analysis of tools and methods that could be used for experimentation activities in CENTRINNO, as well as an overall structure that organizes and contextualizes them. It draws from the existing knowledge, capacity and experience of CENTRINNO partners, and it also incorporates external resources that can complement this. The framework will be a resource for the pilot cities' coordinators, and to the consortium as a whole.

This deliverable constitutes the first iteration of the CENTRINNO Framework. Its content will be updated during the project according to the experimentation activities carried out by pilot cities. These feedback loops will support the emergence at the end of the project of an experimentation framework for other cities to be able to replicate the CENTRINNO approach.

1.2. Contribution to other Deliverables

The CENTRINNO Framework is built on the work developed in previous deliverables, including D1.1 **CENTRINNO Whitepaper**, D2.1 **Urban Ecosystem Mapping Guidebook**, D3.1 **Creative and Productive Hubs Journal**, and D4.1 **Detailed Pilot Planning and Monitoring Framework**.

The CENTRINNO Framework sets the structure for the experimentation of the project, developed within WP4. As such, it is closely connected to pilot cities activities and all deliverables within this work package, namely D4.2, D4.3, and D4.4 (**Sprints' 1, 2 & 3 Collective Results**). In those deliverables, pilots will report on their collective results after each cycle of experimentation. D1.2 offers a framework to carry out a reflection on the results both at pilot city level and at project level, which will in return influence the adjustment of the following cycle. Framing their activities under the structure provided in the CENTRINNO Framework will facilitate pilot cities to compare and exchange between them the knowledge, outcomes or tools used.

The CENTRINNO framework will also be key for the different resources to be developed during the project. Several chapters, but specifically chapter 4, aim at describing different resources, as well as their role and their interconnections with the overall structure of the project. This deliverable provides background to future deliverables related to these resources. This includes the **CENTRINNO Cartography** (D2.2, D2.4 and D2.6), the **CENTRINNO Living Archive** (D2.3, D2.5 and D2.7), the **Fab City Hub Toolkit** (D3.2, D3.3. and D3.4), and **Blueprints and Policy Development Guidelines for Replicability and Wider User** (D6.7).

This deliverable contributes also to D5.1 **Evaluation Methodology** by setting up a general framework for experimentation on which a more specific Impact Assessment Framework may be situated.

Lastly, D1.2 sets the initial steps for D1.3 **The CENTRINNO Handbook**, which will be based on the implementation of the framework by pilot cities and its later iterations, adjusted according to the project's experience.

1.3. Structure of the Document

The document is structured in six chapters, including this first introductory part. Each of them includes different sections. As mentioned before, the research structure comprises the biggest part of this document. Its different components are described in chapters 1, 2, 3 and 4, from the glossary of terms in 1.4 until section 4.3. The initial collection of tools and resources is described and exemplified in the last section of chapter 4.

In **chapter 2**, the conceptual context of the CENTRINNO Framework is presented. The chapter starts with a brief description of the main research discussion where the project is situated. Later, the main CENTRINNO's reference framework within this debate is described. Finally, the overall CENTRINNO's approach, including a description of the key five concepts in which it is supported, is presented.

Chapter 3 includes the methodological context of the first iteration of the CENTRINNO Framework, describing the main sources and processes that have been used to develop it. This includes the development of the whitepaper, the co-creation workshops, and the initial experimentation that pilot cities have implemented during the first months of the project.

Chapter 4 describes the CENTRINNO Framework implementation. It is divided in four sections. First, a description of the main objective of CENTRINNO experimentation, the development of Fab City Hubs in the nine pilot cities. Second, a description of the main resources that will be developed during the project to achieve the development of Fab City Hubs. Third, a description of CENTRINNO`s experimentation process. The fourth section includes a description of different tools and methods that may support pilot cities experimentation. These tools are organized according to the different components of the CENTRINNO Framework, described in the previous sections and chapters.

The last chapter includes a final reflection and a set of preliminary conclusions for the implementation of the CENTRINNO Framework by pilot cities and other cities outside the project. This chapter sketches the next steps of the CENTRINNO Framework and how its future iterations will be developed.

Annex 1 includes an initial collection of useful resources, tools and methods for pilot cities to use in their experimentation activities.

1.4. Glossary of Terms

Throughout this document, several terms and concepts are used to refer to different elements of the CENTRINNO Framework, including methods, tools, or activities. For the sake of clarity

and to avoid misunderstandings and overlaps between them, this section includes a definition for each of the main terms used. They are divided into two categories: Experimentation and Resources.

Experimentation

Every action taking place within the project is considered experimentation and is, directly or indirectly aiming at demonstrating ways to foster an innovative urban development process in historic industrial areas under the project's approach (see Section 2.3). Different types of actions are described below. They are organized from the most specific (session) to the broadest (action plan).

- Step: It is the smallest action of pilot cities experimentation. A step is always part of a broader process in which other steps are taken. Examples of steps are a session within a workshop (e.g., warm-up session, brainstorming session, etc.), a presentation in a webinar, or a survey taken for a mapping process.
- Activity: One stand-alone action carried out by a pilot city or any other project partner during a defined span of time. As mentioned above, all activities developed in CENTRINNO are considered experimentation activities. Throughout this document, the terms experimentation activity, demonstration activity or, simply, activity, are used interchangeably. One experimentation activity may contain different steps, all together providing one or more activity outcomes. Examples of activities are a conference, a round-table, a co-creation workshop, a webinar, or a training program, among others.
- Micro mission: A commitment to address a specific challenge which is framed under pilot cities specific objectives and CENTRINNO's general goal. A micro mission involves one or several activities and may involve different stakeholders. The concept of micro mission is based on the EU R&I mission-oriented approach (Mazzucato, 2019). Examples of micro missions are: developing a community of practice around one topic, mapping the potential food-waste resources available in a neighbourhood, or activating a physical space to carry out community activities, among others.
- Sprint: One cycle of experimentation activities carried out by pilot cities. In CENTRINNO, there are three sprints, each of them lasting seven months and followed by a low-activity period. A sprint may involve several micro missions.
- Action Plan: A concrete roadmap for achieving a pilot city objective. In the case of CENTRINNO, an action plan will bear in mind the project's sprint structure in order to define activities, each connected to specific micro missions. Each pilot city will define its own strategy to set its direction and vision in alignment with the CENTRINNO approach (see Section 2.3). All pilot cities action plans together aim at achieving the overarching goal of the project and demonstrate ways to foster an innovative urban development process in historic industrial areas.

Resources

A specific asset used or developed in CENTRINNO during the project by the partners involved. This includes methods, platforms, toolkits or tools, among others. Examples of external resources used in the project are: Material Flow Analysis, Make Works, or Open Schooling (see Annex 01). Examples of resources developed in the project are: the CENTRINNO Living Archive, the CENTRINNO Framework, the Fab City Hub toolkit, the Urban Ecosystem Mapping Guidebook, etc. Different types of resources are organized alphabetically and described below:

- Framework: An overarching structure that supports different aspects of experimentation activities. It provides context and references to the objectives and purpose of the research, including theoretical and methodological background, as well as highlighting the interconnections of these with specific tools and methods especially suited to achieve the experimentation objectives. A framework may provide a general structure to all experimentation activities in the project, such as the CENTRINNO Framework, and may focus on one specific experimentation aspect, such as impact assessment of experimentation activities, or may target one specific type of experimentation activities, such as the implementation of Fab City Hubs.
- Handbook: A documented guide that includes a description of methods or tools. These descriptions may be self-explanatory so the reader can adjust and implement the methods him/herself, or the handbook may be a resource connected to a training or working program in which the descriptions are complemented with other activities.
- Infrastructure: Digital platform or physical space in which different people can meet, discuss, work or collaborate together. Infrastructure may also refer to different physical and digital interconnected spaces. Within the infrastructure that will be developed in the project, there are several platforms, which are digital tools to which different users can access, provide information, or interact between them.
- Method: A component of research that involves a process with several steps. It ends with the delivery of a specific outcome. It may involve one or more tools and be applied according to a unique sequence of the steps in the process. Examples of methods are an interview, a survey, Material Flow Analysis, Emotion Networking (Rana, Willemsen, and Dibbits, 2017), etc.
- Methodology: The justification and logic behind the selection of methods and tools. Even though they may use the same methods and tools, pilot cities may define different methodologies to approach each of their experimentation processes. Taking as an example two pilot cities using interviews. One pilot city may use them at the beginning of the sprint in order to have baseline information from manufacturers in its local context, whereas the other may use interviews with participants in a training program at the end of the sprint in order to assess its implementation. The goal and use of the interviews in each case is different. In the first case, they will support the creation of the local network and the development of the local approach. In the second case, the interviews will provide feedback for the pilot city in case it wants to implement a second iteration of the training program, or to other pilot cities that want to implement a similar program. The methodology is the rationale each of them have for selecting a set of tools and methods.
- Program: Training or other type of working activities that aim at developing specific skills, knowledge or collaboration by and between the participants during a defined span of time. It may have several sessions that take place online or offline and it may be supported by other resources, such as handbooks, platforms or physical infrastructure.
- Tool: A single resource that could be used for a specific purpose. It is used during one session or throughout an activity to address a micro mission challenge, or recurrently during one pilot sprint. It should be connected to a method and should support arriving at a specific outcome. Examples of tools are digital exchange platforms, a piece of paper and pen, a card game, a blog, a persona sheet, etc.

- Toolbox: A collection of tools. It may or may not follow a theme, but there is no explicit single goal for the toolbox as such, rather than the collection of useful tools.
- Toolkit: A curated selection of tools that follows a specific logic. This logic is defined by the context of application of the tools. It should include a description of the potential purposes for each of the tools, which combined followed an overall objective. There could be different combinations of tools according to the context defined and the overall objective.

2. Why a CENTRINNO Framework?

CENTRINNO envisages a transformation of historical industrial sites in European cities into productive and creative hubs that (1) use heritage as a catalyst for innovation and social inclusion; (2) boost a diverse, inclusive, and innovative urban economy; and (3) hold true to the ecological challenges of our time (CENTRINNO project, 2020). This vision responds to a specific problem within European industrial historic sites. Since the second half of the 20th century and the globalisation of the economy, industrial activity has decreased in European cities and these areas have either decayed or have often been the object of deep transformation processes in which manufacturing activity left room to the knowledge, service-based or financial economy sectors (Hill et al, 2020).

In this regard, CENTRINNO's approach to this problem is rooted in the Fab City vision. The Fab City Global Initiative fosters a shift away from the industrial paradigm of Product-in Trash-out, by enabling the return of local production to cities and regions supported by a Data-in Data-out urban model. The Fab City Global Initiative is building the roadmap (Fab City Full Stack[1], or Strategic Action Plan) and resources to achieve this transition, and supports an interconnected group of locally productive, globally connected cities, regions, and citizens (Diez et al, 2018). Fab City is organized through a Collective of Individuals, a Network of Cities, and a Foundation. CENTRINNO's pilot cities will develop very valuable insights and lessons to understand the role of historic industrial areas in the paradigm shift proposed by the Fab City Global Initiative.

CENTRINNO's vision is also supported by the CENTRINNO approach and the five key concepts: Heritage, Circular Economy, Social Inclusion, Vocational Training, and Innovation Spaces (see Section 2.3), which offer a specific scope for this urban transformation process. The scope includes different dimensions: economic, environmental, social, cultural and technological, and it is grounded in five key concepts.

First, this chapter provides the context to the overall discussion in which CENTRINNO's experimentation is based; secondly a reflection of the interconnections between the CENTRINNO and the Fab City vision, as an existing reference within the debate; and lastly, it includes a description of the CENTRINNO approach and the five key concepts, including their evolution during the project.

2.1. The decay of European industrial areas

The industrial revolution fostered the urban development of many European cities during the 18th and 19th centuries. Many people left the rural areas and migrated to urban sites. They were, on the one hand, pushed away from famines and the harsh living conditions of the countryside, and on the other hand, attracted by new working opportunities in cities that became productive hubs. Novel urban infrastructure such as factories, docklands, power-stations, or railways changed the shape of cities and incentivised the movement of materials and products globally. New technological developments associated with new available energy sources and manufacturing activities intensified resource flows and trade, changing the interconnections and interdependencies between cities, regions and countries. These

[1] See https://fab.city/uploads/Fullstack(27sep).pdf

changes first affected British towns and then quickly expanded to other European towns, cities, and regions around the world.

The appearance of industrial activities and the exponential urban growth had also negative impacts on cities and their population, such as increasing pollution, overcrowded housing conditions, sanitation issues, etc. Even though manufacturing activities coexisted with residential areas and other land uses for a long time, these negative issues brought by industrial urban expansion fostered a tendency to land use segregation, especially during the 20th century. Specific industrial sites were located in peripheral areas of the city, close to logistic infrastructure, such as roads, waterways, or railways, and existing resources, such as water or empty land.

During the second half of the 20th century, globalisation of the economy deeply affected manufacturing processes. Manufacturing and fabrication of goods were relocated to places with access to cheaper labour and cheaper resources (Patel and Moore, 2017). This, together with infrastructure and technological developments, such as containerization of ships and ports or massive production of goods, shifted trading routes, transformed entire geographies, and reconfigured social structures in both ends of the production and consumption paradigm. Decreasing industrial activities changed European urban economies and societies, which transitioned to service-oriented, knowledge-based or financial economies. All these changes had profound consequences in urban areas, not only in European cities, but also in global rural and urban settlements. In Europe, many of the industrial sites lost manufacturing activity and fell into decay, which after decades of urban development were no longer at the fringes of the city. These areas, often called brown fields, were objects of urban renewal operations, linked to the new economic model and a new workforce based both in international finance and businesses, technology or knowledge-based and service-based activities (Fainstein, 2010). Examples of this type of urban development were Canary Wharf in London (1988), IJ river side in Amsterdam (since 1991) or the Olympic area in Barcelona (1989), among others.

Also, this economic shift towards global mass-consumption and resource flows has negative global impacts, such as depletion of resources, massive waste generation, increased pollution. At the same time, the urban development model of industrial areas linked to these global changes is also affecting the social fabric of cities and regions, including small towns and rural settlements. Populations who lived close to those areas are sometimes displaced or segregated due to the increase of land-value fostered by urban renewal processes, often called gentrification.

Nowadays, different global trends, such as the increasing importance of ecology or alternative models such as the circular economy, as well as technology developments, such as automation, digital fabrication, or industry 4.0, have opened again a discussion on the role of manufacturing activities in our urban areas (Hill et al, 2020). Nevertheless, in many places, industrial sites are disappearing and transformed into real estate projects, following a similar model of value extraction and capital generation that fuelled the decay of productivity in cities and regions, as previously exposed. In this context, CENTRINNO aims at exploring alternative paths, towards environmental and social sustainability, for the redevelopment of existing European industrial sites.

2.2. Fab City and CENTRINNO

Emerging as an alternative approach to the current urban model, Fab City aims at fostering more sustainable, globally connected, and locally productive cities and regions (Fab City Global Initiative, 2014). CENTRINNO builds on the Fab City vision to explore the potential of a "new industrial revolution" that has citizens at its core, focusing on the role of industrial historic areas, and the potential to reintroduce manufacturing in urban areas using a circular economy approach.

Cities are complex systems, each of them with a different past and potential futures, influenced by different interrelated groups of people and interests. Even though many of these cities are nowadays interconnected, each urban area had a specific development process with its own specific characteristics, influenced by the local culture, its society and past events (Robinson, 2006). Neither Fab City, nor CENTRINNO, aim at developing one unique approach or methodology to be applied in every city in the same way. It is acknowledged that cities should develop local strategies suited to their own context while partially adapting specific initiatives that they learn through a global network for knowledge sharing. In this context CENTRINNO works on a reduced sample of nine cities (Amsterdam, Barcelona, Blönduós, Copenhagen, Geneva, Milan, Paris, Tallinn, Zagreb).

Focusing on industrial historic sites is a strategic decision. On the one hand, these areas once hosted productive activities and, even though society and technology have changed through time, understanding the past of productive areas is key to foresee the future potential of the specific context-based role of productive activities. On the other hand, as explained in Section 2.1, in many cities these areas have been under deep transformation processes, being places where an industrial fabric has led to the coexistence of many different land-uses nowadays. This offers a great potential to experiment with the future of productive activities in cities, overcoming the modern paradigm of land use separation (Jacobs, 1961) and moving towards a more mixed city.

In the following paragraphs, the Fab City's operational framework and its influence in CENTRINNO are described. Fab City's framework is currently called Fab City Strategic Action Plan (SAP) (Diez, 2021) and was formerly known as Fab City Full Stack. Fab City SAP is a constantly evolving framework, based on the iterative and experimental process carried within the Fab City Global Initiative. For the sake of consistency with the previous documents and activities carried out in CENTRINNO[2], Section 3.2.3 will still refer to this framework as Fab City Full Stack, nevertheless in the rest of the document the new name, Fab City SAP, is used.

The Fab City SAP is the operational and strategic framework of the Fab City Global Initiative, and any city can use it to devise and plan future initiatives (or to understand the scope of previous activities under the Fab City approach) towards an inclusive and sustainable shift in their production-consumption patterns. It is based on a platform-understanding of cities, each platform containing different sets of actors, technologies, spaces, and tools, and at the same time interrelated with each other. The Fab City SAP aims at providing the guidelines to structure initiatives in order to understand what resources a city already has, which resources

[2] During these activities, the Fab City framework was still called Fab City Full Stack.

would need to develop, and which existing resources could be used in a different way in order to foster productive and manufacturing activities in cities under the Fab City vision.

The Fab City SAP is organized in seven layers[3] (CENTRINNO project, 2020), from "Distributed Infrastructure" to "Cities Network". These layers offer simultaneous opportunities for the deployment of the Fab City vision in the territory, with a strong focus on bottom-up processes. The CENTRINNO Framework is built on the Fab City SAP structure, highlighting the connections of the different resources developed in the project with the different layers of the Fab City SAP (Figure 2). These interconnections are further developed and detailed in Section 4.2. Future iterations of the CENTRINNO Framework will consider the evolution of the Fab City SAP and its development, once there is more documentation available. Some changes are the expansion of the scope of action of the framework from the city to the regional scale, adopting a bioregional approach to resource flows, extraction and disposition, and the reframing of some of its layers. These evolutions are already in line with the CENTRINNO's approach on Circular Economy, so future iterations of the project's framework will be easily adjusted and connected to the Fab City SAP.

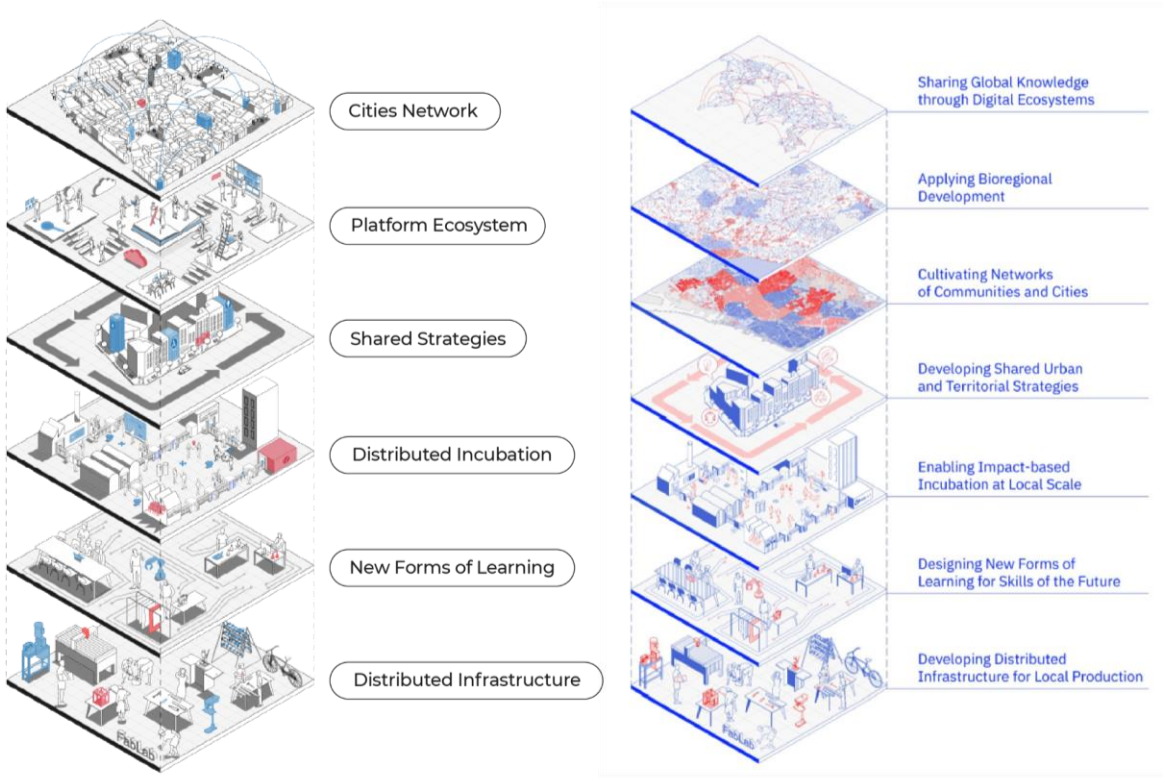

Figure 2 - Fab City Full Stack and SAP. Source: Diez, 2021

[3] The former version (Fab City Full Stack) had six layers that were named differently. See image 1.

2.3. The CENTRINNO approach

The CENTRINNO approach is based on the five CENTRINNO key concepts: Heritage, Circular Economy, Social Inclusion, Vocational Training, and Innovation Spaces. They, at the same time, stem from the project's vision for industrial historic areas:

- **Heritage** responds to the need of taking into account the material and immaterial past of these areas, in order to reflect about the present and discuss about their future.
- **Circular economy**: new productive activity in these areas need to have in mind alternative and circular resource flows that move away from the dominating consumption patterns, based on extraction and depletion of resources, pollution and generation of waste on a massive scale.
- **Social inclusion**: current transformation processes in historic industrial areas, often close to the city centre or in strategic metropolitan locations, are in many cases generating displacement of local population. This is often triggered by the increase of land value or the new uses and activities brought to these areas (technology and business areas, high-end residential developments, etc.). This should be acknowledged and prevented in any alternative transformation that the project researches on, not only allowing the existing population of these areas to take part of their transformation, but also fostering social inclusion of disadvantaged or excluded groups.
- **Vocational training**: the new activities that will follow a sustainable and inclusive transformation of historic industrial areas will demand new professionals and jobs. In order to develop and train this new working force, education plays a key role, especially vocational training education programs which are at the intersection of hands-on and theoretical knowledge. These training programs must deal with tangible urban issues connected to local organizations and companies.
- **Innovation Spaces**: in CENTRINNO alternative urban transformation processes are led by urban communities who are supported by democratic access to technology, becoming agents of knowledge and resources production, thus fostering innovation from the bottom-up (Amato et al, 2021). Therefore, the project will also reflect on which types of innovation spaces will be key to the deployment of the CENTRINNO approach in historic industrial areas.

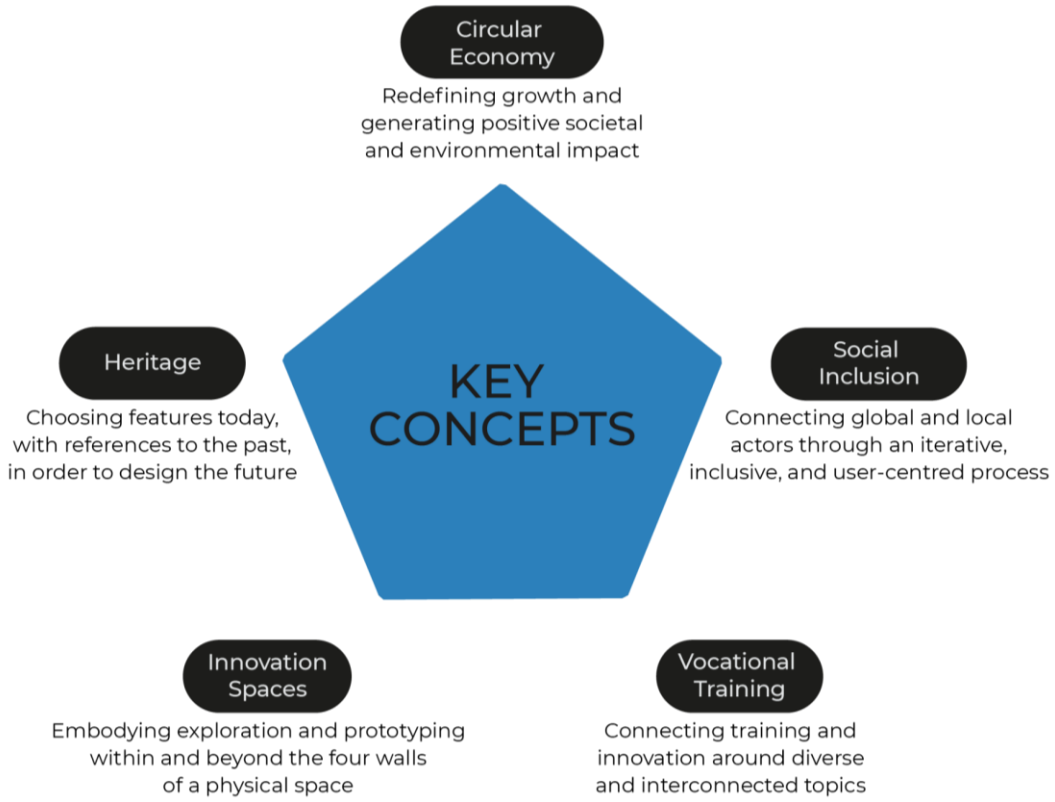

Figure 3 - The CENTRINNO key concepts

These concepts have also undergone a transformation process since they were first stated in the project proposal. Whereas Circular Economy, Heritage and Vocational Training have been part of the CENTRINNO approach since the conception of the project, it is important to note that there have been two major changes during this time, based on the discussions and ongoing work between project partners. The aim of these changes is to develop and end up with an understandable approach and a truly operational framework for the project.

First, “Social Inclusion” replaced “Network” at an early stage of the project. This was done for two purposes. First to highlight the importance of having a socially inclusive approach when engaging partners and collaborators in the project. If the transformation of historic urban areas does not acknowledge power asymmetries, under-representation of certain actors, or the potential of diversity to foster innovation (Robinson, 2006), CENTRINNO’s pilot cities may reproduce the same problems as in current urban transformation processes. Reflecting on these issues is key to foster a new approach aligned with CENTRINNO’s and Fab City’s bottom-up vision. Second, it was difficult to consider the “Network” or the “CENTRINNO Network” as a concept. It was rather seen by many partners as a tool or a group of stakeholders.

The second main change was to replace “Fab City Hub” for “Innovation Spaces”. This was done after acknowledging that considering “Fab City Hub" a key concept created confusion among pilot cities and project partners. Fab City Hubs were seen as something operational rather than conceptual and, therefore, different from the other four concepts. Moreover, Fab City Hubs (FCH) have been a constant subject of discussion during the initial year of CENTRINNO, both in terms of their role and their nature, both to be defined during the project’s

runtime. FCHs are an evolution of Fab Labs, living labs, makerspaces, and creative and productive hubs, based on the Fab City vision and supported by activities on production, knowledge and innovation in a holistic way and from a multi-layered perspective. FCHs concentrate and intertwine these activities in the physical space, creating interactions and hybridisations (Amato et al, 2021). As production and knowledge were already present in the CENTRINNO approach through some of the other concepts, “Innovation Spaces" replaced FCH so the project could have the room to open a discussion on how and where to approach innovation from a bottom-up, inclusive and sustainable way.

3. CENTRINNO Framework development

This chapter explains the method carried out to co-develop the first iteration of the CENTRINNO Framework. It focuses on the different sources that were considered and how their content is used in the Framework. These include, first, the work on the Whitepaper, which aimed at updating the project's proposal into an initial project's approach that could be shared and discussed by its partners. Second, the co-creation workshops are a CENTRINNO milestone that provided key content used in the CENTRINNO Framework in terms of pilot cities approaches, and existing tools and methods that could be used in the project's experimentation activities. Third, the initial activities carried out by pilot cities are also considered, even though at the time of writing, the first experimentation cycle of pilots is not yet finished.

3.1. CENTRINNO Whitepaper

The CENTRINNO Framework is based on the work done in the CENTRINNO Whitepaper[4]. This document, developed at the beginning of the project, summarizes the main objectives, the vision and the background of the project. This work has been shared and discussed among all project partners. Some of its aspects, including the key concepts or the CENTRINNO vision have been adopted by pilot cities and other project partners to frame their activities. Partners ranging from vocational training institutions to makerspaces, research centres, public authorities or creative industries have discussed and adapted the key concepts to position themselves within the initial project's experimentation structure. This has, on the one hand, created a common ground to develop the CENTRINNO Framework, and, on the other, it has provided useful insights to adapt the CENTRINNO approach and its key concepts to better suit the context and partners of the project.

3.2. Co-creation workshops

As part of the development of the CENTRINNO Framework, three co-creation workshops were carried out during the first seven months of the project. Led by the Danish Design Center, these workshops opened a first discussion on the CENTRINNO approach included in the Whitepaper, its key concepts[5] (see Section 2.3) and how this approach could be operationalized in experimentation activities. There were three co-creation workshops. The first one focused on tools and methods. The participants were project partners who are involved in the development of the different methodological resources (handbooks, platforms, toolkits, etc.). The second and third workshop focused on the specific activities carried out at the pilot cities level. The participants were the nine CENTRINNO pilot cities, including all their pilot partners[6]. The overall aim of the three workshops was to open a space for discussion of

[4] See https://centrinno.eu/wp-content/uploads/2021/02/Centrinno_WHITEPAPER_2.0_EUproject.pdf

[5] At the moment when the co-creation workshops were carried out, the five key concepts were: Heritage, Circular Economy, Social Inclusion, Vocational Training and Fab City Hub. As explained in chapter 2.3, the Fab City Hub concept later changed into "innovation spaces"

[6] We differentiate between project partners and pilot city partners in the description of the co-creation workshop for the sake of clarity. We refer to project partners when mentioning partners who are not directly involved in one pilot city, but work on a more general project level, developing methods, tools, supporting work, or frameworks for all pilot cities. We refer to pilot partners when mentioning partners involved in one pilot city. However, within CENTRINNO's official structure, pilot partners are also project partners.

the CENTRINNO approach that could provide insights for the development of the CENTRINNO framework.

Even though co-creation workshops were originally planned in the proposal as a project's milestone that would physically gather all consortium members in a common activity to discuss and share a common project's vision, due to Covid-19 restrictions, all three workshops took place online.

In the subsections below the purpose, output, and learnings for each of the three workshops is outlined.

3.2.1. Workshop 1: Tools and methods

Table 1 – Co-creation workshop 01 Summary

Objectives	To create an overview of the methods and tools connected to the CENTRINNO approach that could be included in the framework. To show how these methods and tools can be operationalized within the context of the pilots
Duration	1h 30 min
Participants	Project Partners
Nr of participants	21
Outcomes	CENTRINNO initial collection of tools
Format	Online (MIRO board and Zoom discussion)

During this workshop, the partners of the CENTRINNO project were engaged in co-creating an initial collection of tools. The aim of the workshop and the creation of such a collection of tools was to have an overview and basic information of all the competencies, tools and methods available among the project partners and to lay the ground for an active use of these within the pilot cities.

During the workshop the project partners contributed with descriptions of relevant tools and methods. They also elaborated with a brief description on how the tools and methods could be applied by the pilot cities on a practical level. Besides making relevant tools and methods available for the pilot cities the workshop was aiming at making the project partners aware of how – and by what means – they could support the work of the pilot cities, using the CENTRINNO approach.

The first co-creation workshop was structured in two different parts:

Part 1:

Purpose: The purpose of the first part of the workshop was to map out existing methods and tools available within the consortium of project partners.
Method: The participants were divided into smaller groups focusing on one of the five key concepts. Within these groups the participants were supporting each other developing 'tool

cards' describing relevant tools and methods. In these cards, the participants described the methods and tools they are familiar with and use, how they relate to the five key concepts of CENTRINNO, and how they can be applied in the context of the pilot cities. Figure 4 below shows two examples of the tool cards developed at the workshop - one by IAAC and one by Metabolic. On each card the participants filled out an appropriate title, description and purpose, contact, and interconnections with other tools or the CENTRINNO key concepts. Each card was accompanied by an instructive illustration making it easier for the user to grasp the content as well as icons indicating the key concepts they refer to. During the exercise the participants were encouraged to qualify each other's tool cards by raising questions in order to clarify the purpose and goals of the tools and methods.

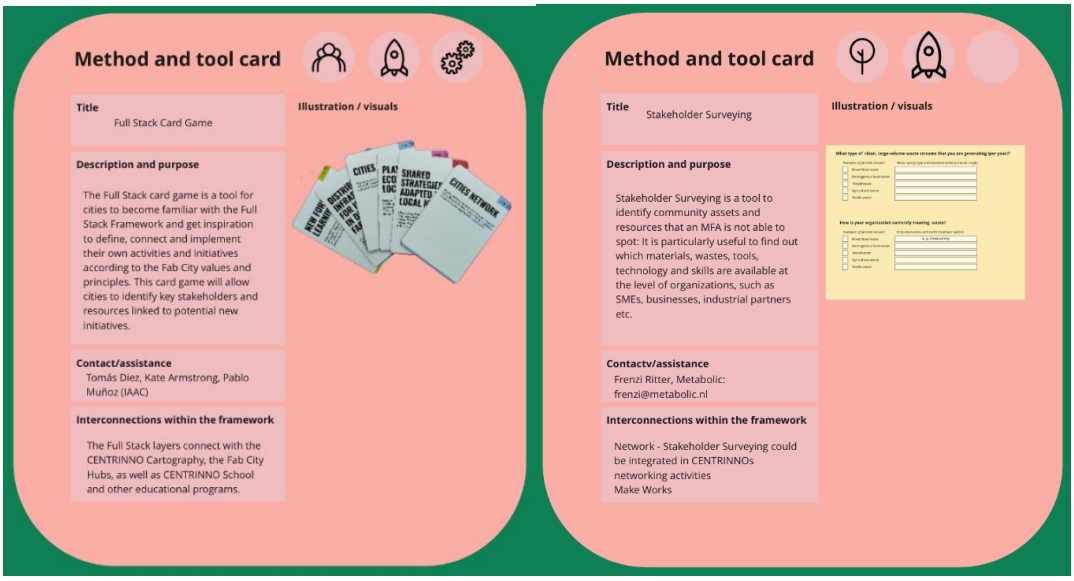

Figure 4 - Examples of tool cards *Visualisation of tool cards. The cards constitute two concrete examples of IAAC's Full Stack Card Game and Metabolic's Stakeholder Surveying Method. The cards hold information such as title, description and purpose, contact, interconnections with other aspects of the framework, and visualisation.*

Output: The output of the first part of the workshop gave inputs for developing the CENTRINNO framework and made a first take on developing the CENTRINNO collection of tools with an overview of available methods and tools within the consortium. 29 tools and methods were described on the tool cards referring to the five key concepts of CENTRINNO. Figure 5 below illustrates the initial output of the workshop and visualises how the tool cards were distributed across the five key concepts of the CENTRINNO framework.

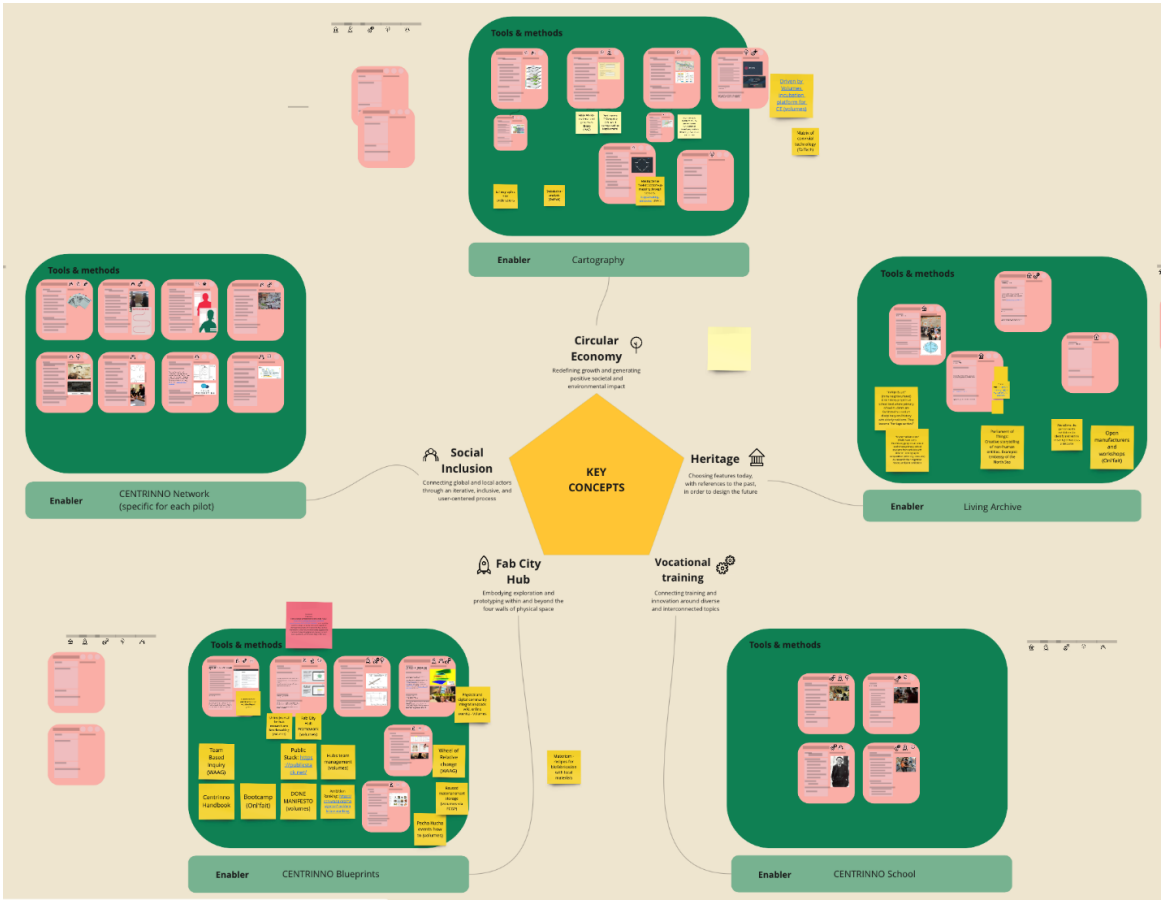

Figure 5 - Screenshot of the co-creation workshop 1 MIRO board: Tools and Methods
Visualisation of the output of the workshop. The participants contributed with tools cards (pink cards) placed in the green boxes. Arrows illustrate the connection between the tool cards and the key concepts visualised by the pentagon in the centre.

Reflections: This session supported the project partners in getting a better overview of all the tools and methods available within the consortium and a better understanding of how they can support the work of the pilot cities. By categorizing the tools and methods under the five key concepts it has created a better alignment of how each tool and method could fit into the CENTRINNO framework.

Part 2:

Purpose: The purpose of the second part of the workshop was to make sure that the project partners could benefit from the two subsequent workshops with the pilot cities, and thereby making sure these workshops would create value for both pilot cities and project partners.
Method: The project partners were asked to provide feedback on two questions regarding the subsequent workshops with pilot cities. Participants were grouped by project Work Package. The first question focused on how could the pilot overview, planned to be unfolded on the second workshop, create value for the project partner. The second question focused on how the overview could be used by each partner to support pilot cities in their work.
Output: Feedback on how to adjust the two subsequent workshops so both pilot cities and project partners could benefit from each other's work.
Reflections: The sharing of reflections created an alignment among project partners on what to expect from the two following co-creation workshops with pilot cities.

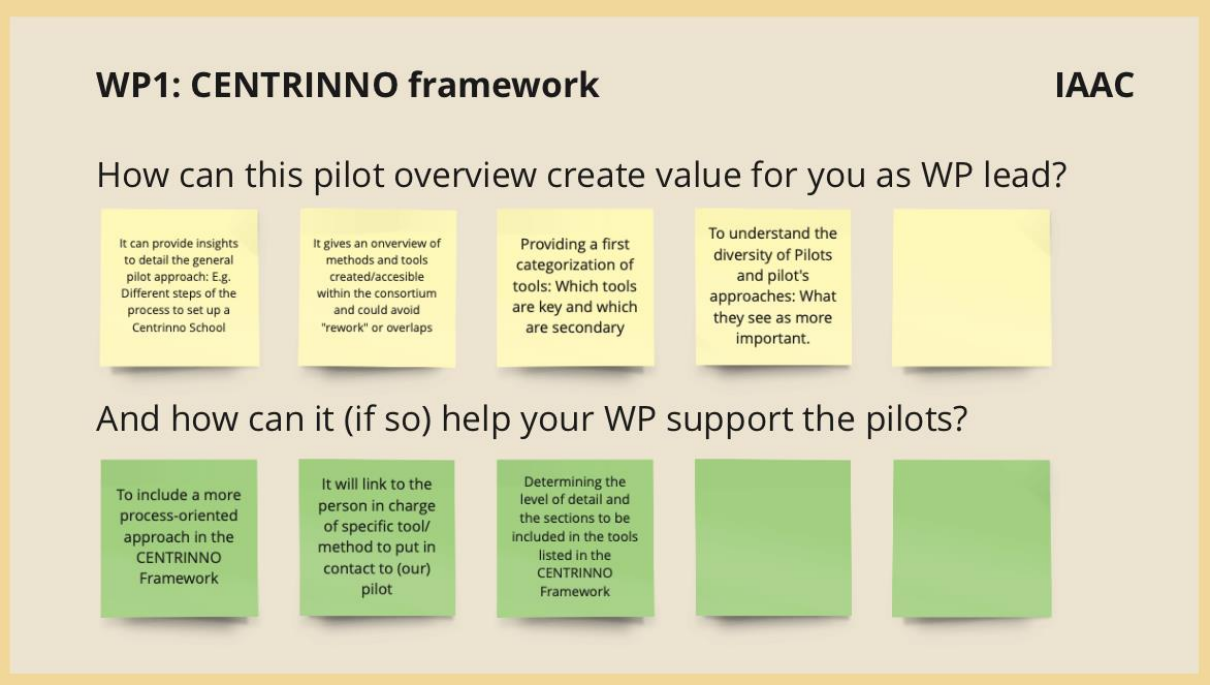

Figure 6 - Example of feedback notes from project partners

3.2.2. Workshop 2: Pilot Cities Approach and Activities

Table 2 – Co-creation workshop 02 Summary

Objectives	To have pilot cities map out their focal points within the CENTRINNO project. To have pilot cities elaborate on their planned activities as well as connecting these to tools and methods from the first workshop.
Duration	2 hours
Participants	Partners from pilot cities
Nr of participants	48
Outcomes	Detailed planning of pilot cities' activities and their connection to the CENTRINNO Approach
Format	Online (MIRO board and Zoom discussion)

During this workshop, pilot partners collaborated in mapping the focal points of their pilot cities within the project. This exercise also revealed what key concepts from the CENTRINNO approach could be further developed at a later stage of the project. Besides focusing on the overall project level, pilot cities also dived into the first project sprint, brainstorming on activities while connecting these to the methods and tools developed in the first workshop with project partners. The aim of this exercise was to create a better understanding of how and where to search for support among the project partners.

The workshop offered the pilot cities an opportunity to elaborate on how they are planning to work with each of the CENTRINNO key concepts. It supported the planning of concrete activities, connecting them to relevant methods and tools collected in the first workshop.

The second co-creation workshop was structured in three different steps. Figure 7 below illustrates the Miro board in which the workshop was facilitated, including the three steps the pilot cities were introduced to during the workshop. Step 1 (top left) was devoted to a project overview for each pilot, also mapping the overall challenges and micro missions of the pilots across the five key concepts. In step 2 (top right) the pilots were asked to pinpoint their focal points visualised by a spider web. In step 3 (centre) the pilot cities were focusing on their first pilot sprint mapping key activities while connecting these to tools and methods from the initial collection of tools created on workshop 1. Below each of the three parts will be elaborated.

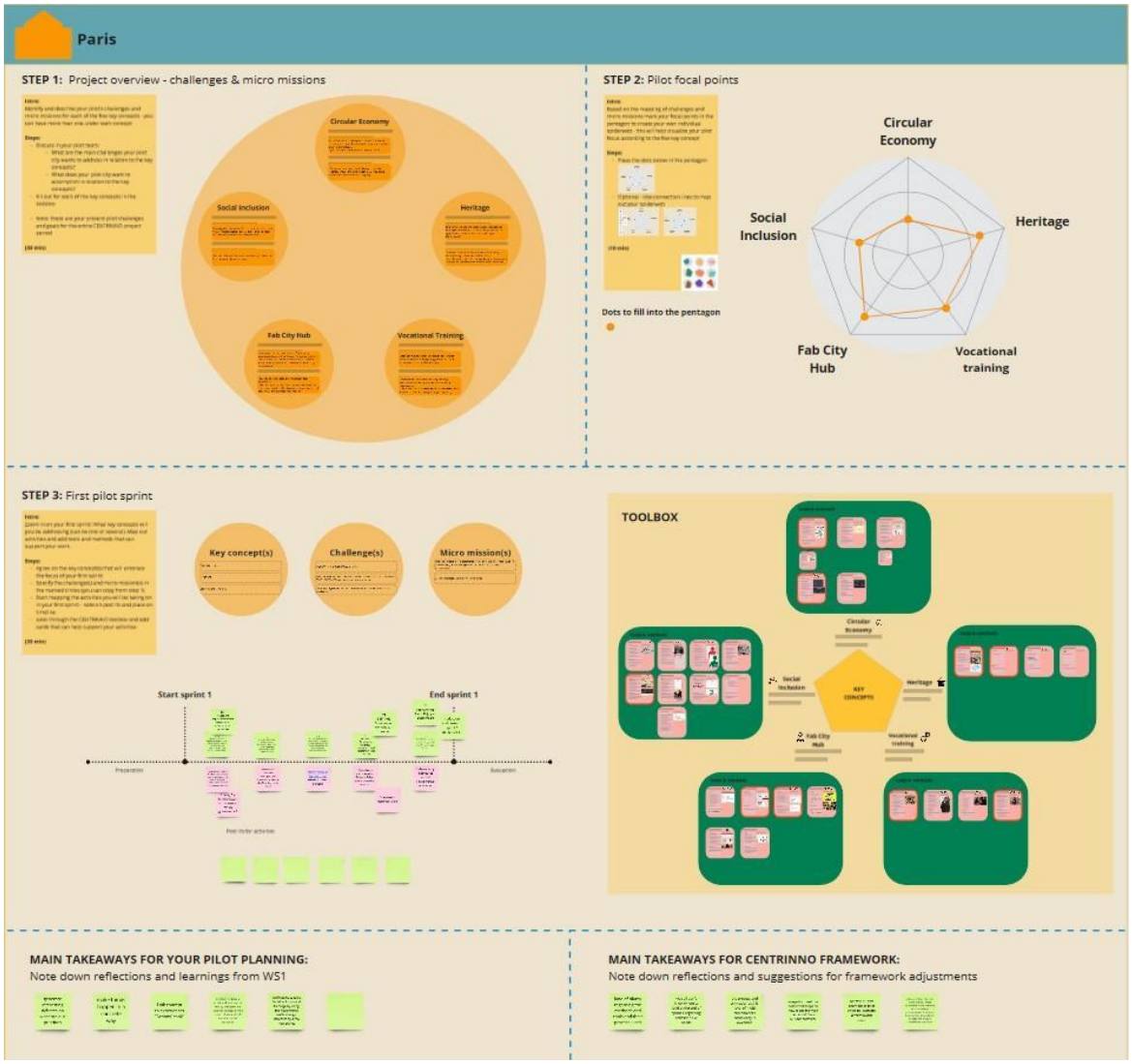

Figure 7 - Screenshot of the co-creation workshop 2 MIRO board: Pilot Cities Approach and Activities *Overview of the second co-creation workshop. The figure shows an example of the contributions of the Paris Pilot through the three steps of the workshop. Step 1 mapping general challenges and micro missions of the pilot. Step 2 mapping the overall focal points of the pilot. Step 3 mapping activities and relevant tools and methods during the first sprint period.*

Steps 1 & 2

Purpose: The purpose of the first two parts of the workshop was to identify the initial challenges and goals of pilot cities for the entire project.
Method: First, pilot partners identified and described challenges and micro missions related to each of the five key concepts within the CENTRINNO approach. This was done on an overall project level. Secondly, the mapping of challenges and missions clarified which key concepts within the CENTRINNO approach each pilot city was initially prioritizing the most. This prioritization was visualized on a pentagon for each pilot project. Figure 8 shows an example of the pentagon for a pilot city focusing mostly on Social Inclusion, Heritage and Fab City Hub and less on Circular Economy and Vocational Training[7].
Output: Pilot cities got a visual overview of their challenges and what they want to accomplish for each of the five key concepts. It helped them identify possible gaps and new opportunities in their pilot work. Besides creating valuable discussions of priorities within each pilot city team, the session also made an overview of priorities across all nine pilots. The collective overview makes it possible for pilot cities to exchange experiences with other pilot cities focusing on the same key concepts. This formed a basis for more collaboration between pilot cities.
Reflections: Mapping challenges and micro missions on an overall project level made the pilot cities reflect on which key concepts they focus on now and which would be beneficial to prioritize later on in the project. The pentagon provided a useful overview for each pilot city. However, some pilot cities were lacking a way to illustrate the interconnectedness of the key concepts in the pentagon visualization tool.
Furthermore, some of the key concepts within the CENTRINNO approach, such as the Fab City Hub, were perceived as overlapping with the others, thus complicating the exercise of relating challenges and missions to key concepts.

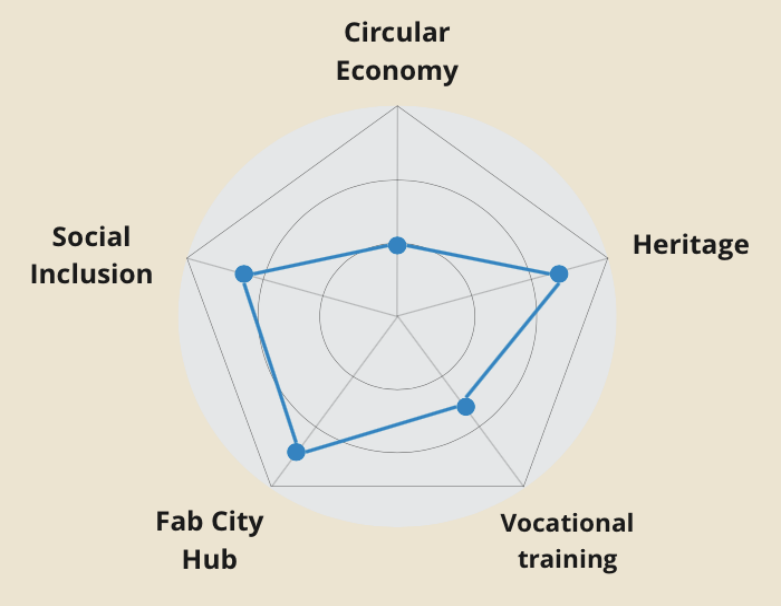

Figure 8 - Prioritization illustration by a pilot city during the workshop

[7] This pentagon still includes the “Fab City Hub” concept, which was replaced by “innovation spaces” later in the project.

Step 3

Purpose: The purpose of the third part of the workshop was to connect available tools and methods (collected during Workshop 1) with the initial activities of each pilot city's first sprint.
Method: The pilot cities had to map activities planned in their first sprint and identify which tools and methods collected on the first workshop with project partners might be useful when executing the activities. This exercise was a way to introduce the pilot cities to the methods and tools available within the consortium.
Output: The pilot cities made progress in their planning of their first sprint by making a timeline of planned activities. For most pilot cities the session led to more concrete actions although still needing more elaboration. Furthermore, pilot cities got a better overview of the methods and tools available within the consortium. Most pilot cities managed to connect their planned activities to relevant tools and methods from the first workshop. However, more pilot cities underlined that a deeper explanation and use-cases were needed in order to fully understand the content and application of the methods and tools.
Reflections: Making tools and methods available throughout the project might be helpful for pilot cities as they can revisit them as the project proceeds. This will presumably underpin a closer collaboration between pilot cities and project partners.

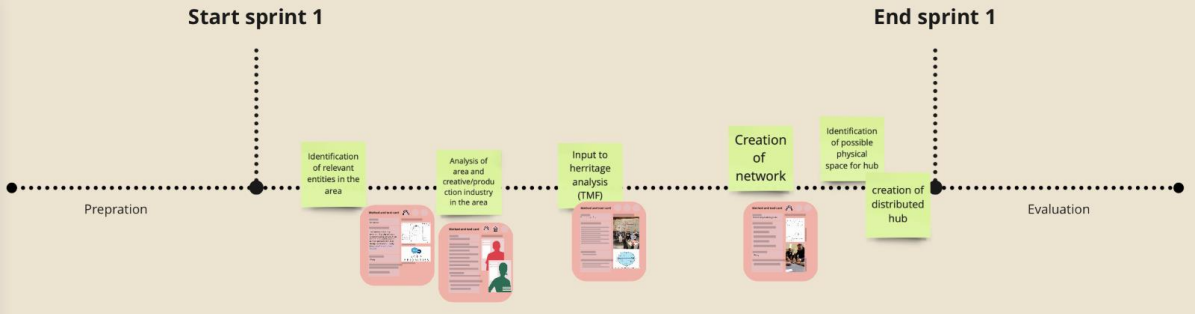

Figure 9 - Timeline of sprint 1, connecting activities with tools and methods

3.2.3. Workshop 3: Full Stack Framework

Table 3 – *Co-creation workshop 03 Summary*

Objectives	To have pilot cities further elaborate on planned activities in a playful way using the Fab City Full Stack framework.
Duration	2 hours
Participants	Partners from pilot cities
Nr of participants	44
Outcomes	Pilot cities gained a better understanding of what the planned activities require of pilot teams and stakeholders within their ecosystem
Format	Online (MIRO board and Zoom discussion)

This workshop was structured as one working session using the Fab City Full Stack framework (see Section 2.2), divided in three steps. As part of the theory framework of CENTRINNO (CENTRINNO project, 2020), the Fab City Full Stack provided a structure to detail and discuss

further the activities developed within the second co-creation workshop. At the same time, this session was used to test the appropriateness of the Full Stack framework to structure CENTRINNO's pilot cities activities and the need to adapt or adjust some of its elements for this purpose.

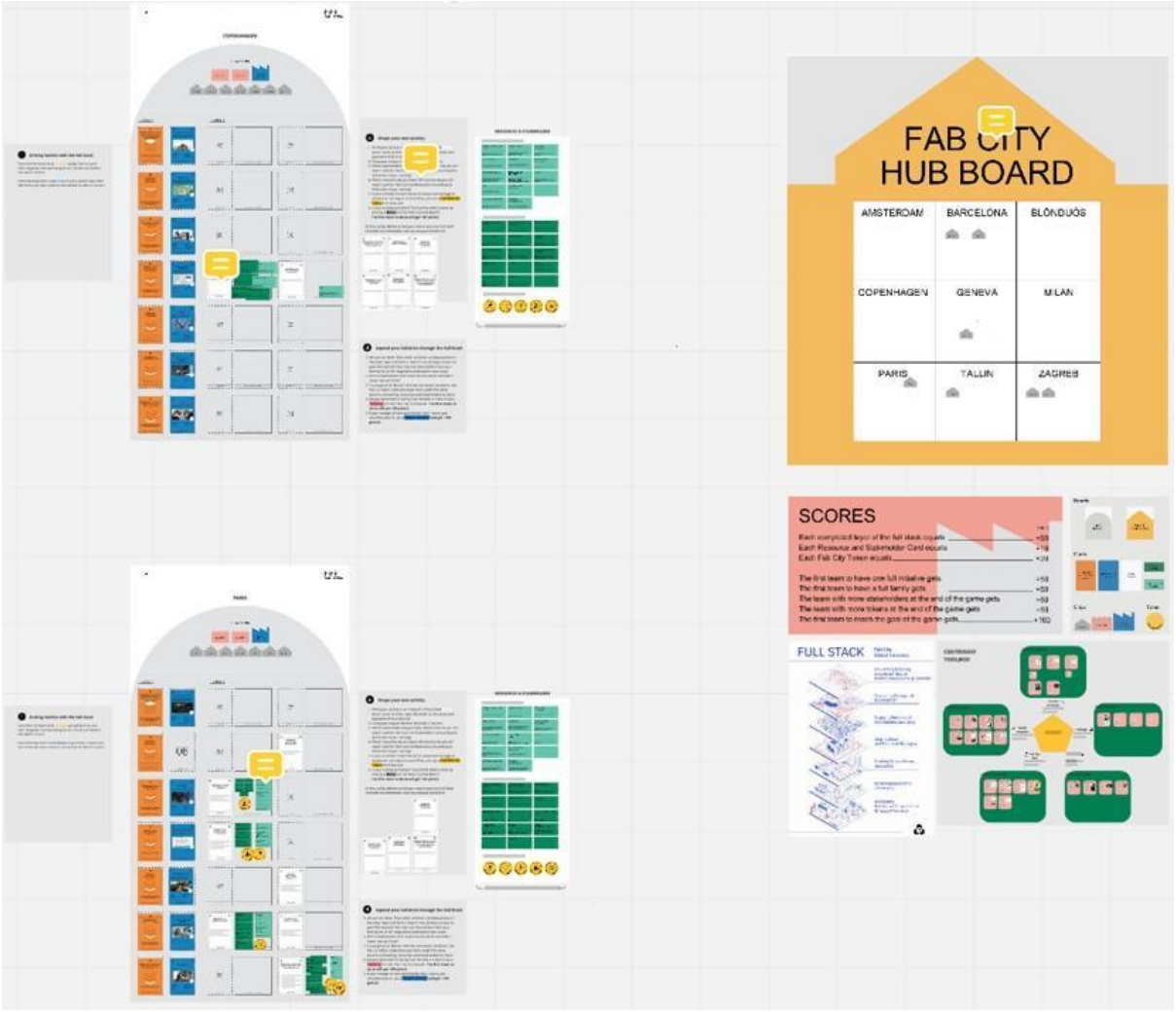

Figure 10 - Screenshot of the co-creation workshop 3 MIRO board: Full Stack Framework. *Each of the "boards" on the left corresponds to one pilot city. There, they could get familiar with the framework through the "inspiration cards" (blue) and Full Stack layers cards (orange). Pilot cities could also develop their own cards, as shown in Figure 10. On the right board, pilot cities could access the tools of the first co-creation workshop, a general overview of the Full Stack and the general score board of the game.*

The workshop was structured as an online card game for pilot cities to play and discuss further their activities.

Purpose: The purpose of the workshop was to further elaborate on the activities planned during the pilot cities' first sprint by using the Full Stack as a playful framework. The framework was a way to ensure that the pilot cities got a better understanding of what the planned activities will require, especially in terms of collaboration with external stakeholders from their ecosystem.

Method: The pilot cities were introduced to a gamification of the full stack framework. Each pilot selected one activity to dive into. The full stack provided a framework for analysing and defining the aim and context of the activity, as well as which stakeholders would be potentially involved in it, and its potential needs in terms of resources. During the exercise pilot cities were also asked to analyse whether the activity underpins one (or several) of the five key concepts thus relating it to the CENTRINNO approach. The tools and methods collected during the first co-creation workshop were also available in the MIRO board, in case pilot partners wanted to connect them to their activities. The exercise was repeated for several activities thus letting the pilot cities elaborate on more of their local strategies.
Output: The Full Stack framework supported the pilot cities in getting a better understanding of the complexity of the holistic ecosystems they are engaging with. This was especially done through an overview of relevant stakeholders connected to the planned activities.
Reflections: Before the workshop, the Fab City Full Stack was often perceived as an abstract framework, difficult to apply in tangible and local contexts. This workshop was perceived by most pilot cities as a fun way of elaborating on their planned activities while becoming more comfortable with the Full Stack framework and its applicability within the project. The Full Stack framework was, after this workshop, perceived more useful than before as it can support the pilot cities in pointing out relevant stakeholders and resources needed for current and future activities. Besides this, it might also be relevant as a dissemination tool to express the project strategy, missions and activities to local and global stakeholders.

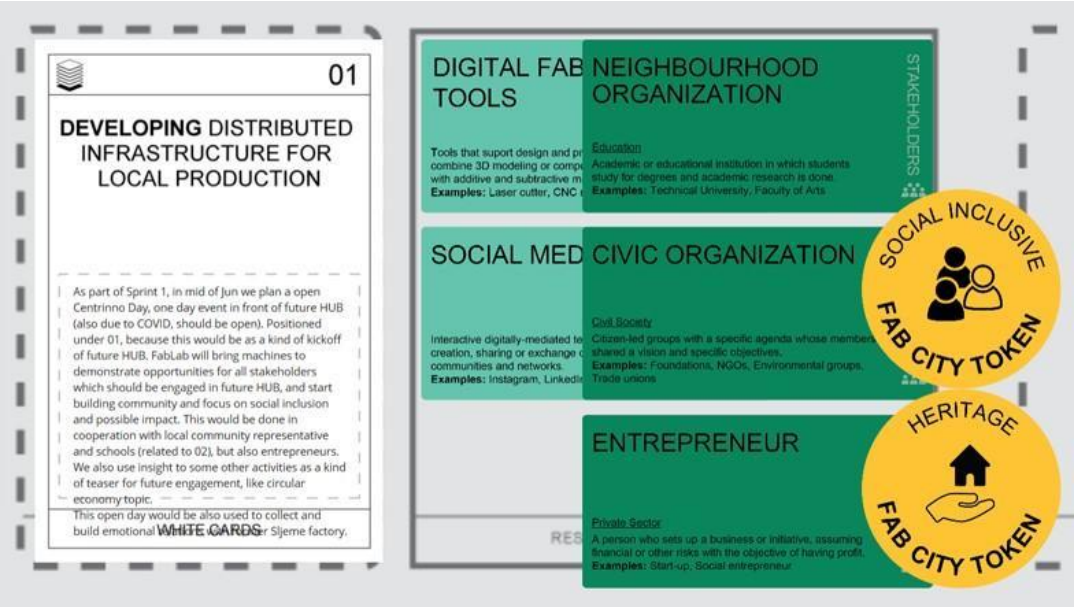

Figure 11 - One pilot city detailed activity using the Full Stack Framework

3.3. Pilot cities activities

Pilot cities experimentation activities take place more intensively during pilot sprints. The first sprint started in April 2021 and will end in October 2021, approximately two months after the final submission of this document. Nevertheless, both their initial Action Plans (Wippoo et al, 2021) and some initial data on pilot cities experimentation activities have already been gathered by the Pilot coordination team at Waag.

Even though most of the preliminary descriptions of pilot cities activities at such an early stage are still general and it may be difficult to assess the impact or consequences of their implementation, useful insights have been considered regarding the types of activities, the tools used and the stakeholders engaged. These insights allow us to see potential experimentation activities, micro missions or pilot cities strategies.

Most activities are related to stakeholder engagement, including co-creation events, working sessions to build communities of practice (Lave and Wenger, 1991; Making Sense Project, 2018) around a specific topic, as well as participation in meetings, discussions and presentations to share and gather feedback on the pilot city's action plans. In some cases, pilot cities have carried out workshops to test some of the methods developed in CENTRINNO, such as Emotion Networking, or to plan mapping activities.

This information is used in this document for two different purposes. First, it influenced the development of the CENTRINNO Framework's implementation (see Chapter 4), more specifically the Framework's approach on micro missions (Section 4.4), which are shaped by different activities that tackle one same challenge. Secondly, some of the activities already implemented by pilot cities include a description of specific tools and methods used. This information was key to devise potential connections between micro missions, the implementation structure, and the tools and methods that may support the experimentation.

4. CENTRINNO Framework implementation

This chapter includes the key operational aspects of the CENTRINNO Framework. In line with the project's vision, the main objective of experimentation activities in terms of implementation is to test approaches to Fab City Hubs in European cities. Each CENTRINNO pilot city will arrive at its own model of Fab City Hub, taking into account the local context and following at the same time the CENTRINNO approach. Even though there have been previous experiences within the Fab City network of cities, it is through CENTRINNO that this new typology of hubs will be unfolded and tested.

Experimentation activities in CENTRINNO are organized in micro missions. A micro mission is a commitment to address a specific challenge, set according to a pilot city local context and CENTRINNO's general objective. A micro mission may have one or several specific objectives and may include several activities that support achieving them. Using Paris pilot context as an example, a micro mission could be "developing an urban food system working group". The specific objective of this micro mission would be to count on a small community of practice to carry out experimentation on local urban food systems during the project. Several activities would compose the micro mission, such as organizing an Emotion Networking workshop to discuss the historic gardening ecosystem of the city, setting up a Make Works[8] region focused on urban food systems, or applying surveys to specific stakeholders to understand the resources availability within them.

There are four sections in this chapter. The first one includes a reflection on Fab City Hubs, their role in CENTRINNO and the specific resources that will support their implementation in pilot cities. The second section describes the main CENTRINNO resources that will be developed during the project, their connections with the Fab City SAP, and how they support experimentation activities in the project. The third section includes a description of the project iterative experimentation process. Lastly, the fourth section will focus on pilot cities' micro missions, including different examples of experimentation activities, and a brief description of tools and methods that could be used in micro missions.

4.1. Fab City Hubs

As it has been described in 2.3, Fab City Hubs (FCHs) have undergone an important shift in its position within the CENTRINNO approach, moving from being one of the five key concepts to constitute the final goal and the final implementation phase of the pilots.

Following this consideration, and as described in *D3.1 "Creative and Productive Hubs Journal"* (Amato et al, 2021), one of the main challenges of CENTRINNO is to support the emergence of this new typology of hubs (the Fab City Hubs, in fact) from a landscape of previously existing experiences of creative and productive hubs in Europe, while anchoring these new hubs on the key concepts of CENTRINNO plus the local contexts of pilots.

The "Creative and Productive Hubs Journal" closes with the formulation of 10 founding principles for FCHs which condensate learnings from the conducted literature review and the portraits realised for a set of 15 hubs as study cases.

[8] Make Works is an online platform, external to the project but used in CENTRINNO to enable the development of a community around manufacturing, allowing designers & makers to find manufacturers, material suppliers and workshop facilities in their local area. See https://make.works/

It is relevant to stress that “these principles want to sketch lines of research and explorations more than providing rules that need to be replicated and check-listed.” (Amato et al., 2021). This statement opens different degrees of freedom for pilot cities to develop their own interpretation when it comes to the development of hubs in their local context, especially when it comes to their centralised or distributed nature and interdependencies between their physical and digital infrastructures[9].

It can be stated that within the CENTRINNO Framework, FCHs represent the physical embodiment of the 5 key concepts developed in CENTRINNO. At the same time, FCHs are the testbed for activities linked to these concepts within the proposed approach based on iterative sprints. Moreover, FCHs connect and unpack all the main CENTRINNO resources (see Section 4.2) (which are by their own nature more intangible) to the physical world through the 5 key concepts of CENTRINNO.

At the moment of writing this document, being pilots in their first sprint, three additional specific resources are worth being mentioned when it comes to the current focus of the work on FCHs.:

- The Online Journal, an already active online platform embedded within the CENTRINNO website that intends to complement the **Creative and Productive Hubs Journal** static deliverable with a live, more dynamic resource hosting new and actualised contents and inspiring examples of hubs for pilots.
- The Exchange Platform, a communication platform whose conceptualisation is still in an early stage. This online platform is intended to work as an interaction and sharing platform to foster collaboration between established and emerging FCHs developed within CENTRINNO and beyond. The Exchange Platform will be either integrated in another CENTRINNO platform (see Section 4.2) or built on an existing software for remote collaboration and community management (e.g., slack[10], mattermost[11], mighty networks[12]), or could take the form of a forum or a wiki.
- The FCH toolkit is devised as a cohesive and contextualised collection of activities, tools and methods that will support the nine CENTRINNO’s pilot cities to implement, maintain and sustain FCHs in their specific context. It will be based on previous toolkits (e.g., the ECHN Creative Hub Kit[13], the Reflow Collaborative Governance Toolkit[14]) as well as other resources developed within CENTRINNO, such as the Creative and Productive Hubs Journal or the CENTRINNO Framework. The FCH toolkit will be developed through three iterations, building interconnections with other efforts such as the evolution of the CENTRINNO Framework itself, other activities and resources developed in the project, as well as the pilots’ project’s experimentation. In its final version the FCH Toolkit aims to be a practical support for bottom-up initiatives that want to implement their own FCH.

[9] As underlined in Amato et al., p.75, 2021, Fab City Hubs are multi-layered spaces that should embed in their design the physical and the digital dimension.
[10] See https://slack.com/
[11] See https://mattermost.com/
[12] See https://www.mightynetworks.com/
[13] See https://creativeconomy.britishcouncil.org/blog/15/06/28/creative-hubkit-made-hubs-emerging-hubs/
[14] See https://governance.reflowproject.eu/

4.2. The CENTRINNO resources

The main goal of experimentation in pilot cities is to develop their own approach to FCHs in historic industrial areas, thus testing alternative ways to foster a new urban economy based on productive activities, circular economy and social inclusion, and in which both material and immaterial heritage have an active role in shaping the future of the area. FCHs require the collaboration of a diverse community, including local and global actors. The focus and approach of each FCH will be different in each city, but in all cases, it will be co-created by its own local community. Moreover, the partners of each city must be aware of the potential and the challenges within their own local landscape.

These different actions are supported by specific resources that will be developed during the project. Each of the CENTRINNO key concepts has associated one main resource. Nevertheless, this doesn't mean that each resource has only one field of action. There are several interconnections between them, as it is explained later in this chapter. The main CENTRINNO resources are: CENTRINNO Living Archive, stemming from the Heritage concept, CENTRINNO Cartography, stemming from Circular Economy, CENTRINNO Network, stemming from Social Inclusion, CENTRINNO School, stemming from Vocational Training, and CENTRINNO Blueprints, stemming from Innovation Spaces (Figure 12).

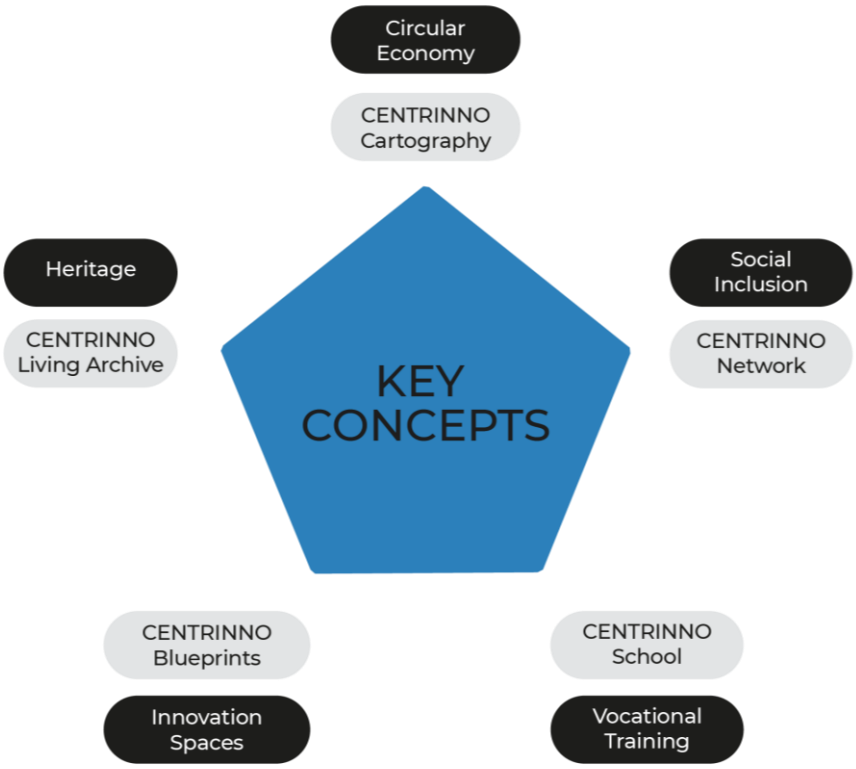

Figure 12 - CENTRINNO main resources associated with each key concept

Each of these resources is also connected to a different layer of the Fab City SAP. As explained in Section 2.2, this Fab City framework organizes different resources available in cities according to seven layers, each of them including different stakeholders and processes. In the case of CENTRINNO, both the Cartography and the Living Archive will "Share

Knowledge through Digital Ecosystems", giving cities an opportunity to map and visualize their resources and memories, and use them in decision-making processes in collaboration with other stakeholders. In the case of the CENTRINNO Cartography, its mapping activities could also support "Applying principles of Bioregional Development". The CENTRINNO Network will be a key resource to co-create and share information with other stakeholders in the city, and therefore "Develop Shared Urban and Territorial Strategies". The CENTRINNO School, trying to draw connections between training programs and new jobs needed in the "new industrial revolution", will both be used to "Design New Forms of Learning for Skills of the Future" and "Enable Impact-based Incubation at Local Scale". Lastly, the CENTRINNO Blueprints, containing policy proposals and guidelines on governance transition and regenerative practice towards flexible urbanism, will support the dissemination of the CENTRINNO approach and framework to "Cultivate Networks of Communities and Citizens".

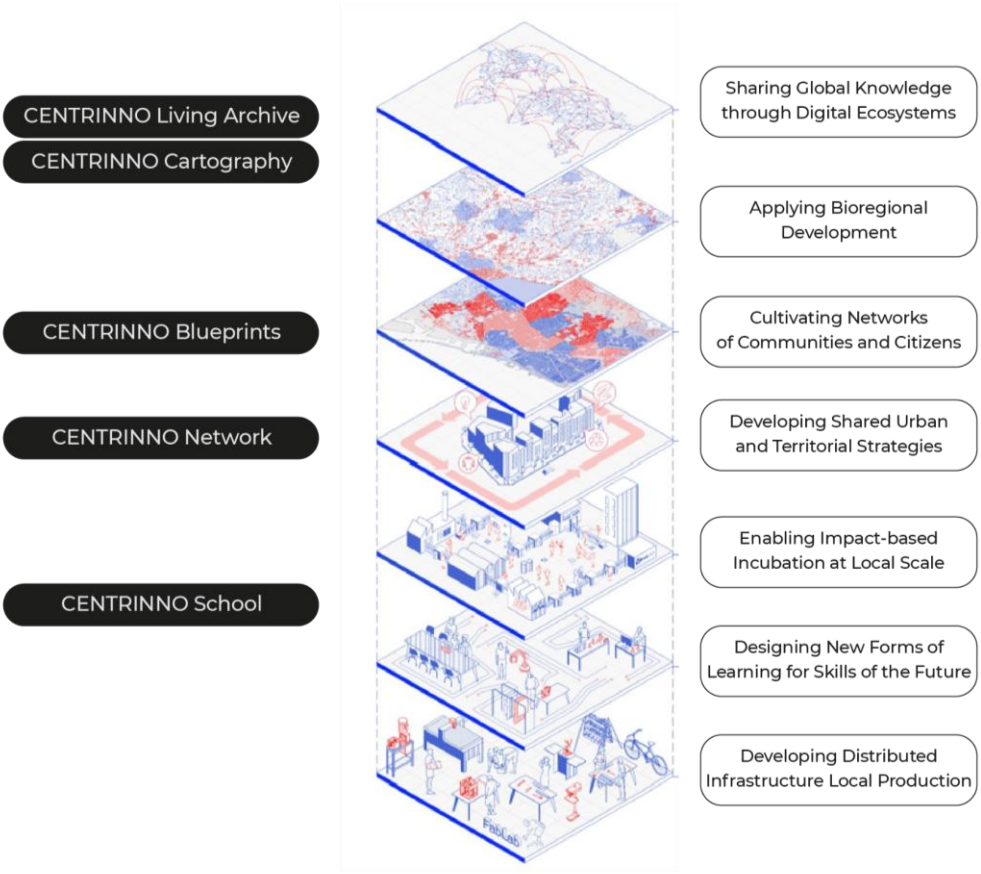

Figure 13 - Fab City SAP and CENTRINNO main resources

There will be, nevertheless, many other resources developed in CENTRINNO, such as those specifically mentioned in Section 4.1 related to Fab City Hubs (e.g., Fab City Hub Toolkit), as well as external resources that may be used during the project, such as distributed infrastructure (Fab Labs, makerspaces), online platforms (Make Works, Co-creation Navigator) or learning programs (Fab Academy), just to mention some (see Section 4.4 and Annex 1 for more examples).

Even though some of the main resources, such as the CENTRINNO Blueprints, aim at replicating the project's approach in other cities, the main objective for most of the CENTRINNO resources is to support the development of micro missions and pilot cities experimentation activities. Having in mind the different resources available and their connections with the Fab City SAP layers, the CENTRINNO Framework proposes three action areas for pilot cities to organize their micro missions. These three areas offer a common language for pilot cities' micro missions and aim at creating a bridge between this framework and experimentation activities. They will be revised and adjusted, if needed, in later iterations of the CENTRINNO Framework so they are truly useful for the project. These three areas will facilitate knowledge sharing between pilot cities, as well as the identification of resources available in the CENTRINNO Framework and throughout the project that could support pilot cities in specific experimentation activities.

The three action areas stem from different layers of the Fab City SAP. First, some micro missions, especially those supported by the CENTRINNO Living Archive and Cartography, will foster sharing knowledge through digital ecosystems. This will happen both as knowledge exchanges between pilot cities and knowledge sharing with each city's local ecosystem. Second, micro missions, especially those supported by the CENTRINNO Network, aim at developing shared urban and territorial strategies. For pilot cities in CENTRINNO this will be narrowed down to creating a community of practice and co-defining their own local approach in an effort to make decisions collaboratively. Last, some micro missions will aim at directly operationalizing Fab City Hubs in pilot cities, creating innovation spaces that enable impact-based incubation, new forms of learning and distributed infrastructure for local production. This will be supported by different ad-hoc resources developed in the project (see Section 4.1). The three action areas proposed to organize micro missions are:

1. **Mapping and understanding the local city ecosystem:** From understanding the material and waste flows of a city to discussing local heritage, exploring local stories and mapping existing knowledge. Mapping local resources will be also key to understanding the productive capacity of a neighbourhood or a city.

2. **Building a community of practice and co-defining its focus:** The local network of stakeholders will discuss together its common focus interests. These may vary in time, involving decision-making, prioritising, or stakeholder engagement activities. Pilot cities may engage with existing communities of practice or create their own, according to the shared interests of the local network.

3. **Implementing and setting up the Fab City Hub:** The final goal of pilot cities during the project is to develop a Fab City Hub. Each city decides on its own specific model, including on whether it is distributed or centralized, which physical spaces are connected to it and which virtual platforms are used to foster exchange, collaboration and experimentation between the members of the network. The Fab City Hub is activated through programs of activities, events and training that have productive and creative activities at their core.

At the same time, these three action areas are interconnected with the five key concepts in the project, resulting in a two-dimension framework that will be used throughout this document to map the use of resources, methods or tools in pilot cities' experimentation activities. It is important to mention that these three action areas are not linear and correlative. Micro missions in different action areas will take place simultaneously during the project, retrofitting

each other both at the pilot city level and the project scale. Therefore, some pilot cities may already have a clear idea to start implementing their Fab City Hubs and at the same time, co-developing their own community around it, while mapping its ecosystem later on the process in order to find existing gaps and opportunities according to the needs of their local hub; while other pilot cities may start by mapping their local city ecosystem to spot the local potential and opportunities to implement both a Fab City Hub, or shape a community of practice around a new topic unfolded by the mapping process.

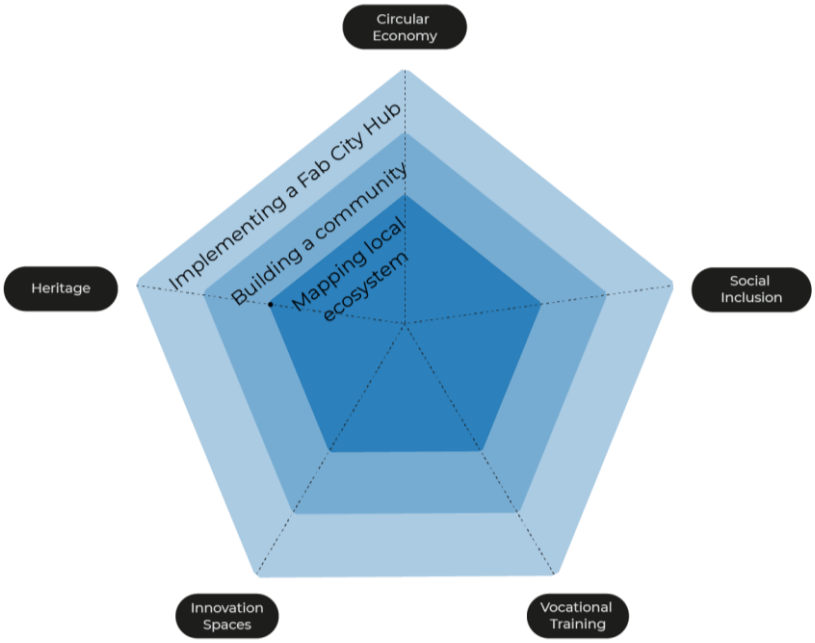

Figure 14 - CENTRINNO Framework: Action areas for micro missions

At the time of writing, most CENTRINNO resources are under development and, therefore, the interconnections between each other and with the CENTRINNO Framework are still being defined. Nevertheless, the following lines include a first attempt to describe them for the first iteration of the CENTRINNO Framework.

CENTRINNO Living Archive

The CENTRINNO Living Archive is an open access platform containing stories related to the pilot cities (post) industrial sites, collected in the present. Its purpose is to help communities imagine a new 'heritage of making' through the memories, experiences and traces of (former industrial) places, practices and the related interactions with materials.

The format and level of co-design is being developed based on experimentations and peer-driven conceptualisation and discussion with the pilot cities, but the current concept sees the Living Archive as a node in the "network of heritage making", with contents about:

- Practices of making (the acts, skills, modes, devices, tools, words and methods);
- Human interactions with each other and with the materials used (in the practices of making);
- Effects of the environment (energy, animals, materials, products, etc.) on these human and non-human interactions and vice versa.

The central component of the Living Archive will be a public website providing access to inputs from the pilot sites, progressively tagged to allow cross-context exploration. Depending on the pilot sprints, experimentations and research, the approach the Living Archive will take to engaged curated storytelling and 'heritage-making' should be replicable, adaptable and used at the pilot cities' local levels. It remains to be explored to what extent content which has been collected locally, using local adaptations remain connected, and what this means for central content management.

With regard to the Framework, the Living Archive may play a role on all three action areas:

1. Gathering information for the Living Archive can be seen as an act of 'mapping resources' which support further developments.
2. Using Emotion Networking as a method to feed the Living Archive can be seen as 'co-defining the focus' of the local community, as participants are able to reflect on the (shaping of the) 'Emotion Network' surrounding a (prospective) item of heritage, and collaboratively - at a meta level - seek how, or if at all to 'make it heritage', and whose voices are heard, unheard, missing or needed. Pilot cities are able to identify people with specific knowledge, memories and/or perspectives which may help other stakeholders get inspired by the past. This allows pilots to uncover the potential to 'make heritage' and go deeper into tensions between:
    - Tradition vs. Innovation
    - Re-use vs. new making
    - Different usages/conceptions of place and time.
3. Embedding the Living Archive within the Fab City Hub as a place to curate and make visible the 'co-made heritage' harnesses and illuminates the potentials of (new made heritage) practices, tools and places to inspire new industrial manufacturing configurations. In particular, by giving voice to the un-heard or less articulated, the LA should function as a source of inspiration for the work of the pilots and beyond. The stories, shared through the Fab City Hub, may trigger readers who wish to also share and contribute their knowledge and experiences, contributing to a broader 'co-defining' of opportunities.

Linkages to the other ends in the CENTRINNO spider web are constantly developed. The Living Archive connects to:

- Circular Economy; by exploring (hi)stories of places, sites, materials and stakeholders not from the vantage point of data, but from a dynamic heritage model.
- Social Inclusion; by fostering approaches in which unheard, missing, repressed, silent, and/or secret voices in which the present interacts with the past for the future are articulated.
- Vocational Education; by appreciating the heritage of making (crafts and related materials, tools, knowledge, language, etc.) as a lens through which to sense industriality, and exploring how the heritage dimension can be useful in lifelong learning (e.g., the skills learned at home from a parent on how to fix a bike as a competence of making – is it something a person would not consider until it is accessed from a dynamic heritage/memory interaction?)
- Innovation Spaces by exploring how important it is that a new Fab City Hub is grounded in a former industrial site and networked globally, and developing the Living Archive as a tool to orchestrate/utilise this potential.

The Living Archive helps the pilot cities in this project to employ traces from the industrial past as a source for inspiration and a catalyst for change. It uses Emotion Networking as a strategy to explore how, and which (kind of) traces from the past play a role in the everyday life of people involved in the areas which have in the past been centres of industry.

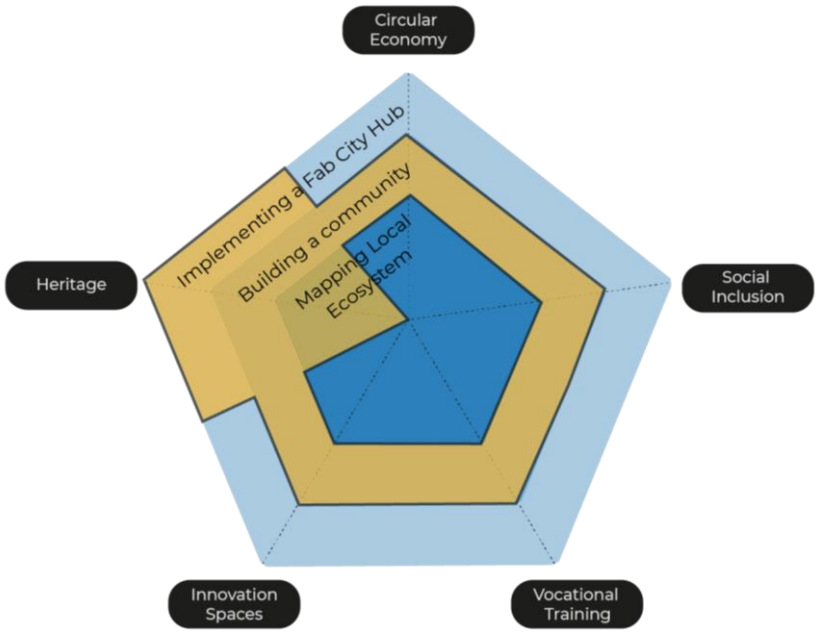

Figure 15 - CENTRINNO Living Archive location within the Framework

CENTRINNO Cartography

The CENTRINNO Cartography is one of the project's central online platforms that visualizes the tangible and intangible resources around pilot sites, their district and the wider city. The underlying assumption behind the Cartography is that (post-) industrial and to-be-regenerated neighbourhoods have a multiplicity of locally abundant assets, such as valuable waste materials, skills, knowledge, tools and infrastructure that should be harnessed in the regeneration projects to help facilitate a socially inclusive and circular economy.

Whilst the format and infrastructure of the CENTRINNO Cartography is still under development, the current concept of the platform envisages an open-source filterable (geospatial) map of local stakeholders classified by their type and tagged by (1) their main activities, (2) the resources that they have ownership over and (3) the type of connections they have with other local actors. Further possibilities for a tagging taxonomy will include their role in circular and socially inclusive value chains (e.g., as producers, loop closers, enablers, supporters). Some resources do not "belong" to an individual organization - such as publicly accessible heritage items or natural resources. These elements of the urban ecosystem will be visualized on the Cartography as a geo-coded base layer underneath the filterable stakeholder mapping.

There are three main objectives of this platform, each relating to one of the action areas of the CENTRINNO Framework:

1. Enable pilots' future innovation hubs and spaces to communicate and promote the value of locally productive urban ecosystems of citizen-driven innovators, makers and SMEs. The Cartography will support this objective by providing a platform that portrays these productive urban makers and the resources they can bring to the transition to a circular and inclusive economy. Data on locally abundant (and currently oftentimes underutilized) resources is gathered via the tools laid out in *D2.1 Urban Ecosystem Mapping Guidebook*, including material flow analyses, stakeholder surveys and workshops, the mapping of geospatial data and emotion networking). Thus, the Cartography will become the central resource that makes accessible the results of urban resource mapping (see inner pentagon of the Framework) to a wider audience.
2. Build local capacity to spot opportunities for material symbioses, networking and learning. While the primary objective of the Cartography relates to the visualization of local resources, the platform further provides the basis for pilots (and their communities) to identify opportunities for implementing circular and socially inclusive value chains (see middle pentagon of the framework). This objective is addressed by the Cartography in two ways: Firstly, the mapping of stakeholders and their resources helps to identify materials, infrastructure and machinery that are candidates for "industrial symbioses" and sharing economy approaches. Secondly, the very same mapping can also highlight gaps of stakeholders, knowledge, tools, skills or resources that are needed to implement circular economy and inclusive production models. Based on the insights that the Cartography provides, pilots can offer more tailored workshops, schooling curriculums and local events.
3. The CENTRINNO Cartography is primarily related to Circular Economy (CE), being the most relevant resource for all CE related activities, including those connected to the implementation of a Circular FCH. For example, if there is a Circular FCH in which a repair program is implemented, the Cartography could play a major role in the process of implementation of the program, being used by participants during the workshops to map available materials or missing pieces for the repairs.

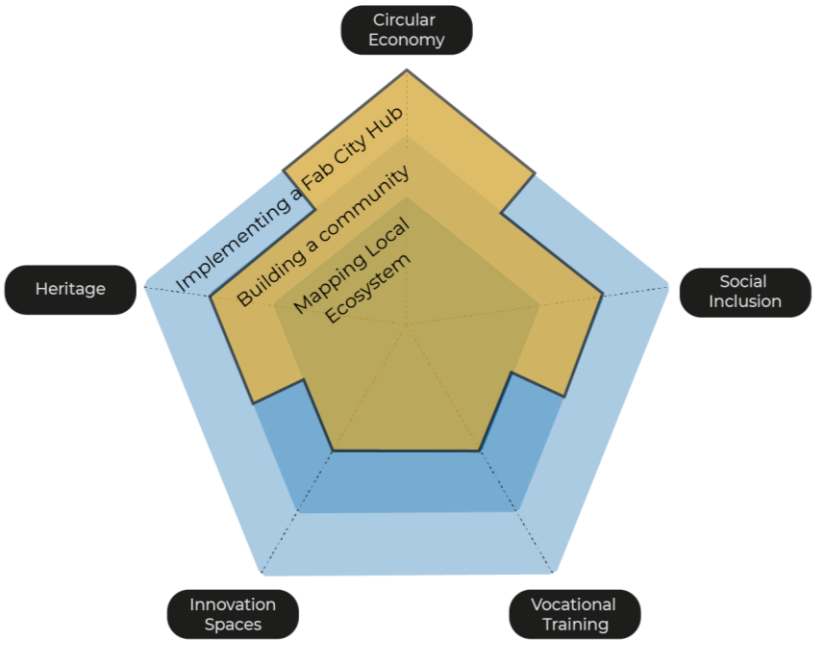

Figure 16 - CENTRINNO Cartography location within the Framework

CENTRINNO School

The strategy and implementation of CENTRINNO schools is been progressively built based on a key statement on which all partners of the consortium agree: “Aware that societal innovation is closely linked to innovative education systems, pilot cities will work closely with vocational schools and institutions in charge of public education to bridge the gap between learning and the socioeconomic milieu of a city”. The operational objectives of CENTRINNO schools are:

1. To redefine and re-establish the value of being a craftsman
2. To ensure a better fit for vocational and post-vocational training with the needs of economy;
3. To foster innovation by introducing digital technologies in artisanal processes and creative industries, as Fab Labs have proven capable to do.

In order to reach these goals, the first step of the CENTRINNO schools will be to map each city’s resources in education and in relation to the pilot ambitions. Circular Economy will be relevant to the mapping process. CENTRINNO schools will support training the new workforce of a sustainable economy and will need to connect their programs to societal needs in this respect. CENTRINNO schools initiatives refer to any micro mission related to vocational learning and training. Target groups are vocational and post-vocational students but also adults participating in programmes for professional reinsertion. Nevertheless, training in CENTRINNO is also intertwined with innovation spaces, especially when co-developing the curricula and when implementing the programs together with the FCHs. There are three main approaches to the CENTRINNO schools' activities, each relating to a different action area:

1. During the mapping process, based on questionnaires to educational institutions and working sessions between the pilot city partners, the specific target audience and the depth of the action will be defined. It will be based on previous experience, the local network, as well as the pilot city ambitions and issues. Each pilot city will build a map of relevant stakeholders that shall be involved in the second phase of the programme.
2. The co-definition of focus interests is probably the most challenging step because traditional educational institutions are usually slow or even reluctant to adopt and test new approaches. Trust, transparency and flexibility are key elements to succeed. In order to classify the stakeholders and establish meaningful relationships that are relevant for CENTRINNO and the stakeholders, a number of co-creation tools like the Participation Map (supporters, providers, influencers…, see Annex 1) and the Pitch grid (quality, interests, needs and offer, see Annex 1) will be used.
3. The final step is to integrate CENTRINNO schools in the implementation of the local Fab City Hub, according to the outcomes of the previous two steps. Each pilot city will choose the methodologies and tools that have been previously identified and which are relevant to their context. Different levels of reflection will be offered: methodologies, tools and concrete tips based on previous experiences from all CENTRINNO project members. On-going sharing of the results will be extremely precious as there are still differences in the perception of vocational training in Europe based on culture and geography.

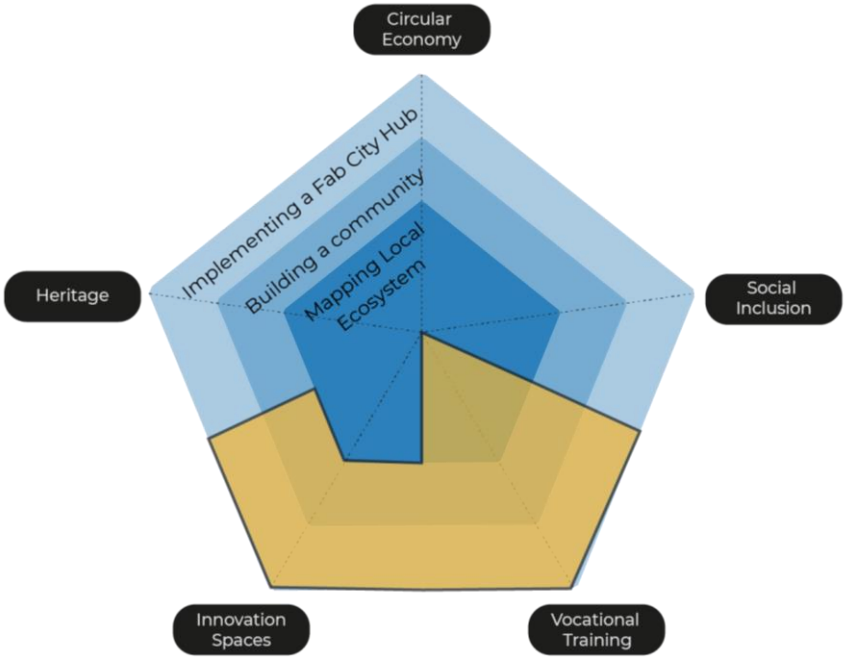

Figure 17 - CENTRINNO School location within the Framework

CENTRINNO Network

Similarly to the CENTRINNO School, the CENTRINNO Network is a framework applied to a specific set of actions in pilot cities experimentation. In this case, it focuses on collaborative actions that involve other stakeholders outside the pilot city core team and, more concretely, on building one or several communities of practice around the city's interests. The two main objectives of the CENTRINNO Network are fostering a social-inclusive approach in pilot cities activities and supporting a "commoning" approach to pilot cities management of resources.

The CENTRINNO Network will have different characteristics in each pilot city. There will not be a unique platform, or physical infrastructure that hosts all "CENTRINNO Network activities". Each pilot city will define which activities, events, digital exchange systems, or decision-making spaces are more suited to its local context.

Nevertheless, the CENTRINNO Network will focus in four different aspects of pilot cities' activities to support its two main goals:

- Adopting a governance model to make decisions at a pilot level, including the pilot city's scope and vision;
- Developing or adopting specific tools to manage interactions between the local hub network and other actors;
- Framing activities and networking events under a social inclusion scope to engage specific actors or disseminate the pilot's findings;
- Devising innovative ways to collaborate with other actors in local Fab City Hubs.

According to its objectives and these four different aspects, there are three main connections between the CENTRINNO Network and the action areas presented in this chapter:

- The CENTRINNO Network will support pilot cities in all co-creation activities, including co-defining the focus of each city and developing a community of practice around it. The CENTRINNO network will suggest tools, methods, platforms or types of events that may help pilot cities to develop their own community.
- The CENTRINNO Network will encourage a socially inclusive approach to all experimentation in CENTRINNO. Through specific tools and methods, will help pilot cities to discuss whether their mapping approach and outcomes reflect the diversity of their local context, or how the different power imbalances are considered when collaborating in the implementation of the Fab City Hub.
- Supporting and encouraging a socially inclusive approach in all levels and dimensions of pilot cities experimentation, the CENTRINNO Network stems from the Social Inclusion concept, but is connected to all five CENTRINNO key concepts.

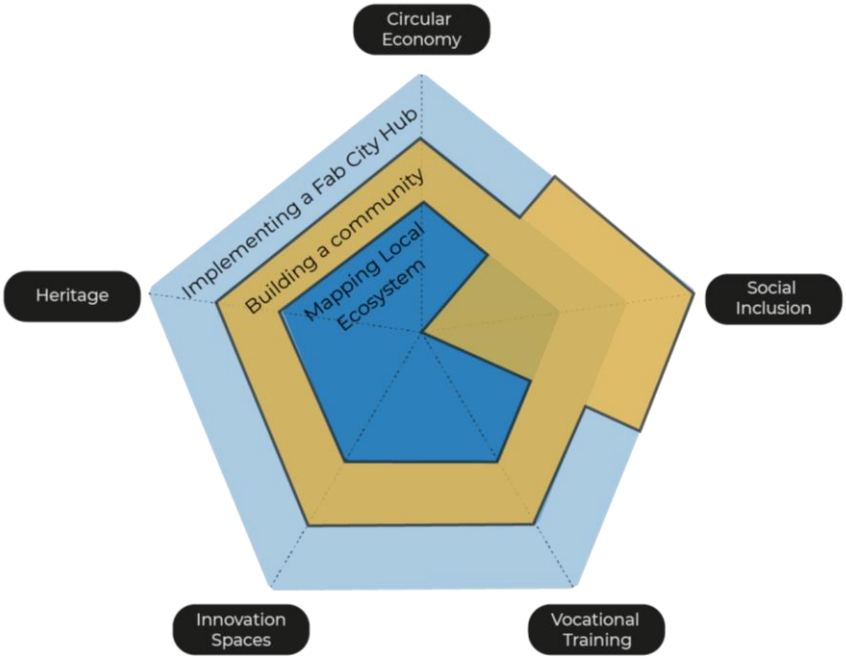

Figure 18 - CENTRINNO Network location within the Framework

CENTRINNO Blueprints

Differently to the previous four resources, the CENTRINNO Blueprints target users are cities outside the project, including the public sector, industry and SMEs, and community organizations. These blueprints will include the guidelines other cities may implement to successfully adopt the CENTRINNO Framework, including policy proposals and guidelines on governance transition and regenerative practices towards flexible urbanism for an alternative transformation of industrial historic sites.

The CENTRINNO Blueprints will be developed at the end of the project. They will consider other resources that will be developed in CENTRINNO, such as the CENTRINNO Handbook or the Fab City Hub Toolkit, as well as their specific target audiences.

Combining the experience gained from the development and deployment of the other main resources (Living Archive, Cartography, School and Network), the CENTRINNO Blueprints will foster replicability and wider use of the CENTRINNO approach and framework, thus covering all aspects and action areas of experimentation in the project.

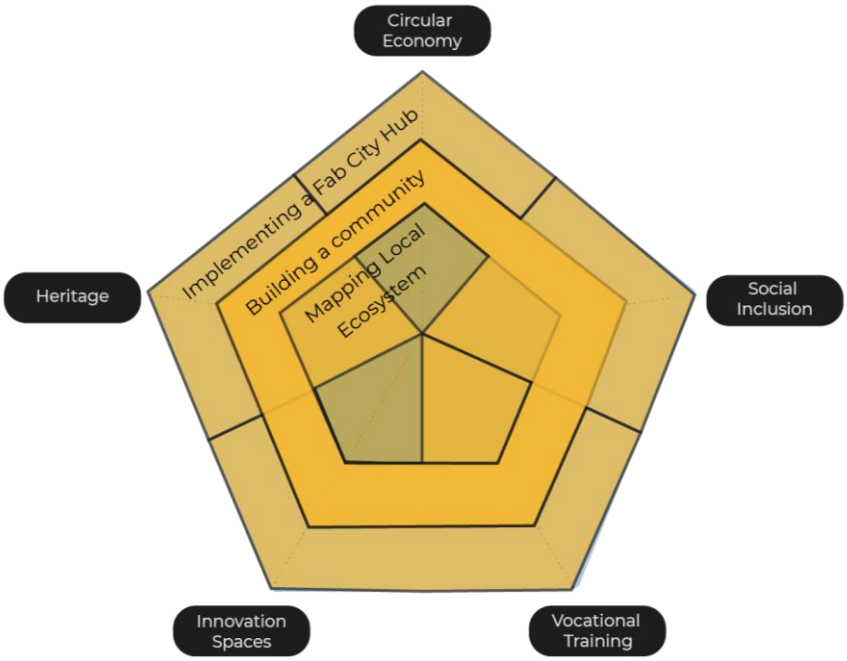

Figure 19 - All CENTRINNO main resources covering all action areas

4.3. CENTRINNO experimentation process

CENTRINNO's cities will carry out three experimentation cycles during the project (Wippoo et al, 2021). Each of these cycles is called a "sprint" and includes different experimentation activities, grouped by micro missions which address specific challenges in each pilot city. The experimentation cycles run in parallel in all nine CENTRINNO cities, thus allowing for cross-pollination and knowledge sharing between them.

The pilot cities coordination strategy, developed by Waag, is based on the CENTRINNO Arches, which "will reveal the development journey towards FCH and the narrative of the (local) user experiences, and the pilots' and stakeholders' role in it" (Wippoo et al, 2021). Each pilot city has defined its approach and narrative and developed a specific action plan. Action plans include the narrative, challenges and objectives for each sprint, and detail the activities that will address those challenges. Currently, pilots have detailed their activities according to their relationships with the five CENTRINNO key concepts. After each sprint, pilot cities, supported by the pilot coordination team and the consortium, will assess the impact achieved and adjust their objectives and action plans accordingly. The CENTRINNO Framework will provide a more detailed structure for pilot cities to adjust and plan their future activities, as well as to understand the resources available to support each of them.

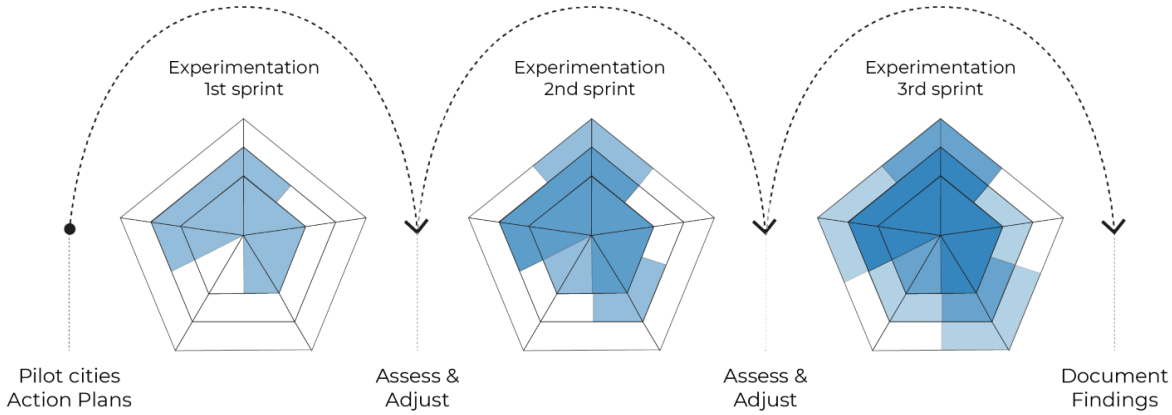

Figure 20 - Three cycles of experimentation in CENTRINNO *(the areas covered are a random example)*

Based on the experimentation and adjustment phases of the project, we could arrive at a simplified cycle: Planning, experimentation, assessment, adjustment. These cycles are iterative; therefore, after the assessment of a first cycle, pilot cities action plans will be adjusted incorporating the lessons learnt. During the project, pilot cities will go through these three phases in iterative cycles of demonstrating activities. Nevertheless, these three stages could be cyclically and iteratively applied as many times as needed:

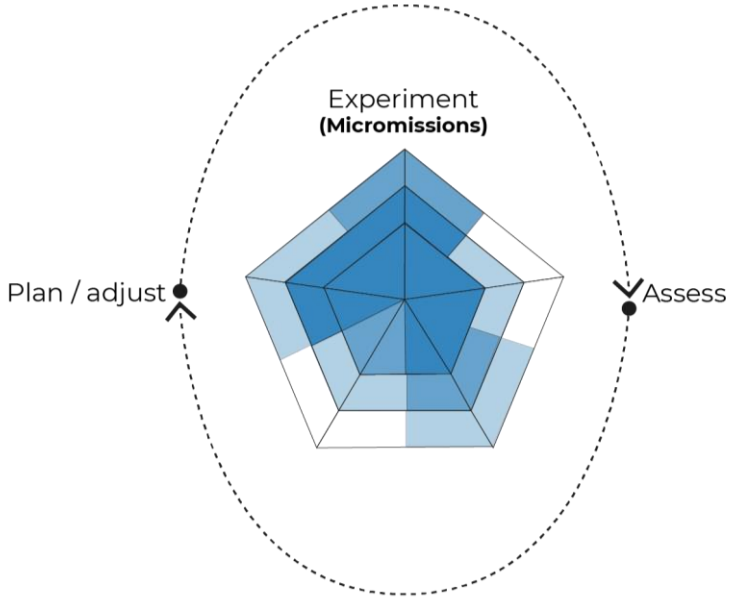

Figure 21 - CENTRINNO Framework's iterative cycle of experimentation *(the areas covered are a random example)*

Here, a basic description of these three stages.

Planning the pilot's approach and narrative: The CENTRINNO arches, combined with the initial CENTRINNO approach and the five key concepts are the basic framework used so far

by pilots to plan their activities. Each smallest arch includes the information related to a specific micro mission, “a storyline or narrative that determines the practical goal of the arch” (Wippoo, 2021) as well as the action plan and context connected to each specific micro mission. Different micro missions form together a bigger arch that corresponds to the pilot city sprint, and the three sprints make the pilot city arch. The project’s vision and the need to collaborate with diverse local actors in the transformation of industrial historical sites demands also a strong focus on co-creation. For this, pilot cities include in their action plans who participates, what is the influence of each participant, and how each of them participates. Moreover, a successful co-creation process implies providing a clear picture of the process, encouraging constructive mindsets and having access to the right tools and methods (Wippoo, 2021). On the project scale, the CENTRINNO Framework, and specifically the structure that provides to experimentation activities, also aims at supporting these three statements on a general project level, initiating a conversation with pilot cities. For this reason, after each iteration cycle, both pilot cities' action plans and the CENTRINNO framework will be adjusted according to the experience in the nine cities.

Implementing micro missions: as explained before, a micro mission is a commitment to address a specific challenge, framed under a pilot city specific objective and CENTRINNO’s general goal. There are broadly three action areas to implement micro missions: mapping the local ecosystem, building up the community and co-defining the focus of the city, and implementing the city’s own approach to the Fab City Hub. More details on this experimentation stage are included in Section 4.4.

Measuring the impact of micro missions: After each experimentation cycle, pilot cities will assess the impact of their activities supported by the project partners, specifically TalTech, based on the challenges they wanted to address, their sprint objectives and their city objectives. Moreover, a specific framework to assess their impact according to the overall CENTRINNO approach also will be developed by TalTech. Based on the project and Fab City’s vision, this framework will evaluate how cities' actions create value for achieving locally productive, globally connected cities. The framework, to be developed during the second year of the project, operates through different dimensions, including commoning, contributing, provisioning, post-growth and *cosmolocalism*. The interconnections between the impact assessment framework and the overall project framework will be explored in a later iteration of the CENTRINNO Framework, considering also the specific KPIs connected to pilot cities experimentation activities.

The planning phase is already developed and detailed in *Deliverable 4.1 Detailed Pilot Planning & Monitoring Framework*, whereas at the moment of writing this document, the impact assessment framework is under development and will be included in later iterations of the CENTRINNO Framework. This document focuses on the second stage of the experimentation cycle, the implementation of micro missions.

The pilot coordination team at Waag, in collaboration with other CENTRINNO partners, has already developed a series of resources and guidelines to support pilot cities through the experimentation process, supporting exchange and assessment of their activities. Nevertheless, a key resource developed to facilitate pilot experimentation and knowledge-sharing is the Pilot Dashboard. The pilot dashboard will be key to gather insights from pilots and establish feedback loops with the CENTRINNO Framework future iterations. For this reason, we have included a brief description of this resource in this document:

Pilot Dashboard

Pilot cities coordination in CENTRINNO will be supported by an online 'platform' facilitating information flow on and between pilot cities. The pilot coordination team at Waag has experience in using a so-called dashboard for pilot coordination in the REFLOW project[15].

The deployment of a pilot dashboard within CENTRINNO will support facilitating progress of the pilot cities and help different cities to share their perspectives, expertise and experiences. The dashboard will structure and simplify the information flows between the pilot coordination, pilot cities and other project partners. The information gathered will be constantly updated by the pilot cities to create a living and evolving picture of each pilot city's context, fostering curiosity and learning from each other. By easily being able to access information, process and challenges that another pilot is working through, it allows for cross-pollination.

The dashboard will be developed by the pilot coordination team using an existing content management system called Drupal and will be made accessible for partners through a log in. Users will be assigned different roles, such as admin (or pilot coordinator, who can edit all content and modify ownership of content), collector (authenticated user with permission to create new content/form types) or contributor (authenticated user with permission to fill out content/form types). With the dashboard, the pilot coordination team (and other authenticated project partners) can create forms/questionnaires which are then filled out by the 9 pilot cities.

One central element of the dashboard will be the Pilot Timeline. Here pilot cities will report on their activities to help understand their process of building the hubs in the different urban contexts. Later this will allow the different project partners to retrieve the necessary learning about the different steps the pilot cities have taken and for example which methodologies have been used or developed. These insights can be later integrated into the CENTRINNO Framework future iterations and the Fab City Hub Toolkit. The dashboard is conceptualised to be lean but flexible. The pilots' dashboard goal is oriented towards exchanging and sharing information that can be used to assess, plan and adjust pilot cities activities.

The dashboard will be a non-public tool, meaning that only CENTRINNO project partners will have access to the Dashboard. There is no intention to open up the content collected in the Dashboard to the outside world. Collected content will only be used in external communication when edited and exported to other platforms (such as the CENTRINNO website, the Living Archive or Cartography).

4.4. Methods and tools for CENTRINNO Micro missions

Mission-oriented research is a key priority for the European Union (Mazzucato, 2018 & 2019) for it provides the means to focus innovation on solving critical problems and, at the same time, foster growth or create jobs (Mazzucato, 2018). Missions are also a key instrument for citizen engagement in research. Social movements and organizations have been central actors in many of the social changes achieved through history, hence mission-oriented research must address real problems that affect communities and citizens, from a global scale, such as climate change, to a local scale, such as the eviction and displacement of vulnerable groups in urban renewal processes in historic industrial areas, in the case of CENTRINNO.

[15] See https://reflowproject.eu/

As defined in Section 1.4, micro missions are a commitment to address a specific challenge. They are rooted in the local context of pilot cities and they address problems scoped by the local team in each city in collaboration with the local network of stakeholders. The process to select, frame and assess micro missions needs to be as transparent as possible and will involve an increasing community throughout the different sprints of the process. While the challenges addressed during the first sprint answer the initial interpretation of the local context and its needs by each pilot city team, in the following sprints, this interpretation must be broader and include other local actors and their views.

A micro mission is defined by a clear objective in relation to a specific problem that needs to be addressed. The problem will be contextualised by understanding why it is important, who is affected by it, and who will benefit from solving or addressing it. At the same time, in order to approach the challenge, the local team must have a clear picture of the resources available, the means needed, who needs to be involved and how and when the challenge of the micro mission will be addressed. As explained in Section 1.4, a micro mission may involve several activities, each of them using different resources (tools, methods, platforms, etc.) both developed in CENTRINNO and from outside the project.

The CENTRINNO Framework includes a set of tools and methods that cities could use in their micro missions to foster innovative practices in historic industrial areas towards the development of Fab City Hubs (see Annex 1). In this section, these tools and methods are organized according to the three action areas described before in Section 4.2.

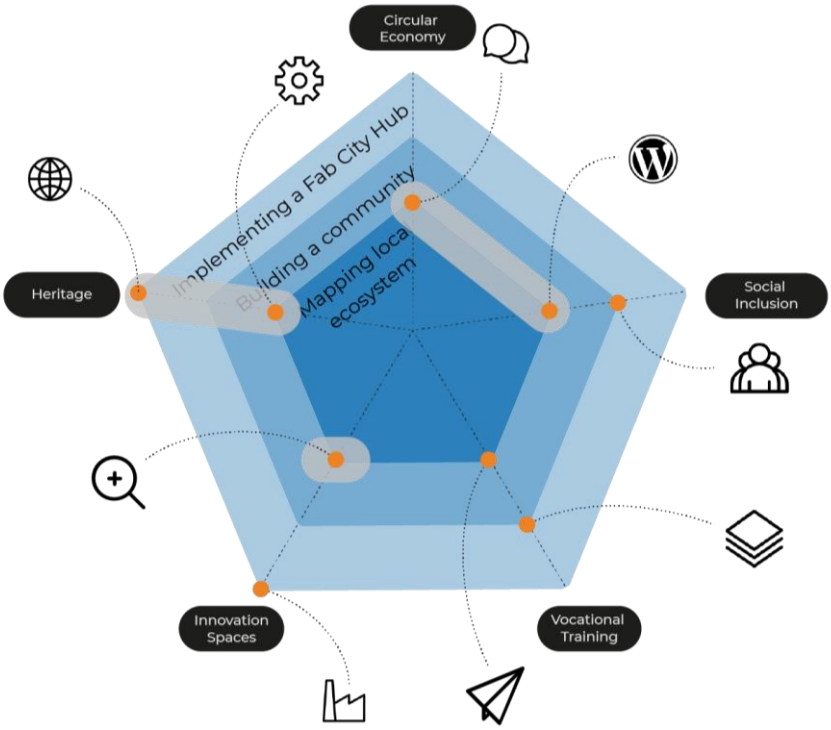

Figure 22 - Visualisation of a pilot city using the CENTRINNO Framework *(random example)**. All the different activities (orange dots) and micro missions (grey areas) are organized according to the action areas and key concepts. Different tools, resources, platforms or methods are used, supporting the pilot city experimentation.*

A key output of the first co-creation workshop with the project partners of CENTRINNO (see Section 3.2.1) was an initial collection of tools available across the consortium. The project partners contributed with around 30 different tools, methods and other resources they were familiar with or had used in the past, as well as a few resources that are currently being developed in the project, such as the Fab City Hub Framework Survey. During the following months, project partners have complemented this initial collection and included a total of 44 tools and methods (Annex 1). These tools and methods have been structured according to the CENTRINNO Framework described in Section 4.2. Key information for each tool or method was documented in order to make them accessible and useful for pilot cities. During this process the project partners have revisited the tools and methods in order to qualify and improve their applicability. This is an ongoing process that will ensure that the collection of tools, methods and other useful resources will stay relevant and applicable to pilot cities throughout the project.

In the following paragraphs this deliverable includes a general description of resources, tools and methods mapped. The details for each resource, including descriptions, suitability in relation to the CENTRINNO resources, or links to additional information can be found in Annex 1.

4.4.1. Mapping and understanding your city's ecosystem

A number of pilot cities' micro missions will be oriented towards mapping their social, natural and industrial resources. CENTRINNO's understanding of resources includes material availability and flows, the local material and immaterial heritage, local stories and existing knowledge, techniques and processes used in manufacturing activities, or stakeholders and local audiences, among others (Ritter et al, 2021).

Under the CENTRINNO approach, mapping local resources will be key to understanding the productive capacity of a neighbourhood or a city, as well as the potential circular flows of materials or other opportunities in the pilot cities' areas. Narrowing down the scope and lens of analysis beforehand may be useful for pilot cities to have a starting point. This can be done by selecting a specific type of resource, such as plastics, or a type of actor, such as SMEs working on manufacturing activities, or by looking at a specific activity related to a space or community, such as the materials needed to transform a warehouse into a textile lab, or the food waste generated by local restaurants in a local neighbourhood.

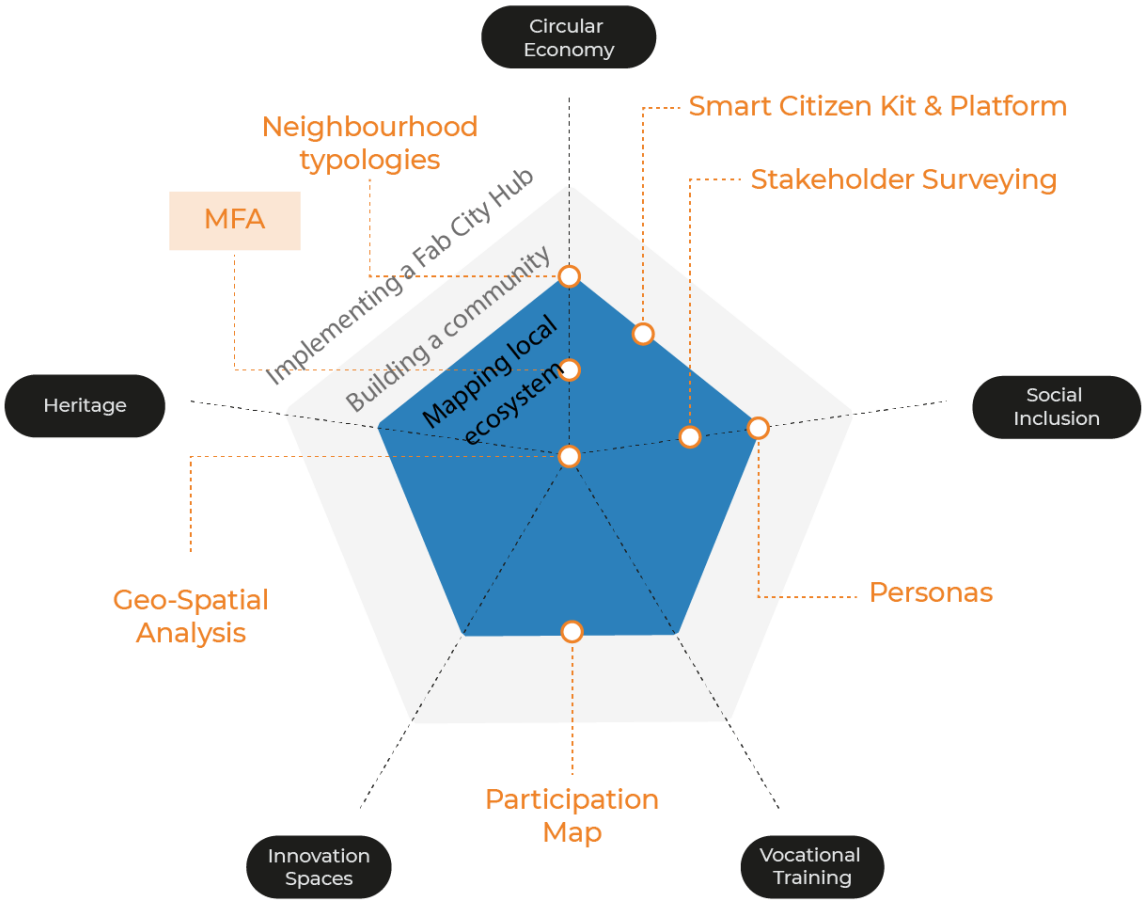

Figure 23 - Resources for 'mapping micro missions' in CENTRINNO

The Urban Resources Mapping Guidebook (Ritter et al, 2021) includes several methods and tools to perform activities that could support the development of mapping micro missions. Some of these methods are Geo-Spatial Analysis, Stakeholder Surveying, or Material Flow Analysis. Material Flow Analysis is a key method of CENTRINNO. Understanding the movement and availability of materials will unfold opportunities for pilot cities to foster, through new products and companies circular manufacturing in industrial historic sites. This process will be supported by Metabolic, project partner of CENTRINNO. While Material Flow Analysis is placed within the Circular Economy corner of the CENTRINNO pentagon, Geo-Spatial Analysis could be used to map resources related to any of the five CENTRINNO key topics. Stakeholder Surveying may be used to map actors and actor-based processes related to different fields. Nevertheless, it is also a key method to engage stakeholders if used in combination with other tools. It can support the definition of the local CENTRINNO Network of a pilot city. This method, as the next ones described, fall in the between mapping and community micro missions.

Similarly to Stakeholder Surveying and Neighbourhood Typologies, there are a series of tools that can be used in micro missions that combine mapping the local context with building up a community of practice around a specific topic. These tools include the Smart Citizen Toolkit (Making Sense Project, 2018), a toolkit thought for participatory environmental maker practices that enables gathering data on a specific topic key to a community, while fostering

active intervention in its surroundings. The data managed may be used to map issues around physical transformation of historical industrial sites (noise, pollution, etc.) to draw comparisons between the impact of different economic activities (circular manufacturing, traditional industry, or office spaces), or to show the local potential for new activities (e.g., soil quality sensors to map potential for urban agriculture). Some activities around this toolkit (developing the sensor kits, co-defining which issue is addressed, or data-sharing events) may not only provide understanding of the local context but also be used to build a community of practice and co-defining its focus, tackling other action areas. Activities using the Smart Citizen Toolkit may also involve the Smart Citizen Platform, with more than 9000 registered users and visualized data of more than 1900 unique sensors.

Other tools, such as Personas, Participation Maps or Neighbourhood typologies may as well be used to have a better understanding of the local ecosystem while co-defining the interest focus of pilot cities' communities of practice. These tools are described in Section 4.4.2.

Smart Citizen Kit: Mapping noise in Plaça del Sol in Barcelona

The Smart Citizen Kit has been tested in several places, including Kosovo, Amsterdam or Barcelona. In Barcelona, the Plaça del Sol is a town square that has historically suffered from the noise of drinking into the early hours of the morning by crowds drawn from near and far. Working with the Smart Citizen Kit and the Making Sense[16] team in Barcelona, the neighbourhood association of the Plaça del Sol researched and measured how high in relation to the norm were noise levels around the plaça in 2017, and what could be done to improve the situation.

The measuring process went in parallel with community building activities, such as the definition of the mapping and sensoring strategies, training workshops so the neighbour could learn the minimum technical skills to set up and use the sensor kits, and events in the public space to raise awareness and engage new stakeholders and participants in the local community. Finally, the data was collected and displayed through the Smart Citizen Platform[17] in order to start a conversation with the local municipality to discuss regulations and potential interventions to mitigate the noise issues. This initiative took place prior to CENTRINNO, but if we are to analyse it through the project's lens, all these activities, tools and methods aim at addressing one micro mission: mapping collaboratively the noise at Plaça el Sol in order to engage in a conversation with the local Municipality.

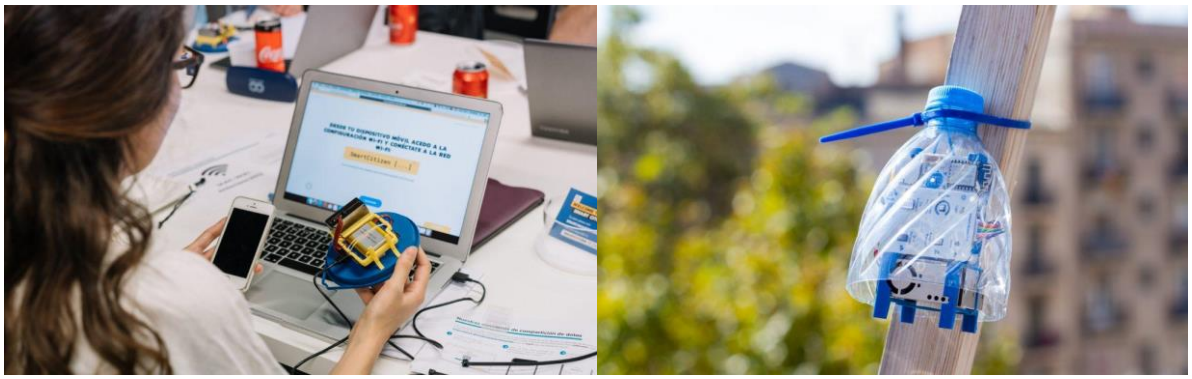

Figure 24 - Smart Citizen Kit used in Barcelona

[16] See http://making-sense.eu/campaigns/placa-del-sol/
[17] See https://smartcitizen.me/kits/

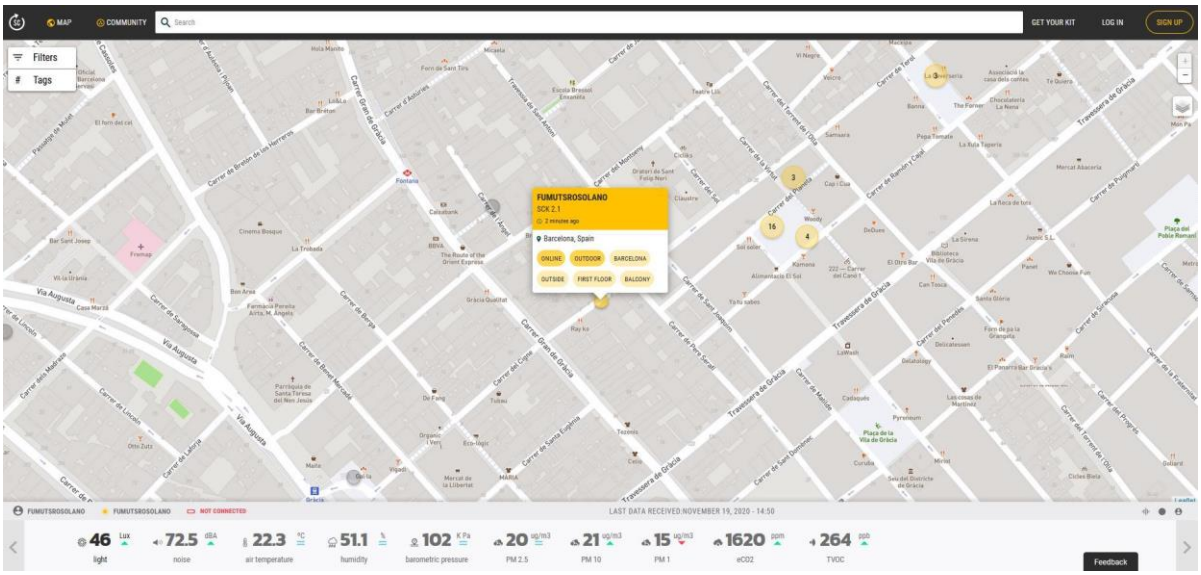

Figure 25 - Smart Citizen Platform

4.4.2. Co-creating your community and co-defining its focus interests

While getting familiar with the local context and understanding what is out there, the local CENTRINNO network of stakeholders will discuss together and explore what are their common focus interests and who will be involved in pilot cities' action. Local communities of practice are "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Lave and Wenger, 1991). They will be the main channel of pilot cities to connect their experimentation with problems and issues that are relevant at the local level.

As mentioned before, mission-oriented research harnesses social movement and citizen participation to achieve social change (Mazzucato, 2019). Co-creation processes are at the core of CENTRINNO to facilitate this conversation among local stakeholders and steer the research process towards alternative solutions that are socially and environmentally sustainable, but also locally significant. In the following lines, we describe different tools and methods that could be used to create a local community of practice and co-define its focus interest.

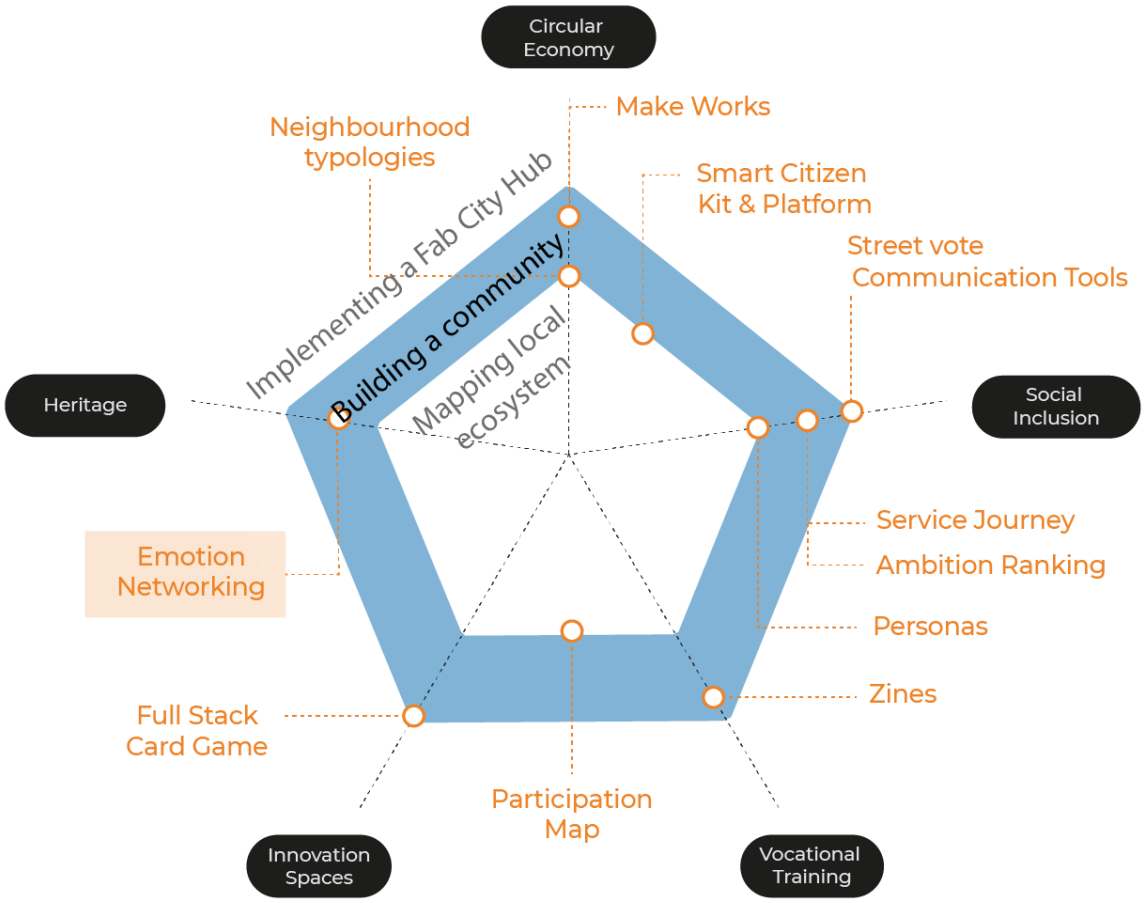

Figure 26 - Resources for 'community micro missions' in CENTRINNO

Neighbourhood typologies, also included in the Urban Resources Mapping Guidebook, is a method to categorize urban areas according to their resources and their potential role in the city landscape. This categorization needs to be discussed among different stakeholders and may also support or influence the co-definition of the pilot city focus. Making this sort of choice, or sharing the results after the categorization, could be a delicate process, for it may affect or clash with how communities self-perceive themselves. Therefore, it is recommended to have a socially inclusive approach when applying this method.

Personas is a tool used in design-driven development processes as a research study where design anthropologists document and map the users' behaviour. Personas translate this knowledge into a form that is simpler and easier to grasp and thus serve as a good basis for the development of new solutions. In CENTRINNO, personas could be used to map and understand the target audience, and adapt accordingly the stakeholder engagement and co-creation activities.

The Participation Map, or Stakeholder Map, is a tool that comes from the EU project SISCODE[18] and could be used to map and classify the local stakeholders of the local pilot city network according to the role they play either in a specific pilot city activity or in its whole

[18] See https://siscodeproject.eu/

experimentation process. The CENTRINNO School will foster the use of Participation Maps to understand the local actors' ecosystem and develop a community of practice around training activities in each pilot. This work will be supported by the project partner Onl'fait during the pilots' experimentation process.

Street Vote is a playful way to connect with citizens in an easy, low-cost, and data-driven way by making interactive interventions in the public space. Passers-by can respond to enticing and inspiring questions through polls displayed in the local context of pilot cities while at the same time, certain topics are publicly positioned to develop a narrative. It could be used as an engagement tool to build up a community of practice, or as a part of a plan to implement a Fab City Hub (FCH). Street Vote and other tools for shaping a community and co-defining its focus interest can be found in Waag's co-creation navigator[19]. Some examples of these tools are the Lego Challenge, a team building activity, the Stakeholder Trust Map, used to classify and analyse collectively the relationship with stakeholders, the Circles of Connection, which provides an overview of the organizations needed to involve in order to reach specific goals, or Ambition Ranking, which is a useful tool to prioritize decisions in a collaborative way and, thus, co-define the focus of a wider community through a very easy set-up.

At the core of all co-creation processes in CENTRINNO is the Emotion Networking method (Rana, Willemsen and Dibbits, 2017), developed by Imagine IC and the Reinwardt Academy. The Emotion Networking method will facilitate conversations and discussions around the transformation of historic industrial areas, putting heritage items at the centre of the discussion. Each pilot city will develop its own way of implementing this method, supported by the Reinwardt Academy and connecting it to the CENTRINNO Living Archive. The discussions about heritage items will facilitate interconnections and access to qualitative information related to the other CENTRINNO key concepts, including knowledge on traditional practices (vocational training), missing stakeholders in the discussion and the overall process (social inclusion), perceptions on materials and resources (circular economy), or opportunities to collaborate and pressing local issues (innovation spaces).

CENTRINNO's goal is to devise alternative paths to transform industrial historic sites. For this, fostering manufacturing activities in these areas can be supported by developing communities of practice around manufacturing. The Make Works platform may be a useful resource for pilot cities to manage and foster this type of community.

Other resources specifically aimed at co-defining common interests and supporting the development of a community are the Context Building Tools and the Outcome Mapping method. Tools, such as the Full Stack Card Game (to devise potential activities aligned to the Fab City vision) and the Service Journey (to visualize user's experiences) can be easily applied in short activities and sessions by pilot cities teams to co-define with their local communities both the focus and the implementation process of a FCH, thus falling in the middle of community and FCH micro missions. Zines, or Reflection Journals (collective reflection on a common experience in a short self-published book or text) fall also in the middle of these two action areas, as well as most communication tools, which are explained in Section 4.4.3.

[19] See https://ccn.waag.org/

The Kopli 93 community in Tallinn

CENTRINNO's Tallinn pilot has started the construction of a community around gardening and the transformation of a 1936 building into the Kopli community centre[20] (Kopli Rahvamaja). For this, the pilot team has developed several activities to co-define the focus of the transformation process. Based on the outcomes and discussion from an Emotion Networking test workshop in which the team members reflected on their expectations or memories in relation to the local project's objective, the Tallinn pilot has developed a "Kopli 93 community persona" in order to understand their target audiences.

This information, together with a social media campaign, has led to an ongoing recurrent activity called "Working Wednesdays", in which a community of practice around gardening, permaculture and the renovation of the old building as a community space, is slowly being developed. Put in the CENTRINNO Framework language, all these different activities (EN workshop. community persona and Working Wednesdays) are part of a micro mission to develop a community of practice around Kopli 93, community gardening and permaculture.

Figure 27 - Working Wednesdays at Kopli 93 flyer. *Source: https://www.facebook.com/Kopli93/*

4.4.3. Implementing a Fab City Hub

The final goal of pilots' cities activities during CENTRINNO is to implement a Fab City Hub (FCH). Each city will decide on its own specific model, including on whether it is distributed or centralized, which physical spaces and virtual platforms are used to foster exchange, collaboration and experimentation between the members of the network. Each FCH is activated through programs of activities, events and training that have innovative, productive and creative activities at their core and foster collaboration with the local communities of practice.

[20] See https://www.facebook.com/Kopli93/

In order to define its own approach to their FCH, each city, or any local initiative who wants to set up its own, will work on three aspects: The FCH Vision, the FCH Community and the FCH Infrastructure. In CENTRINNO, the *Creative and Productive Hubs Journal* (Amato et al, 2021) includes a detailed explanation of the three aspects, connected to the ten FCH principles and a comprehensive review of different examples and approaches of existing hubs for pilot cities to get inspiration from. At the same time, this line of work led to the development of the Fab City Hub Framework Survey, a tool that pilot cities may use to analyse an existing hub or even self-assess their approach according to the CENTRINNO approach.

In the following lines, we will make an initial reflection of specific resources available that may be useful for pilot cities to implement their own FCH. This initial selection, as well as the three previous aspects and the ten FCH principles will be further developed and detailed in the FCH Toolkit, which will be iteratively developed during the project's life for bottom-up organizations who want to set up their own FCH.

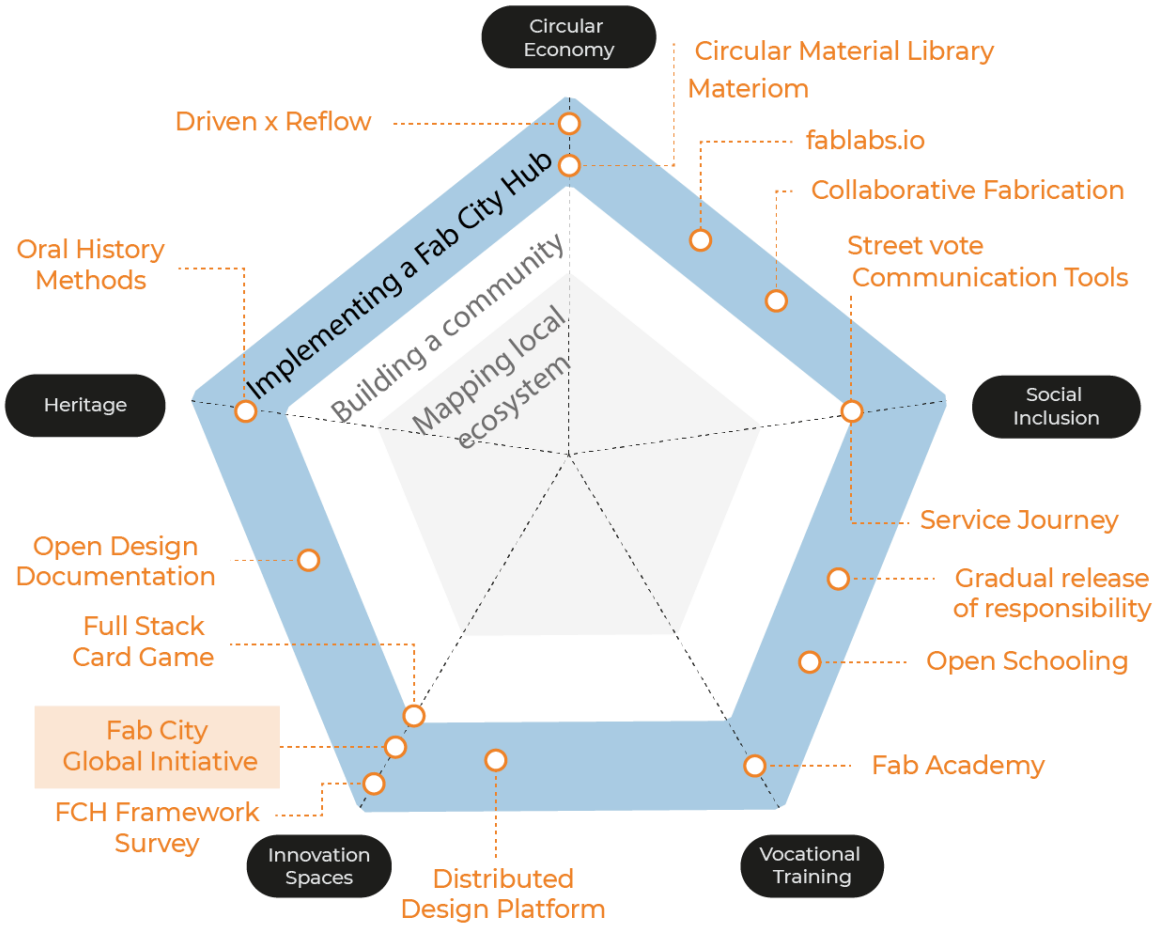

Figure 28 - Resources for 'FCH micro missions' in CENTRINNO

The Fab City Global Initiative coined the term Fab City Hub to describe the main urban interface to expand the impact of the maker movement to local communities. FCHs offer a permeable space for citizens and groups to experiment together with makerspaces or Fab Labs on productive and circular practices that connect with their local reality (Amato et al, 2021). At the same time, FCHs operate in an interconnected global network of cities and regions that share knowledge and their experience with their local communities. Therefore,

global platforms will be a key resource for pilot cities to expand and develop their own approach in their FCH. A key resource in this regard is the Fab City Global Initiative, which provides cities with tools and resources to foster the return of manufacturing to cities, together with the yearly Fab City Summit that provides an opportunity for pilot cities to discover the initiative. Other relevant platforms to access and exchange knowledge that will shape FCHs are the Distributed Design Platform[21], a networking hub for the European maker movement, or fablabs.io[22], which aims at sharing principles, tools, and philosophy to democratize access to technology.

Collaborative activities will be at the core of the FCHs, including collaborative fabrication activities and workshops focusing on collaborative design and fabrication of tools and artifacts that cover specific community needs. This type of activity will benefit from adopting an Open Design Documentation method by creating simple and detailed how-to guides for community designed and manufactured tools. These guides can break language and cultural barriers and allow local communities to scale-wide, through the sharing of knowledge and practices. Tools, processes and designs work better when integrated and adapted to the local context.

Moreover, tracing a clear communication strategy will be key for FCHs. The Communications Handbook for Projects[23] is a comprehensive resource where pilot cities can find useful resources for the management of their local FCH networks. Platforms such as a Blog, social media or YouTube channels will also be useful for pilot cities to continuously co-develop and share the narrative of its own FCH, reaching and engaging their target audiences.

Specific tools and resources are available depending on the approach a FCH may adopt, such as the Full Stack Card Game or Street Vote, already described previously. In some cases, FCHs will host CENTRINNO School activities, interconnecting FCH with vocational training and learning experiences. For this, the Fab Academy Distributed Model offers a great source of inspiration as well as key resources to adopt a distributed approach to learning. The Open Schooling framework may support FCHs to work as mediators in their local communities, positioning training programs as spaces for collaboration between families, universities, research institutes, companies or civil society organisations. Also, methods such as Gradual Release of Responsibility, frameworks such as Constructivism or specific tools such as Service Journey, also mentioned in Section 4.4.2, may be useful for FCHs implementing training activities.

For FCHs focused on Circular Economy, platforms such as Materiom[24] or the Circular Material Library developed by Metabolic, could be used as a source of inspiration to access recipes and specific resources for developing biomaterials or products from waste with their local communities. The DRIVEN x Reflow[25] is an online distributed incubation program developed by Volumes, which aims to embed advanced computational design strategies in early-stage entrepreneurship for a circular economy. The program includes an online training workshop to apply digital technologies to the circular economy that may be useful for some pilot cities.

[21] See https://distributeddesign.eu/
[22] See https://fablabs.io/
[23] See https://flbcn.gitbook.io/communication-handbook/
[24] See https://materiom.org/
[25] See https://drivenbyvolumes.io/about/

Lastly, Oral History Methods are interviews with key figures in the local context that could be done, not by experts, but by peers or collaborators of the FCH community. This could contribute to building the narrative of the FCH around the views and perceptions of the local ecosystem, but the stories could also enrich the CENTRINNO Living Archive or be connected with the CENTRINNO School curricula, thus bringing heritage to the core of FCH activities. There are several guidebooks, resources and examples that could support pilot cities to apply Oral History Methods (see Annex 1).

Milano Fab City Camp: Co-creation event to kick-start the Fab City Hub

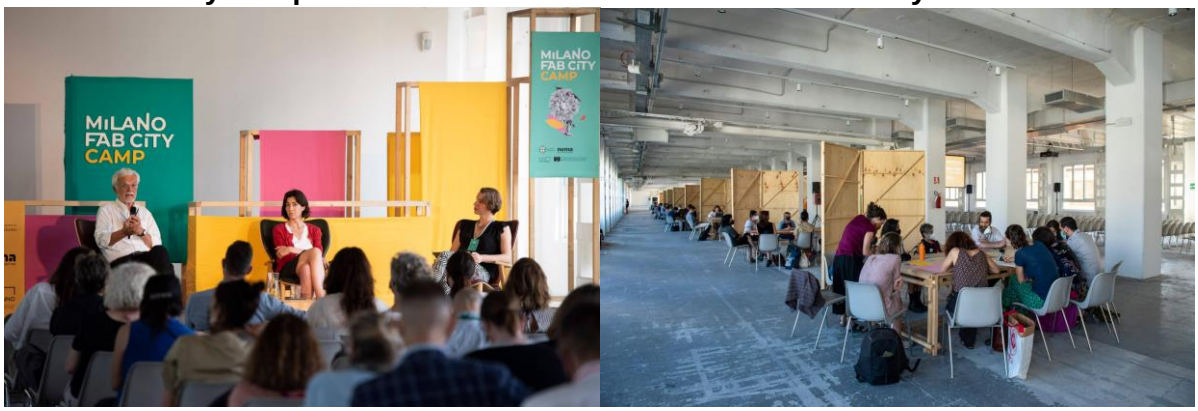

Figure 29 - Milano Fab City Camp event. *Source: https://www.manifattura.milano.it/*

During the first sprint, the CENTRINNO Milan pilot launched a networking and co-design event to start developing their own approach to their FCH, which will be focused around sustainable production and fashion design. 80 local stakeholders attended and participated.

The event included different activities, such as panel discussions, workshops and networking sessions. All these different sessions raised interest among the participants and helped set up the foundation for developing a small collaboration group of stakeholders which will slowly become the FCH core community.

This event constitutes one of the first key activities put in place in Milan to implement the local FCH. Using the CENTRINNO Framework terms, this activity is part of the micro mission to build the FCH Milan vision.

CONCLUSIONS AND NEXT STEPS

This document aims to provide a general experimentation framework for pilot cities activities or other cities that want to experiment with and implement the CENTRINNO Framework and approach. It is developed after the first year of the project, in the middle of pilot cities first sprint. Pilot cities have already started to develop their activities based on the initial CENTRINNO approach, included in the *Deliverable 1.1 CENTRINNO Whitepaper*, and most importantly, according to *Deliverable 4.1 Detailed Pilot Planning & Monitoring Framework*. This means this framework won't be implemented nor tested until the second sprint of pilot cities activities. The CENTRINNO Framework purpose is not to cover every detail of pilot cities experimentation before activities are carried out. There are still gaps and unanswered questions in the framework that will be slowly filled out during the project, allowing for interpretation and flexibility to pilot cities when testing it. This deliverable purpose is to provide enough content to start the conversation with pilot cities, so at the end of the project, all experimentation can be situated under one same umbrella, thus making replication possible after CENTRINNO.

Even though this document includes only the first iteration of the CENTRINNO Framework, already at this stage, some key conclusions can be drawn from its development process. First, as highlighted by pilot cities during the co-creation workshops, Fab City Hubs (FCHs) could not be at the same level as the other CENTRINNO key concepts, as they were considered initially. FCHs are both a resource that can channel experimentation and a goal in itself. Their role(s) in the transformation process of historic industrial areas will most probably be one of the main takeaways of the project, therefore they will be one of the main resources pilot cities will experiment with. Second, pilot cities need examples and resources that are already available and ready to use. Most of the main project resources (Living Archive, Cartography, Fab City Toolkit, Impact Assessment Framework, etc.) will be developed during the project's life and, even though pilot cities may be able to experiment with the first versions of these platforms, they will be iterated and enriched with pilot cities feedback. Therefore, it will be important to reflect together with pilot cities which already existing tools, methods, and resources are already there and how they could complement these platforms. Enlarging the initial collection of tools provided in Annex 01 of this document is a key task that should be done along with the next iterations of the CENTRINNO Framework. Lastly, another important conclusion at this stage is that there should be a revision of the main CENTRINNO Framework elements after the first sprint of activities is fully completed. This revision should assess whether the main elements (action areas for micro missions, key concepts, main resources or the experimentation process) are useful for pilot experimentation and, therefore, could facilitate replication after the project, or if they need to be thought of again or adjusted. In order to carry out this revision, interactions with pilot cities will be needed. This will demand close communication between the project partners responsible for the CENTRINNO Framework and the Pilot Coordination team.

Most importantly, this document will be updated during the project's life gathering insights and feedback from CENTRINNO pilot cities once they have tested the CENTRINNO Framework. For this purpose, the key content of this document will be included in a Gitbook[26] after the

[26] See https://flbcn.gitbook.io/centrinno-framework/. At the moment of writing this deliverable, the content of the Gitbook version is still work in progress. The link is provided so the reader can have an idea of the format expected.

completion of this first iteration. Pilot cities, or other interested actors, will be able to access it easily and, at the same time, the authors can update its content throughout the project's life. The Gitbook version of the CENTRINNO Framework will also include CENTRINNO's general information so the public outside of the project is able to understand and apply it.

The collection of resources, tools and methods included in the CENTRINNO Framework will be shared with pilot cities through the same Gitbook. They will also be updated during the project with insights gathered after pilot cities use them in their activities. All tools and methods will be updated and adjusted during the project, based on pilot cities' experimentation. This makes the collection of resources a "living" repository of tools and methods evolving as the project proceeds. Potentially, these tools will be also included in other project's resources, such as the Fab City Hub Toolkit, or in external platforms, such as Waag's co-creation navigator[27].

The format and details of the co-creation process that will follow the release of this deliverable, providing feedback for the next iterations of the CENTRINNO Framework, is not yet detailed at the moment when this deliverable is being written. It will be defined after the first sprint of pilot cities activities is finished, in coordination with the pilot coordinator, Waag, as well as other key partners that are currently developing the main resources in the project.

[27] See https://ccn.waag.org/

REFERENCES

[1] Amato, D.; Kalathas, G.; Vlachopoulou, C.; Cingolani, F.; Fontana Valenti, C.; Kühr, W.; Armstrong, K.; Diez, T.; Guy, J.C.; Munoz Unceta, P.; Brouwer, N.; Ritter, F. (2021) *Creative and productive hubs journal.* Deliverable D3.1 CENTRINNO Project.

[2] CENTRINNO project (2020) *CENTRINNO Whitepaper*. Available at: https://centrinno.eu/wp-content/uploads/2021/02/Centrinno_WHITEPAPER_2.0_EUproject.pdf

[3] Diez, Tomas. 2012. "Personal Fabrication: Fab Labs as Platforms for Citizen-Based Innovation, from Microcontrollers to Cities." *Nexus Network Journal* 14:457–468. https://link.springer.com/article/10.1007/s00004-012-0131-7.

[4] Diez, T., Gershenfeld, N., Steels, L., Filippi, P. D., et al. (2018). *Fab city: The mass distribution of (almost) everything*.

[5] Diez, T. (2021) "Fab City Strategic Action Plan". Conference paper at *Fab City Summit 2021*. Montreal.

[6] European Commission (2020) *Grant Agreement number 869595 – CENTRINNO.*

[7] Fab City Global Initiative (2014). *Fab City Whitepaper: Locally productive, globally connected self-sufficient cities*. Retrieved August 04, 2021, from https://fab.city/uploads/whitepaper.pdf

[8] Fainstein, S. (2010). *The just city*. Ithaca; London: Cornell University Press

[9] Hill, A.V. (ed.). (2020) *Foundries of the Future: a Guide to 21st Century Cities of Making*. With contributions by: Ben Croxford, Teresa Domenech, Birgit Hausleitner, Adrian Vickery Hill, Han Meyer, Alexandre Orban, Víctor Muñoz Sanz, Fabio Vanin and Josie Warden. Delft. TU Delft Open, 2020. Retrieved August 06, 2021, from https://books.bk.tudelft.nl/press/catalog/book/ISBN_9789463662475

[10] Jacobs, J. (1961) *The death and life of great American cities*. Random House, New York

[11] Lave, J.; and Wenger, E. (1991) *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press.

[12] Making Sense Project (2018) *Making Sense Toolkit*. H2020 Project Final Report and Book. http://making-sense.eu/publication_categories/toolkit/

[13] Mazzucato, M. (2018) Mission-oriented Research & Innovation in the European Union. A problem-solving approach to fuel innovation-led growth. European Commission, Brussels. Retrieved August 05, from:

https://ec.europa.eu/info/sites/default/files/mazzucato_report_2018.pdf

[14] Mazzucato, M. (2019) Governing Missions in the European Union. European Commision, Brussels. Retrieved August 05, from:

https://ec.europa.eu/info/sites/default/files/research_and_innovation/contact/documents/ec_rtd_mazzucato-report-issue2_072019.pdf

[15] Patel, R., and Moore, J.W. (2017). *A History of the World in Seven Cheap Things: A Guide to Capitalism, Nature, and the Future of the Planet.* N.p.: University of California Press.

[16] Rana, J., Willemsen, M. and Dibbits, H.C. (2017) “Moved by the tears of others: emotion networking in the heritage sphere”, *International Journal of Heritage Studies*, https://doi.org/10.1080/13527258.2017.1362581

[17] Ritter, F., Bieckmann, D., Dibbits, H., Even-Zohar, J., Muñoz Unceta, P., Corbin E., and Streefland, T. (2021) *Urban Ecosystem Mapping Guidebook*. Deliverable D2.1 CENTRINNO Project

[18] Robinson, J. (2006) *Ordinary Cities. Between Modernity and Development.* Routledge. UK

[19] Wippoo, M., Hoekstra, N., van Dijk, D., Muñoz Unceta, P., Guy, J., Ritter, F., Even-Zohar, J., Dibbits, H., Becker, C., and Olivotto, C. (2021) *Detailed Pilot Planning & Monitoring Framework*. Deliverable D4.1 CENTRINNO Project (confidential).

ANNEX 1 - CENTRINNO Initial collection of tools and resources

The Annex 1 of this deliverable constitutes the initial collection of tools, methods and other resources, started during the co-creation workshops with project partners (see Section 2.2.1) and updated during the first months of the project. The collected resources have been classified according to different fields that allowed us to sketch potential uses according to the three action areas (see Section 4.4) and the CENTRINNO key concepts (see Section 2.3). This database is mainly built with already existing tools and will be continuously updated during the project both with external tools and other tools developed in the project. The objective of this list is, on the one hand, to provide useful tools for CENTRINNO pilot cities to test them in their experimentation activities and micro missions, and on the other hand, to have a baseline of the project's partners experience on which different CENTRINNO resources can be built, such as the CENTRINNO Framework, the Fab City Hub Toolkit, or the CENTRINNO Handbook, among others.

The initial collection of tools can be seen in the following pages. The different fields used to classify the tools are:

#: Number to identify the tool or resource

Name: Name of the resource

CENTRINNO partner: The partner in CENTRINNO that provided the information about the tool. In the original file, a contact person is also included. Nevertheless, due to the need to anonymise personal data, this public deliverable only includes the name of the organization.

Resource type: The type is defined according to the glossary of terms included in Section 1.4. The different types considered are: tool, method, platform, handbook, framework, program, activity/event and other.

Description: A brief description of the objectives and use of each resource.

External link or reference: link to a website with more information, or the name of an author or document in which more information on the resource can be found.

Action Area ME: Action area where the resource may be potentially useful. **ME** refers to micro missions for **M**apping and understanding the local city **E**cosystem (see Section 4.4.1).

Action Area BC: Action area where the resource may be potentially useful. **BC** refers to micro missions for **B**uilding a **C**ommunity and co-defining its focus interest (see Section 4.4.2).

Action Area FCH: Action area where the resource may be potentially useful. **FCH** refers to micro missions for implementing and setting up a **F**ab **C**ity **H**ub (see Section 4.4.3).

CENTRINNO Key Concept: To which of the five CENTRINNO key concepts the resource is related to. The five concepts (see Section 2.3). The five concepts are: **He**: Heritage, **CE**: Circular Economy, **SI**: Social Inclusion, **VT**: Vocational Training, **IS**: Innovation Spaces.

Interconnections with CENTRINNO key concept and the project's main resources: A brief explanation of the relationship between each resource, the five CENTRINNO key concepts and the main resources developed in the project (see Section 4.2).

Duration*: In case it applies, how long does it take to apply the resource.

Difficulty*: A subjective value provided by the partner who had previous experience using this resource, on how difficult it is to implement it. The values go from very easy, easy, medium, difficult to very difficult. The value “several” is used when the resource comprises several tools or methods.

Group Size*: The average number of people with whom the resource should be applied.

Online / Offline*: Whether the resource has to be applied online, offline or both aspects are possible.

* These fields are not applicable to all the resources. The duration or group size may be useful to apply a method, or whether a tool can be used online or offline, whereas for a program, a framework, or a handbook these categories are more difficult to define. These fields are also included in the database to facilitate the migration of information to Waag’s Co-creation navigator (see Section 4.4.2).

#	Name	CENTRINNO Partner	Resource Type	Description	External link or reference	Action Area (AA)			CENTRINNO Key Concept					Interconnections with CENTRINNO key concepts and the project's main resources	Duration	Difficulty	Group Size	Online /Offline
						ME	BC	FCH	He	CE	SI	VT	IE					
1	**Manifattura Milano**	Comune di Milano	Activity / Event	Programme aiming at promoting manufacture activities, including a networking event for digital makers and 4.0 players. The event a series of activities, conferences, shops and labs opened to visitors, etc. This program is currently developed in Milan, but could be used as a reference in other cities.	https://www.manifattura.milano.it/	x	x	x	x	x	x			Understanding the local ecosystem and building up a local network (CENTRINNO Network). The events included in this program are usefull for stakeholder engagement, collaborative mapping activities (CENTRINNO Cartography), etc.	n.a.	Medium	n.a.	Offline & Online
2	**Service journey**	DDC/Waag	Tool	A service journey places the user of a service at centre stage and provides a visual representation of who is involved in defining a service, whom your target group has been in touch with, what has happened during the service process, and what the experience was like. The exercise will help you identify areas where you do too little or, perhaps, too much, where to initiate and conclude on the service, and what you should do yourselves versus what you should leave up to others.	https://danskdesigncenter.dk/en/service-journey https://ccn.waag.org/navigator/tool/journey-map		x	x	x	x	x	x	x	It connects to the CENTRINNO School and other service-based offerings in CENTRINNO, related to any of the other key concepts.	30'-120'	Medium	5	Offline & Online
3	**Personas**	DDC/Waag	Tool	A key element in a design-driven development process is a research study where design anthropologists document and map the users' behaviour. Research often provides rich and complex data sets and user insights. Personas translate this knowledge into a form that is simpler and easier to grasp and thus serve as a good basis for the development of new solutions. Personas remind the participants that they have to develop solutions that match the specific needs represented by the various user groups, for example, different types of companies, users or clients.	https://danskdesigncenter.dk/en/personas https://ccn.waag.org/navigator/tool/personas	x	x		x	x	x	x	x	It connects to the CENTRINNO Network, as a tool to understand the target audience of the pilot, but it also links to Heritage & the CENTRINNO Living Archive, as personas can be a complementary tool to analyse different user profiles involved in the heritage discussion. This tool could also be applied to other concepts to better understand and exemplify user and citizen groups in a local area, fab lab etc.	60'	Medium	4	Offline & Online
4	**Full Stack Card Game**	IAAC	Tool	The Full Stack card game is a tool for cities to become familiar with the Full Stack Framework and get inspiration to define, connect and implement their own activities and initiatives according to the Fab City values and principles. This card game allows cities to know reference examples that already follow the Fab City values, as well as identify their own key stakeholders and resources potentially linked to new initiatives.	https://fab.city/uploads/Fullstack(27sep).pdf https://miro.com/app/board/o9J_l5nbVos=/		x	x		x	x	x	x	This tool could be used to detail and plan any sort of activity. The current set up allows players to work on the five CENTRINNO Concepts, but as a tool to devise activities' resources it may be potentially linked to the CENTRINNO Cartography, Fab City Hubs, or the CENTRINNO School.	120'	Medium	15-20	Online
5	**Make Works**	IAAC	Platform	Make Works is a platform to establish local communities of practice around making, fostering collaboration and interaction between manufacturing spaces, makers and designers to sustain local economies and support communities. The platform provides also an opportunity for the local community to share with the local and global online community their own narrative around manufacturing, as well as their ongoing activities and resources.	https://make.works		x		x	x	x			The platform is used by a local productive community, which could be connected to the CENTRINNO Network and the Social Inclusion concept. The narrative and information uploaded to the framework could have direct connections with the heritage of making or the management of resources in manufacturing activities and circular economy.	n.a.	Medium	8 (managers) unlim. users	Offline & Online
6	**Smart Citizen Toolkit**	IAAC	Tool	A toolkit aimed for participatory environmental maker practices. It includes operational, conceptual and methodological information to show citizens and communities how to use appropriate tools to enhance their everyday environmental awareness, to enable active intervention in their surroundings, and to change their individual and collective practices. The toolkit is also connected to an online platform where data measured is also visualised.	https://smartcitizen.me/ http://making-sense.eu/publication_categories/toolkit/ https://fablabbcn.org/projects/smart-citizen	x	x			x	x		x	The sensor approach of this framework can be used to develop any assessment on the local environment and gather data that can be used in the CENTRINNO cartography or in relation to CE. The approach is built on an existing (or new) community (SI), that works together around a specific problem that is measured and assessed.	n.a.	Medium	15-20	Offline & Online
7	**Smart Citizen Platform**	IAAC	Platform	The Smart Citizen platform connects people, data and knowledge through sensory data which empowers communities to know about and own their urban spaces to ensure the collective development and ownership of cities. The project involves customised sensing hardware – the Smart Citizen Kit, and a custom online platform with more than 9000 registered users and more than 1900 unique sensors.	https://smartcitizen.me/kits/	x	x				x		x	The sensor approach of this framework can be used to develop any assessment on the local environment and gather data that can be used in the CENTRINNO cartography or in relation to CE. The approach is built on an existing (or new) community (SI), that works together around a specific problem that is measured and assessed.	n.a.	Medium	unlimited	Online
8	**Fab City Global Initiative**	IAAC	Other	Fab City Global Initiative enables a shift away from the industrial paradigm of Product-in Trash-out, by enabling the return of manufacture to cities supported by a Data-in Data-out urban model. It comprises a Network of 38 cities, a core Collective and is governed by a foundation, working to make locally productive, globally connected cities and citizens. The yearly summit provides an opportunity for pilot cities to discover the initiative, and cities can pledge to join the cities network on a yearly basis in order to take part in all the global network activities.	fab.city			x	x	x	x	x	x	Fab City gives an overall framework for the operationalisation of the project including contextualising the Fab City Hubs and the connection between all CENTRINNO resources and concepts and the Full Stack framework.	n.a.	Easy	n.a.	Offline & Online
9	**fablabs.io**	IAAC	Platform	Fablabs.io is the online social platform of the international Fab Lab community. It is the current official list of Fab Labs that share the same principles, tools, and philosophy around the future of technology and its role in society. Fablabs.io is an exchange platform for people, labs, projects, machines, events and groups that operate around the Fab Lab Network.	fablabs.io https://live.fablabs.io/			x				x	x	Fab Labs.io provides a tool to discover and understand local fab labs and provides a framework to assess other facilities for production in local territories and gobally. Due to its connection to existing educational programs (Fab Academy) it may be directly linked to the CENTRINNO School and VT activities in pilot cities.	n.a.	Easy	n.a.	Online
10	**FabX Event**	IAAC	Activity / Event	Each year members of the more than 2,000 worldwide Fab Labs gather to share, discuss, collaborate and create communities around the different local and global interests regarding digital manufacturing, innovation and technology.	https://fabevent.org/			x		x	x	x	x	Yearly opportunity to apply to present a workshop or talk as a great opportunity to disseminate local pilot cities activites and develop the narrative of the local FCH. FAB16 Montreal and online (9-15 August) FAB17 Bhutan (2022) - FAB18 Mexico (2023) - FAB19 Czech Republic (2024)	n.a.	Very Easy	n.a.	Offline & Online
11	**projects.fablabs.io**	IAAC	Platform	Collection of online resources for the international Fab Lab community. It is a collaboration between Fablabs.io, the online social network of the international Fab Lab community, and Wikifactory, a social platform for collaborative product development.	projects.fablabs.io			x		x	x	x	x	This space offers makers/designers/creatives the opportunity to host, collaborate and develop open source hardware projects online, at distance.	n.a.	Medium	n.a.	Online
12	**Distributed Design Market Platform**	IAAC	Platform	The Distributed Design Market Platform acts as an exchange and networking hub for the european maker movement. The initiative aims at developing and promoting the connection between designers, makers and the market. It comprises 18 members from 12 EU countries. It is an official partner of the European Commisson's New European Bauhaus initiative.	distributeddesign.eu			x	x	x	x	x	x	The Platform hosts yearly Awards, Summer Schools and other opportunities for makers, designers and creative professionals to gain exposure and develop their practices towards new and emerging markets. All activites of the platform are linked to the values: Open, Inclusive, Collaborative and Regenerative. There is also the opportunity for local pilot members to join the platform in order to collaborate with an EU network of CCI's focused on the maker movement.	n.a.	Medium	n.a.	Offline & Online
13	**Communication Handbook for projects**	IAAC	Handbook	This is intended as a basic, helpful guide for projects that engage communities, stakeholders and audiences in projects for purpose. It is based on Fab Lab Barcelona experiences working in design, dissemination, communication and outreach for education, research and innovation projects. It is under constant development. It can be used to develop your own skills in communication and outreach or those of your collaborators and stakeholders. It can help you to: Define your brand, Create and curate a narrative; Define, reach and engage an audience; Know more about possible communication channels and actions; Make your content accessible; Monitor and evaluate your actions	https://flbcn.gitbook.io/communication-handbook		x	x	x	x	x	x	x	This guide provides useful resources for the management of the CENTRINNO Network in terms of communications (how to engage/reach stakeholders and target audiences). Nevertheless, it can be applied to develop communication resources, communicate or disseminate any type of content related to any of the five key concepts.	n.a.	Very Easy	n.a.	Online
14	**Blog**	IAAC	Platform	A blog can be placed as part of a website as a dedicated space to ensure the validation with external communities via content dissemination. It allows for tag categories by topics and location. Regular publication (i.e. at least 1 post per month) is recommended to allow for different concepts, members and results to be timely featured. A specific project member is recommended to be designated as responsible for the management and monitoring of its content. This platform is always part of an ongoing process in line with a Communication and Dissemination Strategy, phases, deliverables, milestones and general project level progress. There are different open-source website creation platforms or CMS (content management systems) such as WordPress that are easy to use and adjust with pluggins and themes. However, if the blog is published in a tailor made platform or with HTML, difficulty level may vary.	https://centrinno.eu/blog/		x	x	x	x	x	x	x	A blog is a key platform for developing the narrative of the CENTRINNO Network or to engage/reach stakeholders and target audiences. It is mostly a dissemination platform, so it could include content related to any of the five CENTRINNO key concepts. It will be a key resource to support the implementation of FCHs from a communications perspective.	n.a.	Medium	n.a.	Online
15	**Social media channels**	IAAC	Platform	Twitter, LinkedIn, Instagram and Facebook are the primary social media channels broadly used. Social media channels must be branded with the project look and feel. The platforms should be managed by the same project member to ensure strategy and goals are met. Regular publication (i.e. at least 1 post per week) is recommended to allow for different concepts, formats, messages, members and results to be timely featured. Project members are requested to always tag the project across all platforms accompanying the agreed main hashtags for direct repost.	https://twitter.com/CentrinnoEU https://www.linkedin.com/company/centrinnoeu/ https://www.facebook.com/centrinnoeu/ https://www.instagram.com/centrinnoeu/		x	x	x	x	x	x	x	SoMe are a key platform for continuously co-developing the narrative of the CENTRINNO Network or to engage/reach stakeholders and target audiences. They are mostly a dissemination platform, so it could include content related to any of the five CENTRINNO key concepts. They will be a key resource to support the implementation of FCHs from a communications perspective.	n.a.	Very Easy	n.a.	Online
16	**YouTube content channel**	IAAC	Platform	YouTube is used to post and promote dynamic media content (videos) developed over the course of the project. Members are encouraged to send their video content and/or links to content videos from external events and actions in which the project has participated via pilot actions, etc. When creating video content, the difficulty is high since it involves a strategy, a script, audio tools, edition and software tecnology. When uploading content to this platform, user may encounter difficulties such as file size, copyright infringements, etc. that are communly related to audiovisual materials. In order to reach a medium-easy level of difficulty when contributing with content to the platform, the easiest option is to save external links into the channel playlist (instructions here: https://youtu.be/KExFk_-6-Lo)	https://www.youtube.com/channel/UCJwORKUrHyC9L7cgBTvAqnw		x	x	x	x	x	x	x	A Youtube channel is a key platform for developing the narrative of the CENTRINNO Network or to engage/reach stakeholders and target audiences. It is mostly a dissemination platform, so it could include content related to any of the five CENTRINNO key concepts. It will be a key resource to support the implementation of FCHs from a communications perspective.	n.a.	Medium	n.a.	Online

#	Name	CENTRINNO Partner	Resource Type	Description	External link or reference	Action Area (AA)			CENTRINNO Key Concept					Interconnections with CENTRINNO key concepts and the project's main resources	Duration	Difficulty	Group Size	Online /Offline
						ME	BC	FCH	He	CE	SI	VT	IE					
17	**Geospatial Context Analysis**	Metabolic	Method	Geospatial Context Analyses are a way to build a holistic understanding of how a site, street or district is embedded in their wider urban ecosystem. Understanding cities as complex and interrelated systems, the geospatial context analysis helps to identify local challenges, as well as local assets.	See D2.1 Urban Ecosystem Mapping Guide	x				x	x			This tool can be adapted to map resources or heritage items throughout the wider urban ecosystem, therefore it may have connections both with the CENTRINNO Cartography and the Living Archive.	n.a.	Medium	n.a.	Offline & Online
18	**Stakeholder Surveying**	Metabolic	Method	Stakeholder Surveying is a tool to identify community assets and resources that an MFA is not able to spot: It is particularly useful to find out which materials, wastes, tools, technology and skills are available at the level of organizations, such as SMEs, businesses, industrial partners etc.	See D2.1 Urban Ecosystem Mapping Guide	x				x			x	Stakeholder Surveying could be integrated in CENTRINNOs networking activities. It could also be combined with other platfroms, such as Make Works (which operates on a community level).	n.a.	Easy	n.a.	Offline & Online
19	**Material Flow Analysis**	Metabolic	Method	The Material Flow Analysis is a method to quantify the inputs and outputs of physical or non-physical resources (energy, materials, goods) that flow through a predefined system (here - a city). MFAs are used to understand a city's consumption of different types of materials from a higher level, as well as the types of waste it is generating	See D2.1 Urban Ecosystem Mapping Guide	x				x				Identified waste resources could be used for fabrication in Fab City Hubs. Moreover, they could also be included in the CENTRINNO Cartography, or used to define an interest to build up a community around using the CENTRINNO Network.	n.a.	Difficult	n.a.	Offline & Online
20	**Activity-based Material Flow Analysis**	Metabolic	Method	Activity-based Material Flow Analysis are a "sub-form" of MFAs. This type of MFA is particularly useful to map waste flows between urban waste generators, when material imports are less important. Activity-based MFAs require a bottom-up list of organizations (such as industries, businesses or waste facilities) and their data on waste generation and destination. National or municipal authorities may have data on waste transactions.	See D2.1 Urban Ecosystem Mapping Guide	x				x				Identified waste resources could be used for fabrication in Fab City Hubs. Moreover, they could also be included in the CENTRINNO Cartography, or used to define an interest to build up a community around using the CENTRINNO Network.	n.a.	Difficult	n.a.	Offline & Online
21	**Neighbourhood Typologies**	Metabolic	Method	Neighbourhood typologies can help to identify the role that different neighborhoods can play in the transition to a circular economy at the level of the city. Not all neighborhoods can contribute to city-wide goals to the same extent. For example, a densely populated city-center will have less space available for generating renewable energy, but can play a larger role in reusing materials locally or exchanging products locally. Neighbourhood Typologies aggregate various geospatial data layers to generate descriptive "neighbourhood personas", allowing us to make sense of complex geospatial and demographic conditions of different neighbourhoods.	See D2.1 Urban Ecosystem Mapping Guide	x	x		x	x	x			Pilots can use the neighbourhood typologies to syntethsize and make sense of the geospatial context analysis they have previously done. This is a key element of the cartography and it may include heritage-related or socio-economic content in the CENTRINNO Cartography.	n.a.	Medium	n.a.	Offline & Online
22	**Circular Materials Library**	Metabolic	Other	The Circular Materials Library was created in context of REFLOW - an EU-funded project on circular resource management. It is a collection of innovative materials and products that are regenerative, circular and sustainable. The content can be used to inspire and inform blueprints for regenerative design in Fab City Hubs.				x		x			x	The CENTRINNO Cartography can either identify resources to produce similar products as listed in the library, or the library can be used to inspire the "search" for materials in the city.	n.a.	Very Easy	n.a.	Online
23	**Materiom**	Metabolic	Platform	Materiom is an open-source platform for sharing easily replicable recipes, using widely available biomaterials and wastes. The platform also provides data on various biomass materials to support communities, cities and makers to shift towards bio-based supply chains	https://materiom.org/			x		x			x	The CENTRINNO Cartography can help pilots to map and source biomaterials required for biofabrication. School: Materiom can be a source of inspiration for workshops and citizen engagement in biofabrication	n.a.	Easy	n.a.	Online
24	**Reflections journals: Zines**	Onl'fait	Tool	A reflection journal / zine helps learn by reflecting on the experience. A zine is a short, self-published book of text, images and collage that stimulates creativity and reflection. This tool will provide opportunity to establish an individual and/or group understanding, creating a sense of accomplishment and can help plan for the future.	https://system2020.education/resources/learning-portfolio-zines/		x				x	x		Reflection Journals are linked with the future Pilot Reporting Timelines and the work on the Dashboard by Waag. Zines are an inclusive tool because they provide the framework for self-reflection and opportunity to express oneself.	1-2 hours	Easy	15-20	Offline
25	**Fabacademy distributed model**	IAAC, Onl'fait	Program	Fab Academy Distributed Educational Model offers a distributed (rather than remote) educational model: students learn in local workgroups, with peers, mentors, and machines, which are then connected globally by content sharing and video for interactive classes.	https://fabacademy.org			x		x		x	x	Fab Academy model may serve of inspiration but also be directly connected to the CENTRINNO School programs. It is also an opportunity to develop micro missions and address challenges that are found at the pilot city scale related to innovation and circular economy.	n.a.	Very Difficult	30-50	Offline & Online
26	**Constructivism**	Onl'fait	Method	Constructivist theory of learning asserts that knowledge is not simply transmitted from teacher to learner, but actively constructed by the mind of the learner. Later, constructionism suggested that learners are more likely to develop new insights and understandings while actively engaged in making an external artefact.	https://www.exploratorium.edu/education/ifi/constructivist-learning			x			x	x		Constructivism provides very useful insights for CENTRINNO School local programs to have in mind when developing and deploying their activities. Constructivism is a powerful tool for social inclusion because it puts the learner at the center of the learning process and it's therefore suitable for different kind of learners. The hands-on educational approach of constructionism may be key also for the collaborative activities implemented in the FCHs.	n.a.	Difficult	25	Offline
27	**Open schooling**	Onl'fait	Framework	Open Schooling supports schools and local stakeholders to use research and innovation as a tool for tackling local challenges and contributing to sustainable community development. Open Schooling Hubs work as mediators in each local community, positioning schools as active agents for collaboration between families, universities, research institutes, industry, enterprises, media, local governments, civil society organizations, and wider society, by engaging in real-life projects that meet societal needs.	https://oshub.network		x	x			x	x	x	The Open Schooling model offers a great opportunity and useful insights that may support the implementation of CENTRINNO School local programs and Fab City Hubs as interconnected spaces for intense collaboration and innovation with other stakeholders. Openschooling creates links between schools and the community to engage different kind of learners.	n.a.	Difficult	15-100	Offline
28	**Gradual release of responsibility**	Onl'fait	Method	The GRR model encourages teachers to teach skills in a similar way to the notion of apprenticeship - where the 'master' gradually inducts their students, or 'apprentices' into an area of expertise. This approaches can be summarised in "I do it - We do it - You do it"	https://en.wikipedia.org/wiki/Gradual_release_of_responsibility			x				x		The Gradual Release of Responsibility is a method that CENTRINNO School local programs may use in their implementation. GRR stimulates autonomy and an healthy approach to problems, especially manual ones.	n.a.	Difficult	25	Offline
29	**Emotion networking**	Reinwardt Academy	Method	People foster natural and cultural objects, sites and repertoires as 'heritage'. They do so in reference to the past with an eye on the future. The practice of fostering items as heritage - a way of dealing with the past in the present towards the future - brings along complex, emotional loaded interactions. The concept of Emotion Networking refers to working with the capricious constellations of people who all have feelings about a (prospective) heritage item, though not all the same ones. Emotion Networking is an exercise in visualising and analysing how people's positions in relation to the item of heritage and to each other may shift in conversation with each other. Participation in this exercise of moderated conversations, is a collaborative effort, during which new affiliations and feelings of connectedness may develop, not necessarily based on shared feelings about the item of heritage at stake, but based on a shared understanding of the complex dynamics around the item. Emotion Networking (EN) creates visual representations of networked experiences which can help to better understand the complexity of heritage dynamics and through this understanding may facilitate people to participate in heritage interactions in a more conscious and constructive	https://www.tandfonline.com/doi/full/10.1080/13527258.2017.1362581		x		x		x	x		The Emotion Networking method in CENTRINNO is used to feed the Living Archive. By conducting such sessions, pilots are able to understand the heritage dynamics and collect stories. The method is useful for the CENTRINNO School and the CENTRINNO Network	90'	Easy	8-10 (multiple possible in paralel sessions)	Offline & Online
30	**Oral History Methods**	Reinwardt Academy	Method	Interviews with key figures in the environment could be done, not by experts, but by peers and/or special role for school (history) education. Industrial heritage is less known/available in curricula, so this could be an opportunity to enrich the Living Archive, as well as connect with local communities. There are academic guidelines, toolkits developed in the archival domain, and a vast ocean of DIY oral history projects, where basically someone tells a story orally. Some examples: Canadian town Oral Craft Storytelling: https://guelpharts.ca/about-us/news/243-old-traditions-alive-today-oral-storytelling-and-craft-in-guelph British Library collection on Oral History of Craftspeople: https://sounds.bl.uk/Oral-history/Crafts Basic (University student level) Oral History Toolkit: https://libguides.libraries.claremont.edu/ohtoolkit Hidden Histories Oral History Toolkit: http://eprints.bournemouth.ac.uk/29581/1/HH%20Oral%20History%20Toolkit.pdf	http://dohistory.org/on_your_own/toolkit/oralHistory.html https://www.demurenhebbenoren.nl/			x	x			x		Oral History Methods may be used in Vocational training activities, connecting these methods to the "Open Schooling" approach, where the students can - while engaging with stakeholders - conduct oral history projects.	Variable	Medium	1-4 people	Offline & Online
31	**Open design documentation**	TUT	Method	Diverse teams of makers, facilitated by designers, engineers or other experts, create simple and detailed how-to guides for community designed and manufactured tools. These guides can break language and cultural barriers and allow local communities to scale-wide, through the sharing of knowledge and practices. Tools, processes and designs are better integrated and adapted to the local bio-physical context.				x		x		x	x	Vocational training: Skills and competence building based on shared knowledge and designs. Circular economy: Open design protocols encourage local application of circular processes.	n.a.	Difficult	n.a.	Offline & Online
32	**Collaborative fabrication**	TUT	Activity / Event	Workshops focusing on collaborative design and fabrication of tools and artifacts covering specific community needs. Participants are facilitated to identify needs, exchange ideas, and when applicable, use existing designs available online. Recursive rounds of reflection and discussion help participants optimise the process and resolve potential conflicts. Documentation of the process and outcomes can help other communities replicate them.				x		x		x	x	Fab City Hubs: Urban makerspaces offer unique collaborative environment for these workshops. Circular economy: Open design principles encourage efficient use of materials and shift to more sustainable production models.	1-3 days	Difficult	10-15 persons	Offline

#	Name	CENTRINNO Partner	Resource Type	Description	External link or reference	Action Area (AA)			CENTRINNO Key Concept					Interconnections with CENTRINNO key concepts and the project's main resources	Duration	Difficulty	Group Size	Online /Offline
						ME	BC	FCH	He	CE	SI	VT	IE					
33	**Driven x Reflow online incubation program**	Volumes	Program	DRIVEN is an online distributed incubation program aiming to embed advanced computational design strategies in early stage entrepreneurship for a circular economy. Computational design can play a crucial role in terms of material use awareness: it can optimize the flow of material and its economy, organize its storage, transportation, and reassembly. These elements are usually not incorporated in the design phase but they have social implications and economic properties that could enrich a design's value, scalability, impact, and agency. The goal of DRIVEN is to trigger an awareness of how computational design can be used to consider and put to action all the principles of a circular economy and to showcase built projects embedding such qualities realized as proof of concepts. DRIVEN incubated projects will act as precedents to help all start-up projects that follow in the pipeline.	https://drivenbyvolumes.io/about/			x		x		x	x	Vocational Training - the program includes an online training workshop to apply digital technologies to circular economy (computational design, digital fabrication, machine learning, discrete automation, etc...)	6 months - 1 year	Medium	10-15 persons	Online
34	**Fab city Hub Framework Survey**	Volumes	Tool	Fab City Hub Framework Survey is a questionnaire designed to analyse specific hub case studies. Pilots may have in mind references of hubs around Europe that they would like to get inspiration from. The Fab City Hub Framework can be used to analyse specific references through an interview with the hub founder or a team member, in order to extract valuable information and actionnable takeways for the implementation of the hub within CENTRINNO. It is currently developed, and it may also have potential as a self-assessment tool for CENTRINNO Fab City Hubs. It was already applied in D3.1 Creative and Productive Hubs Journal.	See D3.1 Creative and Productive Hubs Journal https://drive.google.com/file/d/1yMqi5x41rVSYCheuN45LpJPoOu8R84J_/view?usp=sharing			x	x	x	x	x	x	It could be useful for the Cartography as a tool to map out other hubs in the city, and their evolution as well as for the Living Archive to spread interesting stories and projects carried out by hubs and Pilots. It could be useful for the CENTRINNO Network to reach out and connect with other new communities and stakeholders.	1 day	Easy	2 persons minimum	Offline & Online
35	**Civic Design Method**	Volumes	Method	A compilation of reflections, tools and methodologies to support processes related with Civic Design, including programming and activating **Collective Intelligence** processes with impact on the territory. Civic Design proposes to reach the expected solutions through processes or methods, enabling relationships and strategies based on the collaboration of many actors located in their territories.	https://urbanohumano.org/blog/2018/12/08/os-presento-el-civic-design-method/ https://futurearchitectureplatform.org/projects/7375454e-86ef-4763-ad30-6e17dcb18f3e/		x	x		x	x	x	x	This method provide useful tactics to build inclusive communities while implementing innovation, therefore it may be used to co-define the focus through the CENTRINNO Network and also as a tool to map existing resources in the CENTRINNO Cartography.	1 month	Medium	up to 25/50	Offline & Online
36	**Sensitize Tools**	Waag	Tool	Developing empathy and getting more sensitive to the plights of others will help you better understand what you can expect from stakeholders in your co-creative process, and where you assumptions might need to be adjusted. Sensitizing tools are in place to help you reach that understanding and emphatic state of mind. These tools could be useful to develop, prioritize and share ideas of an already established community. Tools included: Empathy Map, Collage, Inspiration Walk, Street Vote, Walk Shop, Photo Safari, Guided Tour.	https://ccn.waag.org/navigator/theme/sensitize		x				x			Understanding the characteristics of an established CENTRINNO Network, finding gaps & the potential to include vulnerable groups	several	several	n.a.	Offline & Online
37	**Circles of Connection**	Waag	Tool	The circles of connection give you a first overview of what steps you need to take to reach your goal, and which organizations or people you need to involve to get there. This exercise can be done with a team internally, or with your community – depending on the goal you set out to reach. If you have access to an online collaboration platform, like a online whiteboard (e.g. Mural, Miro), you can do this exercise online as well.	https://ccn.waag.org/navigator/tool/circles-connection		x				x			This tool could be used in discussions with the local hub community to co-define the CENTRINNO Network: which stakeholders are missing, which is the target audience, etc.	20-40 min	Easy	5	Offline & Online
38	**Stakeholder Trust Map**	Waag	Tool	A first step to understand the context you are working in is to understand who you are dealing with: your stakeholders. But to make sure you are able to involve these people or organisations in your process; you need to know how you can approach them. And that all is connected to your relationship with them. In a stakeholder trust map, you can visualize who your stakeholders are, how you are connected to them and the quality of your relationship with them. When you have that information, you have a better understanding of your priorities. If you have access to an online whiteboard (e.g. Mural, Miro), you can do this exercise online as well.	https://ccn.waag.org/navigator/tool/stakeholders-trust-map		x				x			This tool could be used in discussions with the local hub community to co-define the CENTRINNO Network: which stakeholders are missing, which is the target audience, etc.	30-120 min	Easy	5	Offline & Online
39	**Lego Challenge**	Waag	Tool	A team-building activity in which groups must work together to build a structure out of lego, but each individual has a secret "assignment" which makes the collaborative process more challenging. It emphasizes group communication, leadership dynamics, conflict, cooperation, patience and problem solving strategy.	https://ccn.waag.org/navigator/tool/lego-challenge		x				x		x	This tool could be used in discussions with the local hub community to co-define the CENTRINNO Network: which stakeholders are missing, which is the target audience, etc. It may be also used as part of collaborative activities developed in the Fab City Hub.	30-120	Medium	5-10 pp	Offline
40	**Outcome mapping**	TUT	Method	Outcome mapping is a methodology for planning, monitoring and evaluating development initiatives in order to bring about sustainable social change. As the name suggests, its niche is understanding outcomes; the so-called 'missing-middle' or 'black box' of results that emerge downstream from the initiative's activities but upstream from longer-term economic, environmental, political or demographic changes.			x		x	x	x	x	x	Outcome mapping will be one of the key methods that will be utilized in the project's Impact Assessment. It will be tailored to accommodate for all 5 key concepts through the challenges and missions defined by pilot cities.	n.a.	Difficult	n.a.	Offline & Online
41	**Ambition ranking**	Waag	Tool	Ambition ranking is a method that will give you insight into what ambitions or ideas are prevalent in a team, and in which way you can find common ground. This method can also be done online, when you have access to an online whiteboard like Mural or Miro.	https://ccn.waag.org/navigator/tool/ambition-ranking		x		x	x	x	x	x	Ambition Ranking is a tool that could be used to collaboratively prioritize decisions of very diverse nature. It is veru useful for the CENTRINNO Network, nevertheless it could be also used when working with heritage items, when mapping resources in the CENTRINNO Cartography or when developing a training program in the CENTRINNO School.	5-30 min	Easy	1-10 pp	Offline & Online
42	**Street vote**	Waag	Other	A playful way to connect with citizens/users/target audience in an easy, low-cost, and data-driven way by making interactive interventions in the public space. Passers by can respond to enticing and inspiring questions.	https://ccn.waag.org/navigator/tool/street-vote		x	x	x		x		x	Street vote is a tool to have visibility in the local context of pilot cities while at the same time developing a narrative around a specific topic, in a playful way. It could be used as an engagement tool in the CENTRINNO Network, or as a plan or strategy connected to the FCH	n.a.	Easy	n.a.	Offline
43	**Participation map**	Onl'fait	Tool	A visual tool for understanding who your partners are or might be and what role they play or could play in your ecosystem. It also allows you to visualise who you are targeting with your solution, what role each stakeholder could play in your strategy and how you will work directly together to reach them and by what means. It is part of the SISCODE toolbox for co-creation journeys (p.42-43).	https://siscodeproject.eu/wp-content/uploads/2019/09/toolkit-27092019-1.pdf	x	x		x	x	x	x	x	The participation or stakeholder map is a tool that can be used to have a better understanding of the local CENTRINNO Network, finding gaps or redefining roles in collaboration with your core stakeholders.	30 min	Easy	10-15 pp	Offline & Online
44	**Pitch grid**	Onl'fait	Tool	A visual tool to map the role of stakeholders in a project in terms of needs/competences/offers/interests	Brendan Owens / Science Gallery for OSHUB project	x	x		x	x	x	x	x	The pitch grid is a tool that can be used to have a better understanding of the local CENTRINNO Networking, to understand needs, competences, offers and interests of stakeholders.	30 min	Easy	10-15 pp	Offline & Online