

DELIVERABLE 2.4

CENTRINNO CARTOGRAPHY BETA VERSION

Submission date: 31/01/2023

Project start date: 01/09/2020

Duration: 42 Months



DELIVERABLE FACT SHEET

Work Package	WP2 Urban Resource Mapping
Deliverable	D2.4 CENTRINNO Cartography - Beta Version
Due Date	M28: 30 December 2022
Submission Date	M29: 31 January 2023
Dissemination Level	<input checked="" type="checkbox"/> P – Public <input type="checkbox"/> CO – Confidential
Deliverable Lead	META
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Status	<input type="checkbox"/> Plan <input type="checkbox"/> Draft <input type="checkbox"/> Working <input checked="" type="checkbox"/> Final <input type="checkbox"/> Approved
Abstract (for public dissemination only)	This deliverable accompanies the launch of the CENTRINNO Cartography - Beta Version, published as a digital platform that showcases urban resource mapping progress by CENTRINNO pilots. Within this document, the development progress and changes since the launching of the demonstrator of the CENTRINNO Cartography are explained.
Keywords	Cartography; circular economy; mapping; urban ecosystems
Statement of Originality	This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

REVISION HISTORY

Version	Date	Author	Organization	Description
0.1	01/11/2022	Frenzi Ritter, Eva Promes, Thomas Rieff, Everdina Vermaat, Joris Overmeer	META	First draft
0.2	02/12/2022	Ashley Laffin, Martijn Lammerts	WAAG	Contribution to Amsterdam's Cartography (section 5.1.1)
	02/12/2022	Milena Calvo Juarez, Julia Steketee	IAAC	Contribution to Barcelona's Cartography (section 5.1.2)
	02/12/2022	Katharina Schneider, Margrét Katrín Guttormsdóttir	ITC	Contribution to Blönduós' Cartography (section 5.1.3)
	02/12/2022	Stine Milling, Mathias Andersen, Mikkel Christian Knudsen Holst	CPH	Contribution to Copenhagen's Cartography (section 5.1.4)
	02/12/2022	Stefan Press, Cristina Olivotto, Karima Habbes	RU, OLF, GESTE	Contribution to Geneva's Cartography (section 5.1.5)
	02/12/2022	Zoe Romano, Liat Rogel	MD, MILAN	Contribution to Milan's Cartography (section 5.1.6)
	02/12/2022	Zoe Romano, Liat Rogel	FCGP	Contribution to Paris's Cartography (section 5.1.7)
	02/12/2022	Karin Kruup	TUT	Contribution to Tallinn's Cartography (section 5.1.8)
	02/12/2022	Bojan Baletić, Rene Lisac, Morana Pap, Roberto Vdovic	UoZ, FLZG	Contribution to Zagreb's Cartography (section 5.1.9)
0.3	09/12/2022	Antoine Coudard, Apurva Singh	META	Internal review
0.4	16/12/2022	Frenzi Ritter, Eva Promes, Thomas Rieff	META	Inclusions of comments of internal review
0.5	16/01/2023	Cristina Olivotto	OLF	Peer reviews
0.6	16/01/2023	Roberto Vdovic	FLZG	Peer reviews
0.7	16/01/2023	Frenzi Ritter, Eva Promes	META	Addressing reviewers' comments, revisions
0.8	23/01/2023	Armend Duzha	IAAC	Quality check
0.9	26/01/2023	Frenzi Ritter	META	Final version sent to the Steering Committee
1.0	31/01/2023	Pietro L. Verga	MILAN	Final version by the consortium to be submitted to the EC.

EXECUTIVE SUMMARY

The CENTRINNO Cartography is one of the key infrastructures developed during the CENTRINNO project that aims to support CENTRINNO pilots to visualise locally identified resources and emerging circular opportunities.

Consisting of two parts, the CENTRINNO Cartography is both an **internal** mapping tool for pilots, as well as an external communication platform to educate about urban ecosystem mapping and disseminating mapping outputs. The website shares selected interactive maps and so-called **mapping stories** that guide visitors through the mapping journeys and applied methods of each pilot. Mapping stories present both current-day and historic contextual challenges we have identified, as well as first ideas of circular opportunities, visualised in an interactive fashion.

In the background, pilots have access to individual KUMU maps that act as a visualisation tool of local stakeholder networks, and their skills and resources which we have collected with bottom-up methods, such as interviews, literature research, and surveys. These internal KUMU maps are selectively shared on the website, whilst also used internally by each pilot.

Within this document, the live and functioning Beta Version of the CENTRINNO Cartography website is introduced. Internally used maps which are not publicly shareable are demonstrated with screenshots and images.

TABLE OF CONTENTS

REVISION HISTORY	3
EXECUTIVE SUMMARY	4
1. INTRODUCTION	8
1.1. Purpose and Scope	8
1.2. Contribution to other Deliverables.....	9
1.3. Structure of the Document.....	9
2. BACKGROUND	10
2.1 The mission of the Cartography.....	10
2.2 Development progress.....	11
3. CARTOGRAPHY BETA VERSION	14
3.1. Overview of the Cartography Infrastructure.....	14
3.2. KUMU Dashboards.....	15
3.3. CENTRINNO Cartography Website.....	19
4. PROGRESS ON THE NEIGHBOURHOOD ANALYSIS MAPS	21
5. PILOT CARTOGRAPHIES	23
5.1.1. Amsterdam.....	25
5.1.2. Barcelona.....	26
5.1.3. Blönduós.....	27
5.1.4. Copenhagen.....	28
5.1.5. Geneva.....	29
5.1.6. Milan.....	30
5.1.7. Paris.....	31
5.1.8. Tallinn.....	32
5.1.9. Zagreb.....	33
6. CONCLUSION & NEXT STEPS	34
6.1. Key insights.....	34
6.2. Towards the final version.....	36
REFERENCES	38
ANNEX	39

LIST OF FIGURES

Figure 1 - Roadmap towards the Cartography Beta Version	11
Figure 2 - Exploring Opportunities for Circularity through the MIRO platform	13
Figure 3 - Components of the CENTRINNO Cartography.....	14
Figure 4 - Soil pollution and agricultural projects across Paris. Dark green circles..... illustrate stakeholders directly involved by the pilot. Red triangles show potential.. soil pollution. Maps show a cluster of potential soil pollution around the pilot area.	18
Figure 5 - A sample from the CENTRINNO website homepage	19
Figure 6 - Landing Page	20
Figure 7 - The Cartography Alpha Version demonstrator	21
Figure 8 - Interactive neighborhood map for Amsterdam	22
Figure 9 - A CENTRINNO website sample showing the different pilots and their..... cartography pages.....	23
Figure 10 - A high-level map of different districts in Tallinn, with scores on green..... space cover specifically	35
Figure 11 - A context map of Barcelona’s wood stock within the Sant Martí neighbourhood.	36

LIST OF TABLES

Table 1 - An overview of the Cartography components and their scope	8
Table 2 - Original KUMU views proposed in the Cartography Alpha Version and..... implemented changes	15
Table 3 - Overview of the different maker & craftspeople maps per Pilot	16
Table 4 - Case studies - KUMU Opportunity Mapping	17
Table 5 - Selection of neighbourhood-scale output indicators across three pillars	21

ACRONYMS & ABBREVIATIONS

ACRONYM	DESCRIPTION
CENTRINNO	New CENTRAlities in INdustrial areas as engines for inNOvation and urban transformation
FCH	Fab City Hubs
MFA	Material Flow Analysis
WP	Work Package

GLOSSARY

TERM	DEFINITION
KUMU	KUMU is an open-source software, used for mapping stakeholder networks, complex systems or community assets. It is the platform that CENTRINNO pilots will use to organize, visualize and analyse data collected on the current and future CENTRINNO Network, its resources and resource flows
Mapping Story	Blog post & interactive embedded maps in which pilots present their cartographic results and insights
Bottom-up data collection	First-hand collection of primary data on local stakeholders and their resources via interviews and surveys
Top-down data collection	Collection of publicly available secondary data from geoportals, waste statistics and literature

1. INTRODUCTION

1.1 Purpose and Scope

The CENTRINNO Cartography is one of CENTRINNO's key digital infrastructure components, supporting the project's pilots to identify, build and visualise local circular ecosystems and opportunities emerging from local resource mapping. Developed in an iterative approach, this document demonstrates and discusses the second iteration of the CENTRINNO Cartography, referred to as the CENTRINNO Cartography Beta Version. The Cartography Alpha Version was published in M17 and has been made accessible on the [CENTRINNO Resources](#) Archive [1].

The objective of this deliverable is to showcase the development progress of the CENTRINNO Cartography since the last iteration was published and to discuss changes and differences between the demonstrator presented in February 2022. In contrast to the first iteration of the Cartography, the Cartography Beta Version consists of a live website which includes nine 'mapping stories' from each of the CENTRINNO pilots. These mapping stories weave together the applied urban ecosystem mapping methods that were developed and presented as part of the CENTRINNO Urban Ecosystem Mapping Guidebook (D2.1) [2]. Material flow analyses (MFAs), geospatial maps of the pilot areas and stakeholder maps are embedded in these stories and highlight opportunities for circularity that emerged from the co-mapping activities between pilots and project partners.

An overview of the Cartography components and their scope demonstrated within this deliverable is presented in the following table.

Table 1 - An overview of the Cartography components and their scope

COMPONENTS	DESCRIPTION	SECTION	FORMAT
Website (external)			
CENTRINNO Cartography Website	Externally-facing website that provides methodology, resources for replicating the methodology and pilot-specific mapping outputs to a wider audience	Section 3.3	Live version
Public cartography blog posts (Mapping stories)	Interactive maps, material flow diagrams and shareable KUMUs are embedded within blog posts for each pilot. The posts shall guide readers through the mapping journey and first circular opportunities identified around pilot's stakeholders and their resources	Section 3.1	Live version
KUMU Maps (internal)			
Internal KUMU maps	Since not all mapped resources and information about stakeholders can be shared publicly yet, we will demonstrate internal maps with screenshots and description of the purpose	Section 3.2 & ANNEX	Screenshots of KUMU maps for relevant pilots (ANNEX)

1.2 Contribution to other Deliverables

The Beta Version of the CENTRINNO Cartography has been influenced by and builds upon the following other deliverables:

D2.1 [Urban Ecosystem Mapping Guidebook](#) (M08) [2]: The Cartography Beta Version relates to the Urban Ecosystem Mapping Guidebook in two ways. One, the website of the Cartography presents a shortened version of the urban mapping methods to a wider audience. We use the website to educate potential replicators of the CENTRINNO methods on how urban ecosystem mapping can inform urban regeneration and circularity. Second, the full guidebook is made available in the website's resource library.

D2.2 [CENTRINNO Cartography Alpha](#) (M17) [1]: The website presented within this deliverable was built out based on the concepts explained and presented within the CENTRINNO Cartography Alpha Version. Further, proposed KUMU maps presented within D2.2 have been partially adjusted to accommodate the diverse needs and new insights emerging from urban resource mapping activities of pilots during Sprint 2.

D4.1. **Detailed Pilot Planning and Monitoring Framework** (M08 [3]: This deliverable also took into account and was shaped by the planning timelines of pilots. To align with their planning timelines, the scope of the CENTRINNO Cartography Beta Version was designed in its scope to match the differences in pilot focus points between the key concepts and differences in progress along the urban ecosystem mapping process. Practically, this means that the Beta Version of the Cartography publishes interactive maps and mapping results as part of **mapping stories** that guide the reader through the diverse application of urban ecosystem mapping that have been applied by our pilots.

1.3 Structure of the Document

The remainder of this document will be structured as follows:

Section 2 gives an update on the mission of the Cartography Beta Version as well as a detailed description of the development approach and progress since the publishing of the demonstrator in February 2022.

Section 3 introduces the components of the Cartography Beta Version, covering (1) the website and (2) an updated description of the KUMU Dashboards. We will present links to online materials and screenshots of the internally used Dashboards to present the progress.

Section 4 is dedicated to dive deeper into the progress of one mentionable component of the Urban Ecosystem Mapping approach- the neighbourhood analysis. The neighbourhood analysis was proposed as a harmonised approach to compare and contrast post-industrial neighbourhoods with other areas within and between cities. Since the Alpha Version of the Cartography foresaw a publishing of these interactive maps, we decided to dedicate a short chapter, explaining the progress and challenges with this approach.

Section 5 contains nine overview pages for each of the pilot's progress on the CENTRINNO Cartography. Links to the online Cartography pages and embedded mapping stories are found within these tables.

Lastly, in **Section 6**, we will present some of the challenges, learnings and next steps for the development of the final version of the Cartography.

2. BACKGROUND

2.1 The mission of the Cartography

Within the first version of the CENTRINNO Cartography, the mission and objectives of the CENTRINNO Cartography have been laid out [1]. To recall this mission, the CENTRINNO Cartography should become “**an open-source tool to mediate the reorganisation of industrial and productive communities towards a circular system**” [1]. Each of the components of the CENTRINNO Cartography play a different role in achieving this mission. Above all, the introduction of KUMU, an open-source mapping tool, to map and visualise local stakeholders and their resources aims to empower the CENTRINNO pilots and similar actors to self-organise local production ecosystems into a more circular model. Ultimately, the goal of the Cartography is to showcase the diversity of circular synergies that can emerge from mapping local stakeholders, urban waste streams and urban ecological systems. The website developed for this project has the mission to inspire others to follow a similar approach as our CENTRINNO pilots.

Apart from these previously established goals, the second sprint period has led to new insights into the mission of the Cartography that we have not elaborated upon in the previous iteration. To reflect these additional needs from our pilots, we would like to add three revised objectives that we aim to achieve with the CENTRINNO Cartography:

- **Giving visibility to makers:** Several interviews between pilot teams and their stakeholders have confirmed that makers and industrially active businesses are under immense pressure from real estate developments and urban transformation processes. Lacking workshop space at affordable prices, ending contracts and changing zoning laws are undermining the continued existence of makers around CENTRINNO's pilot areas. Often, maker communities lack a shared voice to lobby for their needs within urban development processes. Pilots such as Amsterdam have used the CENTRINNO Cartography to give a centralised face and voice to local maker communities and raise awareness about the diversity and assets that makership contributes to their neighbourhood (see [Section 5.1.1](#)).
- **Supporting facilitators to make new connections:** The sharing of resources (such as space, materials or knowledge) rests upon human connections and knowledge on who knows whom, who knows what and who has what. There are a lot of informal networks present between maker communities already and the goal of a digital platform to substitute these non-digital connections is neither feasible nor desirable. Yet, Fab City Hubs (FCH) can act as successful facilitators of new connections and concrete resource exchanges by bringing together the right stakeholders and inspiring a discussion. It is often in informal conversations between pilot teams and local stakeholders as part of the “stakeholder interviews” in which new ideas emerge. The Cartography as a platform and tool can help facilitators to keep note of the outcomes of the informal “mapping process”. It can help them to keep an overview of emerging ideas from their stakeholders, even if maps are only used internally.
- **Providing circular inspirations:** Both existing and potential opportunities for circular resources sharing have emerged from our mapping activities, interviews and desk research. As an example, pilots like Geneva and Tallinn are discussing the introduction of biowaste processing technologies into their hubs to process available biowaste streams from businesses and citizens clustered in post-industrial areas. The mission of the Cartography should be to help our pilots to inspire others with these opportunities by tangibly showing what is possible with the resources already present locally.

2.2 Development Progress

Since the publication of the CENTRINNO Cartography Alpha Version [1], the development goal for the Beta Version was to translate the designs and concepts into a functional and live website which shares a first set of maps of resources, ecosystems or local stakeholders. Further, the pilot sprint in the Summer 2022 was to be used by pilots to interview and survey their stakeholders to collect information on local resources, skills and assets available. Based on this information, **opportunity workshops** with each pilot were planned to extract first circular opportunities emerging from local resource mapping, material flow mapping or other geospatial mapping activities. The results of this workshop and all relevant related maps were shaped into a mapping story (blog post) that walks readers through the insights and learnings that emerged from multiple mapping activities (Figure 1). These blog posts and embedded maps can also be shared within the CENTRINNO main website as a blog, as well as content on the CENTRINNO Cartography website.

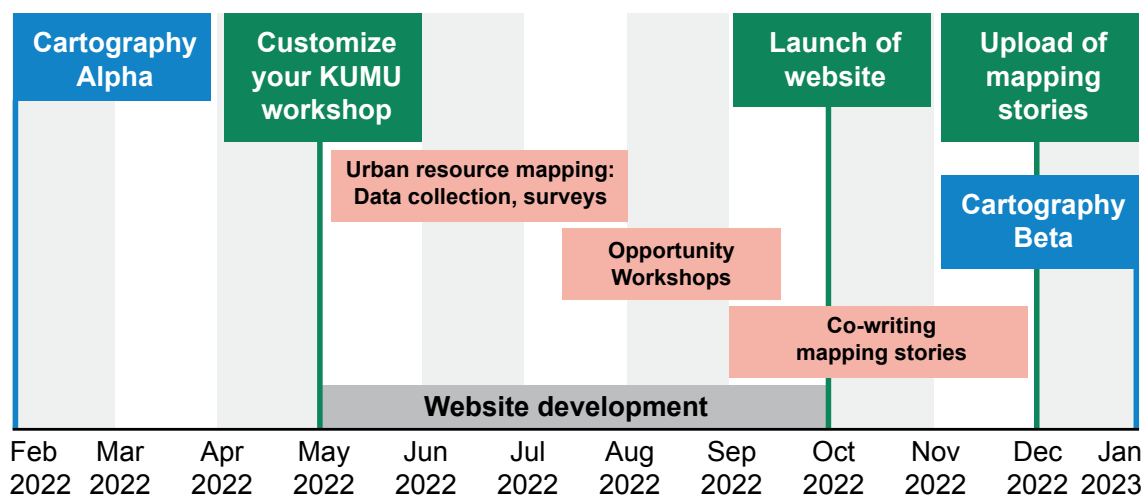


Figure 1 - Roadmap towards the Cartography Beta Version

A more detailed description of the main steps and development milestones, as well as the rationale behind them follows:

1. Urban Ecosystem Mapping in Sprint 2. Urban resource mapping continued on two levels during Sprint 2. On one level, Metabolic worked with pilots to collect further data on urban metabolisms, urban material flows and geospatial characteristics. This mapping sprint led to the development of a range of urban metabolism-inspired analyses: (1) an urban wood stock analysis of Barcelona’s urban mine, (2) a municipal waste material flow analysis (MFA) for Tallinn, (3) a municipal waste MFA for Amsterdam, (4) a wool waste MFA for Iceland, (5) a spatial visualisation of waste collectors and their waste volumes of Milan, (6) a micro-scale urban mining analysis of a brownfield site in Zagreb and (7) demolition and construction waste MFA for Geneva ([ANNEX](#)). Furthermore, close discussions with pilots have helped to map specific data layers on urban ecological, social and economic per pilot city that were deemed relevant to understand the local challenges. It is important to note that not all maps are publicly shared. The reason for this is that we learned over time what scales and data layers do make sense for the agenda of CENTRINNO’s pilots and, in turn, which types of maps lack relevance. Only maps that pilots found meaningful for their mapping stories are shared within the website. An overview of the maps we created for each pilot can be found in the [ANNEX](#).

- The second level of urban ecosystem mapping progress refers to the **bottom-up data collection** of resources, skills and infrastructural assets present within already identified and mapped stakeholders. At the beginning of Sprint 2, pilots and Metabolic had a one-on-one check-in to define a target for interviewing stakeholders on their available resources. An elaborate [survey template](#) in excel sheet format was developed to support pilots in this process. A few pilots made it their focus during this sprint to conduct a range of interviews, whilst others focussed on a small number of stakeholders to test the survey. As such, Barcelona and Amsterdam spearheaded the interviewing process and conducted 25 and 28 interviews respectively. Geneva, Tallinn, Blönduós, Copenhagen and Paris followed a different approach and interviewed a small number of stakeholders (between 3 and 10) each. Zagreb and Milan opted for different stakeholder engagements and did not focus on the bottom-up identification of resources within their stakeholder ecosystem. Elaborating the reasons for different levels of engagement in bottom-up resource mapping for each individual pilot is beyond the scope of this report. Yet, a few main reasons for delayed or limited engagement with this data collection method have emerged across several pilots. These include:
 - **Limited focus on circularity:** The bottom-up collection of existing waste streams within local makers, producers and other stakeholders is a very time consuming and lengthy process. For some pilots that focus on any of the other key concepts, interviewing a range of stakeholders on their resources is not a main priority. In this case, we have prioritised other forms of ecosystem mapping or top-down data collection that pilots can use as an entry point to raise awareness and educate on topics relating to circularity.
 - **Concerns about data use & purpose:** Sometimes, pilots have found it challenging to communicate the ways that data on local resources will be used or visualised in the project. A recurring response from stakeholders was that they were uncertain why they should disclose their waste streams, infrastructure and other assets available for sharing. In these cases, pilots were asked to interview only a handful of close stakeholders. Based on these stakeholder interviews and identified circular opportunities, we can showcase the uses of the CENTRINNO Cartography. This way, we hope pilots will have materials to show, educate and convince their stakeholders to further engage in the Cartography.
 - **Focus on other mapping methods:** Surveying and bottom-up data collection of waste resources is only one of the mapping methods laid out in the CENTRINNO Urban Ecosystem Mapping Guidebook. For some pilots, this scale of mapping was less relevant compared to one of the other mapping methods, such as top-down MFAs.

2. Opportunity Workshops

Whilst mapping activities moved at different paces, we have organised opportunity workshops with each pilot to come together and analyse the insights we gained from the diverse mapping results of the last year. Prior to the two-hour workshop, Metabolic synthesised the mapping progress and conducted further literature research to present to the pilots a current-state baseline of our knowledge on urban social, ecological and industrial issues. The workshops were structured as follows:

1. Exploring your context: Pilots had 15 minutes time to explore all maps and generate insights. Participants were prompted to write questions and remarks around the maps to communicate what information was new, interesting or unclear to them.

2. Discussion round: Afterwards, we had an open discussion on what pilots learned and what information we should explore further.
3. Opportunities: In the preparation for this workshop, Metabolic identified a set of opportunities that emerged from the collected data (both from top-down maps and bottom-up stakeholder maps in KUMU). Pilots were again asked to explore the opportunities and leave remarks on what resonates most with them. A discussion followed in which we decided on one or two opportunities to share in a Mapping Story part of the Cartography Beta Version.
4. Developing a Mapping Story Narrative: Lastly, participants and Metabolic agreed on a rough structure and narrative of the Mapping Story for the Cartography and picked a number of relevant maps, KUMUs and other insights to include in this blog.

OPPORTUNITIES FOR CIRCULARITY

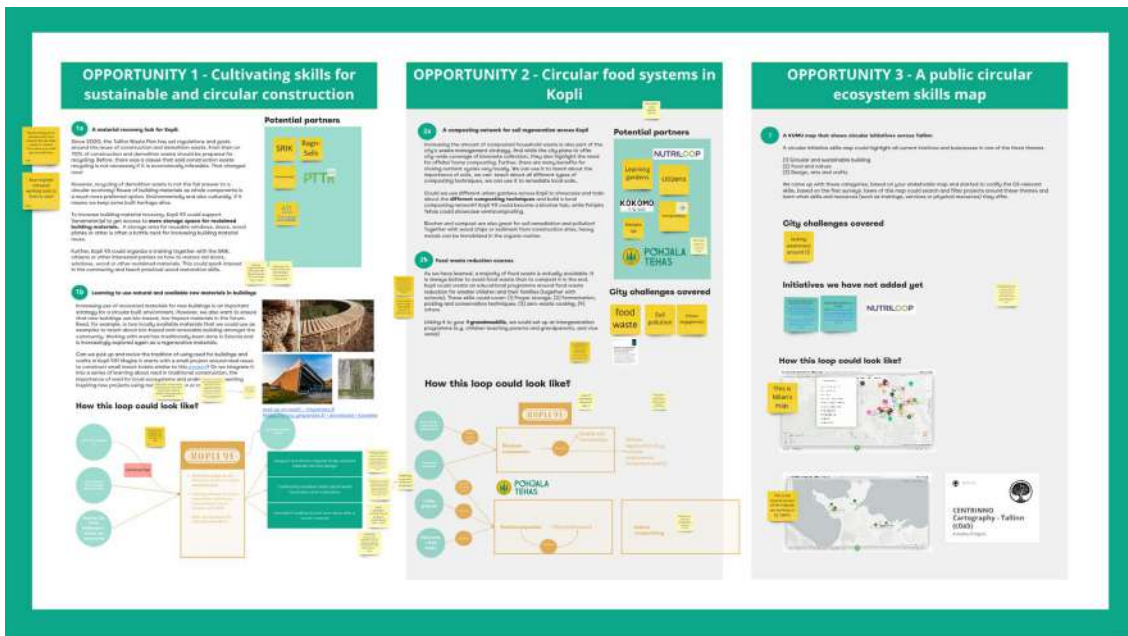


Figure 2 - Exploring Opportunities for Circularity through the MIRO platform

3. Mapping Stories Writing

After the workshops, Metabolic or the pilot team drafted a blog post and prepared a shareable version of the relevant mapping materials, such as KUMUs, maps or MFA diagrams. Content was reviewed and adjusted by the pilot to ensure that all information correctly reflected the local context. Once completed, the Mapping Stories were published on the respective pilot cartography pages within the CENTRINNO Cartography Website and also linked as blog posts on the main CENTRINNO Website.

3. CARTOGRAPHY BETA VERSION

3.1 Overview of the Cartography Infrastructure

The Cartography Infrastructure of the Beta Version remains closely aligned with the proposed structure described in the Alpha Version. As explained in the CENTRINNO Cartography Alpha Version, the main components are an external website that links towards the main CENTRINNO Website as well as a KUMU project developed for each pilot.

While the website's main purpose is to communicate and showcase mapping outcomes, KUMU remains the main functional tool for pilots to gather all information on their stakeholders in one place. In the remainder of this section, we will outline the main differences between the first iteration of (1) the KUMU Dashboards and (2) the website structure, audience and content.

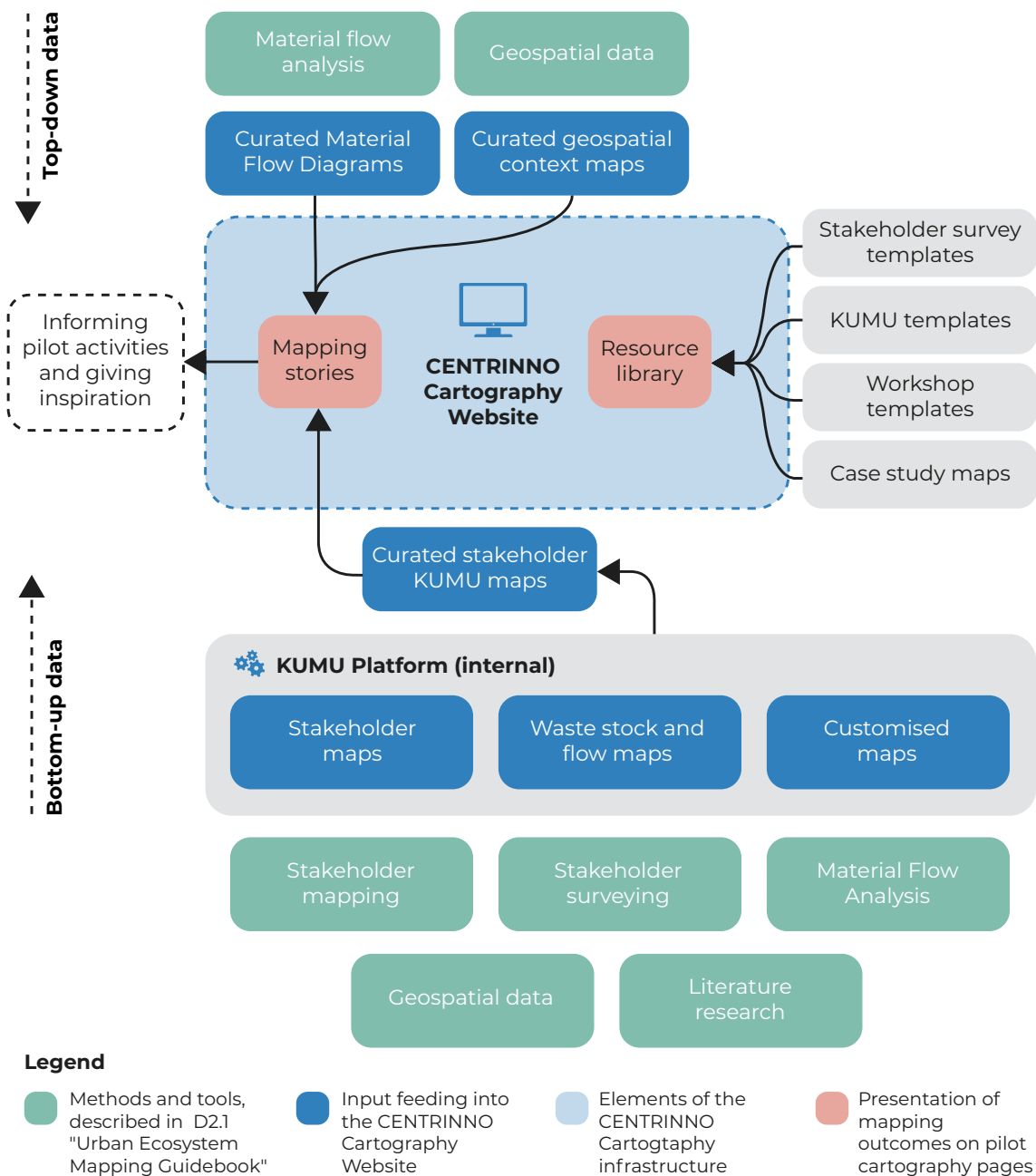


Figure 3 - Components of the CENTRINNO Cartography

3.2 KUMU Dashboards

3.2.1. Alterations to the KUMU Dashboards

Our continued work with the pilots has led to slight deviations of the way KUMU was used by pilots and Metabolic. Originally, we proposed four “views” within KUMU. The following tables illustrate the changes we integrated and the new views we have added to some of the pilots.

Table 2 - Original KUMU views proposed in the Cartography Alpha Version and implemented changes

PROPOSED VIEW IN ALPHA VERSION	DESCRIPTION OF ORIGINAL VIEW	CHANGES
Full Ecosystem View	The Full Ecosystem View was proposed as the most exhaustive overview of all mapped stakeholders around the pilots. It was planned as an internal management tool for our pilots.	In the Beta Version, every pilot still has access to one overview of all stakeholders. However, we slightly changed and customised what information we collect on each stakeholder, based on pilot needs. As an example, some pilots reclassified the stakeholders with a more relevant taxonomy, while others added specific data points (e.g. on length of rental contracts)
Waste Flow View	The Waste Flow View was proposed as an example on how to visualise spatially how material streams flow throughout the city.	Apart from Geneva and Blönduós, the majority of pilots did not have access to the right spatial data on waste collectors to visualise waste flows within KUMU. Instead, we resorted to non-spatial Sankey diagrams of material flow analyses to visualise waste flows at different scales for the other pilots. For some pilots, we also adjusted the KUMU to show not waste “flows” but the stocks collected by different waste collectors (Milan).
Roles in the Circular Economy View	Within the Alpha version, we proposed a Circular Economy Roles view to visualise potential contributions of different actors towards a circular system.	During conversations with pilots, it became apparent that it is problematic to assign “roles” to stakeholders without including stakeholders within this discussion. We noticed that the Circular Economy Roles view is limited in its usefulness to create a shared sense of belonging to a circular economy, especially if the terminology is new to businesses. Due to these findings, we moved away from this view. Instead, we worked with some pilots to identify “circular highlights” or “circular champions” within their network. These are businesses with a clear focus on the circular economy which can be showcased on public maps.
Exploration Dashboard	The exploration dashboard intended to be a non-spatial map for pilots to cluster and analyse their stakeholders based on different commonalities.	While the exploration dashboard was used by Metabolic in the analysis of some pilots’ stakeholder networks, it was not adopted by pilots to investigate their own networks. We believe that this limited adoption is due to technical challenges and a steeper learning curve with the platform. Further, we noticed that it was easier and more useful for the pilots to use the spatial maps for filtering and exploring their stakeholder maps.

¹ A Sankey diagram is a type of diagram which is used to visualise differently sized flows of materials, water, energy or other volumes through a system. Flows are represented with differently sized arrows. For an example, see Annex

3.2.2. New additions and customisations

Our continued work with the pilots has led to slight deviations of the way KUMU was used by pilots and Metabolic. Originally, we proposed four “views” within KUMU. The following tables illustrate the changes we integrated and the new views we have added to some of the pilots.

Makership & Craftspeople Maps

In response to a workshop session at the consortium meeting in Barcelona in May 2022 and several one-on-one calls with the pilots, we complemented the above-mentioned KUMU maps with pilot-specific map views. The most common use case for pilots that we worked on can be described as curated “**Makership and Craftspeople Maps**”. As already mentioned in the Cartography Alpha Version, pilots have indicated the importance of having a publicly shareable map of all creative and productive industries that are characterising the diverse pilot areas. During the last months, the majority of pilots have realised such maker and craftspeople maps, based on their initial full ecosystem map (which also included stakeholders such as real estate developers, government agencies or waste collectors). The difference in these maps is that a lot of the background information collected on these stakeholders remains hidden, while only some data is publicly shown. These maps also take different forms, depending on the pilot’s focus. An overview of the explored types of maps is found in the table below.

Table 3 - Overview of the different maker & craftspeople maps per Pilot

TITLE	PILOT	FUNCTION	LINKS
Circular Skills Map	Tallinn, Paris	Allow users to explore skills around circular economy topics relating to food systems and built environment	Tallinn’s Circular Ecosystem Map Paris’ Circular Skills Map
Creatives and Maker map	Copenhagen, Barcelona, Amsterdam, Geneva, Milano	Allows pilots to give a common visibility to makers in the pilot neighbourhoods to act as a communication tool towards policy makers and public on the importance and diversity of creative businesses.	Copenhagen’s Creative Industries Map (private) Barcelona’s Maker Map Amsterdam’s Makers in Noord Map Milan’s Manifattura Milano Map Geneva’s Discover the ZIC Map
Textile Ecosystem Map	Blönduós	Shows all members of the textile value chain revolving around sustainable and local wool production to create shared identity around regenerative wool system	Blönduós’ Textile Ecosystem Map

Opportunity Maps

During the second sprint, we also used KUMU maps to draw potential identified connections between mapped stakeholders to visualise where possible circular synergies could emerge. These “opportunity maps” are embedded within pilots’ mapping stories to better visualise how local resources, stakeholders and infrastructures could be connected in closed loops. Two examples are shown below.

Table 4 - Case studies - KUMU Opportunity Mapping

Case study

INTRODUCING DECENTRALISED BIO-WASTE PROCESSING INTO PRODUCTIVE CLUSTERS

During our opportunity workshops with some pilots, we identified an opportunity to close local bio-waste streams from wood industries, food industries and local communities via decentralised micro- and meso-scale composting or biochar generators. We have made use of KUMU to showcase the possible networks of stakeholders that could be brought together.

Micro Biochar Generator

LINKED TO KNOWLEDGE

Links

Saw dust and wood chips have been identified as a common by-product by the community of wood trades within the ZIG. Over 1000m3 of wood chips alone are generated by Les Deux Revêres, the only mobile saw mill in the area.

Outside the ZIG, there are also many other private and public wood-based resources. For example, the city's garden and tree maintenance service SEVE generates 3000m2 wood chips from that are currently composted at the SEVE facility for biogas production. A number that will hopefully drastically increase as the city is rolling out their ambitious tree planting projects.

This biomass could be an interesting feedstock for a site-owned biochar producer that generates biogas for electricity and biochar for soil remediation across the city.

Available technologies

Oekozentrum - Pyro Power Plant Based in Switzerland, oekozentrum developed a process to create clean energy and biochar from biowaste residues.

Legend

- Wood trader
- Food waste
- Biowaste resource
- potential saw dust position

Opportunity Map of Tallinn - Food waste and soil regeneration opportunities

Vermicompost at Põhjala linnaaed

LINKED TO KNOWLEDGE

Links

Worm bins (vermicomposters) are special containers made for composting food waste with the help of earth worms. With worm bins, we can box compost food waste indoors and outdoors. Since the city of Tallinn requires home composting to be covered, vermicomposters could be a good solution. The local composting expert Kompostjon could help in the design and choice of the right composting solution for the Põhjala Tehas complex and its food-waste producing businesses.

VERMICOMPOSTING

Legend

- Food waste & biomass
- Digital, firms and ecological initiatives
- Shared resources
- Cultural institutions
- Markets, designers and infrastructure
- Facilities
- Output
- Composting technology
- Spent grain (wheat)
- Biorefinery and millerage
- Food Community
- Waste water treatment

Opportunity Map of Geneva - Biochar generation from local saw dust and spent grain

KUMU and top-down data

Another addition that we worked on during the last sprint is to integrate top-down data into KUMU directly. Before, most geospatial mapping of top-down data was visualised outside of KUMU in other (static or interactive) maps. As an example, for Paris, we mapped possible soil pollution sites and all existing food-growing locations in the city to identify (1) potential challenges for urban food production in proximity to soil pollution and (2) identify skills of food growers who have adopted strategies of soil-less, vertical or other forms of food production possible on polluted soils.

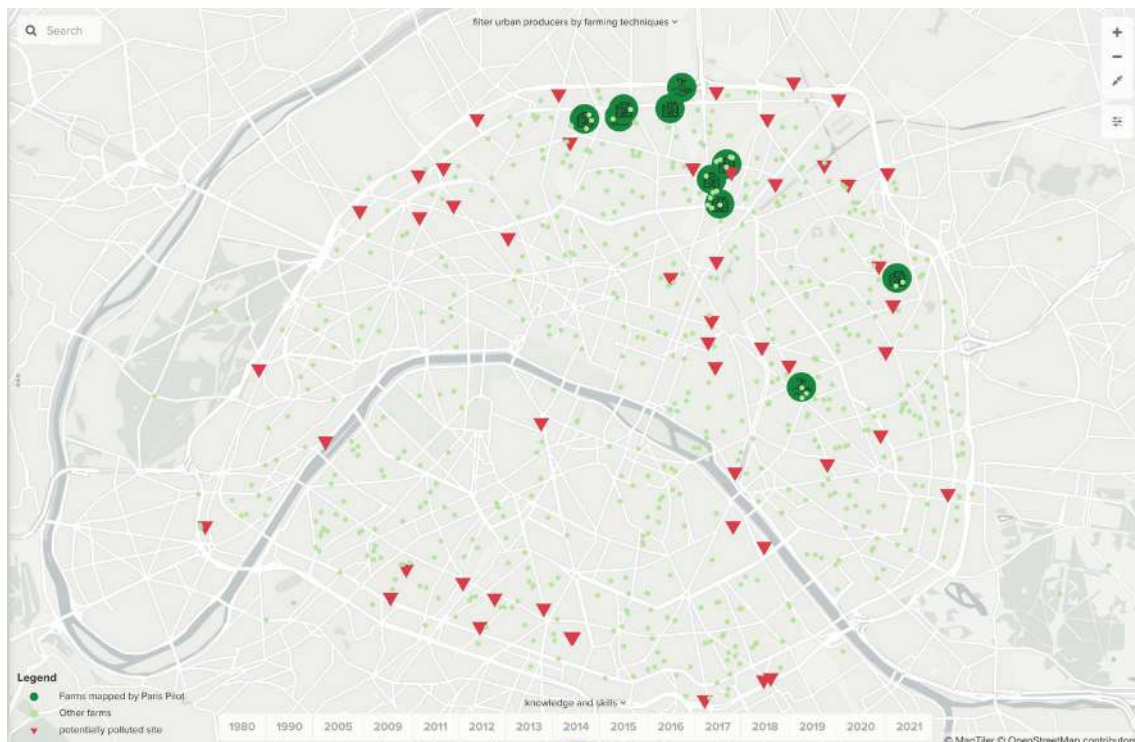


Figure 4 - Soil pollution and agricultural projects across Paris. Dark green circles illustrate stakeholders directly involved by the pilot. Red triangles show potential soil pollution. Maps show a cluster of potential soil pollution around the pilot area.

Reflections and next iterations

The last sprint has indicated both potentials and challenges of working with KUMU as an open-source mapping platform to visualise both bottom-up and top-down data on local resources, stakeholders and infrastructures. Overall, the vast flexibility of the platform has proven to be a success since it allows each pilot to find their own use cases and realise desired functionalities within the platform. Yet, the flexibility also led to a trend of **divergence** between the maps, their functionalities and the way we categorise mapped stakeholders. Initially established stakeholder taxonomies were partially adjusted and extended by pilots and the comprehensive list of possible resources to be mapped has also been customised, depending on a pilot's focus on waste, infrastructure or skills-mapping.

During the third and final sprint, it will be our challenge to **converge** the diverse ways our pilots made use of the platform into a replicable blueprint (Section 6.2 for more information).

3.3 CENTRINNO Cartography Website

The CENTRINNO Cartography Website has been developed during the second sprint period of the project in the summer 2022. Its purpose is to share learnings, inspirations, tools and outputs from the urban ecosystem mapping process that CENTRINNO pilots have been following. The target audience of the CENTRINNO Cartography covers other community-centred innovation hubs or Fab City Hubs with an interest to become facilitators of circular ecosystems in their neighbourhoods. **Inspiring and empowering these actors to learn from the Cartography journeys of CENTRINNO pilots is one of the main goals of this infrastructure.**

3.3.1. Connection to other CENTRINNO resources

In close alignment with other CENTRINNO partners, we made the decision to build the CENTRINNO Cartography Website on a separate server from the project’s main site. The reason for this decision was to simplify the maintenance and development process of the platform which was carried out by Metabolic. To allow a smooth connection, the Cartography can be accessed from the main homepage of the [CENTRINNO](#) website that brings users to the CENTRINNO Cartography website (Fig. 6). This solution was worked out as part of the regular monthly WP1 infrastructure meetings.

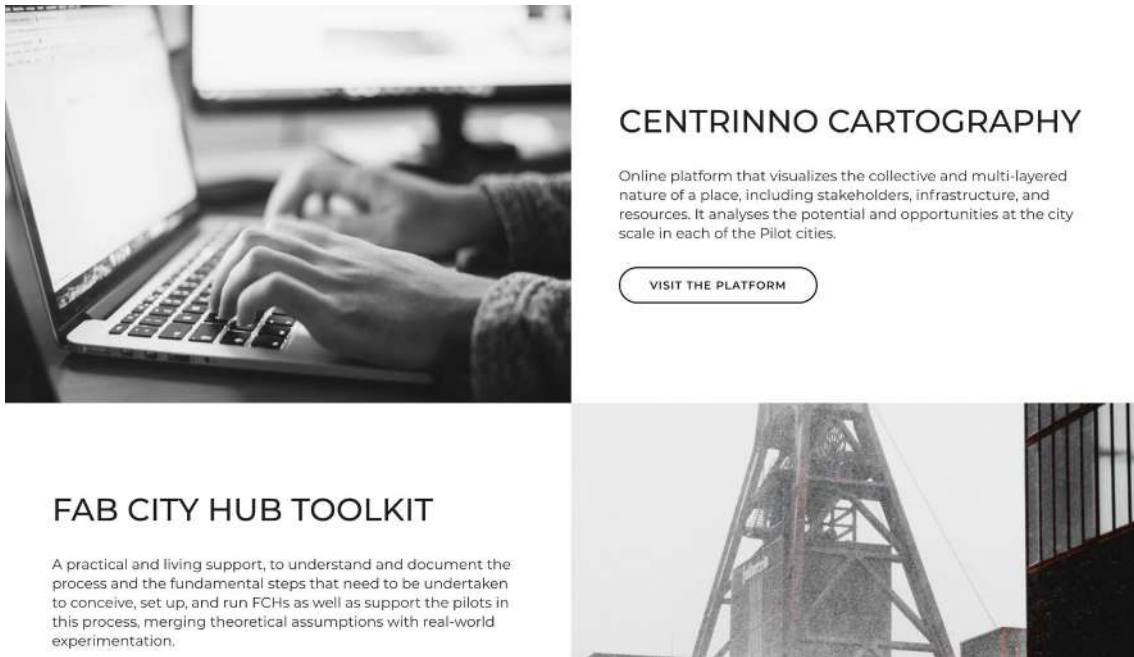


Figure 5 - A sample from the CENTRINNO website homepage.

3.3.2. Website structure and changes

No major changes to the website pages and structure was made in comparison to the Cartography Alpha Version. The website remains structured around the following pages:

- A home page
- A methodology page
- Nine pilot pages
- A resource library

One of the only mentionable changes refers to the reduction of mapping steps from five to three steps to reduce the complexity of the process, described in the methodology page. **Step 1** embraces the mapping of local urban contexts, encouraging pilots and other similar urban actors to become “context detectives” of socio-economic and ecological local specificities. Becoming a “context detective” means embracing multi-disciplinary research and following different clues to learn about local challenges from various angles. It means diving into locally conducted research articles and studies about soil pollution if no consolidated city data is available. It could also mean supplementing and deepening top-down data with local experiences. To illustrate such a diverse research pathway, Tallinn is a good example. Here, city data on green space loss we had collected sparked conversations in the pilot around reasons for a reduction of green spaces in the area, discovering the concerning trend of homeowners to convert biodiverse gardens into parking spaces. Without such deep context knowledge, it is hard for pilots to create adequate training programs (e.g. spreading knowledge on benefits of maintaining biodiverse gardens). In **Step 2** (Getting local), we apply bottom-up mapping methods, such as surveys, interviews and informal conversations to identify stakeholders and their resources. Lastly, **Step 3** outlines activities that encourage the identification and exploration of circular opportunities by connecting local resources. For each step, the website presents embedded examples from our pilots and a link to the resources in the resource library to download templates for replication. Changes for the pilot pages are further elaborated in Section 4.



Figure 6 - Landing Page

4. PROGRESS ON THE NEIGHBOURHOOD ANALYSIS MAPS

In the demonstrator of the CENTRINNO Cartography - Alpha Version, we presented our approach to analyse post-industrial neighbourhoods of all CENTRINNO pilots and their wider socio-economic and ecological context (Fig. 7). During the second sprint period, we continued working on these interactive neighbourhood maps by collecting public information, sourced from public datasets provided by pilots and OpenStreetMaps that could be used as indicators of the three pillars of **Ecological Health**, **Economic Inclusion** and **Liveability** (Table 5). Since the data between cities varies, the scores cannot be compared between cities but it does give a clear indication of city-wide specificities across neighbourhoods, helping pilots to gain a better contextual knowledge on how their pilot areas compare to other areas in their cities. Based on this knowledge, pilots shall be prompted to reflect on whether any of their activities are directly addressing identified challenges. But more importantly, we aim to use these maps as a vehicle for communicating neighbourhood-specific needs and challenges to policy makers for more inclusive and sustainable neighbourhoods in the municipalities in the future. For example, we envision a map providing a city-wide overview on where residential areas are combined with comparatively low green scores or high-pollution values. These ‘critical’ neighbourhoods could then be marked as needing direct attention, giving a direct indication to policymakers on where action is needed.



Figure 7 - The Cartography Alpha Version demonstrator

Table 5 - Selection of neighbourhood-scale output indicators across three pillars

ECOLOGICAL HEALTH	LIVEABILITY	ECONOMIC INCLUSION
<ul style="list-style-type: none"> Air pollution Green space coverage 	<ul style="list-style-type: none"> Access to green spaces <i>Urban heat island effect²</i> 	<ul style="list-style-type: none"> Unemployment rate <i>Equal access to education</i>

² Cursive indicators are those where no EU-wide public data at the neighbourhood-scale has been found yet.

To test and reflect on the process and outputs of this analysis, we first conducted a workshop and presentation on the neighbourhood analysis framework. In this session, pilots could give feedback on the types of indicators they deemed important to describe the local context at the level of individual neighbourhoods. Further, during the consortium meeting in Milan in October 2022, we published static versions of first neighbourhood maps, focussing on easily accessible data on green spaces, land use and population (see [ANNEX 10](#)). During a workshop with the pilots, we reviewed together what learnings we can derive from the analyses so far, as well as what data-related uncertainties and challenges remain.

Parallel to the testing with pilots, we have worked on interactive versions of these maps, illustrated in Figure 8. For each neighbourhood, a pop-up shows the values of the scores for each pillar. The values for the indicators were assigned at random for the test map in the figure. The colours of the regions show in which categories the neighbourhoods score the highest. In the future, these indicators will be based on the data openly available and provided by the cities. A prototype of the neighbourhood typologies map is shown below. During the third sprint, we will continue working on the interactive neighbourhood maps, expecting to finish a fully working prototype. By the end of Sprint 3, we will work out strategies with pilots on how the insights of these maps could support their continued communication effort with policymakers.

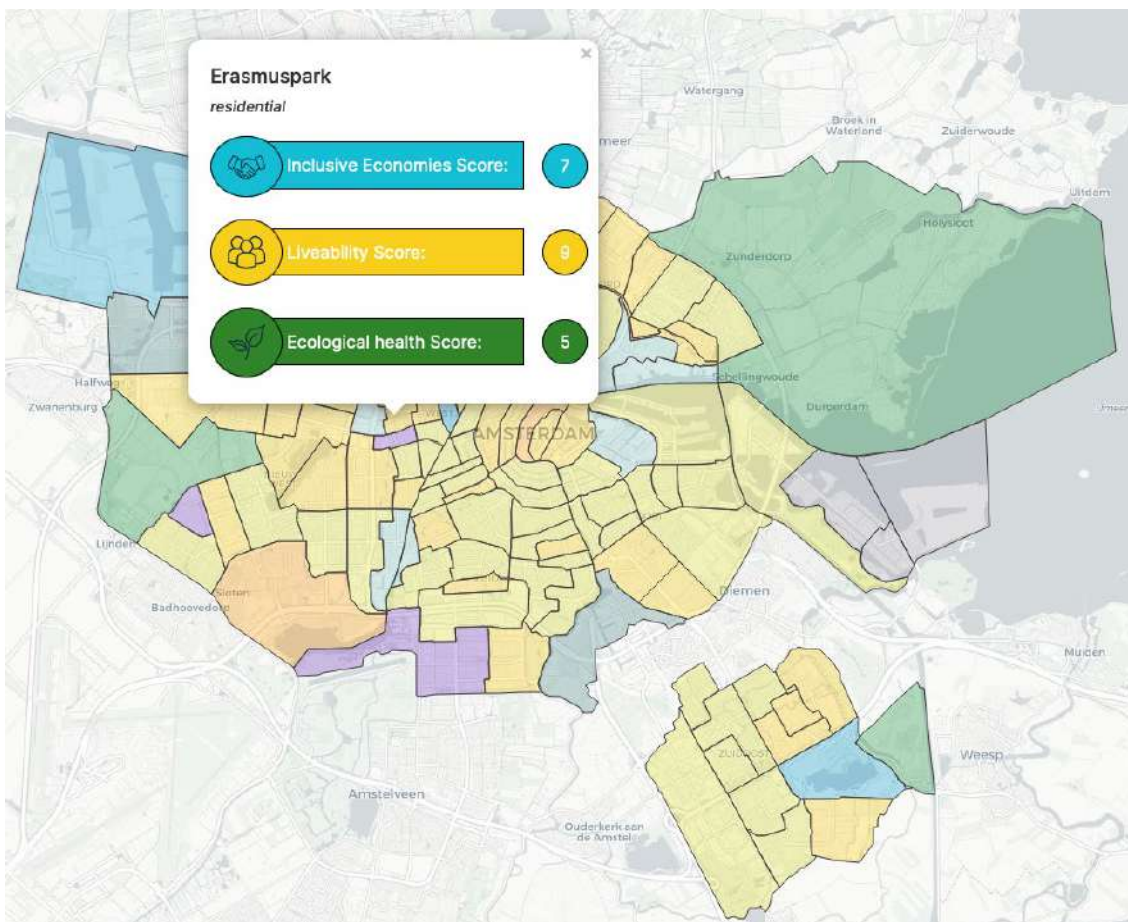


Figure 8 - Interactive neighbourhood map for Amsterdam

5. PILOT CARTOGRAPHIES

One of the website's central components are the pilot cartography pages. These pages are the dedicated space for pilots to share their **mapping stories and galleries of maps**. At the time of this deliverable, each pilot has completed one mapping story including curated maps published on their respective pages. **The goal of these pilot pages is to provide users of the website with applied examples of how different urban ecosystem mapping methods have helped pilots to explore circularity within and around their sites.** Building on our proposed pilot page structure of the Alpha Version, we made a few changes to the Beta Version:

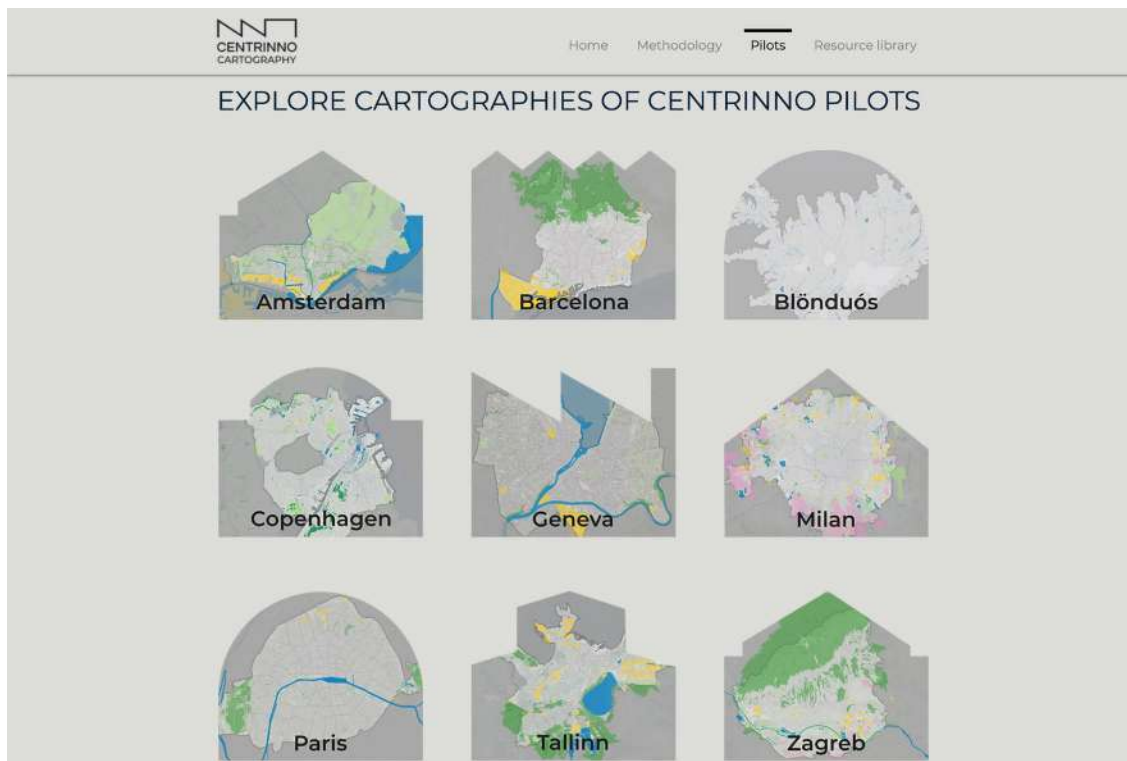


Figure 9 - A CENTRINNO website sample showing the different pilots and their cartography pages

- *Addition of overview on which mapping steps are covered:* In the beginning of each pilot page, we integrated a section that highlights which of the three mapping steps have been a focus point by the respective pilot since not all steps are equally important across all nine pilots. Since the website's purpose is to inspire replication of mapping approaches, this structure shall help users to find pilot mapping stories that specifically address one of the three mapping steps and select tools most interesting to them.
- *Omission of the interactive neighbourhood analysis maps:* As described in Section 4, the neighbourhood analysis maps require detailed data on the neighbourhood-level to become a reliable and valuable tool to derive insightful conclusions. In its current state, harmonised data is still lacking in many aspects, for example within the social or environmental sections of the neighbourhood typologies. For some countries and pilot cities, like Amsterdam, data is readily available on such indicators (Table 5). However, this is not generally the case for the majority of CENTRINNO pilots due to differences in which, at which scale and how well city governments collect data at the neighbourhood level. Furthermore, the ideal system behind the neighbourhood analysis would be based on large-scale, well-updated and in-depth data on the city-level scale. Currently, the used

dataset behind the neighbourhood typologies is based on crowd-sourced OpenStreetMap data, which is the closest we can get to a continuously updated dataset applicable to all pilot cities. This data is however not reliable and detailed enough to be considered valid and usable for all nine pilot cities. Deriving solid conclusions for pilot activities from the current version should be treated with caution. This is why the current website only makes accessible chosen geospatial context maps that focus on specific social, ecological or other geospatial information that was directly relevant to our pilot's insights on either the city or regional level. The [ANNEX](#) shows the broad diversity of these maps.

- *Restructuring page content around mapping stories:* For the Beta Version of the Cartography, it was important to publish the first KUMUs and context maps not as free-standing maps but as part of a wider explanatory blog post. Uploading maps without explanation would make it challenging for readers to follow the rationale behind mapping certain social, ecological and economic characteristics around our pilot areas. Instead, the nine mapping stories have been chosen as a good medium to share the diversity of approaches towards urban ecosystem mapping and identified opportunities covered by the nine pilots. These posts also helped pilots to get a better sense of direction for the future of their mapping activities.
- *Omission of "mapping in action" blogs:* Originally, we proposed a Mapping in Action Section at the end of each pilot page. Since the above-mentioned Mapping Stories already sufficiently cover how mapping has been applied by the pilots, we decided to omit this section.

The following section will, per pilot, elaborate on the different cartography steps that were made over the past year. In **Step 1**, 'Be a context detective' entails any mapping which gives deeper insights into the broader context in which the pilot areas find themselves. This can be data on the city-scale, with varied topics such as housing prices or green space contents. For **Step 2**, cartography steps are included which can be included under the 'Get local' label, meaning any mapping which is focused on the direct locality in which the pilots find themselves or where their project focus is. Within these maps we often find stakeholder information. Finally, **Step 3** 'Synergize, convene and connect' is related to initiatives bringing the collected stakeholders and contextual information together in order to find possible solution entry-points.

5.1.1. Amsterdam

AMSTERDAM'S CARTOGRAPHY

Mapping makership in Noord to give a collective voice to artisans in face of rapid urban transformation.



Progress	
Cartography steps	What have we done?
<p>Step 1 <i>Be a context detective</i></p>	<ul style="list-style-type: none"> 🗺️ Geospatial analysis: Mapped housing inflation and new development projects in Noord. 👤 Material flow analysis: Mapped the city's waste flows from different sectors to visualise current state of Amsterdam's urban metabolism
<p>Step 2 <i>Get local</i></p>	<ul style="list-style-type: none"> 👥 Stakeholder mapping: Mapped 28 makers and producers and their practices in Noord 🗨️ Stakeholder interviews: Interviewed 28 makers and producers in Noord on resource flows, challenges and needs, rental contracts and waste flows. These data are only internally used and not publicly visible.
<p>Step 3 <i>Synergize, convene and connect</i></p>	<p>De Ceuvel 3.0 - Building shared workspaces for makers at risk of displacement and for future makers</p>
Cartography blog post	
Title	Makership as a vehicle for a circular Amsterdam? Link to blog post
Circular opportunities identified	Space and resource sharing in a distributed hub

5.1.2. Barcelona

BARCELONA'S CARTOGRAPHY

Mapping local opportunities for wood waste reuse.



Progress	
Cartography steps	What have we done?
<p>Step 1 <i>Be a context detective</i></p>	<p>🔍 Urban wood stock analysis: Mapped wood stocks in Sant Marti's built environment and in trees, as well as estimated wood waste generation from registered businesses</p>
<p>Step 2 <i>Get local</i></p>	<p>👥 Stakeholder mapping: Mapped 181 makers or other relevant stakeholders</p> <p>🗨️ Stakeholder interviewing: Completed interviews with 25 makers to map the detailed resources, such as skills, technologies, tools and materials for sharing</p>
<p>Step 3 <i>Synergize, convene and connect</i></p>	<p>🔄 Connecting stakeholders: Mapped 92 possible connections for sharing and reusing wood-related resources.</p>
Cartography blog post	
<p>Title</p>	<p>Circular economy opportunities for reusing wood resources in Poblenou Link to blog post</p>
<p>Circular opportunities identified</p>	<ul style="list-style-type: none"> • Sawdust for experimentation • Cellulose pulp for industry • Wood waste storage • Sawdust for urban gardens

5.1.3. Blönduós

BLÖNDUÓS' CARTOGRAPHY

Regenerating Iceland's textile circularity through utilising local wool and alternative fibre solutions.

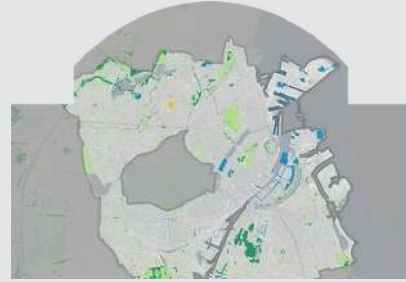


Progress	
Cartography steps	What have we done?
<p>Step 1 <i>Be a context detective</i></p>	<ul style="list-style-type: none"> ✈ Material flow analysis: Mapped wool and textile waste through Iceland. Where possible, we spatialized these flows in KUMU and identified stakeholders who control resource flows 👤 Geospatial Analysis: Mapping of ecological emissions and erosion hotspots to identify potential environmental pressures from sheep farming
<p>Step 2 <i>Get local</i></p>	<ul style="list-style-type: none"> 👥 Stakeholder mapping: Mapped of 66 alternative and regenerative small-scale designers, yarn shops, wool producers and other stakeholders in the wool value chain, as well as alternative fiber sources
<p>Step 3 <i>Synergize, convene and connect</i></p>	<p>Convening stakeholders around a textile cluster</p>
Cartography blog post	
Title	Makership as a vehicle for a circular Amsterdam? Link to blog post
Circular opportunities identified	Space and resource sharing in a distributed hub

5.1.4. Copenhagen

COPENHAGEN'S CARTOGRAPHY

Retaining local makers and creatives within the Copenhagen city area to foster circular innovation.







Progress	
Cartography steps	What have we done?
Step 1 <i>Be a context detective</i>	📍 Geospatial context analysis: Analysed the distribution of creative industries across the city and the development rental prices of real estate listings for workshops, offices and storage spaces
Step 2 <i>Get local</i>	👥 Stakeholder mapping: Mapped 81 stakeholders (75 in the pilot area) and their practices
Step 3 <i>Synergize, convene and connect</i>	🔄 Networking events: Brought together identified stakeholders, such as maker spaces, businesses and educational institutions to identify themes for collaboration
Cartography blog post	
Title	Sharing in times of change - How can a local sharing economy benefit the creative industries in Nordvest? Link to blog post
Circular opportunities identified	Space and equipment sharing between local maker spaces and members of distributed hub

5.1.5. Geneva

GENEVA'S CARTOGRAPHY

Enabling the regeneration of land & soils through the ZIC's by-products wood waste.



Progress	
Cartography steps	What have we done?
Step 1 <i>Be a context detective</i>	<ul style="list-style-type: none">  Geospatial material flow mapping: Mapped wood waste and textile waste flows and respective stakeholders in the waste collection system  Geospatial mapping: Mapped potential soil pollution sites, walkability, green cover across the city
Step 2 <i>Get local</i>	<ul style="list-style-type: none">  Stakeholder mapping: Mapped over 50 craftspeople and businesses in the pilot area  Stakeholder interviews: Interviewed nine craftspeople on their available resources and waste streams to identify circular opportunities
Step 3 <i>Synergize, convene and connect</i>	<ul style="list-style-type: none"> Identifying opportunities: Identified first synergies and circular resource opportunities based on triangulation of top-down analysis and bottom-up stakeholder mapping
Cartography blog post	
Title	<p>The ZIC - an actor for circular transformation? Building bridges and closing loops with wood (waste)</p> <p style="text-align: right;">Link to blog post</p>
Circular opportunities identified	<p>Transforming local waste wood streams and brewery spent grain into biochar for soil remediation</p>

5.1.6. Milan

MILAN'S CARTOGRAPHY

Reusing textile waste flows to create new materials by connecting circular innovators.



Progress	
Cartography steps	What have we done?
<p>Step 1 <i>Be a context detective</i></p>	<ul style="list-style-type: none"> Waste mapping: Mapped waste streams and their volumes collected by local waste collectors Geospatial mapping: Have mapped the historic development of artisans and industries in the pilot area to highlight loss of craftsmanship throughout time
<p>Step 2 <i>Get local</i></p>	<ul style="list-style-type: none"> Stakeholder mapping: Mapped 61 makers, designers and open labs to create a Manifattura Milano map that shows services offered by and for small-scale artisans
<p>Step 3 <i>Synergize, convene and connect</i></p>	<ul style="list-style-type: none"> Recovering hotel sheet waste: Connected local hotel with sewing studio, training facilities and fabrication labs to showcase reuse of hotel textile waste while training women with the use of innovative processes
Cartography blog post	
Title	<p>Building Circular Bridges in Fashion Capital Milan</p> <p>Link to blog post</p>
Circular opportunities identified	<p>Reusing textile waste streams into new products by coordination between circular actors</p>

5.1.7. Paris

PARIS'S CARTOGRAPHY

Creating a learning network around circular food systems by mapping alternative food skills across Paris.



Progress	
Cartography steps	What have we done?
<p>Step 1 <i>Be a context detective</i></p>	<p>📍 Geospatial mapping: Mapped potential soil pollution sites and city-wide agricultural initiatives</p> <p>📦 Material flow analysis: Mapped the food-based material flows through the city of Paris</p>
<p>Step 2 <i>Get local</i></p>	<p>👥 Stakeholder mapping: Mapped 20 actors and their skills across food production, distribution, transformation and food waste management</p>
<p>Step 3 <i>Synergize, convene and connect</i></p>	<p>🔍 Identifying opportunities: Mapped 11 first opportunities for further investigation to grow circularity of the food system in Paris</p>
Cartography blog post	
<p>Title</p>	<p>Make Paris' food system great again - Mapping learning network for circular food system skills</p> <p>Link to blog post</p>
<p>Circular opportunities identified</p>	<ul style="list-style-type: none"> • Cultivating skills for brownfield agriculture • Shared processing equipment for food transformers • Composting and education for polluted soil regeneration • Brownfields as carbon-storage banks

5.1.8. Tallinn

TALLINN'S CARTOGRAPHY

Bringing together Kopli's community to close food-soil webs and share circular economy skills.

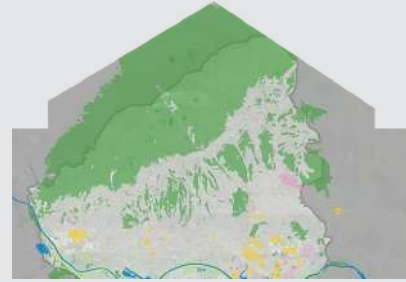


Progress	
Cartography steps	What have we done?
<p>Step 1 <i>Be a context detective</i></p>	<p>👤 Geospatial mapping: Mapped green space loss and construction trends around the city. Used literature research and local knowledge to map soil pollution</p> <p>🗑️ Material flow analysis: Mapped the city's waste flows by type</p>
<p>Step 2 <i>Get local</i></p>	<p>👥 Stakeholder mapping: Mapped practices and skills of 24 stakeholders and interviewed over 10 stakeholders on concrete circular skills and practices</p>
<p>Step 3 <i>Synergize, convene and connect</i></p>	<p>🔍 Identifying opportunities: Identified concrete opportunities to establish a network of community members and businesses around the topics of soil-food webs and sustainable building practices</p>
Cartography blog post	
<p>Title</p>	<p>Cultivating circular lifestyles in Kopli 93 How can Kopli 93 support Tallinn's green transformation by 2035?</p> <p>Link to blog post</p>
<p>Circular opportunities identified</p>	<ul style="list-style-type: none"> • Setting up a composting and biochar learning programme for local soil regeneration • Cultivating circular and sustainable building skills using local resources

5.1.9. Zagreb

ZAGREB'S CARTOGRAPHY

Mapping the material reuse potential of an old factory building in Zagreb.



Progress	
Cartography steps	What have we done?
<p>Step 1 <i>Be a context detective</i></p>	<p>👤 Geospatial mapping: Mapping of industrial wood waste generated by businesses in each neighbourhood. Mapping of environmental problems of illegal waste dumps. Mapping of other brownfields to educate about replication potential of building material reuse</p> <p>🔍 Material flow mapping: Small-scale mapping of material stocks in built heritage of the Sjeme factory to highlight reuse potential emerging from renovation and demolition</p>
<p>Step 2 <i>Get local</i></p>	<p>👥 Stakeholder mapping: Mapping of stakeholders and social initiatives around Sesevete who could be involved in Fab City Hub network</p>
<p>Step 3 <i>Synergize, convene and connect</i></p>	<p>🗨️ Roundtables: Organised roundtables with stakeholders to explore reuse potential of demolition waste of Sesevete's old meat factory</p>
Cartography blog post	
<p>Title</p>	<p>From meat factory to urban mine - Mapping the reuse potential of building materials in Zagreb's brownfields</p> <p>Link to blog post</p>
<p>Circular opportunities identified</p>	<ul style="list-style-type: none"> • Reusing local construction waste streams coming from deconstruction and rebuilding processes

6. CONCLUSION & NEXT STEPS

6.1 Key insights

The second iteration of the CENTRINNO Cartography should provide a fully functional version of a digital platform that visualises different elements of the city ecosystems, such as stakeholders, knowledge, skills and underutilised resources. With the combination of the website and embedded KUMU maps, the Beta Version of the Cartography already gives a solid idea of the possibilities and outlook for the final version. It is promising to see how KUMU, as a platform for mapping stakeholders and their resources, has been adopted flexibly by each pilot, leading to KUMU maps with diverse formats and focuses. For the future, we will take our pilots' preferred formats for KUMU into account to standardise replicable and comparable blueprints of the tool for other facilitators for circular production systems.

The iteration period of the second sprint has, however, equally brought about a number of insights into the challenges with the original format of the Cartography and the respective resource mapping methods. We would like to present a few key learnings that have affected the development of this deliverable and most will also affect the trajectory for the final sprint. It should be noted that these trends do not jeopardise the original description of what the Cartography should deliver.

Insight #1: The diversity of cartographies reflects the diversity of hubs' agendas

As the content of the CENTRINNO Cartography across all pilots show, there is a wide range of focal points, political contexts and pilot-specific agendas. While some pilots placed a strong focus on bottom-up mapping of local resource flows, others dove deeper into city-wide urban metabolism analysis to develop arguments for policy change. Also the circularity focus differed largely between pilots. Some aimed to highlight existing knowledge and skills for the circular economy already present or whether they tried to find new physical resources and waste streams for new value chains.

Insight #2: Both formal and informal mappings of stakeholders is meaningful

Our initial approach to stakeholder mapping was grounded in the use of semi-standardised surveys to interview stakeholders on their skills, resources and needs. These templates are now published on the [website](#) to be downloaded for replication. During the second sprint, however, our pilots used our guidelines and templates in a more flexible fashion to help them conduct more informal interviews and conversations with local stakeholders. This approach was preferred by pilots to build trust amongst their stakeholders.

Both formal and automated surveying, as well as informal conversations have their benefits and drawbacks. With informal conversations, pilots create a low threshold for their stakeholders to share their resources and resource needs, while interviewers have better control to introduce CENTRINNO and the purpose of this data collection. Yet, in contrast to formal surveying, using a template as provided, informal conversations are challenging to decode into a format visualised by KUMU, requiring more manual labour.

Insight #3: Top-down mapping of urban metabolism and context maps are useful vehicles for communication and education

As originally laid out in the vision for the Cartography, the visualisation of urban metabolisms through city MFAs was a core aspect of the Cartography. At the end of Sprint 2, we have completed urban metabolism diagrams (sankeys) for six of the nine pilots, each ranging in degree of detail and scale. The result was a mix of general waste-focused MFAs and more specific material-focused MFAs. While both have their drawbacks and benefits, we noticed that those MFAs that highlight a specific material (such as wood, wool or food)

are better suited to communicate the concrete reuse potential of urban resources. In contrast, general city MFAs (as done for Tallinn and Amsterdam) do not offer the depth for pilots to clearly identify potential material streams for reuse. Yet, they are used as a good entry-level visualisation of urban linear economies, useful as educational materials in pilot activities, workshops and stakeholder discussions.

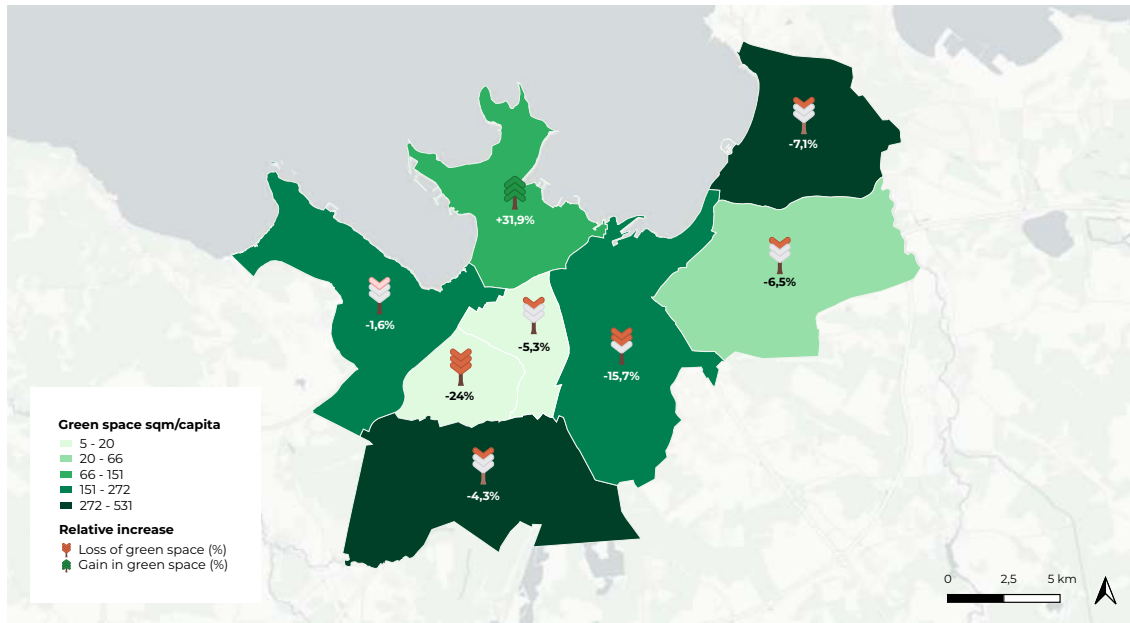


Figure 10 - A high-level map of different districts in Tallinn, with scores on green space cover specifically

The same is true for geospatial context maps that were created to help pilots visualise local ecological, economic or social conditions within their neighbourhoods. The more abstract and high-level maps are less useful to guide specific action and have a primary purpose to increase pilots' understanding around their neighbourhoods. Thematically specific context maps, such as the urban wood stock map of Barcelona, are instead more suited to be used by pilots in external communication and education.



Figure 11 - A context map of Barcelona's wood stock within the Sant Martí neighborhood

6.2 Towards the final version

These insights, together with an analysis of the current gaps of urban resource mapping across the pilots, will inform the final version of the CENTRINNO Cartography. During the final sprint, we are planning the following activities that focus on harmonising, synthesising and leaving a clean, replicable legacy of our work:

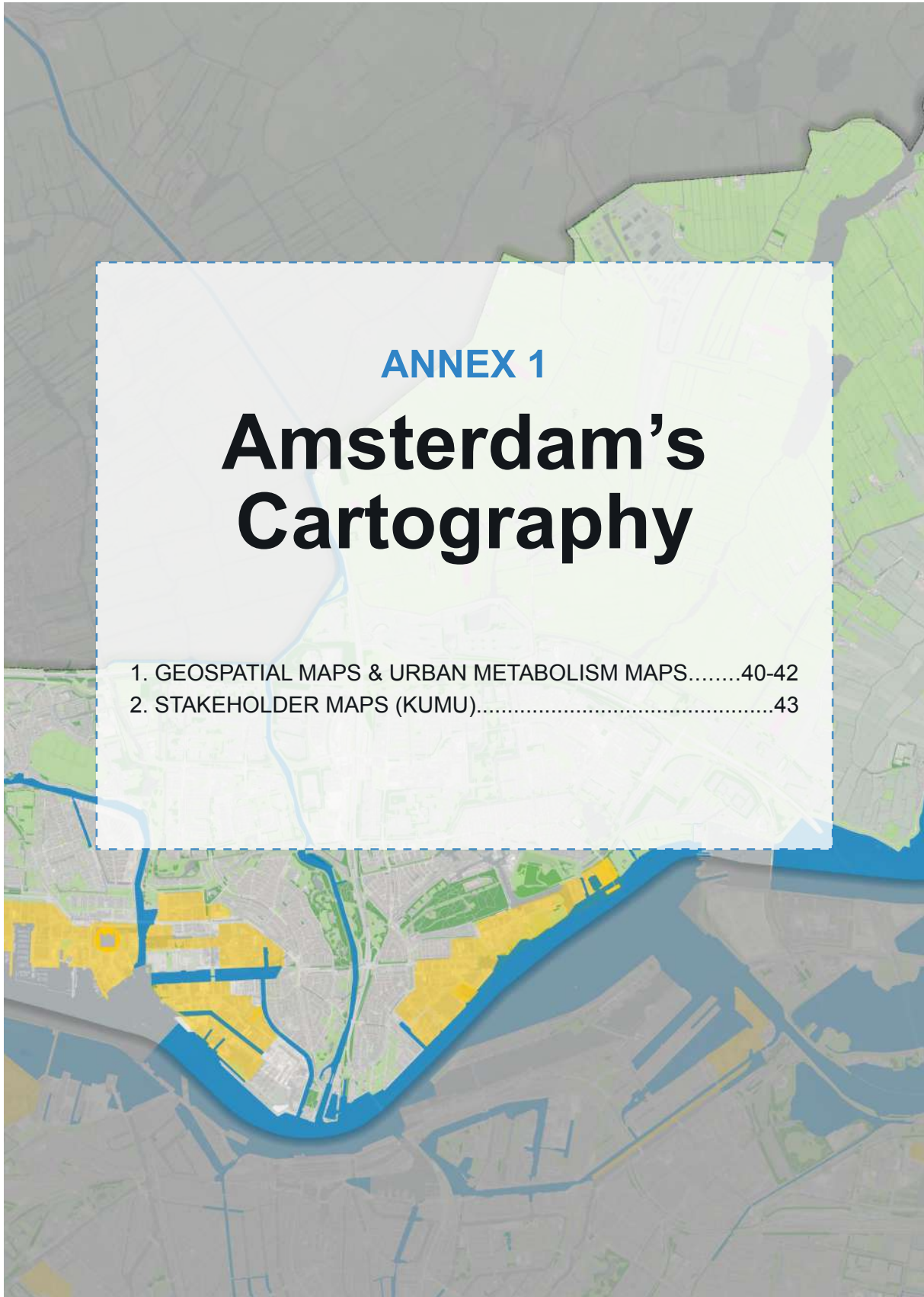
- *Identification of urban metabolism visualisations for remaining pilots:* Rooted in a focus on different CENTRINNO key concepts, not all pilots had prioritised a city-wide urban material flow or urban metabolism-based analysis. Yet, at the end of the second sprint, we have conducted opportunity workshops that identified circular opportunities for all pilots. We will work together with those pilots without a prior focus on circularity to identify the potentials and benefits for an urban metabolism-focussed analysis. The scale and scope of this analysis should reflect pilots' ambition and focus areas within the circularity key concept of CENTRINNO.
- *Completion of neighbourhood typologies:* In this deliverable, we have presented our progress on mapping the geospatial context of post-industrial neighbourhoods in relation to the wider city. To date, these analyses for pilots and future Fab City Hubs have proven less applicable to pilot's direct work on Fab City Hubs. However, we will further explore how the neighbourhood typologies can support pilots in communicating the needs and challenges of their projects to city governments.
- *Growing KUMU maps:* The majority of our pilots have well-built out KUMU maps with many entries. Thus, growing KUMU maps in numbers of mapped stakeholders is not a priority for the majority of our pilots. Rather, the last sprint will focus on growing the

KUMU maps in terms of depth and quality. This means, interviewing more mapped stakeholders on their resources and identifying new resource synergies to establish beyond the end of the project.

- *Standardising KUMU blueprints:* This sprint gave us a very clear picture of the types of resources and additional information that is meaningful to collect on local stakeholder networks. We will integrate this information into clear KUMU blueprints that can be used by future Fab City Hubs. This might include a revision of the stakeholder classification system we created for the CENTRINNO Ecosystem Mapping Guidebook, as well as a revision of the stakeholder resource inventory templates currently published in this version. These templates will then be shared on the final version of the CENTRINNO Cartography.
- *Building out the website:* Lastly, we expect additions and iterations of the CENTRINNO Cartography website. This might include an additional section directed to city officials that synthesises a few key steps city officials can learn from the CENTRINNO Cartography to facilitate circular makership in their cities. Further, we will work out a different structure of the pilot cartography pages that show the last iteration of each pilots' outputs.

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2. Ritter, F., Bieckmann, D., Dibbits, H., Even-Zohar, J., Muñoz Unceta, P., Corbin, E., & Streefland, T. (2021). Urban Ecosystem Mapping Guidebook. Deliverable 2.1 CENTRINNO Project.
3. Wippoo, M., Hoekstra, N., van Dijk, D., Muñoz Unceta, P., Guy, J., Ritter, F., Olivotto, C. (2021). Detailed Pilot Planning & Monitoring Framework (p. 174). Deliverable 4.1 CENTRINNO Project.
4. Dibbits, H., Even-Zohar, J., Reddick, H., & Kuijten, D. (2022) CENTRINNO Living Archive - Alpha Version. Deliverable 2.3 CENTRINNO Project



ANNEX 1

Amsterdam's Cartography

1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS.....	40-42
2. STAKEHOLDER MAPS (KUMU).....	43

1. GEOSPATIAL MAPS & URBAN MATERIAL FLOWS

Title:

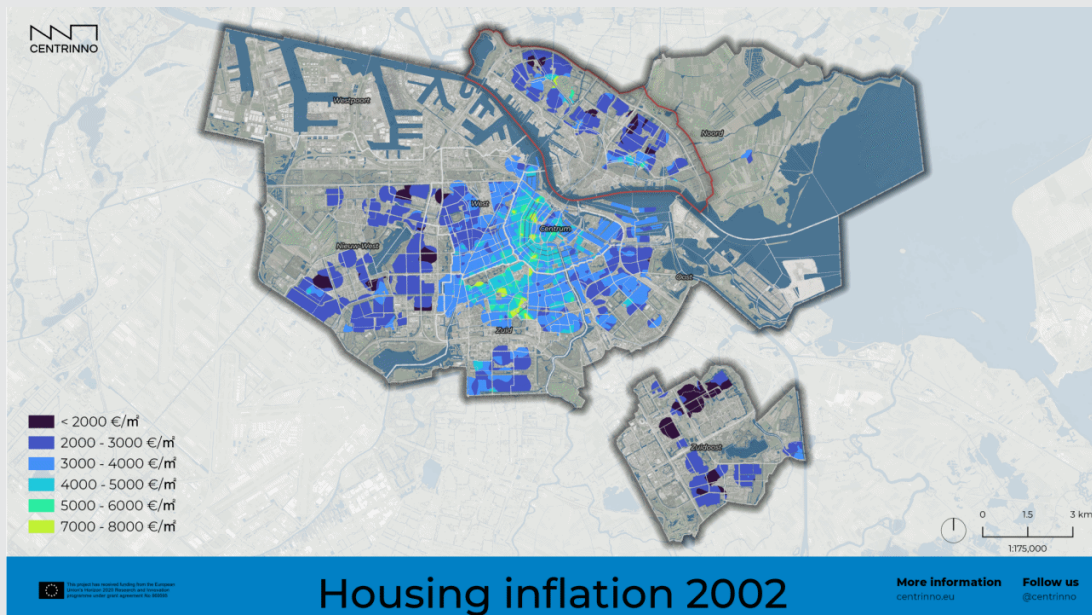
Housing Inflation in Amsterdam (published)



Description:

A map in gif format showing the development of housing prices in the Amsterdam city area, through a period from the early 2000s till 2019.

Map/Image:



1. GEOSPATIAL MAPS & URBAN MATERIAL FLOWS

Title:

Map of planned developments in the pilot area of Amsterdam Noord (unpublished)



Description:

This map was created to highlight where in the pilot area new developments have been taking place or will take place in the future. The map shows a pressure on industrial land use zones (light yellow) due to several already completed investment decisions (dark yellow).

Map/Image:



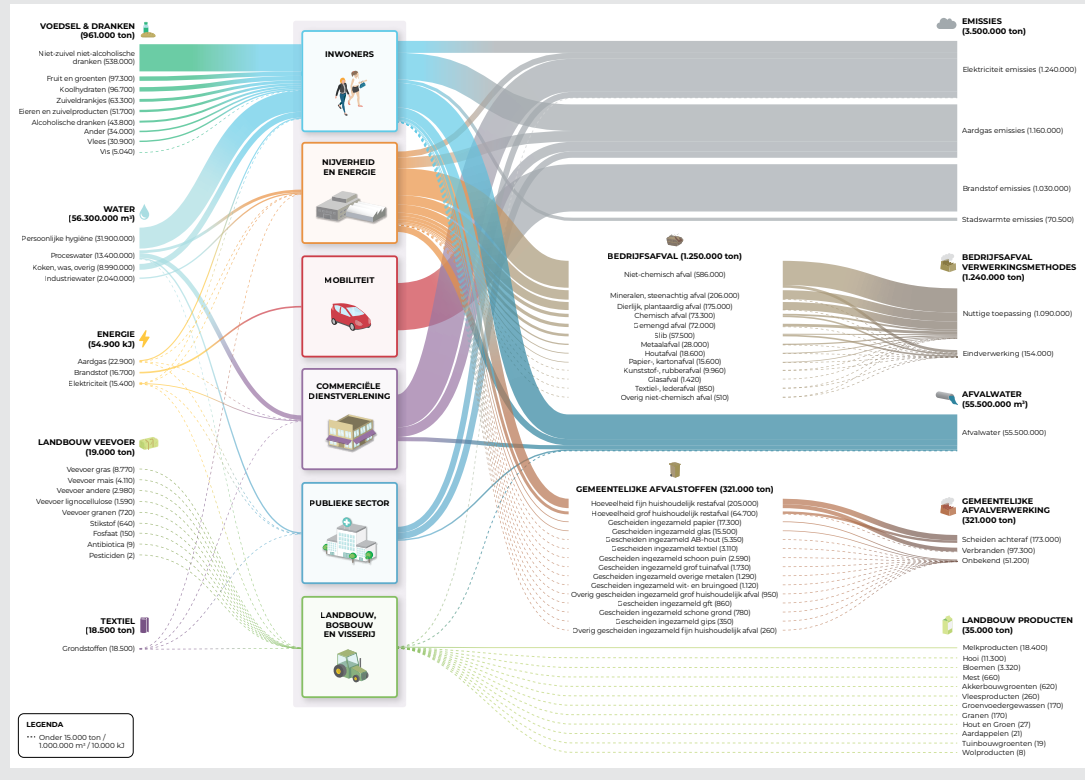
1. GEOSPATIAL MAPS & URBAN MATERIAL FLOWS

Title:
Material Flow Analysis (published)



Description:
This image shows the waste flows from the city of Amsterdam. It was used to communicate and educate pilots on the largest sources of waste streams and the respective sectors responsible for waste generation.

Map/Image:



2. STAKEHOLDER MAPS (KUMU)

Title:

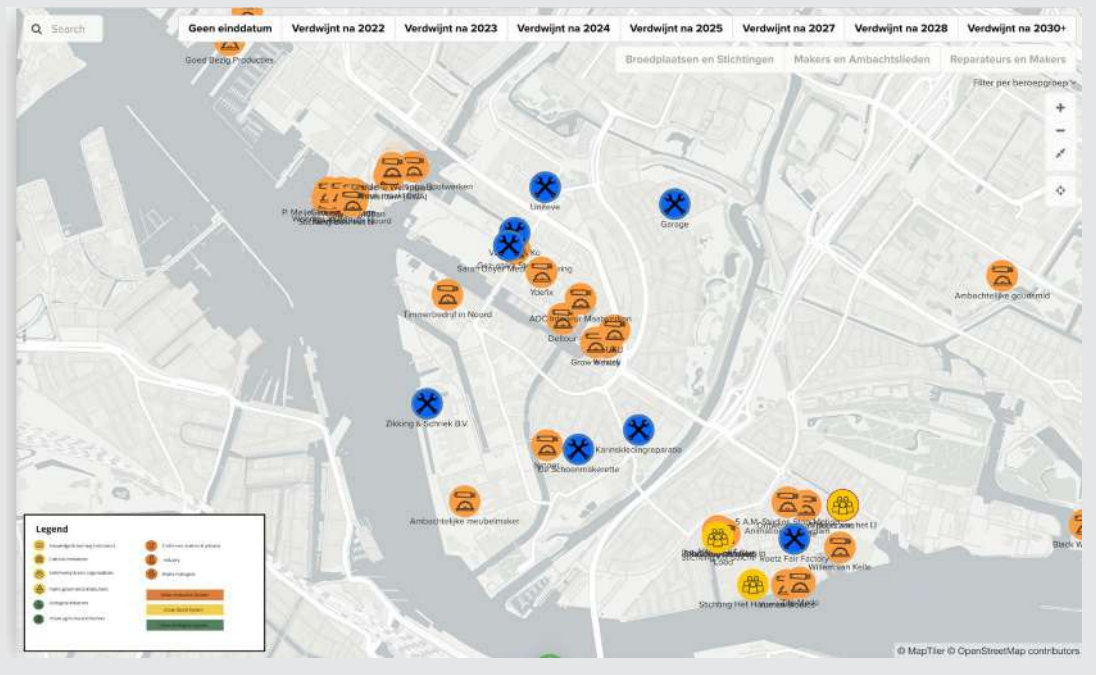
Stakeholders and their expected time of relocation (published)

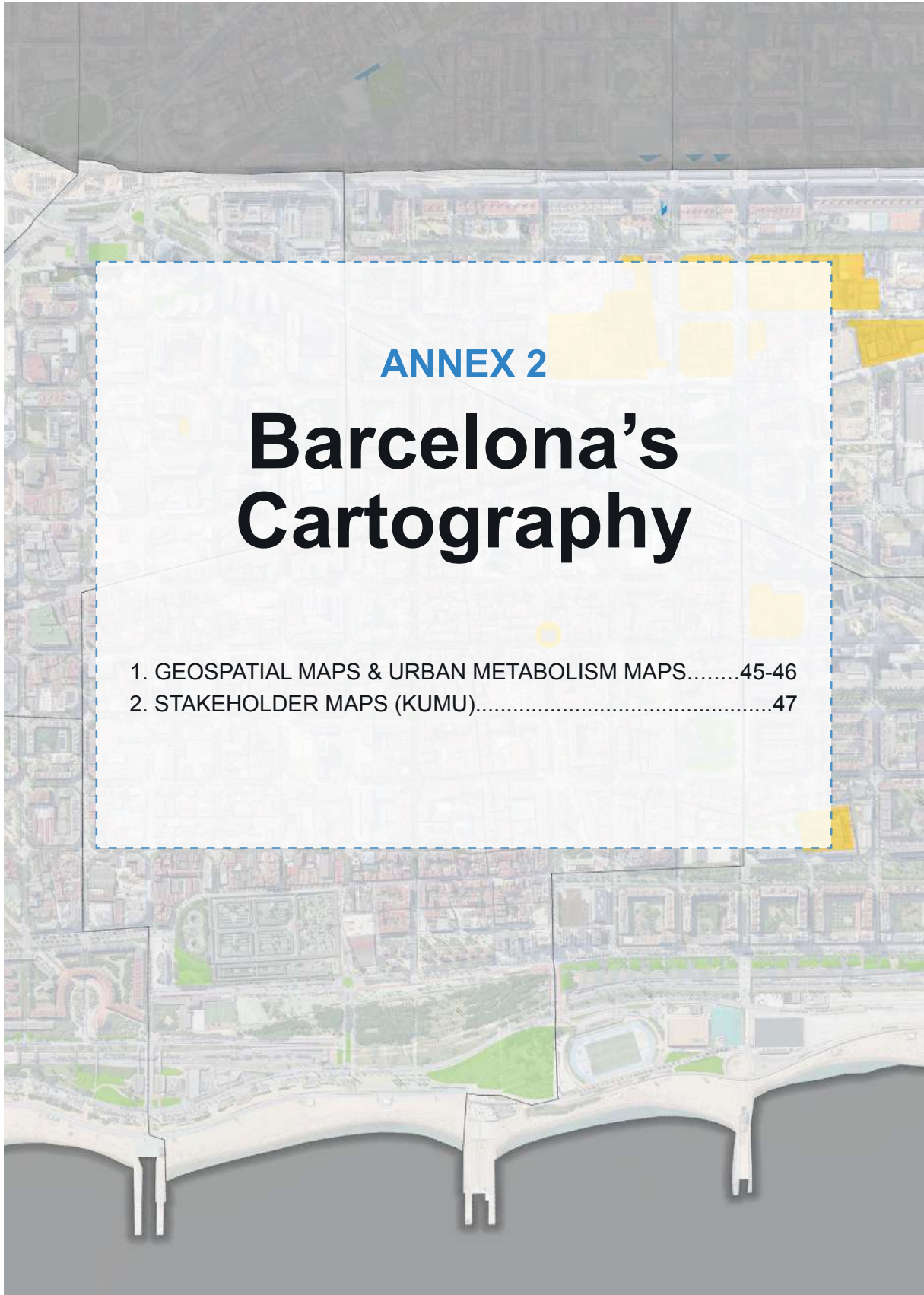


Description:

This KUMU map shows the different stakeholders present in the Amsterdam Noord industrial area. Amsterdam conducted interviews with local makers to collect data on resource needs, space availability, waste generation and contract length. To protect stakeholders' data, only name and location is shared publicly, while all other fields are only internally accessible by the pilot.

Map/Image:





1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

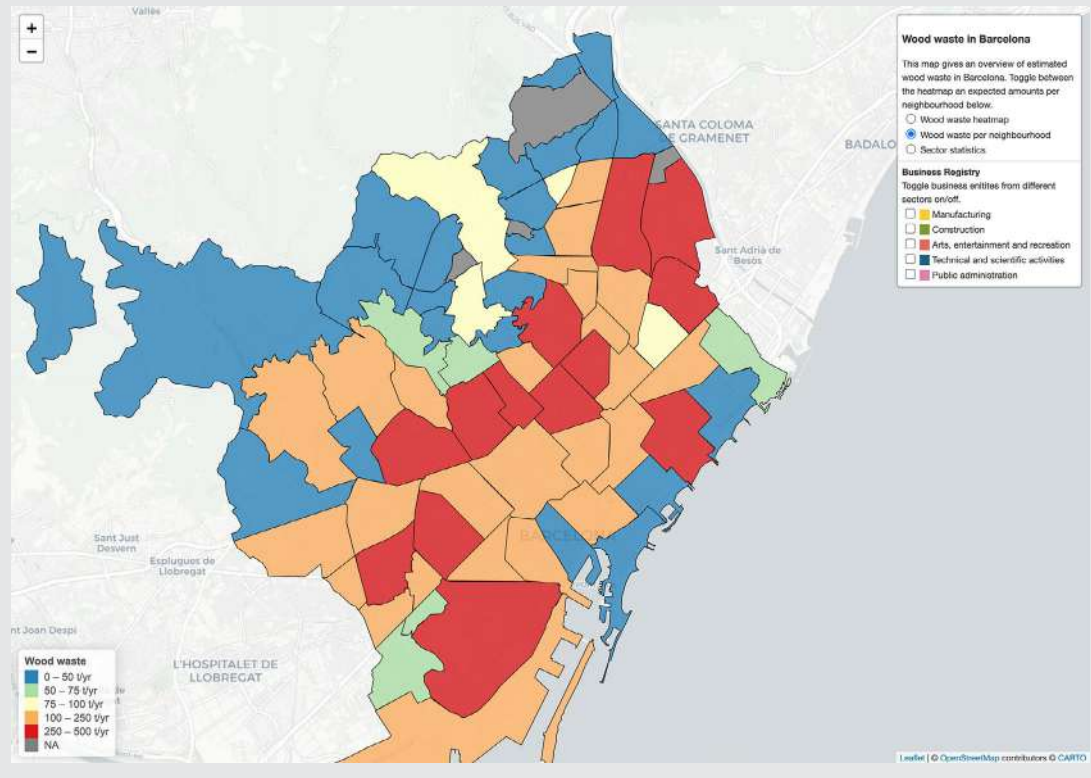
Wood waste in Barcelona (published)



Description:

This interactive map shows the annual expected wood waste per neighbourhood generated by businesses and industries. To model annual wood waste, we used public business registry data from Barcelona and estimated wood waste volumes per sector. The interactive map was used to initiate a discussion with the pilot team about wood waste reuse and recovery opportunities in Poblenou.

Map/Image:



1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

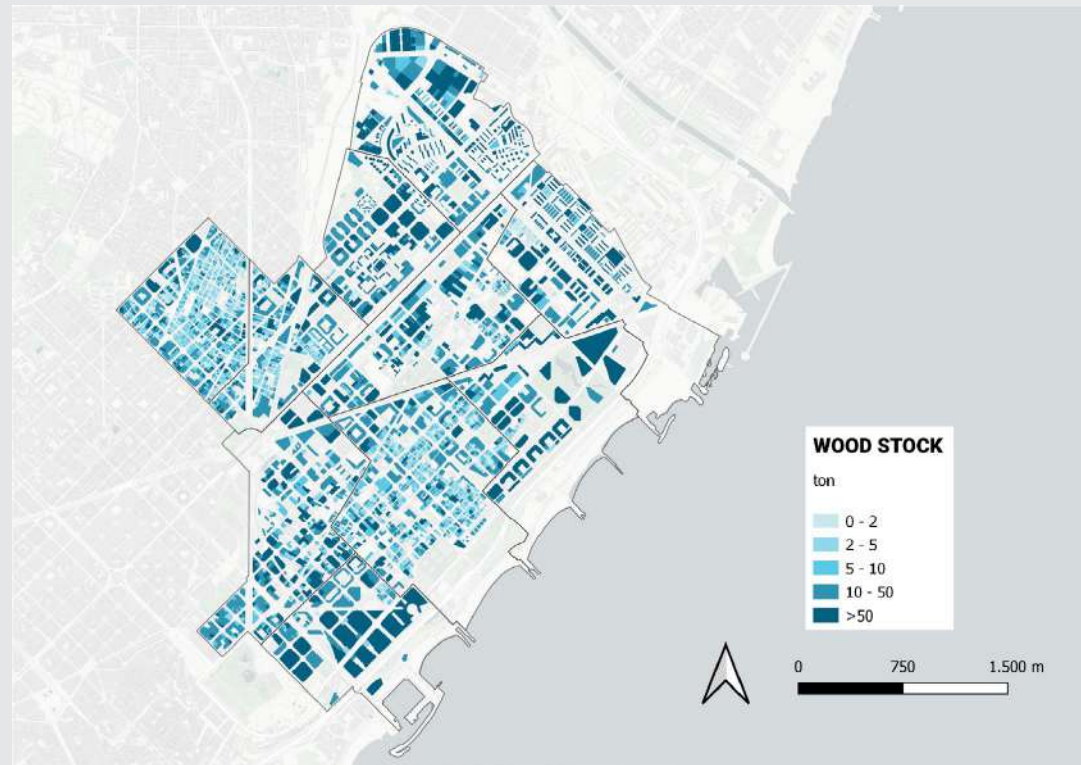
Wood stock in Poblenou's buildings (published)



Description:

Due to interest in demolition and construction wood waste - one of the major sources of urban wood waste, we mapped the estimated wood stock currently hidden within the building stock of the neighbourhood. The purpose of this map was to visualise the potential for local wood reuse in a neighbourhood that is currently heavily transformed.

Map/Image:



2. STAKEHOLDER MAPS (KUMU)

Title:

Full Ecosystem Map & potential connections

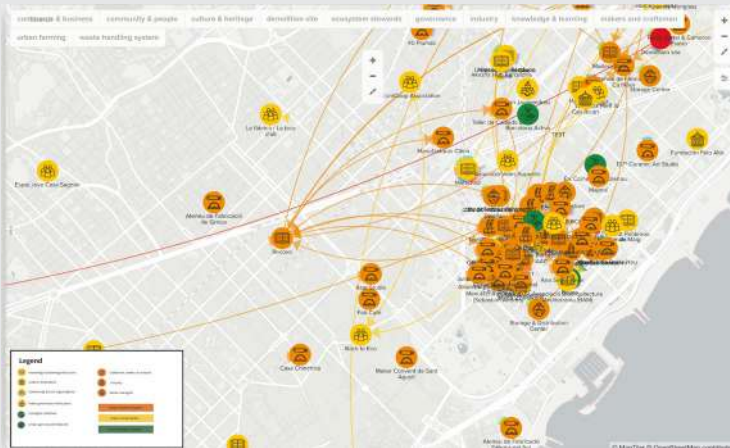


Description:

The Barcelona pilot has mapped over 150 stakeholders and potential connections emerging from materials and skills that businesses possess. This map was used to internally manage and visualise potential synergies that could be explored in networking and stakeholder engagement events of the pilot. A sub-view of this map, focussing on wood waste connections is published on the pilot's Cartography page.

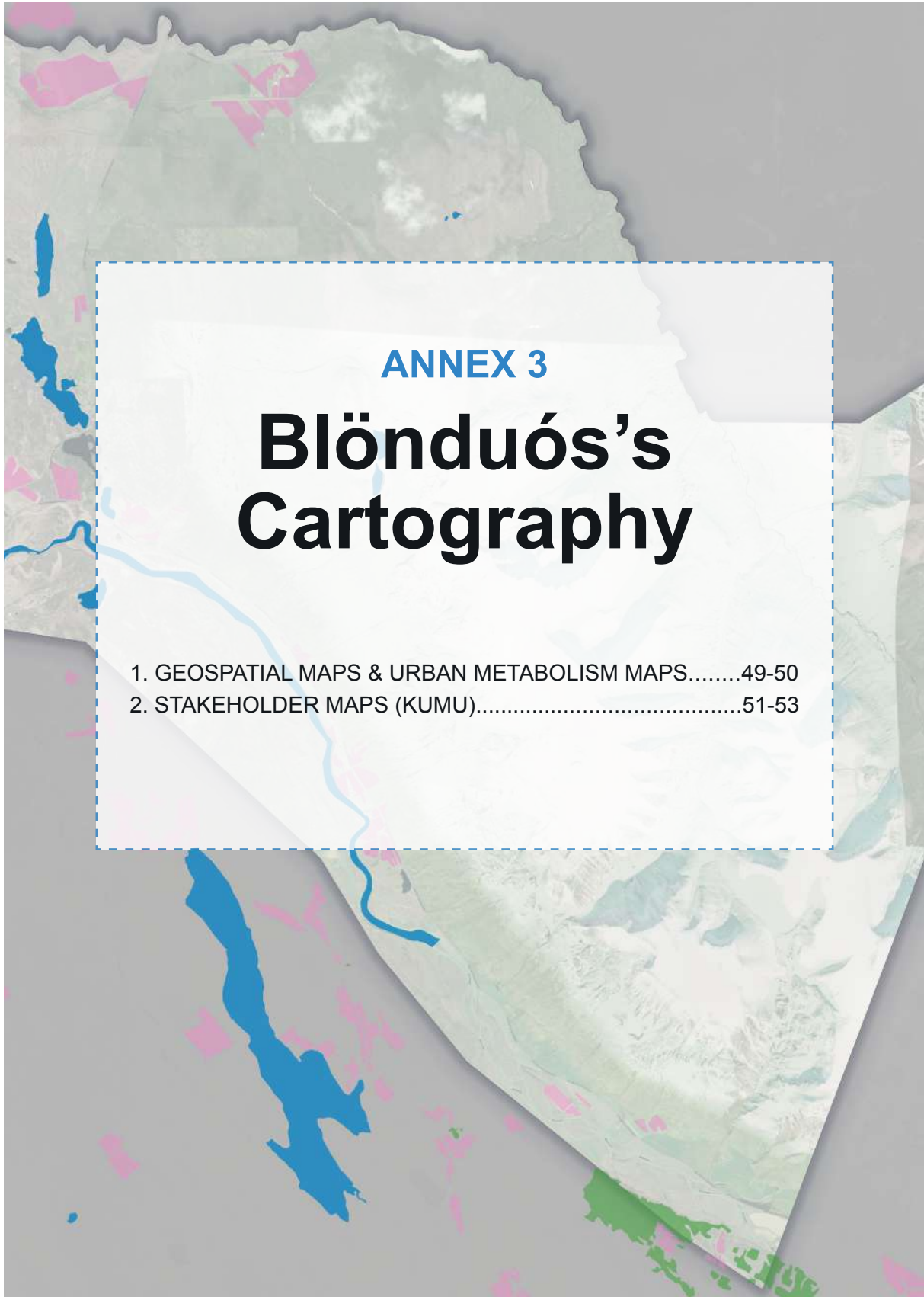
Map/Image:

All potential connections



Wood connections





ANNEX 3

Blönduós's Cartography

1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS.....	49-50
2. STAKEHOLDER MAPS (KUMU).....	51-53

1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

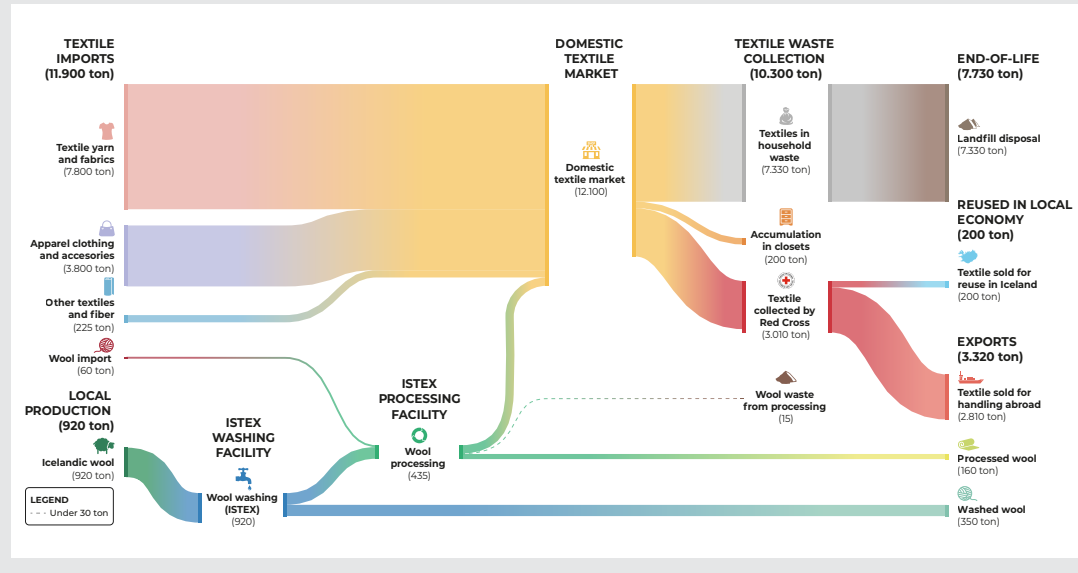
Wool and textile MFA for Iceland (published)



Description:

This image visualised the inputs and waste outputs of wool and imported textiles through Iceland. The map was used to highlight different hotspots of textile waste and textile imports that currently describe the linear textile consumption of the country.

Map/Image:



1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

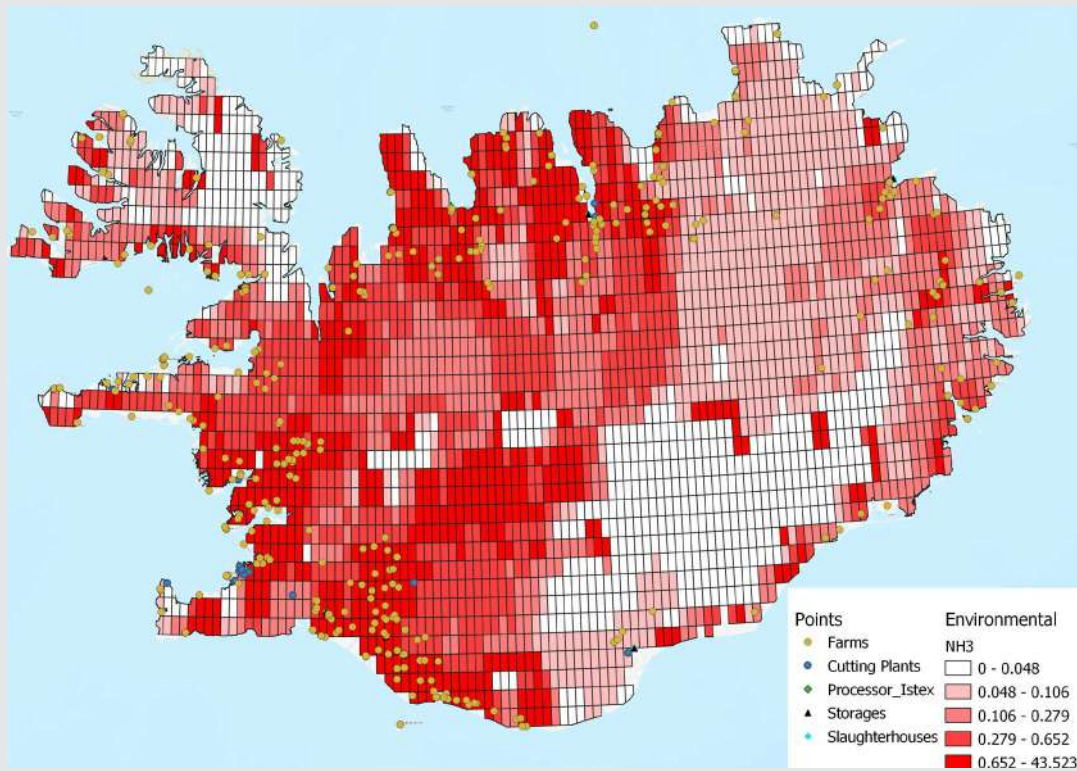
Air emissions (NH3) (unpublished)



Description:

The Blönduós pilot was interested in mapping potential environmental challenges linked to the wool industry and sheep farming in Iceland. As a response, we mapped air emissions that are commonly linked to sheep farming, such as NH3 and NOx-emissions. This map was only used internally to discuss the potential environmental implications of sheep farming. Not visualised here are other research findings on environmental problems, such as water pollution and erosion hotspots. The reason these are not depicted is that we did not obtain the primary data behind these maps. Therefore, they were only used internally to raise awareness about the problem.

Map/Image:



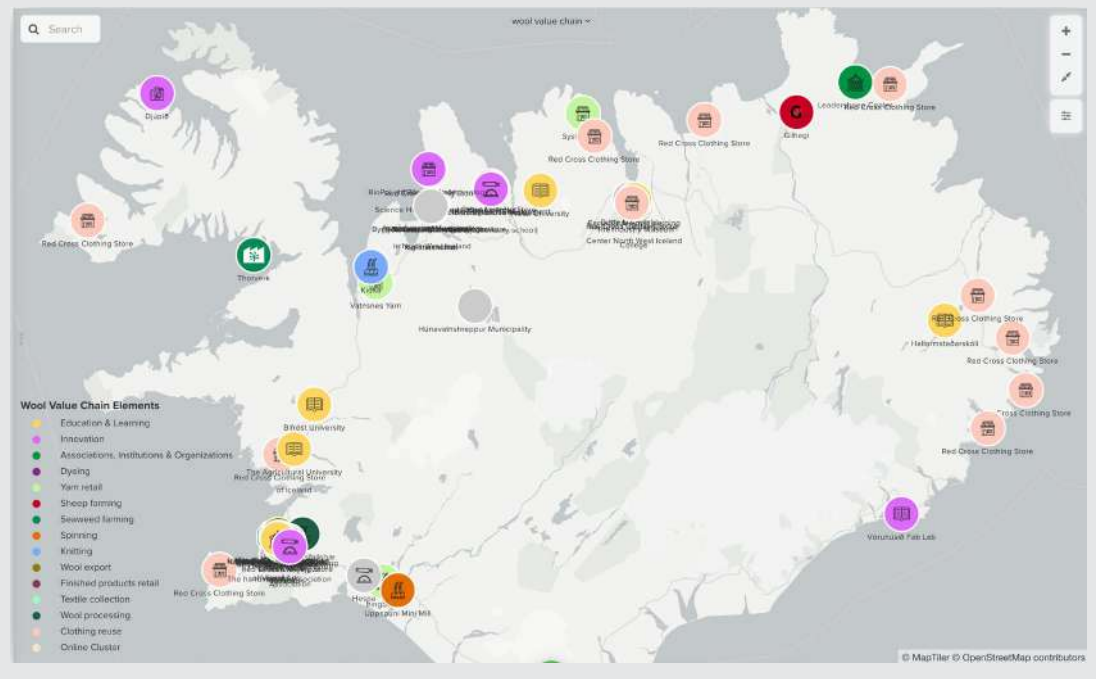
2. STAKEHOLDER MAPS (KUMU)

Title:
Full Ecosystem overview (published)



Description:
An overview of all the mapped stakeholders for the Iceland - Blonduos pilot team.

Map/Image:



2. STAKEHOLDER MAPS (KUMU)

Title:

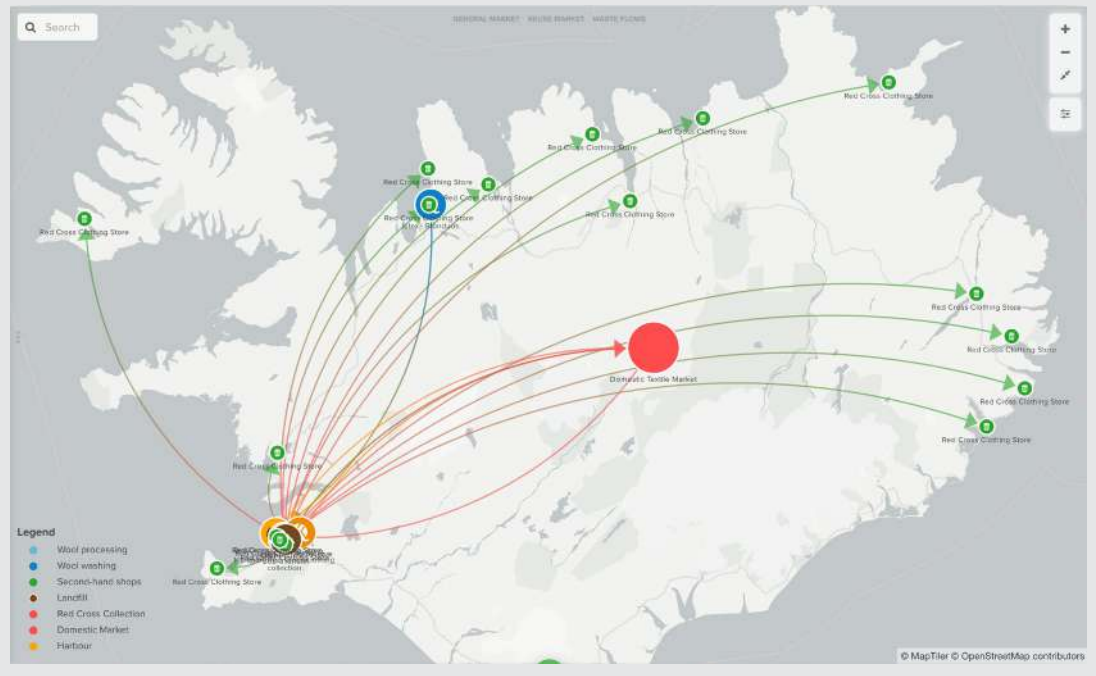
Geospatial mapping of textiles in the Icelandic market (published)



Description:

A map visualising the material flow analysis conducted for the Icelandic textile market. With the three buttons on top different material loops can be highlighted, with options for waste flows, reuse flows and the general market flow.

Map/Image:



2. STAKEHOLDER MAPS (KUMU)

Title:

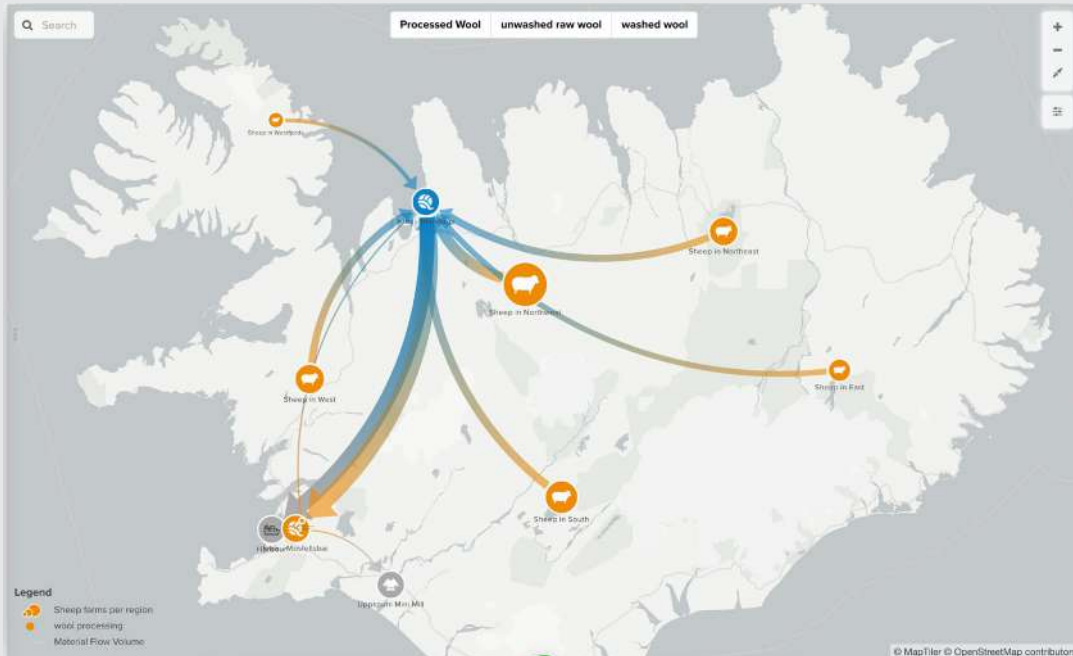
Wool material flows throughout Iceland (published)



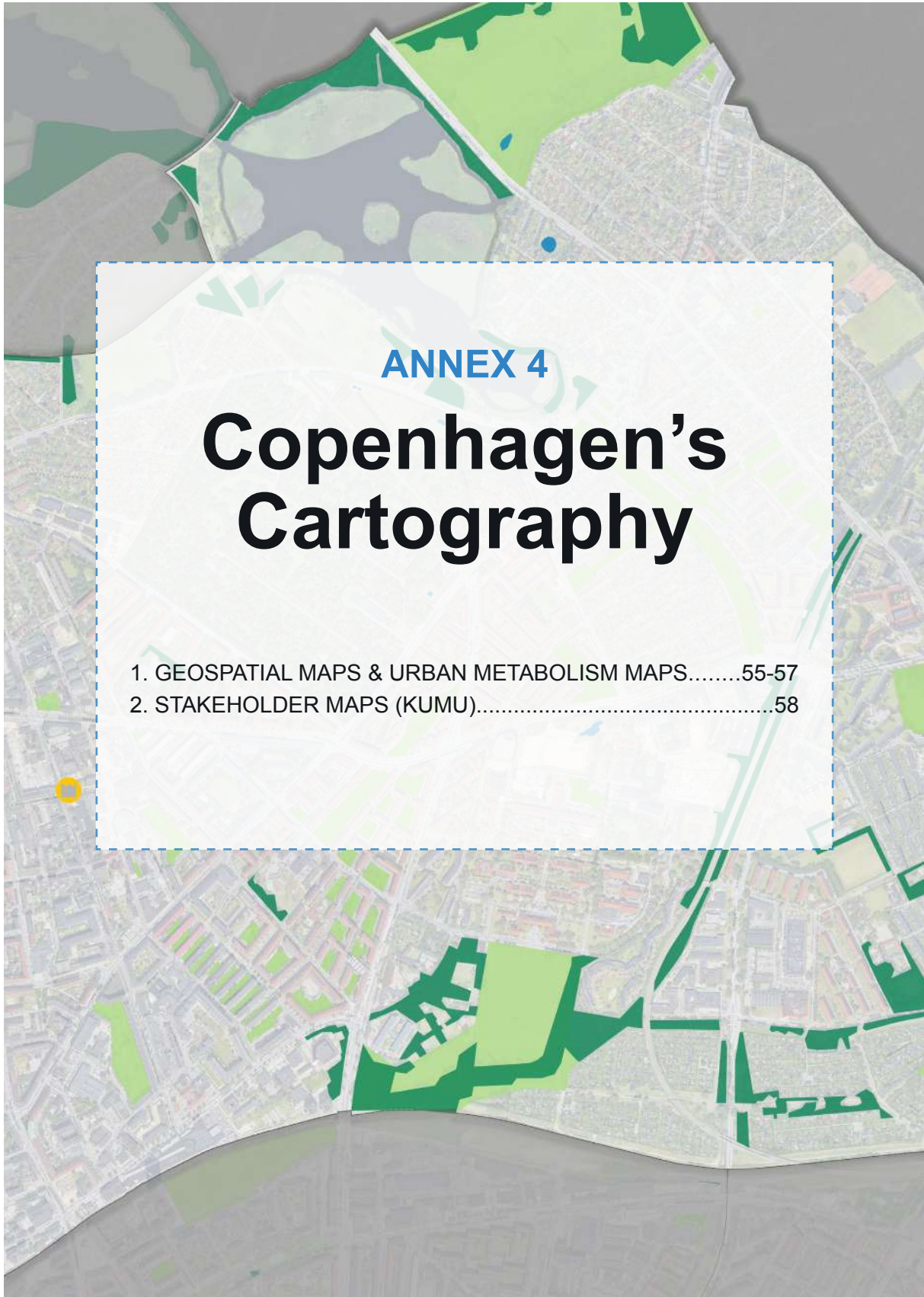
Description:

This maps shows the different sources of wool within the Icelandic regions, whilst also allowing the user to select the wool type - processed, unwashed and washed - as well as showing the relative size of the flows.

Map/Image:



COPENHAGEN



ANNEX 4

Copenhagen's Cartography

- 1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS.....55-57
- 2. STAKEHOLDER MAPS (KUMU).....58

1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

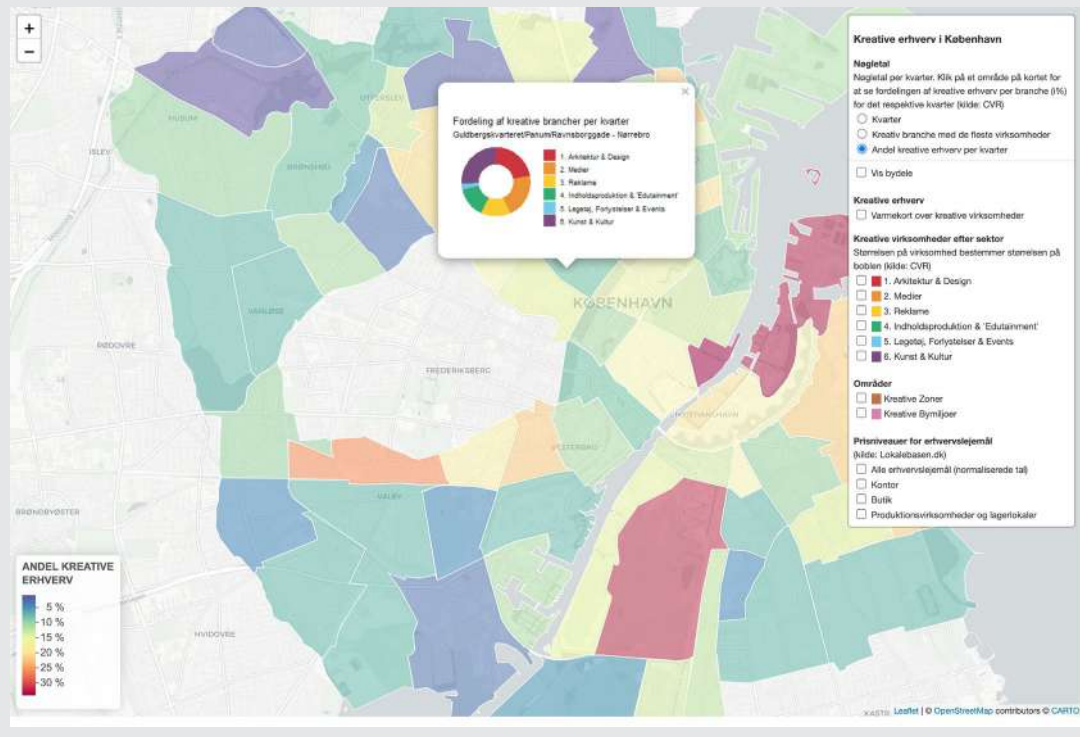
The shares of creative businesses per Neighborhood in Copenhagen (published)



Description:

This map displays the different shares of creative businesses out of all businesses in the neighbourhoods for Copenhagen. It was based on business registry data received from the City of Copenhagen.

Map/Image:



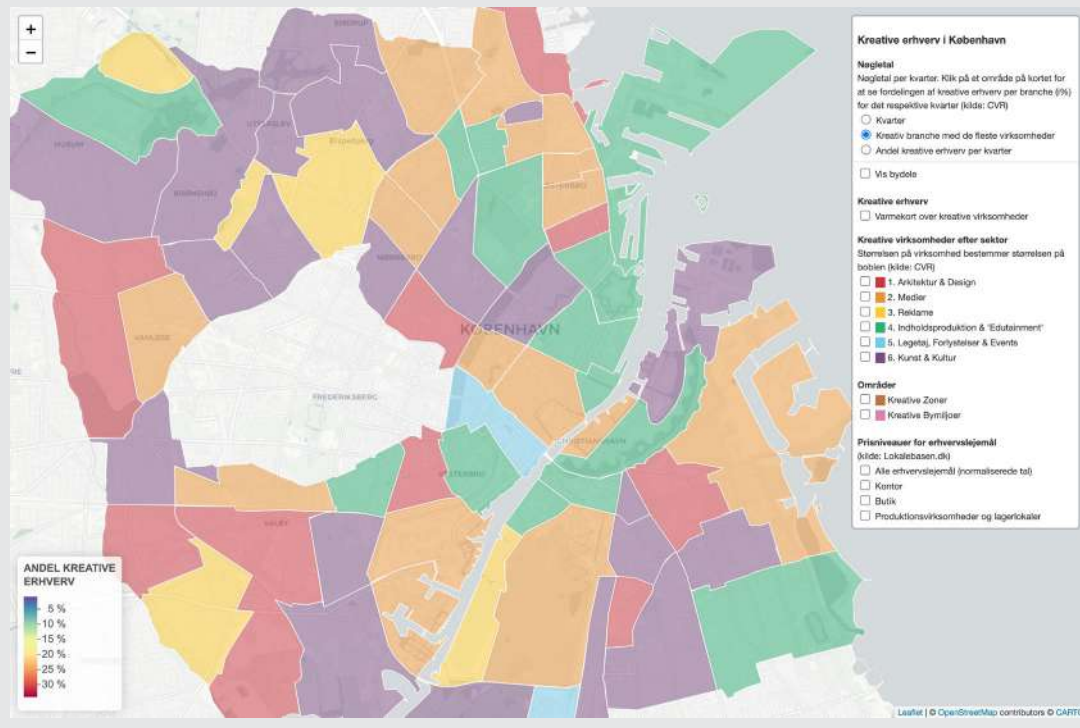
1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:
Dominant creative business type per
Neighbourhood in Copenhagen (published)



Description:
This map displays the dominant creative business type within a given
neighbourhood in the Copenhagen city area.

Map/Image:



1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

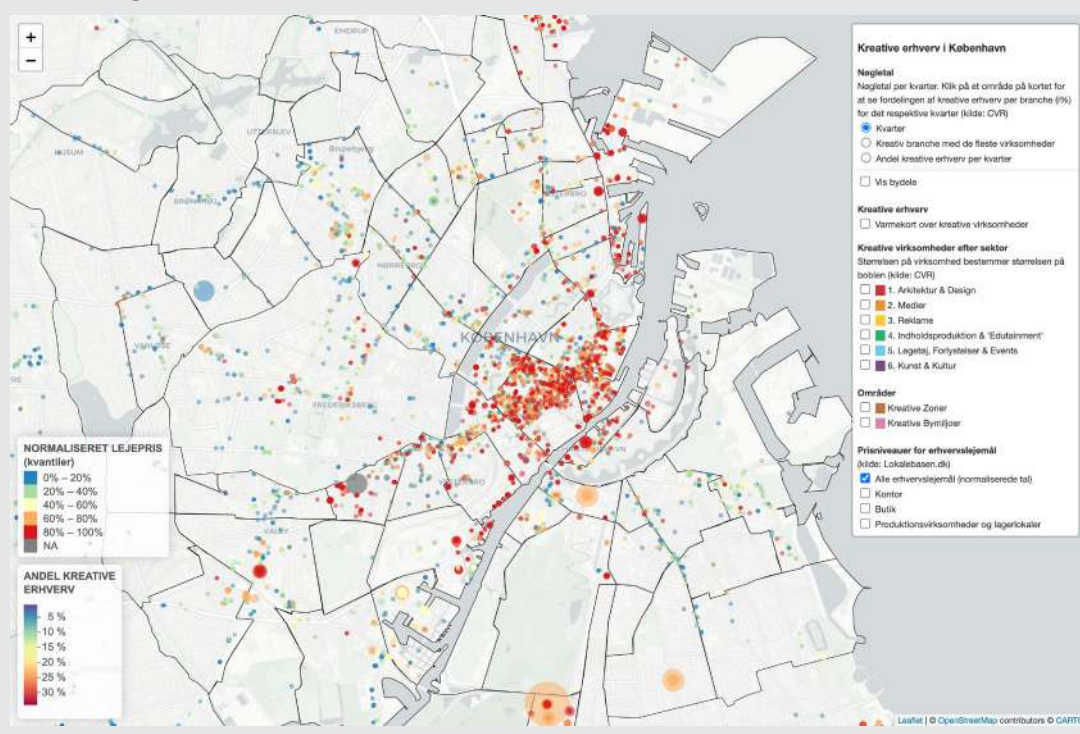
Mapping the price levels of suitable spaces for creatives (published)



Description:

This map displays the rent prices for different types of suitable spaces for creative businesses, that being offices, storefronts and productive spaces.

Map/Image:



2. STAKEHOLDER MAPS (KUMU)

Title:

Mapping the stakeholders in the Copenhagen Pilot area (published in anonymized format)

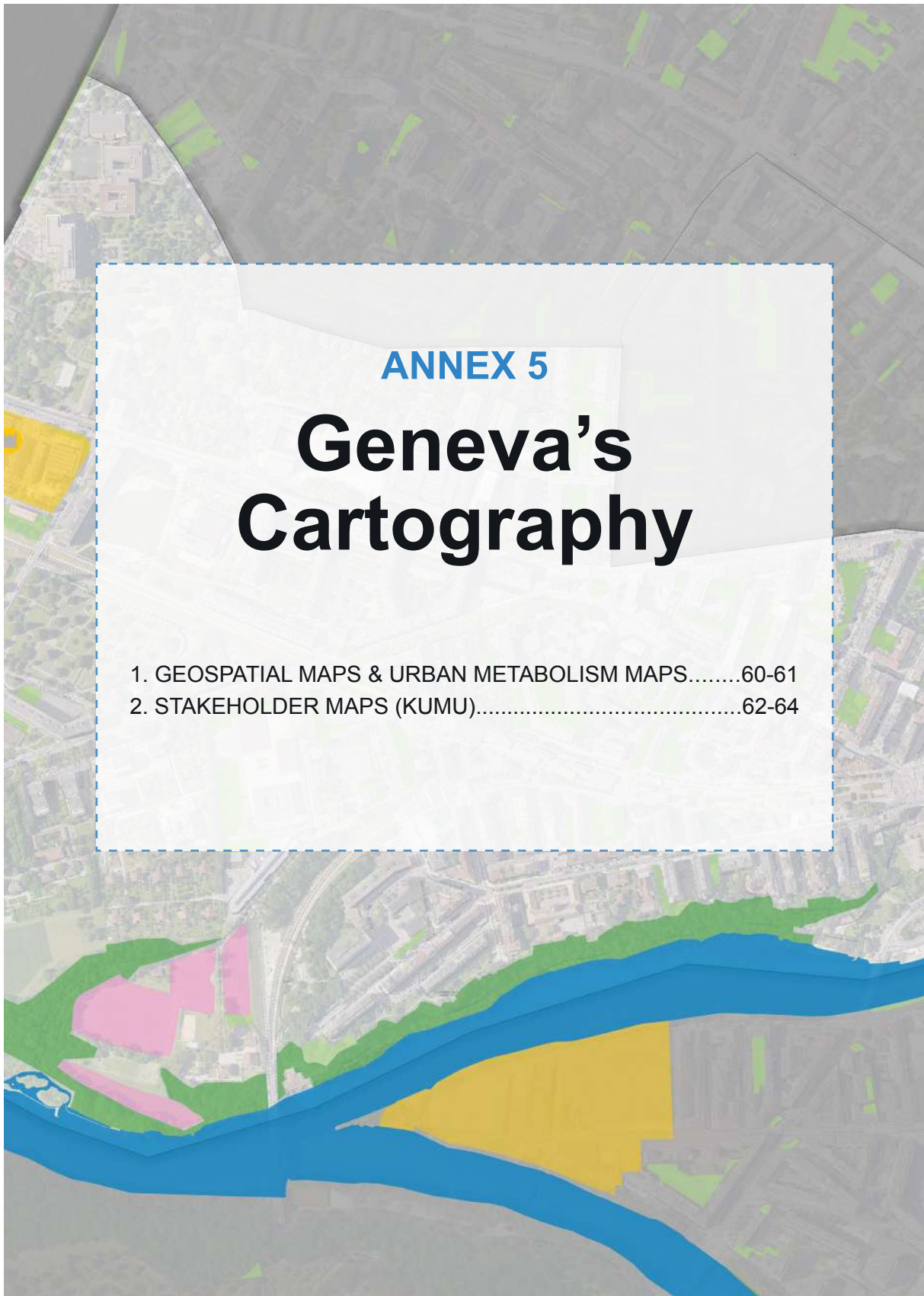


Description:

This map displays the mapped stakeholders for the Nordvest area in Copenhagen. The stakeholders have been subdivided into six categories, all with their distinctive colour and icons. These categories can be individually accessed by interacting with the button in the bottom of the map. The pilot decided to only publish an anonymized version of this map for now.

Map/Image:





1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

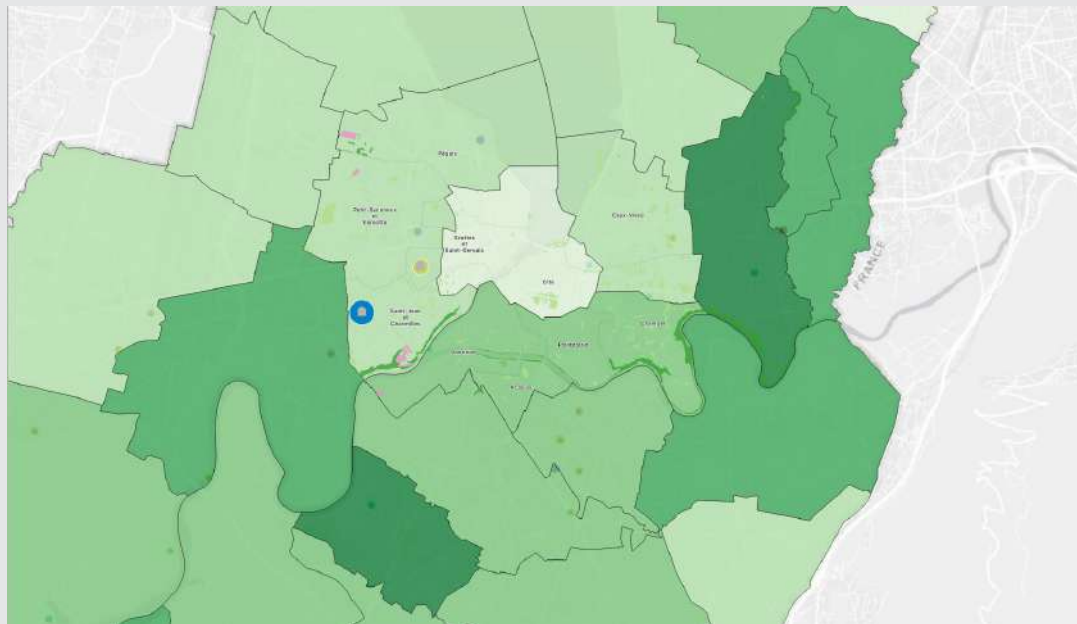
Urban tree density (unpublished)



Description:

We mapped urban tree density to discuss potential differences between green space access in the pilot neighbourhood and the city. This map was also used as a starting point to understand what the ZIC can do to contribute to (1) increase urban forests and (2) to reuse urban wood waste from tree maintenance.

Map/Image:



1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

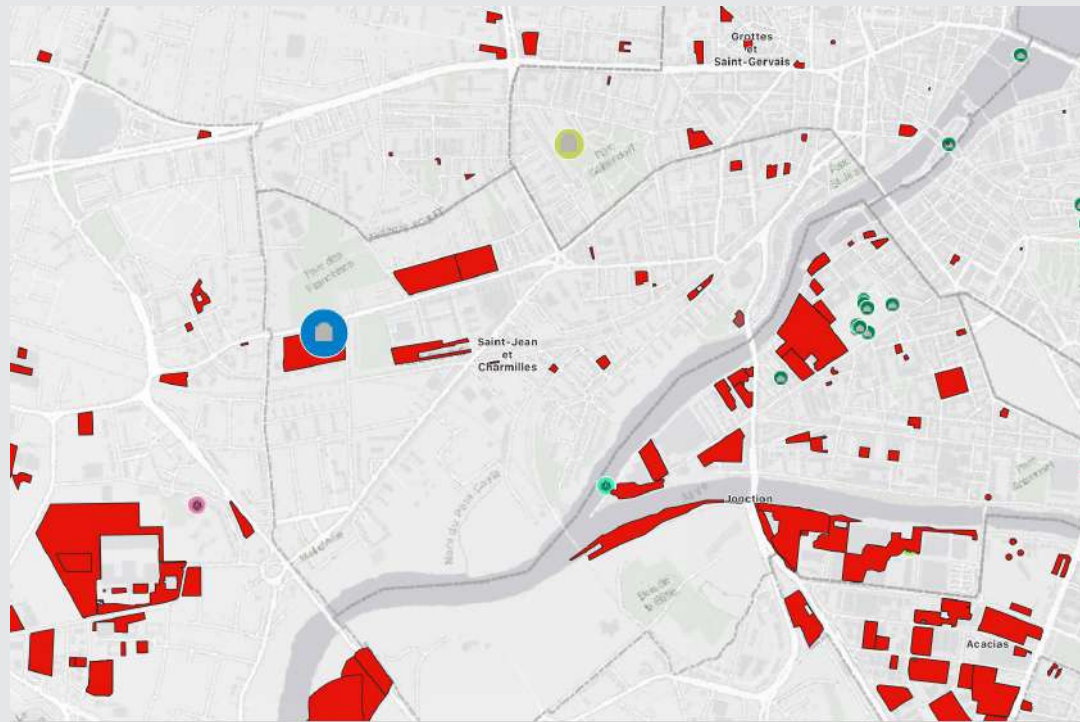
Potential soil pollution (published)



Description:

Soil pollution is a common ecological problem around many industrial neighbourhoods. We have mapped listed polluted sites around the neighbourhood to discuss the potential of ZIC waste streams from clean wood waste could help regenerate polluted soils in the area.

Map/Image:



2. STAKEHOLDER MAPS (KUMU)

Title:

Craftsmen of the ZIC (published)



Description:

This map shows the full overview of all stakeholders and their practices currently present in the ZIC. Based on interviews and codifying of practices, this map was used to analyse the potential of possible circular synergies. Resources and skills are not publicly visible.

Map/Image:

Discover the ZIC

More than 100 years ago, the Zone industrielle des Charmilles (ZIC) was the site of a factory producing state-of-the-art physical measuring instruments. Today, we find an impressive diversity of traditional, innovative, artistic and cultural businesses co-located in one of Geneva's last artisanal zones! Defying against the city's rapid de-industrialization, the ZIC will remain a gathering point for artists, makers and producers of all kinds.

Who is hidden behind the ZIC's walls? From traditional craftsmanship to digital innovation. From masonry to visual arts. From saw mills to 3D printers - Currently, more than 70 creatives, artists, craftspeople and businesses share an old factory building in Geneva's last artisanal zone.

As part of the CENTRINNO project, La Maco has started to map all members of the building, in hope to find new ways to strengthen the synergies and relationships between ZIC inhabitants.

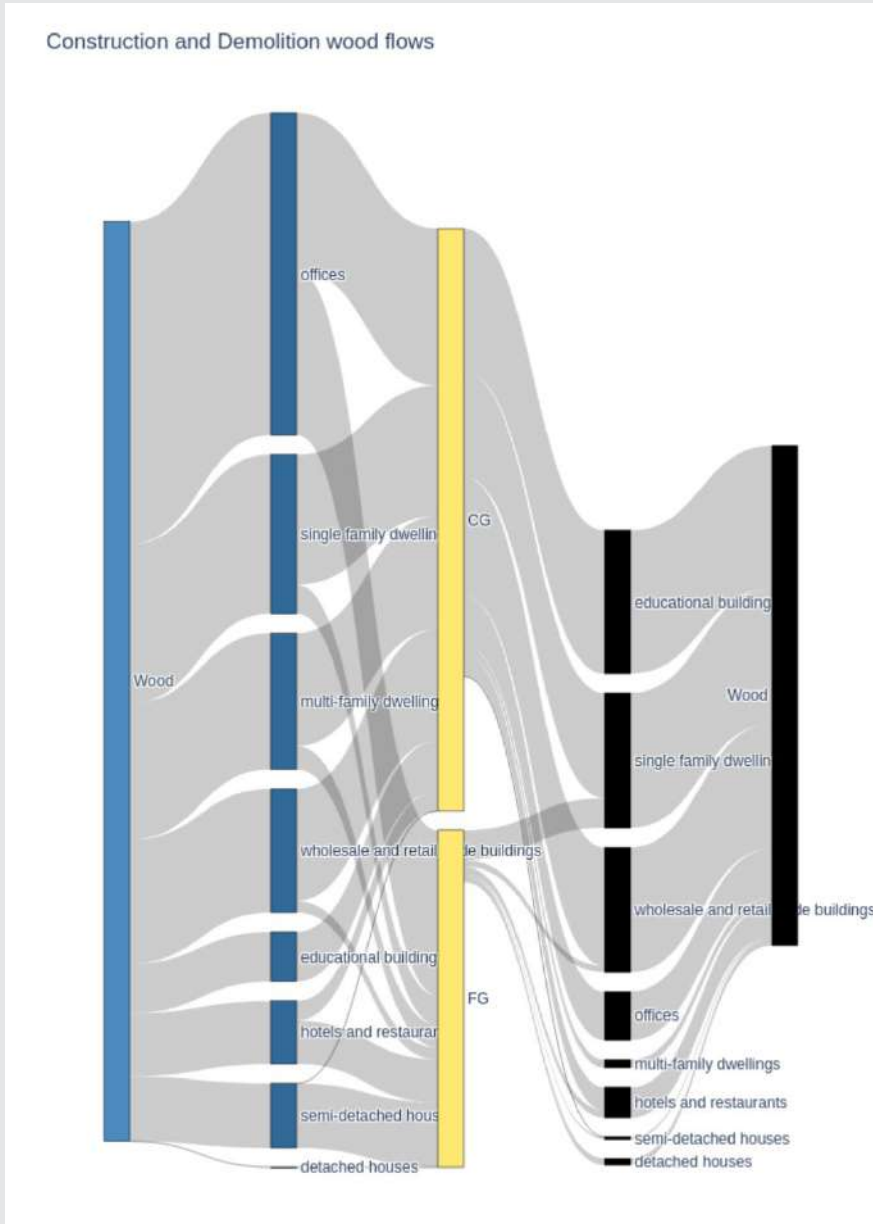
2. STAKEHOLDER MAPS (KUMU)

Title:
Construction & demolition MFA (published)



Description:
This Sankey diagram visualised the wood flows through Geneva's construction and demolition sector.

Map/Image:



2. STAKEHOLDER MAPS (KUMU)

Title:

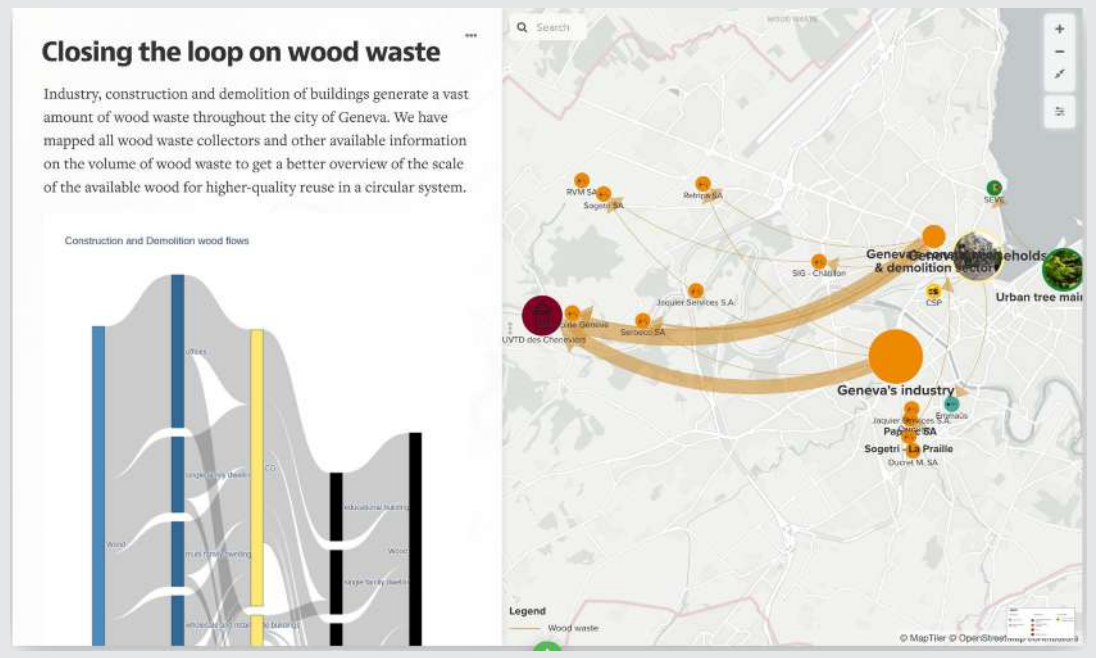
Spatializing urban wood flows (published)

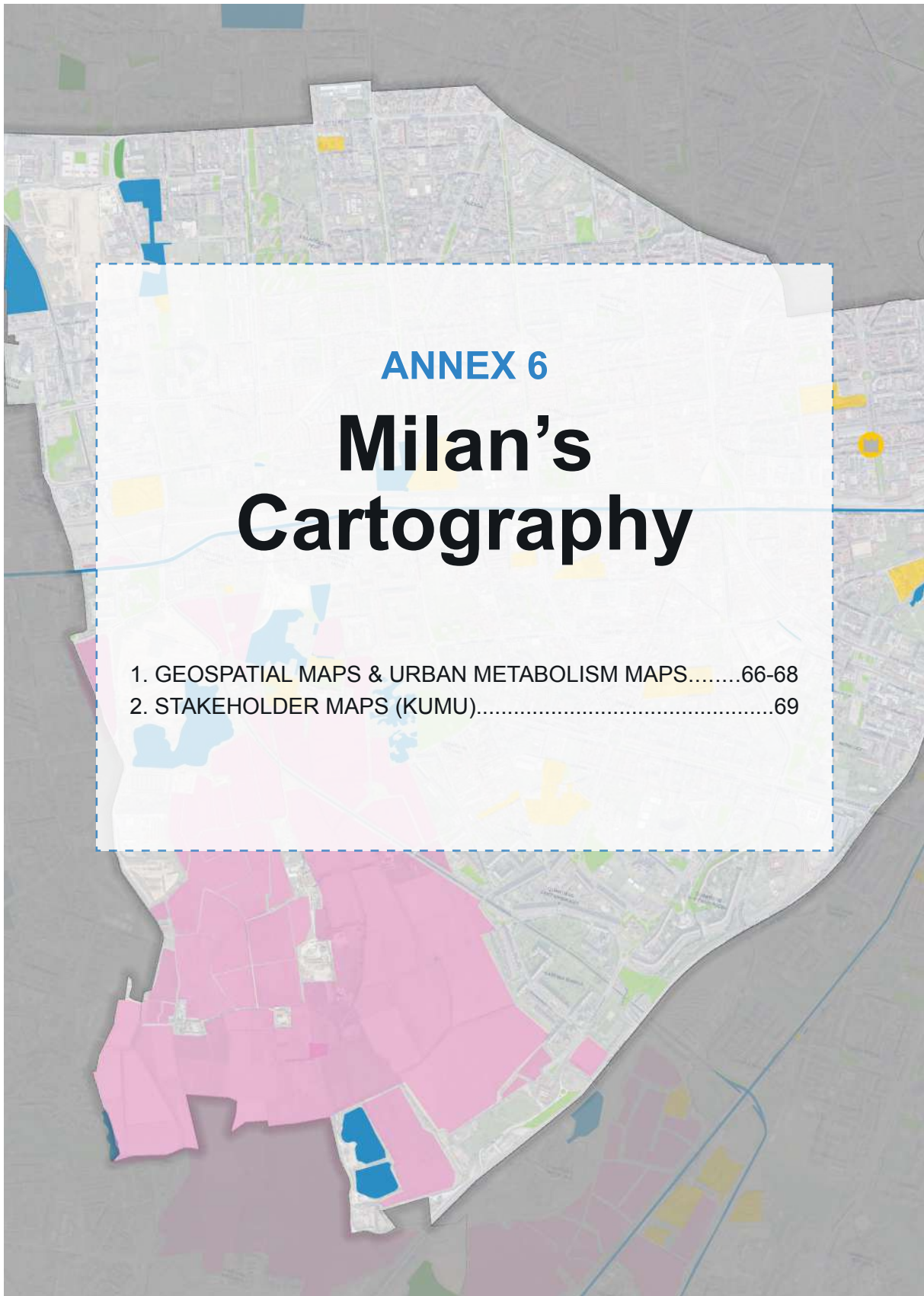


Description:

To identify which stakeholders are relevant in the reuse and recovery of urban wood waste flows, we mapped the waste collectors of urban wood waste.

Map/Image:





1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

An overview of the waste collectors in the Milan city area (published)



Description:

This map displays the different waste collectors, the total volume of the waste they collect and their locations in the Milan city area for the year 2020. Highlighted are specifically those locations which collect textiles in their waste streams, labelled as green squares. The question to be answered was the following: are there waste streams which contain materials which could be saved from landfill, like textiles, and where are these located within the city?

Map/Image:



1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

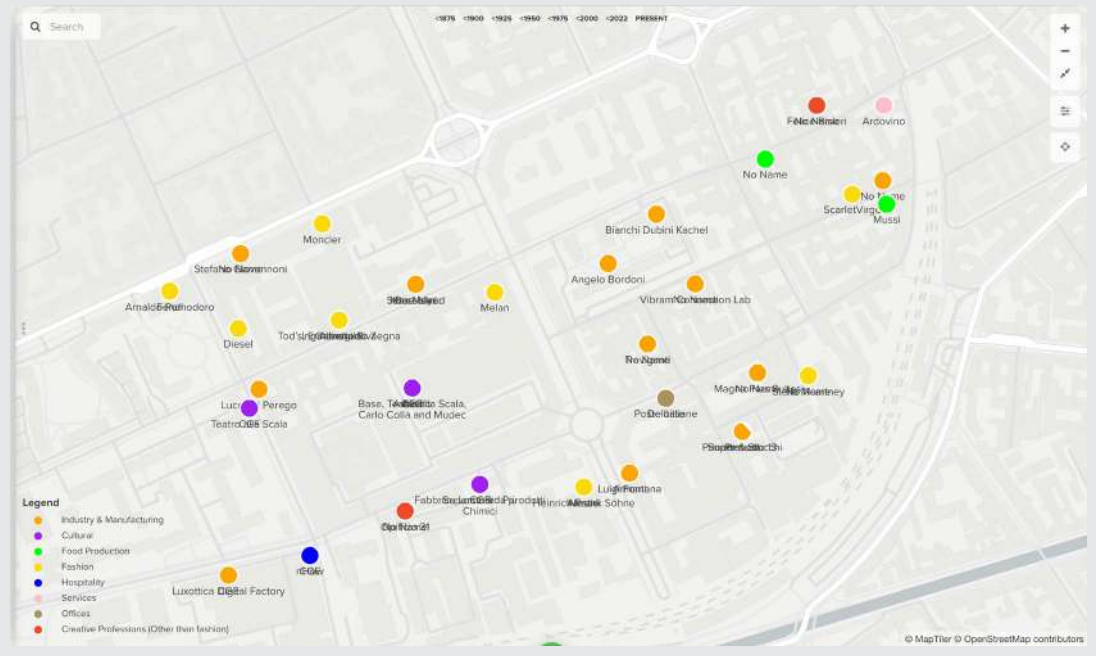
The historical evolution of the Tortona area in Milan (published)



Description:

This map was made to display the shift between what used to be a primarily industrial and manufacturing area, towards what currently is a mostly fashion and hospitality centered area.

Map/Image:



1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:


Mapping the stakeholders in the Milan city area (published)



Description:

To understand the actors which are involved in Milan’s creative industry, we have mapped a large number of different types of stakeholders. This map contains a number of artisans and producers, labs, stakeholders providing services and some relevant, (academic) institutions.

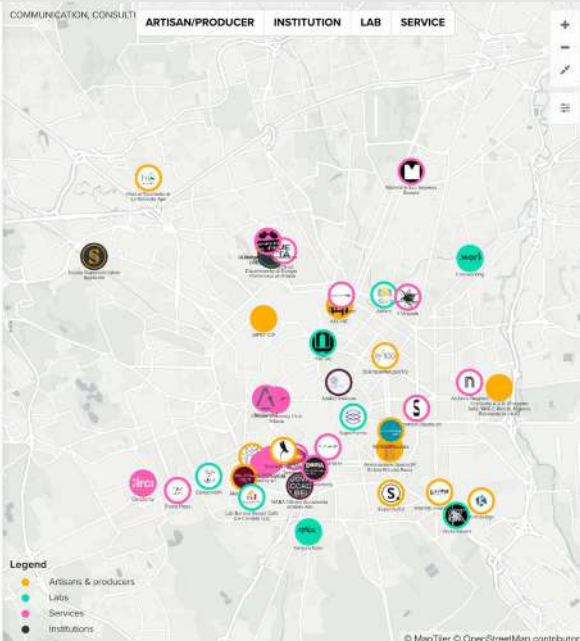
Map/Image:



Explore Manifattura Milano

Manifattura Milano is the platform dedicated to craftsmanship, urban manufacturing and the circular economy in the fashion and design sectors of the city. Manifattura Milano is one of Milan’s pilot actions of **CENTRINNO**, a project funded by the Horizon 2020 program and dedicated to urban and circular manufacturing, social inclusion and the recovery of former industrial areas in cities.

The map is a work in progress and shows the stakeholders



COMMUNICATIONS, CONSULTI **ARTISAN/PRODUCER** INSTITUTION LAB SERVICE

Legend

- Artisans & producers
- Labs
- Services
- Institutions

© MapTiler © OpenStreetMap contributors

2. STAKEHOLDER MAPS (KUMU)

Title:

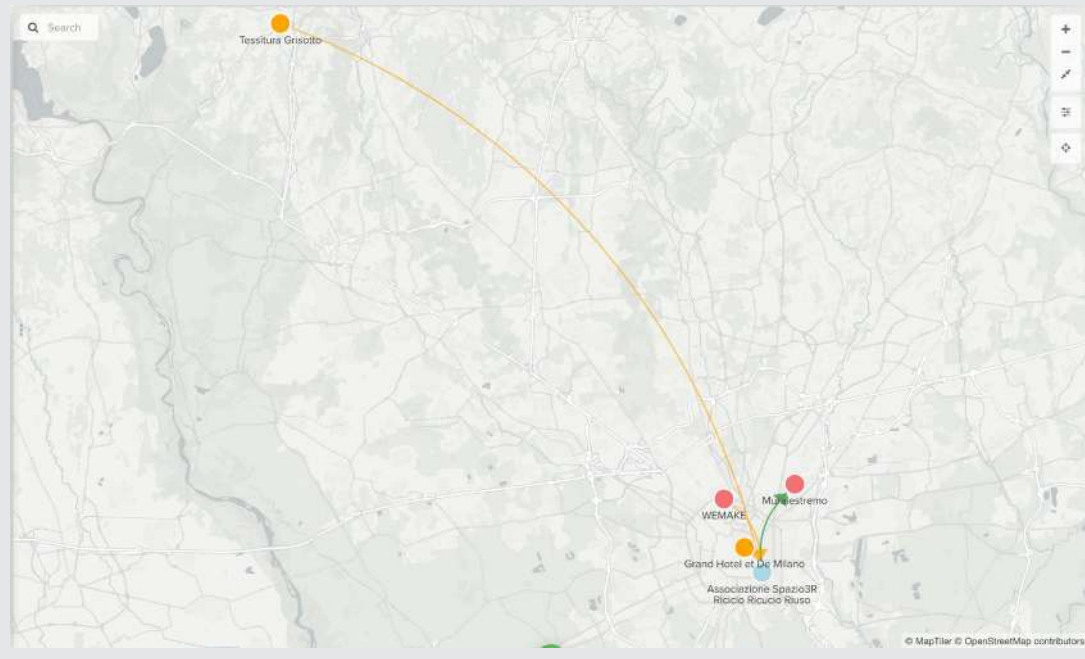
A map showing the production chain of the Meta Circular Tote Bag (published)

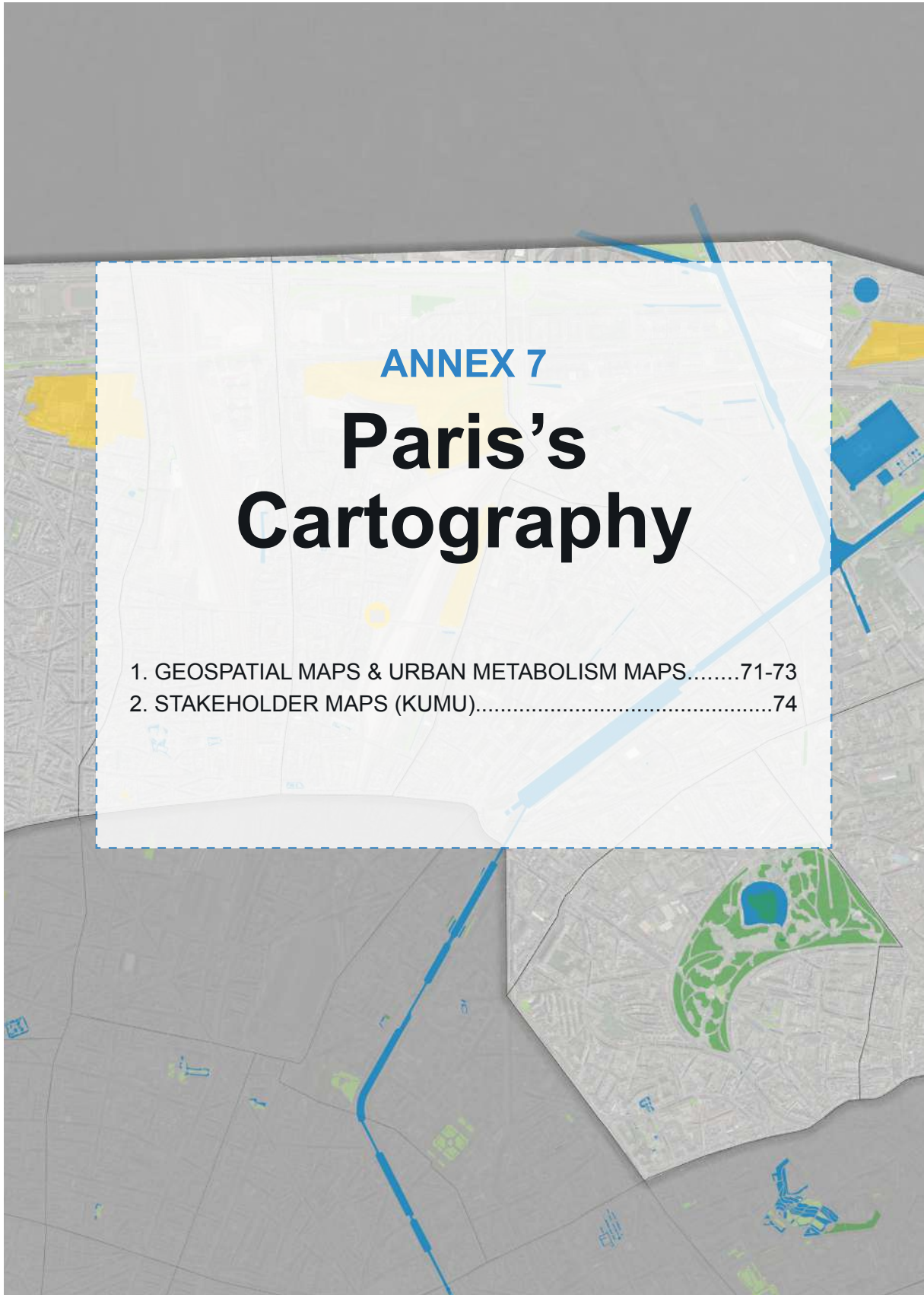


Description:

This map displays the different material streams connected to the production of the circular, Meta brand tote bag. Companies are subdivided into suppliers, manufacturing support and final producers.

Map/Image:





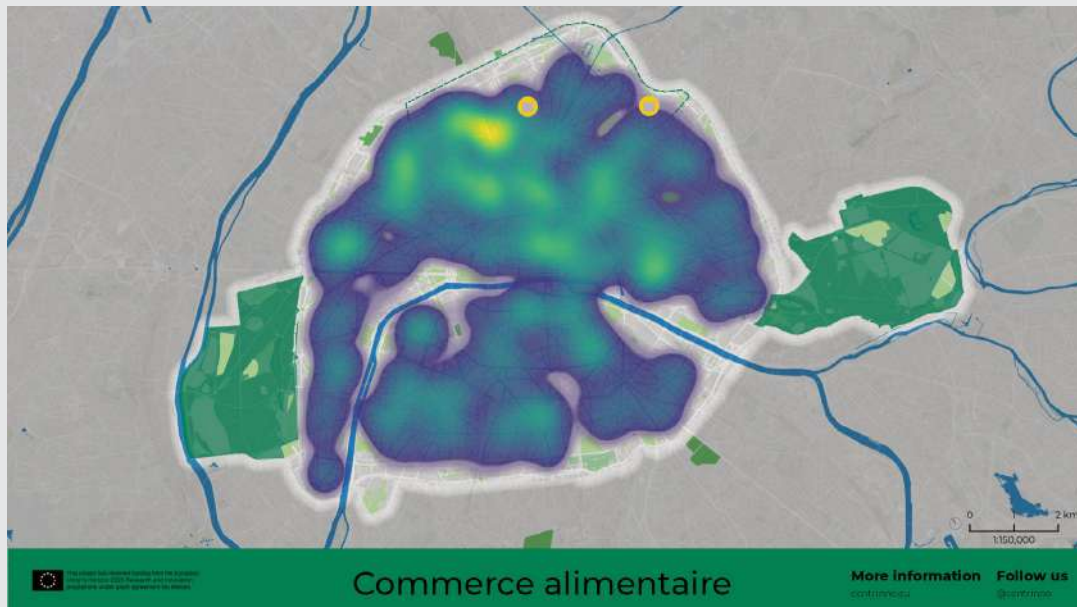
1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:
Density of food retail (unpublished)



Description:
Given the pilot's interest to regenerate a local, alternative food system for Paris, we attempted to map the three aspects of urban food production, distribution and transformation. This map shows the density of food distributors across the city, highlighting a hotspot of food-selling businesses close to the pilot area.

Map/Image:



1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

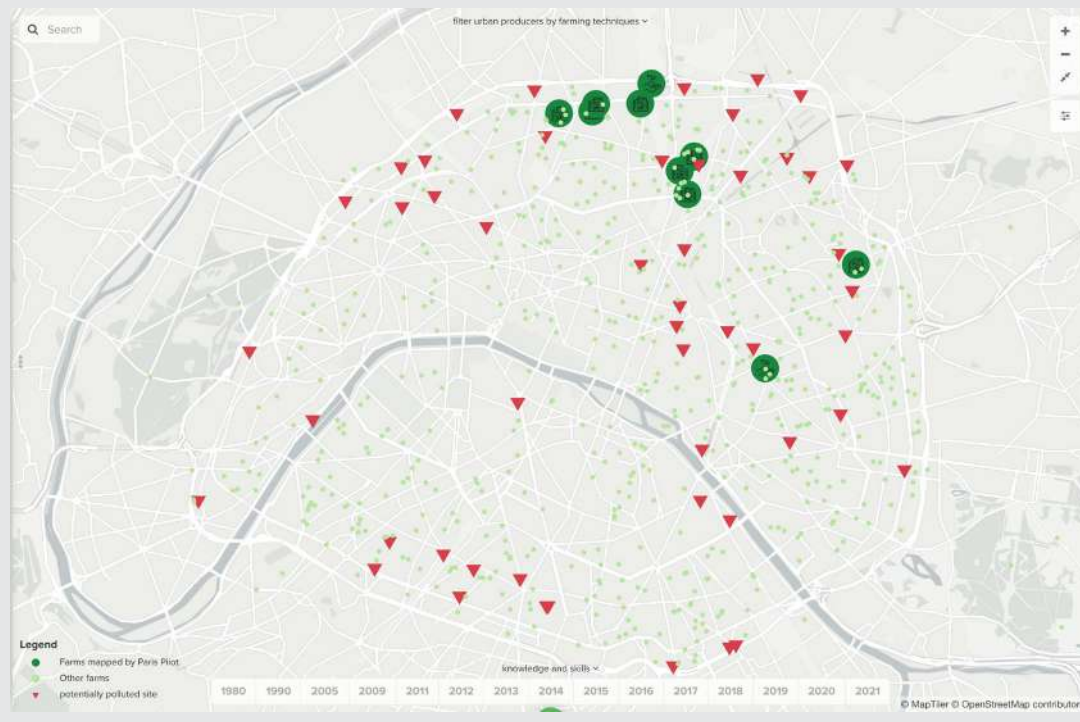
Alternative urban food production across Paris (published)



Description:

To get an overview of Paris' existing urban food production ecosystem, we mapped existing city-wide data on urban agriculture in KUMU. This map helped us to visualise the size and evolution of food-growing projects in the city. It was used to educate the pilot and analyse the trends of urban agriculture over time.

Map/Image:



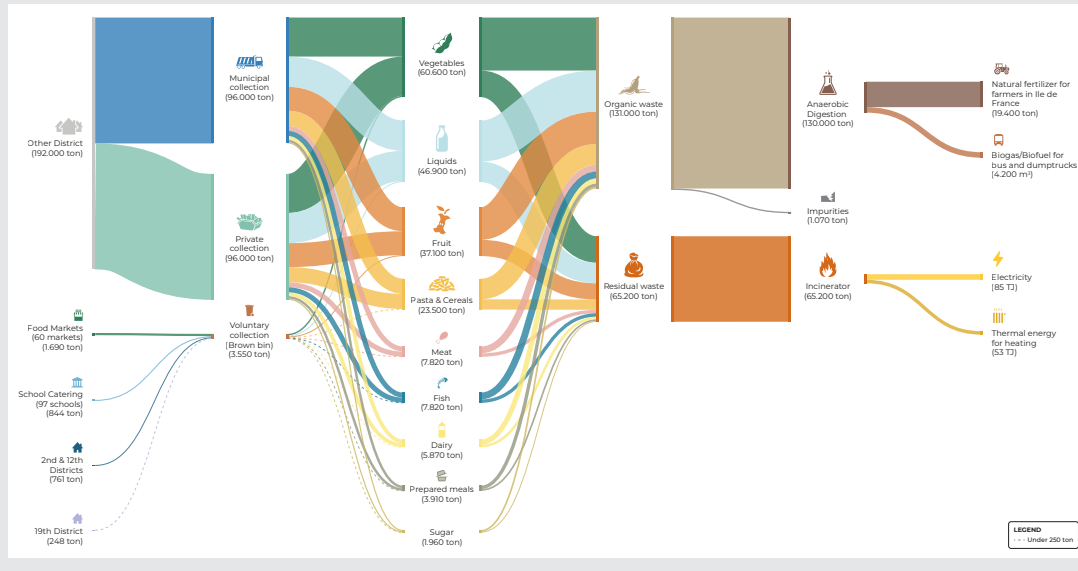
1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:
Food waste flow analysis of Paris (published)



Description:
Given the food focus of the Paris pilot, we have mapped the urban metabolism from the angle of food waste. We have used this MFA to raise awareness around food groups that are most often wasted and to discuss activities that the Fab City Hub in Paris can do to address these waste streams.

Map/Image:



2. STAKEHOLDER MAPS (KUMU)

Title:

Food System Learning Ecosystem (published)



Description:

The Paris pilot created a map of all stakeholders holding transversal skills for learning programmes around sustainable and circular food production, transformation, distribution and waste management.

Map/Image:

Fab City Grand Paris
KNOWLEDGE & LEARNING

fab lab vocational school other knowledge facility NGO

CENTRINNO THEME
vocational training
circular economy
social inclusion
heritage

IMAGE

LOCATION
15 B RUE LEON GIRAUD 75019 PARIS

PARTNERSHIP IN TRAINING PROGRAMS
Circular Making

ROLE IN CENTRINNO
local partner

ROLE IN CIRCULAR VALUE CHAINS
Design thinking for circular economy
food production
food transformation
circular training

SKILLS FOR FOOD PRODUCTION
Design
Digital fabrication
Circular economy
Research
Third place management
business model
training

WEBSITE
fabcity.paris/

VERIFIED?
yes

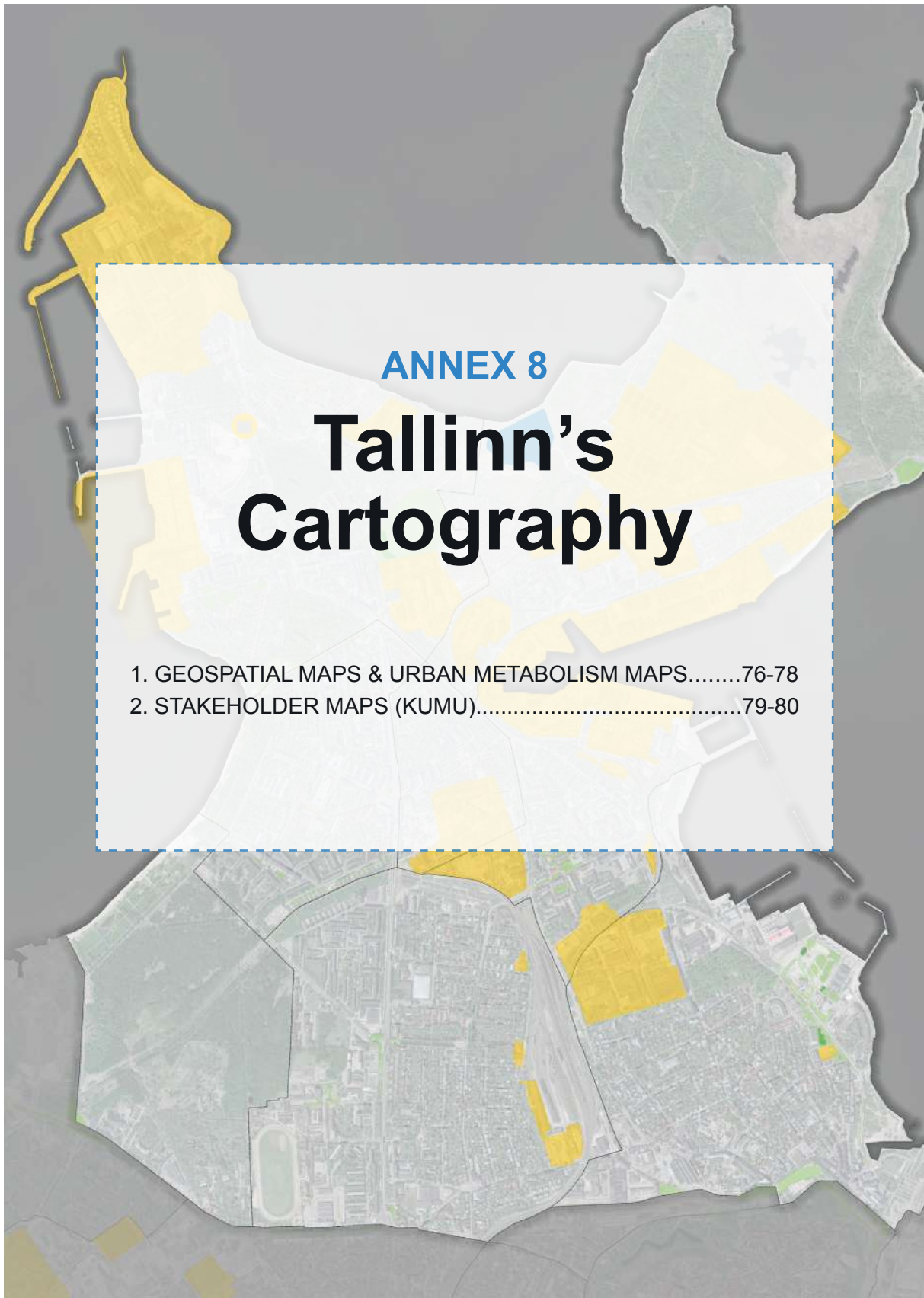
Legend

- Knowledge & learning activities
- Local partners
- Community & civil organisations
- Public institutions
- Other organisations
- Business & industry
- Research
- Urban management
- Urban agriculture
- Urban farming

Hub: Knowledge & learning makers and craftsmen Public institution research
Services and training urban farming

vergers urbains
Fab City Grand Paris

© MapTiler © OpenStreetMap contributors



ANNEX 8

Tallinn's Cartography

- 1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS.....76-78
- 2. STAKEHOLDER MAPS (KUMU).....79-80

1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

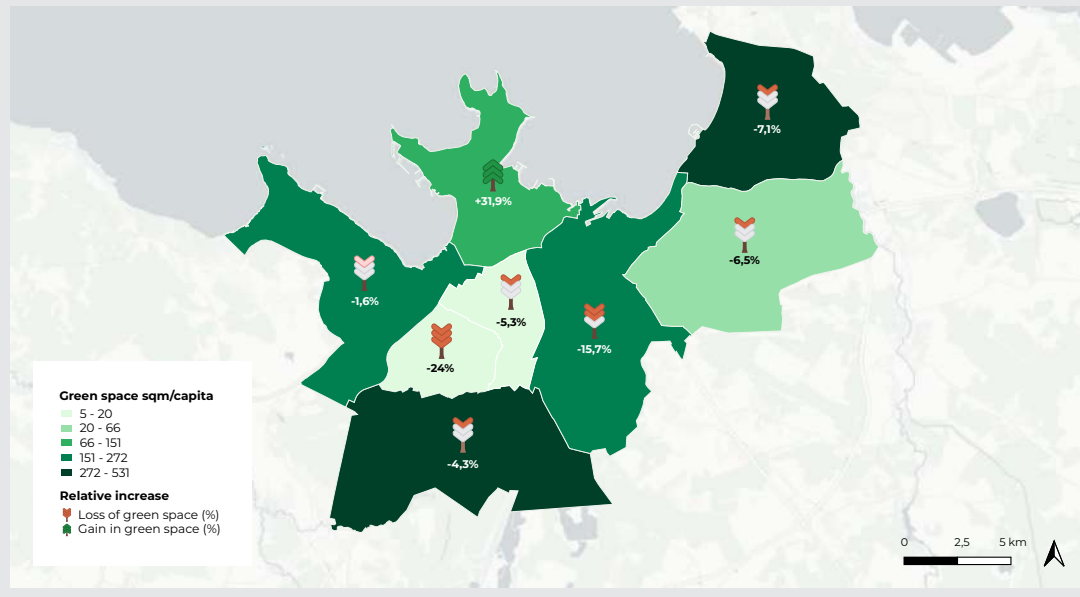
Loss of urban green space (published)



Description:

We mapped the city-wide loss of urban green spaces and green space ratios per neighbourhood to obtain a high-level picture on the state of greenery across the city. We learned that Kopli (1) is the only area with growing green space but (2) that we see a lack of green space compared to all other neighbourhoods.

Map/Image:



1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

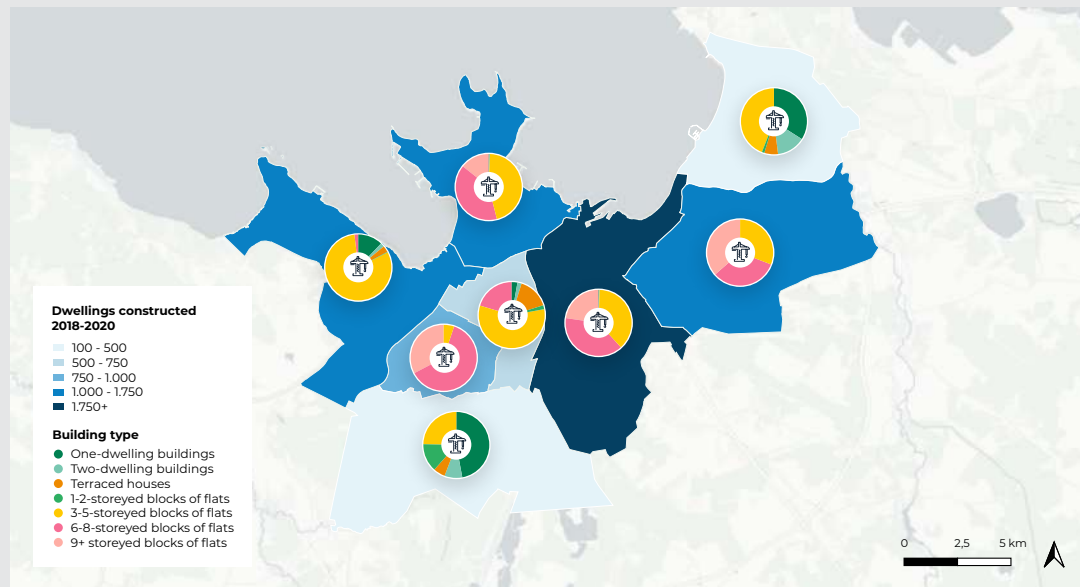
Construction activities across Tallinn



Description:

This map highlights the amount and type of buildings constructed between 2018 and 2020 across Tallinn. It highlights trends in urban transformations that will affect Kopli significantly. In Tallinn’s North, the constructed 6- to over 9-storeyed buildings stand in stark contrast to the current building typology of multi-family wooden houses and industrial buildings of the neighbourhood. We used this map to highlight the upcoming opportunity for educating around topics of building material reuse and sustainable construction.

Map/Image:



1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

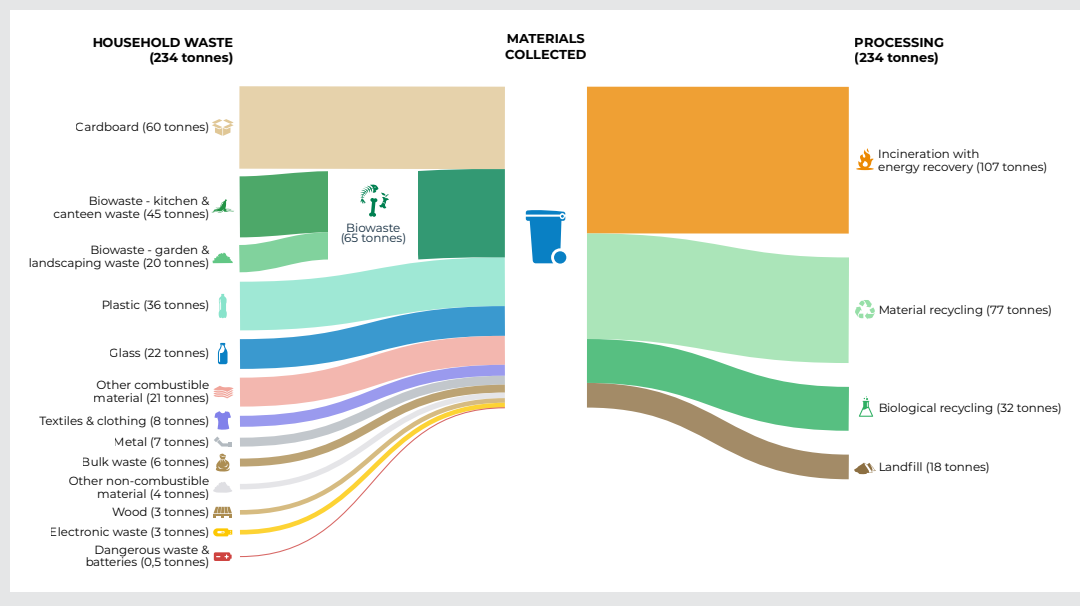
Waste flow analysis of Tallinn



Description:

This image shows the waste streams collected from public waste services throughout the city of Tallinn. While no data on recycling and recovery rates were available, we used this MFA to highlight to our pilots the availability of food and bio-waste from household waste. The purpose of this MFA could be to raise awareness around food waste and soil regeneration potential - one of the core focus areas of the pilot.

Map/Image:



2. STAKEHOLDER MAPS (KUMU)

Title:

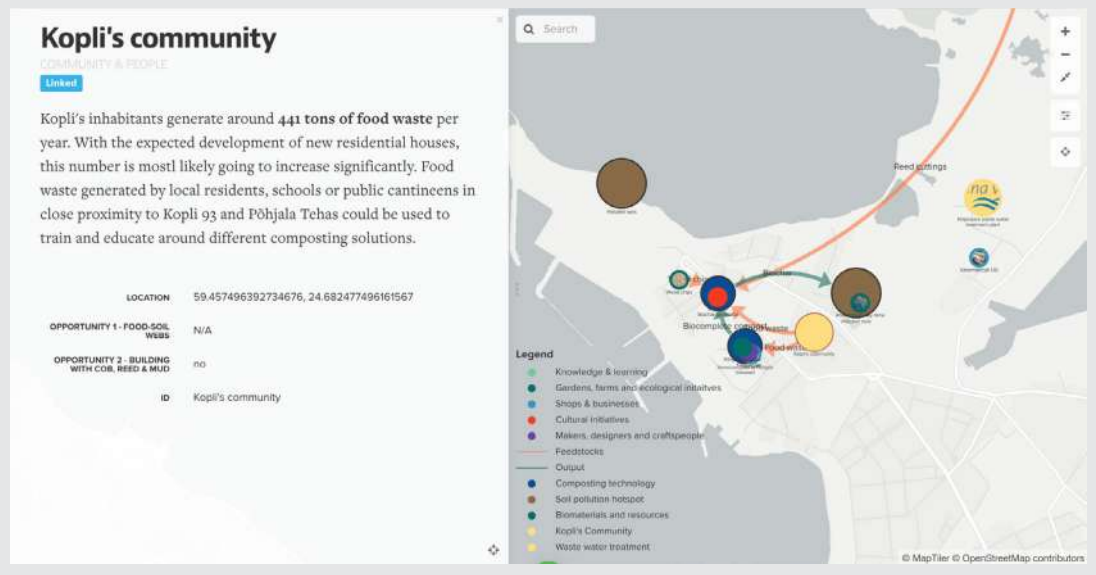
Potential soil regeneration activities through Kopli (published)



Description:

Kopli 93 is interested in mapping local skills and circular opportunities around topics of composting, local soil regeneration and food waste reduction. We have used KUMU to communicate and visualise potential synergies that link local knowledge and skills into a soil-food web. Data that fed into this map was coming from literature research on pollution hotspots, locally mapped stakeholders and their skills and geospatial information on available natural resources, such as reeds.

Map/Image:



2. STAKEHOLDER MAPS (KUMU)

Title:

Circular Ecosystem Tallinn (published)




Description:

This map shows all stakeholders and respective circular economy that the Tallinn pilot has mapped throughout the project. The goal of this map is to create a growing network of partners that can give workshops or trainings for different circular economy topics.

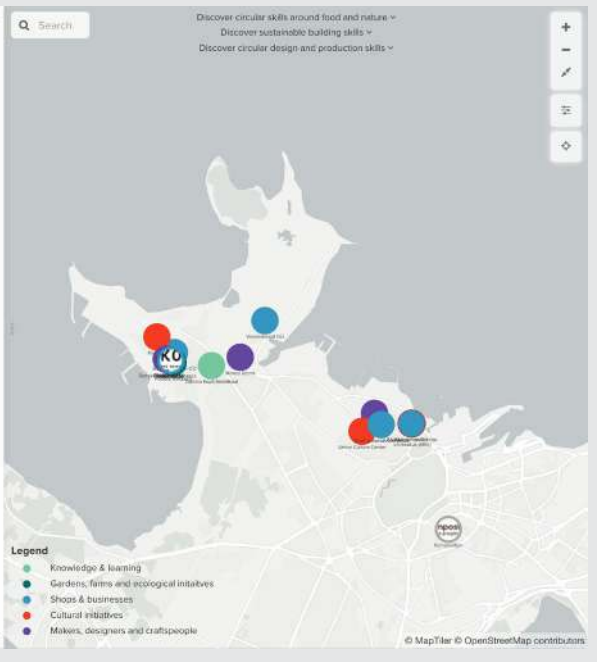
Map/Image:

Majatohter OÜ
CONSTRUCTION & BUSINESS SERVICES
[Linked](#)

Majatohter is a store for natural, traditional and reclaimed building materials. People interested in learning the craftsmen skills needed for heritage restoration of old buildings, doors, window frames or plaster find an interesting set of courses and workshops at Vanamaterials. Further, builders can buy recovered wood, logs, bricks and other building elements which were saved from the demolition of wooden houses across Tallinn.



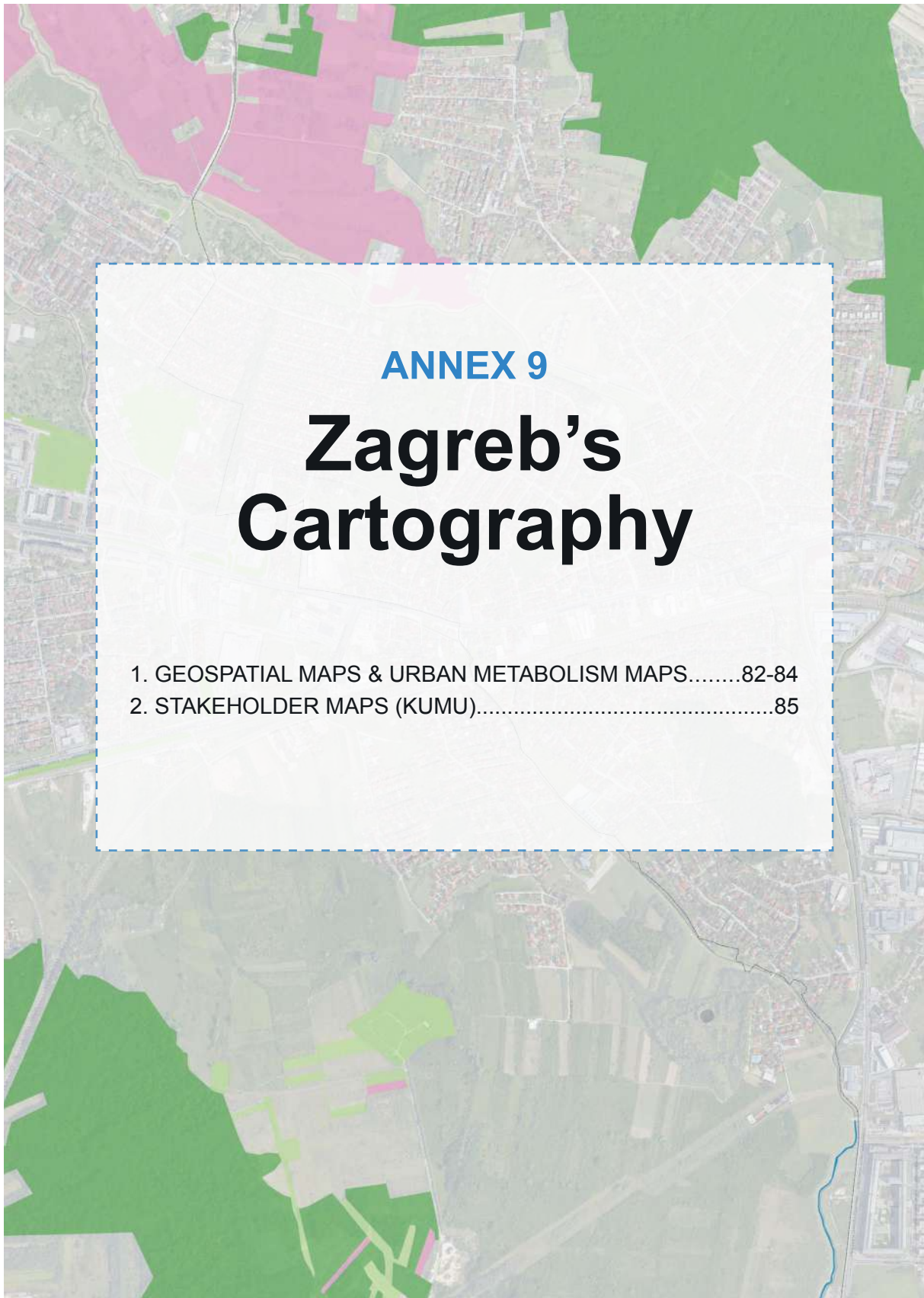
repair & reuse store



Legend

- Knowledge & learning
- Gardens, farms and ecological initiatives
- Shops & businesses
- Cultural initiatives
- Makers, designers and craftspeople

ZAGREB



ANNEX 9

Zagreb's Cartography

1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS.....	82-84
2. STAKEHOLDER MAPS (KUMU).....	85

1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

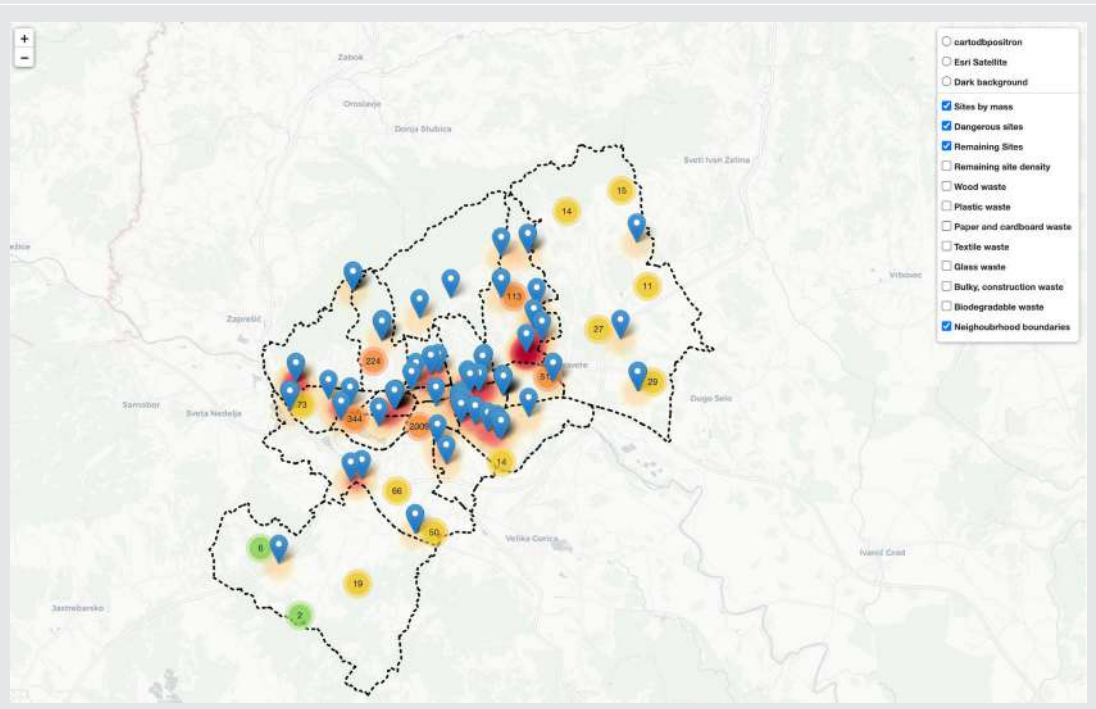
Illegal landfills across Zagreb (unpublished)



Description:

Due to lack of reliable waste data, we attempted to find different ways to highlight Zagreb's challenge with circular and sustainable waste management. One of our attempts was to map the size and content of illegal landfill sites across the area. However, due to pilot concerns on the validity of these maps, we did not proceed further.

Map/Image:



1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

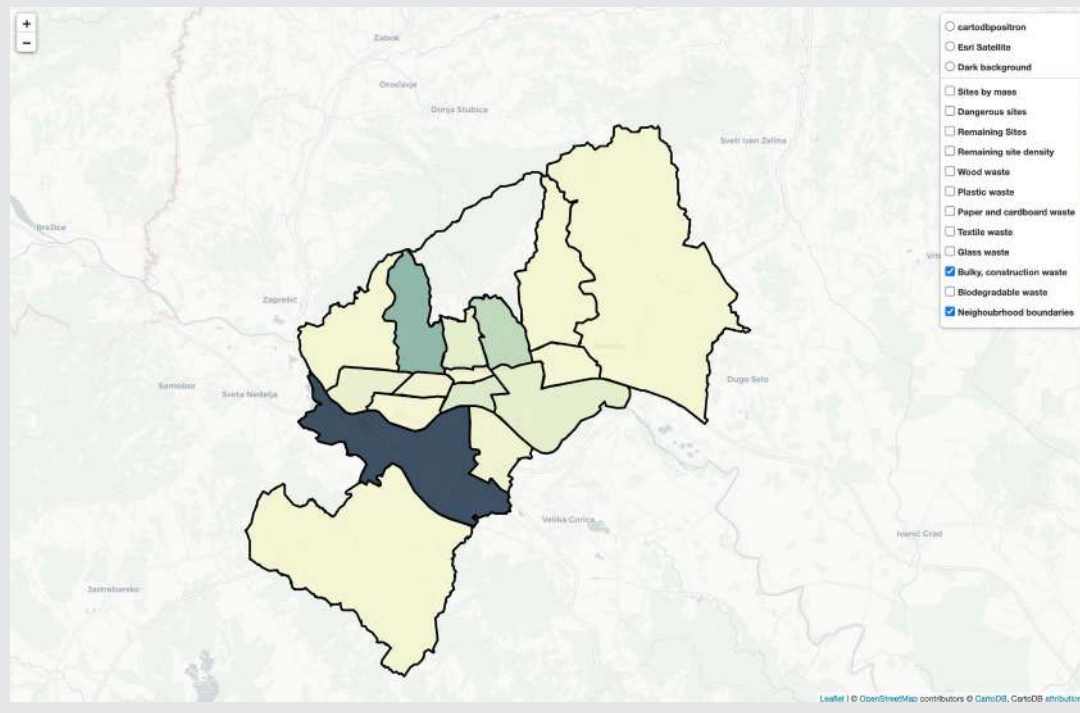
Waste generation from registered companies per neighbourhood (unpublished)



Description:

In Zagreb, public data exists on the location of companies and their generated wastes across key waste types. This data could give interesting insights into city-wide hotspots on waste from private businesses that could help us to identify interesting reuse synergies. In Sesvete, the pilot area, we identified a hotspot of plastic and glass-waste generating businesses. Due to the pilot’s focus on construction and demolition waste, however, we did not yet further any of these opportunities.

Map/Image:



1. GEOSPATIAL MAPS & URBAN METABOLISM MAPS

Title:

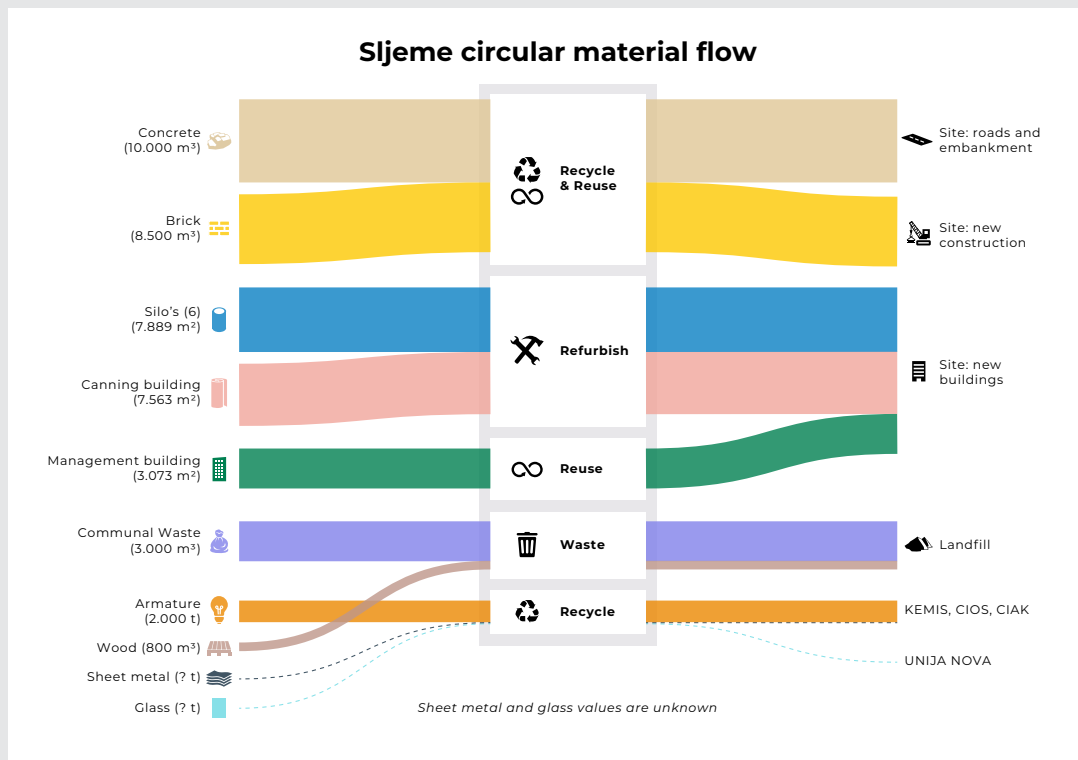
Material stocks and potential reuse cases for the Sjeme factory transformation



Description:

The Sjeme factory, a former meat factory in Sesvete, will undergo significant renovation and partial demolition before being transformed into a fab lab. The pilot analysed the volumes of materials currently hidden in the stock of the factory buildings to identify reuse and recycling pathways, visualised in this material flow diagram below.

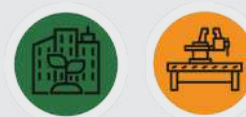
Map/Image:



2. STAKEHOLDER MAPS (KUMU)

Title:

Mapping Zagreb's Brownfields, Non-Legal Construction waste Dumps, Recycling locations and innovation spaces



Description:

To investigate the current problems and opportunities surrounding Zagreb's construction waste production and end-of-life treatment, the pilot team mapped non-legal waste dump sites, brownfields, material recycling facilities and urban innovation spaces.

Map/Image:

Centrinno ZG Circular public

INNOVATION SPACES

- HUB385
- Impact HUB
- HUB_S
- BIZkoshnica Coworking
- ZICER - Zagrebački inovacijski centar
- HUB_S mini
- FabLab.hr
- Radiona makerspace
- Narodno učilište Sesvete
- Učilište Sesvete

Brownfield ZG

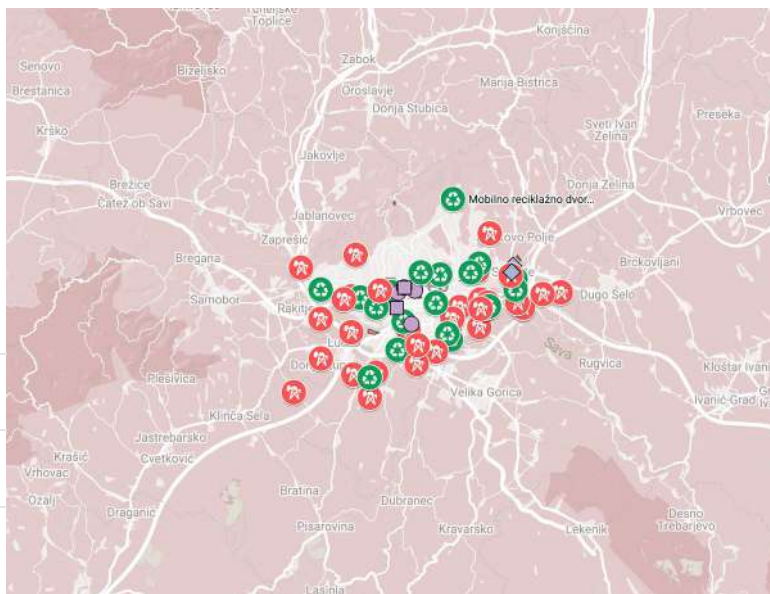
- All items

Official Recycling facility

- All items

Non-legal dumps for construction materials

- All items



Opis karte

BASELINE POSTER EXAMPLE

This poster was used in the consortium meeting 2022 in Milan, Paris and Blönduós to present to pilots a baseline of (1) city-wide and neighbourhood-specific data on land use, green space loss and potentially other identified social, ecological and economic challenges, (2) a factsheet about each site and (3) a baseline of mapping activities and heritage engagements that each pilot engaged with during the sprint. All nine pilot posters can be viewed on this [MIRO](#) board.

COPENHAGEN

NEIGHBOURHOOD FACTSHEET

Bispebjerg

Neighbourhood type: Cultural

Green space score: 19.7% ●●●○

Population density: 7,427 ●●○○

Role in circular city: Innovation hub, learning hub

HIGHLIGHTED CHALLENGES

- No major ecological challenges identified
- High unemployment rates among young people, women, immigrants and refugees
- Outflow of professionals
- Urban redevelopment projects
- Lacking access to work spaces

HIGHLIGHTED OPPORTUNITIES

- Space sharing: Fostering collaboration between makers and real estate development for shared workspaces and adaptable assets
- Circular economy education: Collaboration with local vocational school and construction/demolition project to explore potential of urban mining

Neighbourhood types

Green space share

SITE FACTSHEET

Anchor building: Reformstrædevej (Neighbourhood)

Former activity: Basket production (N.J. Plast (1934-1993))

Current activity: Offices since 2005

Heritage status: Protected by law (National Inventory)

Ownership: Ownership distributed amongst different small businesses

POSSIBLE SITE CHALLENGES

-
-
-
-

POSSIBLE SOLUTIONS

-
-
-
-

HUB ACTIVITIES BASELINE

WHO HAVE YOU MAPPED?

Breakdown of stakeholders

YOUR LOCAL HERITAGE ENGAGEMENTS

Strategies for local engagement

Facilitate with the collective: Use local resources, when possible, to create a specific, authentic, and meaningful experience.	Cognitive Center: Encourage visitors to explore a specific, authentic, and meaningful experience.	Advocacy: Encourage visitors to explore a specific, authentic, and meaningful experience.	Explore how sites and stories are related to local history.	Facilitate community: Encourage visitors to explore a specific, authentic, and meaningful experience.	Consider current story: Explore how sites and stories are related to local history.	Work on urban based solutions for original degradation.	Work on artistic interventions.
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

ADDRESSING THE GAPS

Checklist for self-reflection

Have you mapped a good diversity of newcomers and long-term locals?	1	2	3	4	5
Do you know if your stakeholders are affected by the challenges we have mapped for your area?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you have stakeholders mapped who are relevant in working towards solutions for your site?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do the stakeholders you have mapped have any emotional connection to the physical site?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>