

D3.2

Co-Designed IoT Concepts 3

ESR 4 - Smart Cities
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Contents

This file contains documentation about **Reuse Commons**, a Co-Designed Concept originally created in the first year of my PhD research focusing on Waste Prevention and Smart Cities at the OpenDoTT project.

The concept was updated during the third year and reshaped as a participatory toolkit for collaborative policy-making around the concept of generous cities.

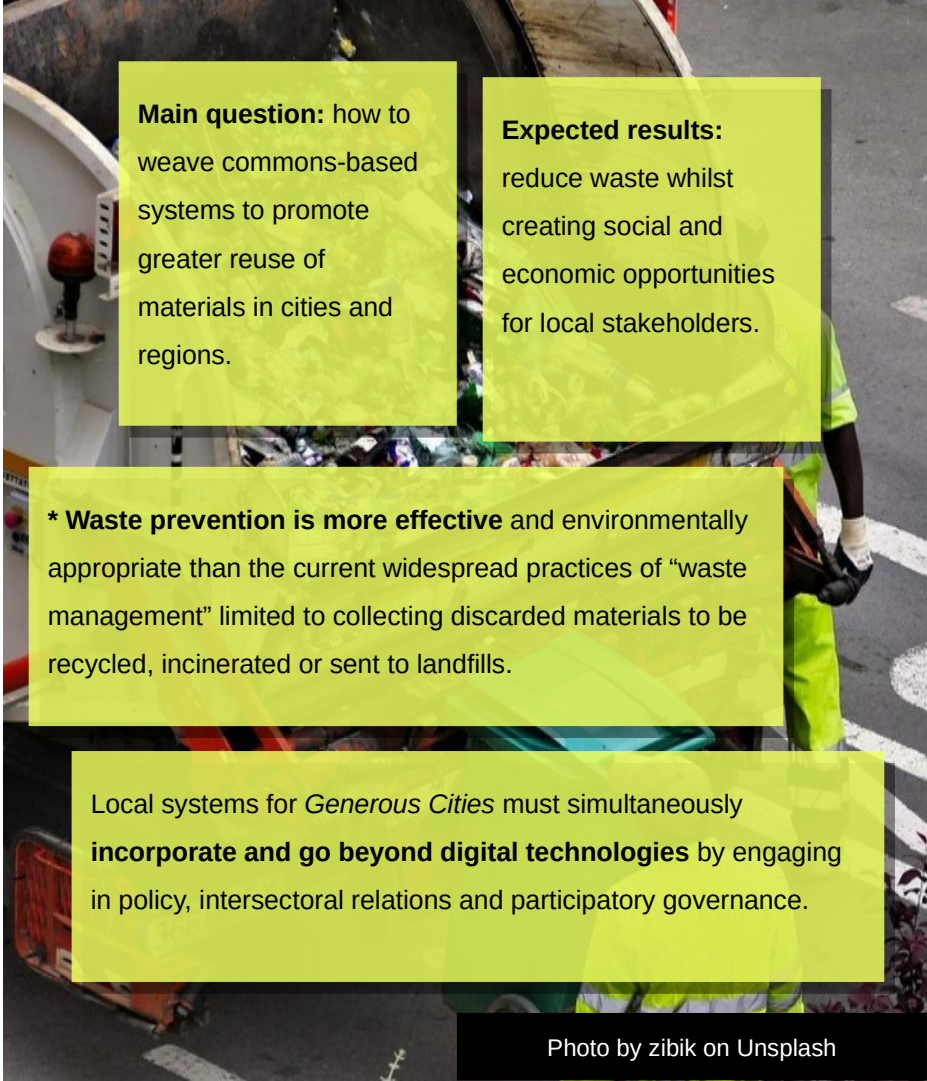
- Research Focus
- Background
- Co-Designed Concept

Research Focus: Waste Prevention

Under a global climate emergency, there is an immense opportunity - an urgent need, in fact - to transform **Smart City projects into powerhouses of environmental regeneration**. My research is based on the understanding that *recycling is not enough* to cope with the growing volume of materials getting discarded every day in contemporary cities. I am creating systems to:

- Identify unused goods and materials * - redundant, broken, left over, inadequate or otherwise - in cities and regions.
- Dynamically and collaboratively assess and actualise the potential value of such materials - by reframing, recirculating, transforming or repairing them, among many other potential operations.
- Allow commons-based governance of such goods and materials involving diverse participants.
- Identify and create trusted innovative technologies to generate, store and deliver data for material reuse systems.

Such systems must strive to **conserve materials** by keeping them away from the waste stream for *as long as possible in an environmentally safe manner and benefitting local stakeholders*. To do that, it is necessary to articulate policy, technology and intersectional cooperation.



Main question: how to weave commons-based systems to promote greater reuse of materials in cities and regions.

Expected results: reduce waste whilst creating social and economic opportunities for local stakeholders.

* **Waste prevention is more effective** and environmentally appropriate than the current widespread practices of “waste management” limited to collecting discarded materials to be recycled, incinerated or sent to landfills.

Local systems for *Generous Cities* must simultaneously **incorporate and go beyond digital technologies** by engaging in policy, intersectoral relations and participatory governance.

Background (2019 / 2021) - concept ideas and prototypes

1/8
Universal Registry of Things
Open database
Information about as many types of objects as possible.



2/8
Point and Reuse
App / Website
Allows users to quickly evaluate the potential value of an object.



5/8
Data on Reuse
Open Dataset
Data about different kinds of reuse of materials in urban environments.



6/8
Reuse Bin
Urban Service
Track your donations.



3/8
Save This Thing
App / Website
Geo-referenced open directory of reuse alternatives with user evaluation / reputation system.



4/8
Make Waste Visible
Urban Interventions
Expose the volume of waste generated by towns and cities.



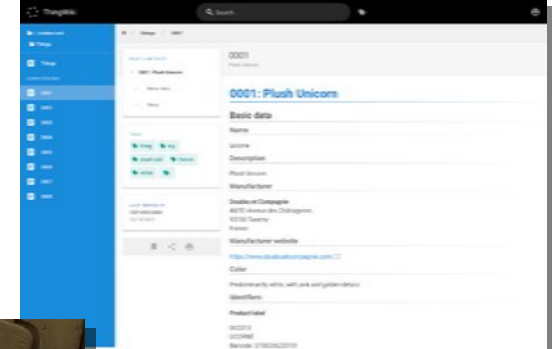
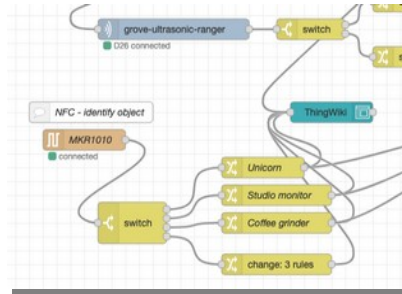
7/8
Transformation Lab / Shop
Blueprint
Urban infrastructure for reuse / upcycling of materials.



8/8
Reuse Commons
Urban Service
Collective stewardship of post-consumption materials.



Through a series of research activities, eight original concept ideas were co-designed since 2019. Three of them were further developed and prototyped in an online collaborative lab in 2021: **Universal Registry of Things, Point and Reuse, and Transformation Labs.**



An aerial photograph of a city street grid, viewed from a high angle. A complex network of black lines is overlaid on the image, connecting various points across the city, suggesting a network or data flow. The lines are thicker in some areas and thinner in others, creating a web-like structure. The background shows buildings, streets, and trees, with a warm, golden light suggesting late afternoon or early morning.

To reconnect my research on waste prevention with the urban scale, the design concept **Reuse Commons** was revisited from a perspective of policy-making for Smart Cities.

Reuse Commons

A participatory toolkit to enable Smart Cities to transition to Generous Cities.

The toolkit contains the following tools:

- **Generative Mapping;**
- **Collaboration Cards;**
- **Data / Materials Flows.**

Reuse Commons: participatory policy-making

Reuse Commons is a dynamic toolkit for the *generative mapping* of systems for material generosity in Smart Cities. It helps local stakeholders identify available resources, potential collaborations, and exchange opportunities.

The toolkit aims at creating situated arrangements of cooperation through **shared data, trusted IoT and commons-based governance** to reward the reuse of materials and reduce waste generation.

Adopting an intersectional approach, Reuse Commons allows stakeholders to gain awareness of existing or proposed policies, technologies and practices that may facilitate or hinder the development of local reuse systems and how to engage with those areas.

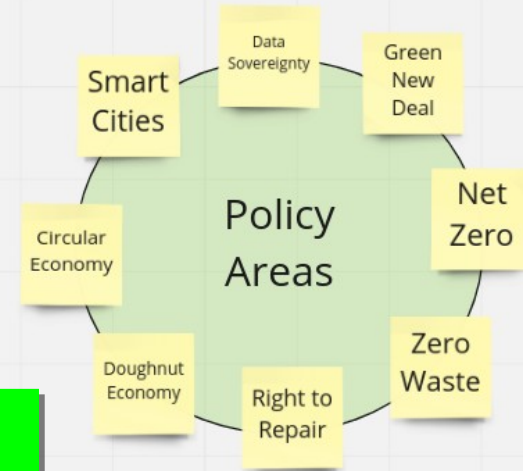
Benchmarks from other contexts and international examples of legislation are also brought in as inspiration. Attention to privacy, trust, stability and resilience of data structures is incorporated by default.

Reuse Commons helps local authorities, civil society and local entrepreneurs work together to shape innovative, regenerating and climate-aware waste policies for Smart Cities.

The toolkit builds trust by facilitating negotiated protocols and transparent data agreements to challenge the commonly opaque practices of waste management.

It enables data about the reuse of materials to be generated in order to:

- Reward maintainers.
- Inform policy-making.
- Create technologies.
- Integrate stakeholders.



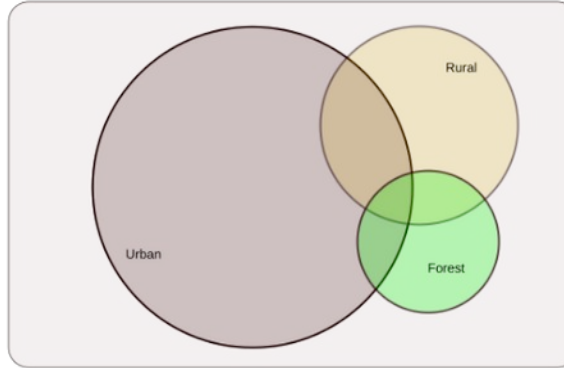
Generative mapping

Reuse Commons allows stakeholders to identify sources and potential destinations for materials, and to co-create protocols for the assessment, storage, exchange, use and transformation of goods and objects.

The *generative map* is an iterative overview of relevant actors in the field and of material flow patterns, resistances and potential alliances. Instead of merely depicting the scenario, the mapping phase is itself an exercise in creating novel pathways for material exchange.

Existing data sources and the need to develop sensors, tools and trusted data collection tools are identified and acted upon.

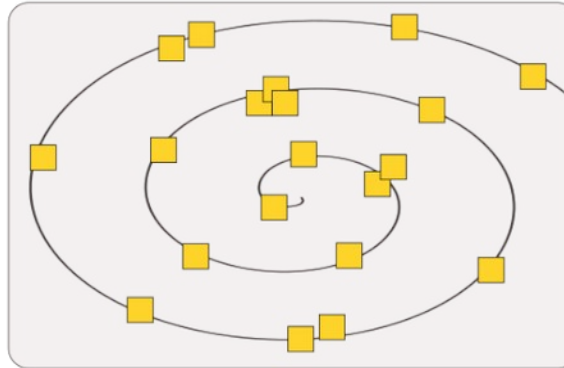
Step 1: visualize bioregion for the commons



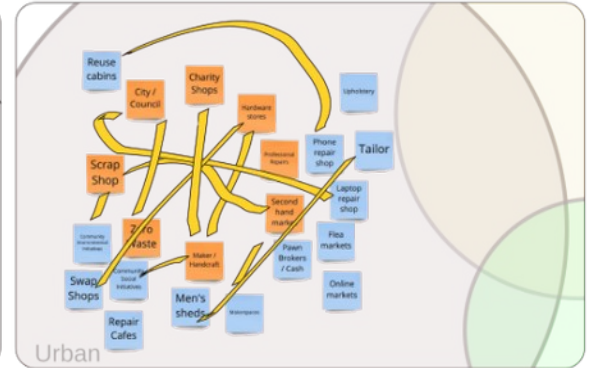
Step 2: map members of the commons and existing interaction among them



Step 3: use cards to build the reuse commons



Step 4: update map with material flows and protocols of the commons



"We receive 300kg of computer donations each month"

"My team is skilled in computer refurbishment"

"The city can pay for the diversion of electronics from the waste stream"

Community Association



Offers

- Lorem ipsum dolor
- Sit amet, consectetur adipiscing
- Elit, sed do eiusmod tempor

Requests

- Incidunt ut labore et dolore
- Magna aliqua
- Ut enim ad minim veniam

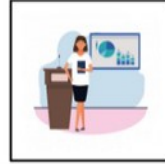
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Social Entrepreneur



Offers

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Requests

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Municipal Environmental Department



Offers

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- Elit, sed do eiusmod tempor

Requests

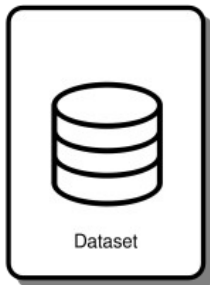
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Interactive collaboration

Thematic cards are used to trigger collective conversations about tools, technologies and policies to seize collaboration opportunities and overcome common challenges.

The cards are used as a workshop guideline to engage local actors in generating strategies for trusted generous cities. Alternatively, individual organisations or groups can use Reuse Commons to visualise their local context and suggest tactics for moving forward.

Examples of outcomes are policy recommendations, privacy-aware IoT device specifications, cooperation protocols, open equipment inventories, and data integration agreements.

Data / material flows

Stakeholders willing to contribute to waste prevention in cities and regions identify agents and design flows of materials and data on top of local maps. The toolkit allows all participants to observe patterns and identify potentialities.

Every node in the map can contribute with trusted data, offer tools and equipment, request materials or specific skills. They can also invite others to collaborate in collective bidding, hackathons, repair cafes, swap events, street cleaning days and other formats.

Datasets about waste prevention are used to highlight the relevance of the commons and inform trusted policy-making. Relevant gaps in data availability can be responded to by informing the development of IoT devices.

