Reflow

Co-creating circular & regenerative flows in cities

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WHITEPAPER

Introduction

More than 200 years since the Industrial Revolution, global urbanisation continues to accelerate. The United Nation's projections indicate that 68% of the world's population will live in urban areas by 2050[1]. Modern urbanisation has created a lifestyle based on the linear economy, causing destructive social and economic impact which has led to the ongoing compromise of the ecological systems of the planet. There is a need to rethink urban development, not as mechanic metropolises, but as ecosystems to sustain human life. We must consider urbanisation not as a parasite but as an extension of the planet and develop an environmentally enhancing, restorative relationship with the natural systems that the city and its inhabitants rely on.

From Linear to Regenerative

Europe gave birth to the industrial revolution more than two centuries ago thanks to the convergence of a series of factors that allowed technology to be closer to society, while creating economic benefits for regional and national economies[2]. Globalisation opened markets, in which not only European cities, but cities across the world could trade in manufacture. Europe took advantage of this and manufacturing moved away from cities, in search of better cost-benefits and optimization of production for faster delivery. Europe rapidly transitioned to a knowledge and service economy supported by a global production and manufacturing system based on industrialisation.

In Europe, this traditional industrial model is no longer seen as valuable due to environmental degradation, resource scarcity and price volatility concerns. In contrast, the multiple values created by circular economy (CE) are increasingly being recognised; from the opportunity for job creation to the non-reliance on the consumption of finite resources.The EU's Circular Economy Action Plan explains CE as an economy "where the value of products, materials and resources is maintained in the economy for as long as possible,and the generation of waste minimised". It can therefore be understood that CE not only aims to increase the efficiency of resource use, but also to achieve a better balance and harmony between economy, environment and society.

In short, CE can support imminent urbanisation by rethinking, at a systems level, the social, environmental and economic complexities that currently poison sustainable urban growth. However, the transition from linear to circular economy is a complex task.

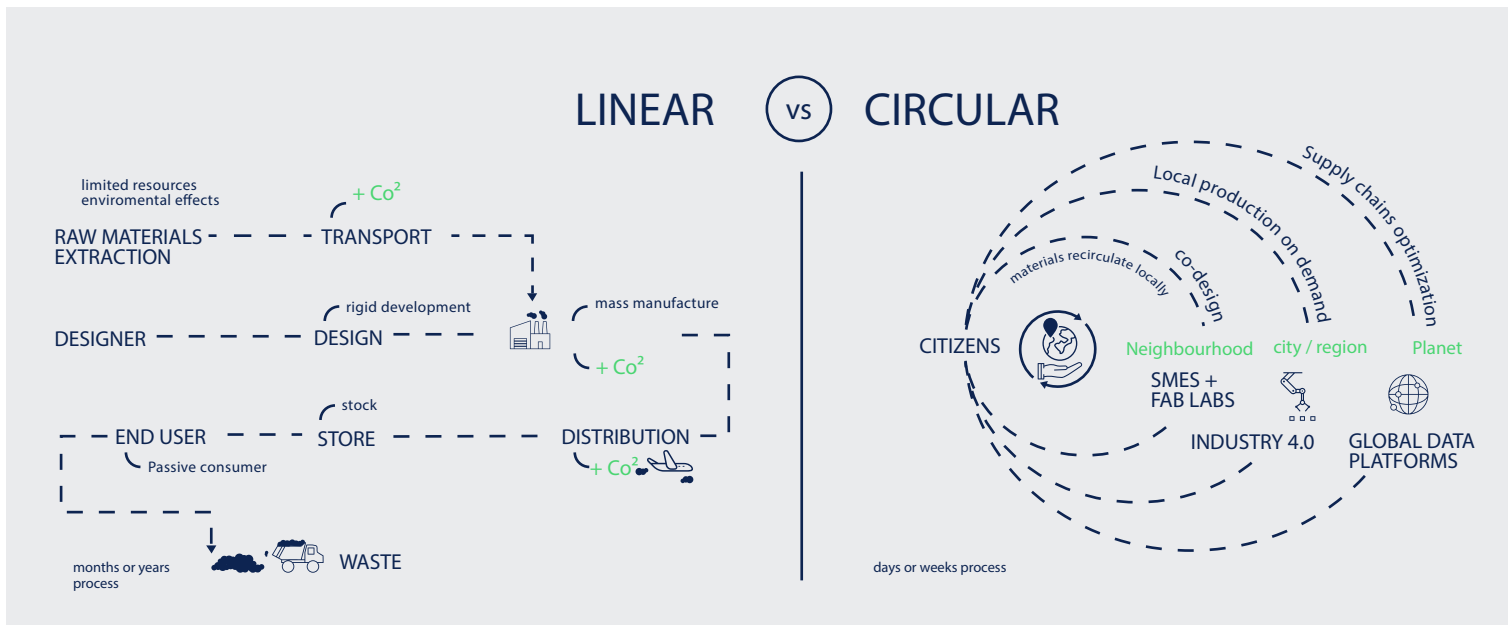
[1] https://population.un.org/wup/
[2] https://www.erih.net/how-it-started/the-industrial-revolution-in-europe/

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LINEAR vs CIRCULAR

LINEAR

limited resources
enviromental effects

RAW MATERIALS EXTRACTION — TRANSPORT — + Co²

DESIGNER — DESIGN — rigid development — mass manufacture + Co²

END USER — STORE — stock — DISTRIBUTION + Co²

Passive consumer

months or years process — WASTE

CIRCULAR

Supply chains optimization
Local production on demand
materials recirculate locally
co-design

CITIZENS — Neighbourhood — city / region — Planet

SMES + FAB LABS — INDUSTRY 4.0 — GLOBAL DATA PLATFORMS

days or weeks process

Figure 1: From Circular to Linear. Tomas Diez, Mariana Quintero. Fab City Global Initiative.[3]

Circular economy relies on stakeholder action at multiple stages of the value chain (figure 1). This complexity requires a lot of the urban system as a whole and as such, CE models can transform city metabolisms from suspended, synthetic systems into environmentally embedded regenerative systems. A regenerative city aims to maintain a symbiotic, mutually beneficial relationship with its surrounding hinterland not only by minimizing its environmental impact but by actively improving and regenerating the productive capacity of the ecosystems from which it depends. By measuring, monitoring and re-circulating the city's flows through circular economy approaches, regeneration can be achieved.

REFLOW Approach

Reflow's mission is to understand and demonstrate how the reconfiguration of the urban metabolism can enable the transition to circular and regenerative cities.

The vision of REFLOW is to develop circular and regenerative cities through the re-localisation of production and the reconfiguration of material flows at different scales. More specifically, it will use Fab Labs and makerspaces as catalysers of a systemic change in urban and peri-urban environments. Concretely, REFLOW aims to provide realistic best practices aligning market and government needs in order to create favourable conditions for the public and private sector to adopt circular principles. To provide critical examples of ways in which cities can adopt a CE model and reach the 2030 Sustainable Development Goals, REFLOW will create new CE business models (Distributed Design Market model, On-Demand System, Corporate Hacking and Corporate Pyramid) within 6 pilot cities (Amsterdam, Berlin, Cluj-Napoca, Milan, Paris, Vejle) and assess their social, environmental and economic impact. The project will make use of blockchain technologies to incentivise the circular practices in local ecosystems and create data visualisation tools to enable continuous monitoring and optimisation of "urban

metabolic" processes and rapid intervention management. Networks of sensors, urban computing and geo-localisation will capture data ensuring accuracy, integrity and interoperability of relevant data infrastructures, while data visualisation and standard templates will be available for effective communication, public consultation, and exchange of experiences.

A focus on urban metabolism

The project builds from the concept of the 'urban metabolism', which seeks to understand the city and its surrounding region through the lens of biological systems, and technical processes. In biology, the synthesis of proteins is considered a constructive metabolic process. In urban sciences, city dynamics are defined by the flow of materials, information, and the distribution of activities, making it the most complex system ever created by humans. Under the current urban paradigm, cities consume more resources than they produce. They synthesise energy, food and materials in a way that degrades, discards, or pollutes the environment. However, over the past decades, the digital revolution in computing has profoundly affected logistics, trade, and international communications; opening up new urban dynamic flows and deeply changing the current unsustainable industrial paradigm.

REFLOW uses computational power to calculate and analyse city resource use through specific social, environmental and economic indicators to assess the relationship between what cities produce and consume. This allows REFLOW to provide sound economic ground for the redefinition of material flows in urban and peri-urban areas. In order to achieve this goal, REFLOW will design and implement specific methodologies and models to test new forms of circular governance. In addition, it will test a new multidimensional and multi-stakeholder performance management system to foster the development of local manufacturing ecosystems, and emerging business models. This strategy relies not only on computational means but also the mobilisation of existing networks and movements that are working towards a new productive model for cities such as Circular Cities, C40 Cities and Fab City Global Initiative.

Pilot approach

Core to the project's activities are six pilots in smaller and larger cities across Europe: Amsterdam, Berlin, Cluj-Napoca, Milan, Paris, and Vejle, each of them focussing on one specific resource or industry: textiles, trade faires, plastics, agrifood, housing & electricity. A pilot approach provides the grounds to understand realistic best practices that can align public, market and government need to create favourable conditions for the public and private sector to adopt circular principles.

Pilot cities will map existing urban manufacturing, innovation and recycling infrastructure to assess the current state of urban metabolic processes pertaining to a specific resource flow. They will then be involved in the development and assessment of tools and applications that support and manage potential transitory changes to CE.

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Through an iterative approach, pilot cities will document tools that can enable the scaling and replication of processes in other cities. Importantly, in line with the multiscale approach of REFLOW, the pilots will focus on how actors and stakeholders-- from industry, SMEs, government grassroots innovators and civic society-- are able to co-create and implement circular economy practices at the neighborhood and city levels. The pilots will engage the most important resource of a city: the citizens.

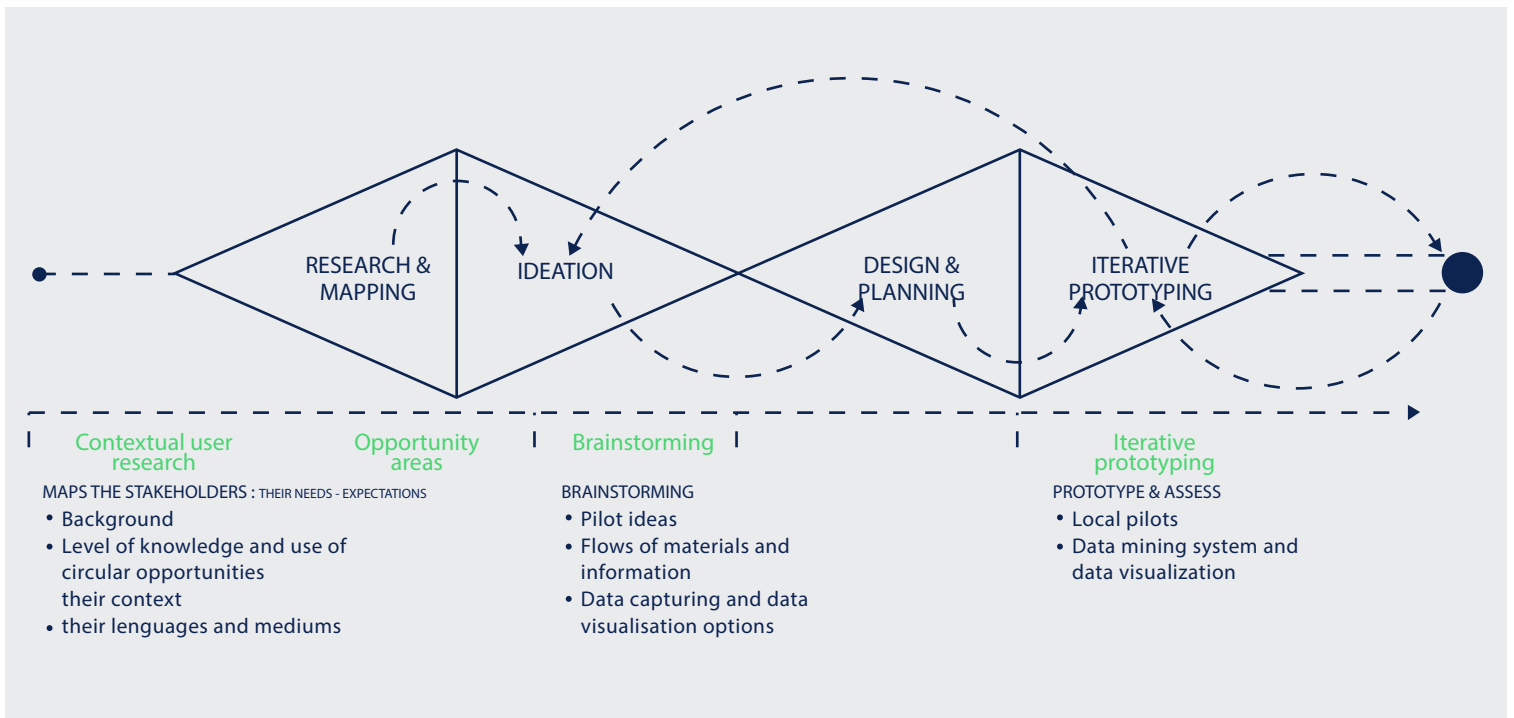Figure 2: REFLOW Approach: Sally Bourdon, Manuela Reyes Guerrero. IAAC

Outputs

Handbook

We will consolidate the knowledge from cities around Europe -- including policies adopted, good practices on collaborative governance, sustainable urban models and tools to deploy strategies for a bottom-up CE -- into a handbook. The HB will provide insights and learnings to foster, assess, and monitor the transition towards establishing circular and regenerative cities.

Toolkit

Practical approaches that will be tested and explored by the REFLOW pilot cities; intended as a 'how-to' for city, civic and industry leaders to begin the transition to circularity in their city. The "Productie Cities Toolkit" aims at supporting urban systems to adopt and implement circular practices in local manufacturing and innovation policies by facilitating the deployment of methods and tools for co-creation and decision making processes.

Documentation

The project's people-centered approach will be shaped by conducting fieldwork in the pilot cities meant to understand citizen and institutional behavior. Doing so will allow REFLOW to best understand what is really needed in cities while also helping to establish partnerships between local actors and the pilot programs. Research will also be conducted to understand 1) potential CE governance and business models and 2) the city metabolism, anatomy, and resilience index and consolidate data in order to assess their impact on the circular economy strategy.

Outputs

Business Strategies

REFLOW will co-create, design and implement specific methodologies and models allowing pilot cities to test new forms of circular governance to foster the development of local manufacturing ecosystems and emerging business models. Through the definition of business models for CE practices, REFLOW will assess the social, economic, and environmental impact of the pilot cities.

Platforms

REFLOW will develop and implement an Open Data Dashboard: a decision-making tool for policy makers and stakeholders to enable flexible and innovative urban planning approaches. The Dashboard will also include instruments to support and guide the transition towards achieving circular cities. This will be a decentralised open data platform, connecting the multiple nodes in the REFLOW network, reinforced by Blockchain technology and accessible to citizens, specialists and policy and industry leaders.

REFLOW platforms will also consolidate data visualization tools to enable continuous monitoring and optimization of urban metabolic processes.

Webinars

Webinars will be used throughout the project as an interactive educational tool, featuring live interviews, conversations, and debates on REFLOW deliverables and objectives. They will focus on knowledge transfer, tackling successes, problems and how-to's to inspire and serve as a guide for stakeholders and cities around the world. Webinars will be conducted between consortium and pilot members as well as with various stakeholders. Each webinar will typically be directed to a particular group of stakeholders, who will have the opportunity to submit questions and comments on the webinar topic. All webinars will be recorded and published on the REFLOW website for reference.

Conclusion

REFLOW takes advantage of the current shift in recognition of the benefits of CE coupled with the technological revolution to build practical, tested solutions to transition cities towards circular and regenerative models that conceptualise the impact urbanisation has on the planet. By engaging multiple scales of the city, from citizens to policy makers, REFLOW aims to develop long-lasting social impact in which outputs such as Handbooks and Toolkits are readily accessible and able to be implemented across European cities and beyond.

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