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# INTERFACER PROJECT

# GREEN PAPER

## Political framework for a Fab City



# INTERFACER



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# 01 Introduction

The European Commission adopted the new Circular Economy Action Plan (CEAP) in March 2020. It is one of the main building blocks of the European Green Deal, Europe's new agenda for sustainable growth. The EU's transition to a circular economy will reduce pressure on natural resources and create sustainable growth.

It is also a prerequisite to achieving the EU's 2050 climate neutrality target and halting biodiversity loss. The new action plan includes initiatives along the entire life cycle of products. It targets how to design products, promotes circular economy processes, encourages sustainable consumption, and aims to prevent waste and keep the resources used in the value-creation cycle for as long as possible. It introduces legislative and non-legislative measures targeting areas at the EU level. Now, these measures need to be complemented by regulations at the national level to maximize their impact.

This Green Paper has been produced as part of the INTERFACER Project, which aims to build, test, and validate an open-source digital infrastructure in the form of a federated network to support a local yet globally connected value creation system. These goals derive from the Fab City concept that outlines a path towards a decentralized and more sustainable production and consumption system.

The Green Paper marks the prelude to a broader discussion and participation process. It identifies, defines, and correlates the technical, political, sociological, and regulatory questions and challenges relevant for cities' transformation into Fab Cities.

It lays the groundwork for a new general framework to facilitate a decentralized, open, and circular production ecosystem in Hamburg and its metropolitan region and for the required physical and digital infrastructure to achieve self-sufficiency according to the Fab City ideals.

The Fab City concept brings together ecological sustainability and circular economy concepts and therefore addresses the goals of the European Union. Fab City is a new urban model that shifts how cities source and use materials: from 'Product In - Trash Out' (PITO) to 'Data In - Data Out' (DIDO). In this model, production of all



goods occurs inside the city and materials are reused and recycled to meet local production needs. The trade balance of urban centers concentrates on the movement of data such as information, knowledge, design, or code required for manufacturing.

The circular economy builds on concepts related to waste management and material reusability. It creates economic and social value while reducing environmental impact through design principles, the highest and best use of materials, and efficient use of resources and energy.

## 02 Approach

The INTERFACER Project set out to initiate a process of consultation and discussion to lay the foundations for such a general framework and to establish an open dialogue with the various actors involved to establish the basic infrastructure for any Fab City.

To determine the general conditions that facilitate the emergence of the Fab City, we need to ask questions such as:

1. How can we become more autonomous and achieve self-sufficiency in producing the goods we consume in our cities? How can we transform any city into a Fab City?
2. How can we establish and promote new design principles, reduce the use of materials for production, and use resources and energy more efficiently in manufacturing?
3. How can we raise awareness about the environmental impact of the current design, manufacturing, and distribution modes of production and consumption?



4. How can we foster the emergence of active, open, and decentralized self-sufficient production communities at the local level?
5. How can we establish sound industrial policy that stimulates the emergence of business clusters that include circular production approaches in their processes?
6. How can we embed circularity approaches into the education system so that all citizens are empowered to design, build, repair, reuse or recycle almost everything they consume?
7. How can we regulate existing industries to embed more circularity and sustainable approaches into their current business models, ensuring a leveled playing field for all economic actors?
8. How can we implement legal test fields to allow local designers and production sites to test different approaches to circular manufacturing without hurdles of bureaucracy?
9. How can we incentivize circular practices and materials by updating regulations on end-of-waste and by-products, promoting standards and other economic incentives for recycled materials, as well as disincentives for virgin materials to be used?
10. How can we promote and facilitate the emergence and consolidation of decentralized production infrastructure, i.e., Makespaces, open workshops, and Fab Labs?
11. How can we modify current zoning regulations to enable the emergence of local production infrastructure at the neighborhood level?

With this Green Paper, the INTERFACER Project and its partners want to initiate a dialogue that leads to further discussions and, eventually, policy measures and regulation changes that contribute to building more Fab Cities.

There are many aspects at stake, but we will only be able to deal with these successfully if we engage in a broad, open, and mutually constructive dialogue with regulators and politicians, the scientific community, businesses of all sizes, and civil



society. Implementation at the local level requires the active involvement of decision-makers from politics and business, as well as citizens.

In collaboration with the Hamburg Ministry of Economics and Innovation, the INTERFACER Project partners conducted a transdisciplinary workshop on November 25th, 2022, at the Fab City Haus in Hamburg with representatives from local businesses, interest groups, academia, and government authorities. The goal was to generate a common understanding of the vision and challenges ahead for the different sectors while transitioning to a Fab City.

Using design thinking methodologies and the sailboat metaphor, the workshop stimulated and encouraged the participants to think about their motivations, come up with a shared understanding of a vision for the future Fab City, and discuss the current challenges and future risks of such a transformation.

After the workshop, we consolidated the input from the participants to formulate this paper's main premises.

This Green Paper concentrates on the **central vision, motivations, challenges, and risks for transforming any city into a Fab city**. In the interest of simplicity, it does not address directly associated aspects that are also well elaborated elsewhere, such as the circular economy, digitalization, and sustainability.

Furthermore, this Green Paper defines the **opportunities and challenges of such a transformation** but does not advocate or propose specific solutions and policy measures, as further dialogue with all stakeholders must first take place.



## 03 Findings

The following findings summarize a vivid discussion during the Green Paper workshop conducted in November 2022. Participants were guided through three main phases: understanding stakeholders' motivations, developing a shared understanding of the vision for becoming a Fab City, and elaborating on current and future obstacles and risks.

Based on these aspects, we concluded 5 major goals on the way to become a Fab City. For each goal, we derive a set of crucial requirements that should guide future policy making. They define a minimum common understanding of the vision, mission, goals, and challenges ahead for any city that wants to become a Fab City.

### Goal I: From linear waste production to a product life cycle

Until recently, most attention has gone to waste management as a natural endpoint of linear consumption instead of making goods and their materials less harmful to our environment by design. We need to transition towards a circular economy in which the life cycle of products is extended. Waste must be reduced to a minimum, materials kept in use longer, and additional value beyond monetary profit recognized and created.

#### Requirements

- (1) To modify our mode of consumption, products must have longer life cycles and be repairable (“right to repair”).
- (2) The core focus of waste management should be to make materials available for reuse or upcycling to close the material loop.
- (3) Economic incentives are essential to ensure a viable circular economy. Product regulations and business models must create non-monetary value to incentivize the extension of goods' life cycles. The social and environmental impact of products has to be taken into account when pricing and creating added value.



- (4) Product designers and consumers understand the design principles that minimize waste and make it possible to keep materials longer in use. Product standards and safety regulations should account for and adapt to this new reality, making it easier for products that are circular by design to have a more accessible market entry opportunity.

## Goal II: Empowering citizens to foster change

Urban regions are consumption and production centers with a high environmental and social impact. The Fab City approach reinvents cities' relationship to people and nature by re-localizing production so that they become generative rather than extractive, restorative rather than destructive, and empowering rather than alienating.

Thus, urban centers become more autonomous and achieve self-sufficiency in producing goods while preserving the foundations of human life for future generations. However, a socially just society is not achieved by default. A just transition involves tackling environmental and economic challenges in a way that also promotes an equitable distribution of positive and negative impacts among citizens.

### Requirements

- (1) Citizens must be empowered to do more by and for themselves. The relationship between citizens and the cultures of production and consumption will be transformed.
- (2) Citizens feel a sense of responsibility and ownership for their goods and understand the goods' impacts over their life-cycle. Localized and collaborative production systems generate a shared feeling of connection and identity around things and materials people in the cities need and own.
- (3) Neighborhoods must be understood as productive entities with a mutual responsibility to support each other and take care of the immediate environment. Inclusive community organizations should be





supported, which focus on relationship-building and providing access for all individuals to be part of the value-creation process. T

- (4) Community members collaborate closely to co-develop and co-produce the goods they consume; for this, knowledge has to be understood as a common good. Advancements in technology will allow global collaboration via knowledge and design repositories.
- (5) Changes to the currently prevailing trade and waste management systems will lead to a redistribution of economic, social, and environmental impacts, both positive and negative. Impacts and carry-on effects must be understood and accounted for. Compensation for those most affected by these changes contributes to the acceptance of the new model.

### Goal III: Realizing economic potentials

Through local production systems, the Fab City approach expands capabilities and supports the development of skills and knowledge, leading to new business opportunities and alternative business models. Sourcing materials locally and reducing and reusing waste for local production contribute to establishing a sustainable economy and value chains.

#### Requirements

- (1) Awareness-raising and educational programs to empower citizens to “do it yourself” (DIY) will be key to achieving the Fab City.
- (2) Schools and vocational institutions take an active role in fostering the skills people need to thrive in a Fab City. Schoolchildren must learn about the principles of a circular economy and how to use digital tools and other manufacturing infrastructure as part of their curriculum.
- (3) Local manufacturing infrastructure must be open to anyone whenever needed. Local fab labs, maker spaces, and other manufacturing facilities must provide production capabilities as well as skills



development through knowledge transfer activities like workshops or vocational programs. These facilities will be inclusive and reliably accessible, and not highlighted as elitist, high-tech institutions for specialists.

- (4) Engagement with open source communities shall improve the product-market fit of “open source hardware” because community collaboration makes a product more user-centric, reflecting the users’ needs and increasing its demand. It also contributes to improving a product and to building up a network of close contributors and first users.
- (5) Local businesses should work with those facilities to share knowledge and expertise, transferring know-how and contributing to the development of capabilities.

## Goal IV: Embracing new standards and regulations

Rapid technological transformation and changes in consumption behaviors foster the emergence of new business ideas and market players along with changing consumer culture and demands. Regulators and standards-setting mechanisms need to be able to adapt faster to changes and become more flexible to ensure fair competition among new and old economic actors and to enable the integration of production as an essential activity of urban life. Standards can support consumer confidence in circular products and materials, facilitating a wider adoption.

### Requirements

- (1) Product standards and safety regulations inhibit the emergence of more “open source” products. Government authorities must provide a framework for safety and liability management for do-it-yourself goods which enables product innovation and flexible development.
- (2) Test fields must be created for companies to test their products under lower risk conditions. Government authorities have to accept their role



in supporting small- and medium-sized companies' access to markets and in reducing entry barriers for new circular products.

- (3) Regulatory frameworks for zoning and land use planning must allow for and facilitate the implementation of local fabrication infrastructure, such as fab labs, makerspaces, and open labs, in the urban fabric. Urban developers, real estate investors, and financiers need to be aware of the potentials for local production infrastructure.

## Goal V: Collaborating on the global scale

While our focus is local, the Fab City requires a data-driven global community that constantly collaborates to design solutions to manufacturing problems and the digital and physical infrastructure that enables this.

### Requirements

- (1) A digital platform for collaboration (see Fab City OS) must be available to empower global product developers and local consumers to engage in mutually beneficial productive exchanges. A critical mass of users will be reached only if local manufacturing infrastructure exists and is accessible to anyone.
- (2) Local stakeholders should foster global collaboration by creating local awareness for this platform and its potentials and by providing support and knowledge to local citizens and SMEs to enter the global scene.
- (3) Pilots including consumers, designers and manufacturers such as Fab Labs on very specific topics or products with other Fab Cities should be initiated to spark global collaboration.



## 04 Way ahead

This paper proposes some starting points for a larger conversation that should take place among citizens, academia, companies, and government about the implications of the current shift towards a more sustainable circular economy and the implementation of the Fab City in urban regions.

The next step is a broader discussion about the policy instruments and approaches required to transform any city into a Fab City. This includes criteria, aims, and necessary policy measures to ensure that social and environmental goals are reached. Clear roles and responsibilities among involved stakeholders must be defined and an implementation plan laid out that determines the amount of government support required to make the transformation meaningful.

Furthermore, a wider mindset change needs to take place across all parties involved. For this process to become mainstream, we need to build up thought leadership and local production communities that set a good example, while continuing to monitor our goals and milestones ahead. Coordination problems among policymakers, economic actors, and citizens must also be solved.

Additional challenges ahead for Europe and its urban regions to implement the Fab City model lie in governance structures that make regulation and the legal framework at the local level dependent on the supranational decision-making process. Local authorities might not know the portfolio of instruments and policy measures at their disposal. That is why an invigorating dialogue and broader participation process will offer guidance for implementing policy measures and continuing to test innovative approaches.

The main challenge ahead is related to a lack of awareness of the need for change on the part of many of the main stakeholders. To overcome this challenge, community leaders have to come together and to demonstrate a way for this shift to take place. Leading by example and motivating others to follow will be crucial for any Fab City.



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