FABRIX Theoretical and conceptual frameworks

Deliverable 1.1

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1 Executive summary

This deliverable is the outcome of Task 1.1, *Theoretical and Conceptual Framework*, within the FABRIX project's Work Package 1, *Theory and Methodology*. The document lays out a comprehensive framework to guide research across the project, which aims to establish sustainable, regenerative textile and clothing (T&C) ecosystems through local, circular manufacturing systems in urban areas. By integrating spatial sciences, industrial symbiosis, and economic geography, FABRIX addresses the fragmented nature of current urban manufacturing practices and seeks to bridge gaps between economic networks and spatial environments.

At its core, FABRIX emphasizes the dual concepts of 'network of spaces' and 'space of networks' to explore how urban planning and economic systems can mutually support the shift towards circular and regenerative practices in the T&C sector. The analytical focus is on rethinking the spatial and network relationships that structure urban manufacturing, with an emphasis on creating sustainable frameworks that can be scaled across European cities. The project's evaluative dimension will assess interventions in urban manufacturing spaces, identifying spatial configurations that promote or hinder circularity.

Central to the instrumental dimension of FABRIX is the development of the MANTEL platform, a digital platform of tools that enhances local stakeholders' capacity to manage and improve value chains along circular and regenerative pathways. MANTEL targets facilitators, businesses, and public authorities, equipping them with tools to implement circular production and foster socioeconomic resilience.

Table of Contents

List of images

2 Introduction

FABRIX's 2030 vision

> Imagine a future in which textiles and clothing (T&C) are manufactured and consumed as locally as possible, in beautiful and sustainable urban environments, close to home and close to where people want to live. Imagine a time, not long from now, in which low quality fabrics and garnments are out of fashion, where pre- and post-consumer textile waste is turned into a resource through local processing; a future where one company's low- to high-tech repair expertise is a student's dream job. Where companies share resources, data and innovation, and cooperate in symbiotic ecosystems, towards shared regenerative goals. A time and place that embrace diversity and equity. Where local cultural heritage and traditional textile techniques are preserved, valued and modernized, and where local craft skills are part of a decentralized urban manufacturing ecosystems. What will such a T&C productive system look like when it is beautiful, designed to be circular, innovative, adaptive, just, and regenerative? This is the future of the T&C ecosystem that we need, and FABRIX delivers the methods, frameworks and digital interactive tools to realize this vision.

The transition towards a greener, more resilient, inclusive, and democratic economy and society in Europe strongly depends on the capacity to combine digital and regenerative industrial technologies with a more human-centred approach (COM, 2023). Research done in the past decade demonstrates the deficiencies of techno-centric approaches, but also of a restricted focus solely on environmental concerns (Corvellec et al., 2021). While there is an increasing number of tools, practices and studies that favour a more human-centred approach to the green and digital transition, these initiatives are often small-scale, fragmented, and isolated. Moreover, they often fail to integrate insights from different disciplines, from urban studies to industrial symbiosis, and to develop interconnections across local value chains in support of more regenerative practices across the board. As a result, opportunities for wider system change towards an inclusive technological and social development are often overlooked at the local level within urban areas; innovative practices emerge within businesses, but then fail to scale-up or connect and become part of a local ecosystem (Diemer et al., 2022). Many times, they are hosted in old industrial or office buildings in deprived neighbourhoods that are undergoing rapid processes of gentrification and increased social inequalities (Ferm et al., 2021). Many of the challenges are related to cross-border and cross-sectoral – or network relational – systems; systems that go beyond the area itself (Van den Berghe et al., 2018). In turn, many of the economic sectoral challenges, such as a more human-centred development of digital technologies in Europe, relate to spatial design as well (COM, 2022b).

The **aim of FABRIX** is to tackle this challenge through an integrated approach to local and regenerative urban manufacturing. This involves blending spatial design with strategies for industrial symbiosis and circular manufacturing, as well as conducting thorough value chain analysis and management. By integrating theories and practices that have hitherto remained disconnected, FABRIX develops knowledge in actionable form in support of an ecosystem transition in local and urban manufacturing. It doesn't start out of the blue, but builds on existing yet disconnected digital platform of tools that currently primarily focus on the business-level and integrates the spatial and network dimensions, developing an

innovative and interactive platform (MANTEL) in support of local value chain management for more circular and regenerative urban manufacturing.

The platform MANTEL targets businesses but also public authorities and other sectoral organisations. The interactive information provided by MANTEL in particular aims at detecting and helping facilitators. Facilitators, who can be companies, public authorities or other forms of organisations, enable coupling of actors and the subsequent emergence of ecosystems. In ecosystems, facilitators play a very important role, and their value and knowledge is often very specific and path-dependent. Via the classic 'spreadsheet' perspective, such facilitators are often difficult to detect, as they mostly aren't the largest companies, or the most relevant public authorities. Often, their facilitating role is broad, and can be on different levels, such as financing, regulative, through coupling, or by spatial planning and design. This leads to the central **research question** of FABRIX: How can we through urban, regional, and (inter)national spatial development and the use of digital platform of tools, facilate the existing network of actors, institutions, and assets, towards a more localised, innovative, and socially inclusive ecosystem of regenerative manufacturing?

To answer this question, FABRIX employs an innovative research design, whereby the two analytical perspectives are constantly split and combined. These two analytical perspectives are derived from the two main challenges described above: an economic challenge to innovate, and a spatial challenge to interwove these in urbanised environments. As such, the former can be assigned as 'a network of spaces' and the latter as 'a space of networks'. In reality, space and networks cannot be seen as apart, but in practices, research, and policy, this occurs regularly. The hypothesis is that herein lies an important reason why significant progress is lacking. Therefore, FABRIX starts with the observation of 'suboptimal' underperforming economic networks and spatial designed areas and neighbourhoods. Understanding these 'apart-together', feeds into the development of MANTEL, in turn helping both analytical perspectives to progress, eventually leading to a more optimal implemented reality (Figure 1).

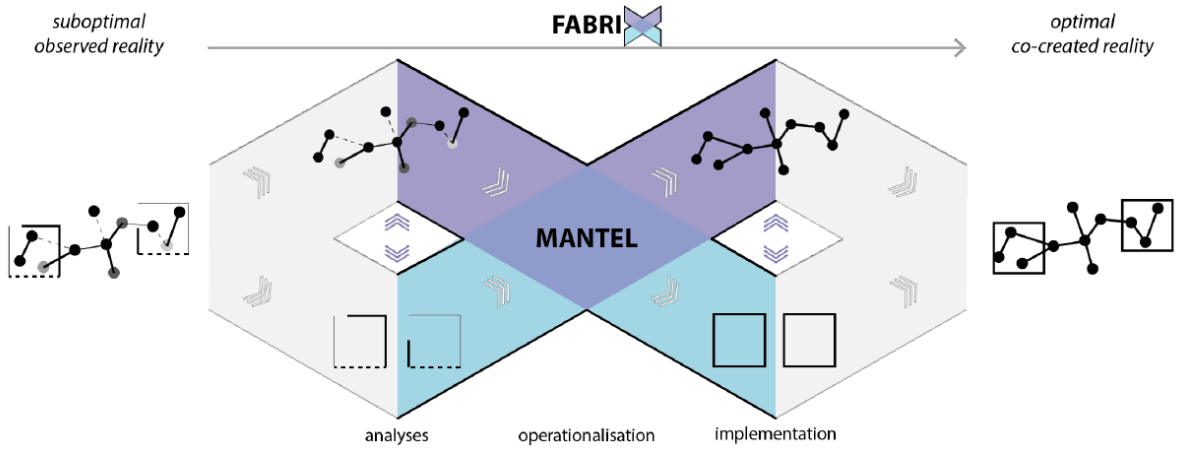

Figure 1: The 'red thread' through FABRIX' research design: splitting and combining spaces and networks

The **logo of FABRIX** emphasises on the X; the interconnected nature of cross-border and cross-sectoral co-creation. FABRIX is first about the urban, social, and cultural (fa)bricks; second, about the 'fabrique', or manufacturing functions; and third, about the fabric of the Textile and Clothing (T&C) ecosystem. FABRIX focusses on the T&C sector because it is instrumental to understand, analyse, and intervene in many of the urgent challenges that many other European manufacturing sectors have, like explained above. The European

Green Deal, the Circular Economy Action Plan, and the Industrial Strategy identified the T&C sector as a priority sector to pave the way towards a carbon neutral, circular economy, and a key product value chain with an urgent need and a strong potential for the transition to sustainable and circular production and consumption, including new business models (COM, 2022a). While being one of the most innovative, economically significant sectors in the EU (more than 160,000 companies and 1.5 million workers, generating a turnover of EUR 162 billion in 2019), the T&C sector is also on one of the most environmentally and socially unsustainable (every year 11.3kg clothing per person in the EU is discarded) (EPRS, 2019), an epitome of the sustainability transition challenges faced by many sectors in EU.

The transition of the sector is, however, slow, and the environmental and climate footprint remains high (Niinimäki et al., 2020). On top of that, research highlights how the industry's value chains are characterized by an asymmetric distribution of power (Hileman et al., 2020) and major social injustice (Ozdamar Ertekin et al., 2020; Pugh et al., 2024). The EU T&C sector is essentially composed of micro and small and medium size enterprises (SMEs) whose sustainability efforts mostly focus on using materials with a lower environmental impact, without addressing more systemic issues such as garment end-of-life or working conditions down the supply chain (Buchel et al., 2022). Moreover, production in T&C has moved out of urban areas, leading to shortages in adequate skills and small-scale manufacturing locations close to customers. These negative impacts have their roots in the race to cut costs of production as much as possible and in the dominant linear economic model based on take, make, dispose, that is characterised by low rates of use, reuse, repair, and recycling of T&C. Often, such model does not put quality, durability, and circularity as priorities for the design and manufacturing of T&C. Therefore, the EU T&C sector is in a key position to implement a more human-centred development of digital and industrial technologies in the EU transition to a greener and more inclusive economy and society.

3 Theoretical framework

3.1 The relational approach

Following FABRIX focusses on the role of space for manufacturing functions in cities in order to achieve a resilient and circular textile and clothing sector, it is relevant to understand how space can be perceived in general.

The field of geography and the understanding of space can be assigned to four dominant strands (Bathelt & Glückler, 2003; Paasi, 2010): landscape research, spatial science, social constructionism, and the relational turn. First, landscape research, or the science of regional descriptions and synthesis, is considered by many the traditional form of geography. It attempts to classify the earth into naturally defined landscapes and tries to understand their diverse structures through a description and synthesis of their geographical layers, such as ecological, social, built environment, or economic geographies (Bathelt & Glückler, 2003). Central here is that the region is seen as a construct, as the end product of research. The researcher performs analyses of for example the soil, the vegetation, altitude, language, typologies of buildings, etc. to collect data. This data is then aggregated in order to make classifications (Hettner, 1927). At last, these classifications (e.g. dessert, tundra,…) are projected back on reality to appoint these deligned and separated different regions – although in reality you don't see this lines. One the most known maps of such regional 'constructions' is the Köppen-Geiger climate classification map, which distinguishes e.g. 'polar' or 'equatorial' parts of the earth. Important to note here, is that regions are presented as homogeneous and bounded

During the second half of the twentieth century gradually alternative ways of understanding spatial reality emerged. First, 'spatial science' emerged during the 1950s and 1960s, with a revival during the 1990s following the work of Krugman (1991) (Boschma & Frenken, 2006). A synonym often used is the 'quantitative revolution or turn' (Barnes, 2001; Isard, 1956). The expansion of the field of spatial science was driven, on the one hand, by an increased need for applied research (Cox, 2014), for example in relation with economic development, and on the other hand, by the development of technologies. Spatial science criticized landscape research for having a dominant ideographic, descriptive, holistic, and naturalistic program (Bathelt & Glückler, 2003). As such, spatial science moved from describing to analysing space. The naturalistic conception of space as a constructed region, became replaced by an abstract conception of space as a formal geometry (Haggett et al., 1965; Isard, 1956). Spatial science incorporated economic theories into the conceptualisation of space through the integration of spatial variables. The end goal of spatial science was to develop general theories and models of spatial order. Different locational patterns, such as processes of agglomeration, were explained using distance or proximity. Important to note here is that where landscape research ends, cf. the construction of the region, spatial science begins. In other words, the region is seen as a given. The most common given region in spatial science are administrative regions, defining what a municipality, region, or nation is. In spatial science the question who or when this has been defined, for what reason, and why another definition is not dominant, is not of (so much) importance. Spatial science today is often associated with economic geography, as well as GIS software and tools.

Spatial science was criticized of essentialism, that suggests that complex realities, like regions thus, are ultimately reducible to simpler, or essential, realities (Paasi, 2010). Therefore, the attention for the other, less dominant, or neglected 'version' of what a region is, received attention. Regions became conceptualised as a result of social practices or discourses. As such, spatial science become subject as other sciences of the so-called

linguistic turn. Perceiving regions as such became widespread, from (neo-) Marxist to phenomenological, from structuralist to post-structuralist fields (Bryant et al., 2011). In general, the emphasis lies on the exploration of discourses, ideas, belifes, and narratives (Gong, 2024). The region in this case is perceived as always in becoming. The 'region as a given' is the core of the main critique that led to social constructionism turn in the spatial sciences. The critique centers around the role a region is given. In spatial science, regions are treated as if they were actors themselves, having their own particular characteristic. The explanation of why effects could be observed, remained blurred (Bryant et al., 2011; Gong, 2024; Massey, 1978, 1979; Paasi, 2010).

Such attention for discourses, power processes, and human agency was a welcome addition to the field of geography (Lagendijk, 2006) and spatial planning (e.g. Healey, 1997). For example, in recent years, we are witnessing more attention to questions of degrowth (Hickel et al., 2022) or democratic localism as a counter to dominant (neo-) liberal capitalist discourses. However, critiques grew on the dominant attention for discourses, power processes, and human agency, following its emphasis on epistemology and its focus on interpreting, accounting, experiencing, interrogating, or contextualising (Yeung, 2024). Otherwise said, the critique grew that such discourse oriented research remained in a sort of 'anecdotal' research, without abstraction (Hassink, 2019) or truly disentangling the condition of possiblity for these different (dominant) discourses that in the end construct reality.

In response, a arguably 'middle road' emerged, which can be appointed as the relational turn (Yeung, 2005), or relational approach (Van den Berghe, 2018). It represents a shift towards understanding space and place as dynamic, interconnected, and constituted through social relations rather than as fixed or isolated entities. This approach emphasizes the roles of networks, flows, and actor-centered perspectives in shaping geographic processes. Or, as argued by Martin and Sunley (2001), the relational approach avoids the so-called false dualism that dominated the field of geography during the beginning of the 21st century. Geography should not choose between economics or sociology, or between quantitative or qualitative, but it should understand they are dimensions of the same empirical reality, and are different perspectives. That empirical reality, space or a region in this example, is the result of a process of becoming. Once exisitng, it becomes a temporal fix (Jessop, 2008), not permanent, but 'in permanence' (Jones, 2019). The key research question thus lies in understanding, through abstraction and concrete research, who or what constructs regions and their borders, and how, through what networks, and for what purposes (Paasi, 2010, p. 2301).

Epistemologically, there are three principles leading in the relational approach (Martin & Sunley, 2010; Sunley, 2008; Yeung, 2023), those are: (i) contextuality, (ii) path-dependency, and (iii) contingency. Contextuality refers to the fact that (empirical) observations are embedded in specific contexts, hence they cannot be explained only through application of universal spatial laws. Path-dependency explains that past processes and effects need to be taken in account, as they condition present day observations. Lastly, contingency differentiates between necessary conditions, that are always 'necessary' for an action to occur, and contingent conditions; conditions that only occur under specific circumstances. Contingency is not solely linked to human actions, but can also arise from differences in localised material structures, like places, territories or (typologies of) the built environment. Finaly, the research process deconextualises, in order to reveal the (contingent) conditions of becoming (Hassink, 2019; Yeung, 2019).

Figure 2 summarizes the 'background' of what the relational approach is derived from: a flat, but also deep ontology (Van den Berghe, 2018). It acknowledges the existing reality beyond a single observation, cf. the underlying structure, but questions by what mechanisms and under what conditions they became a reality, or are reproduced, cf. the effect (Sayer, 2000). Epistemologically, to go back and forth into time, and to go within and outside the context, a causal explanation can be derived (Yeung, 2024) allowing decontextualisation and theorizing (Gong & Hassink, 2020; Hassink, 2019).

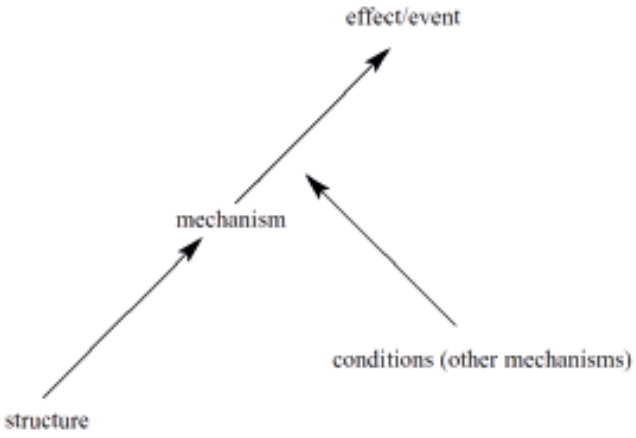

Figure 2: A critical realist ontology, with structure, mechanism, conditions, and effect (Sayer, 2000).

3.2 The future and the normative turn: facta and futura

Normativity is not something new in spatial sciences. Questioning the causes of (un)even or (un)justice development is one of the key reasons for the postmodern and poststructuralist wave within geography and spatial planning. However, how to theorize this normativity remains a challenge. As explained by Gong and Hassink (2020), we need to go beyond 'surface geography' (Yeung, 2023), and embrace the process of contextualisation and decontextualisation to advace our theories and methodologies (Figure 3).

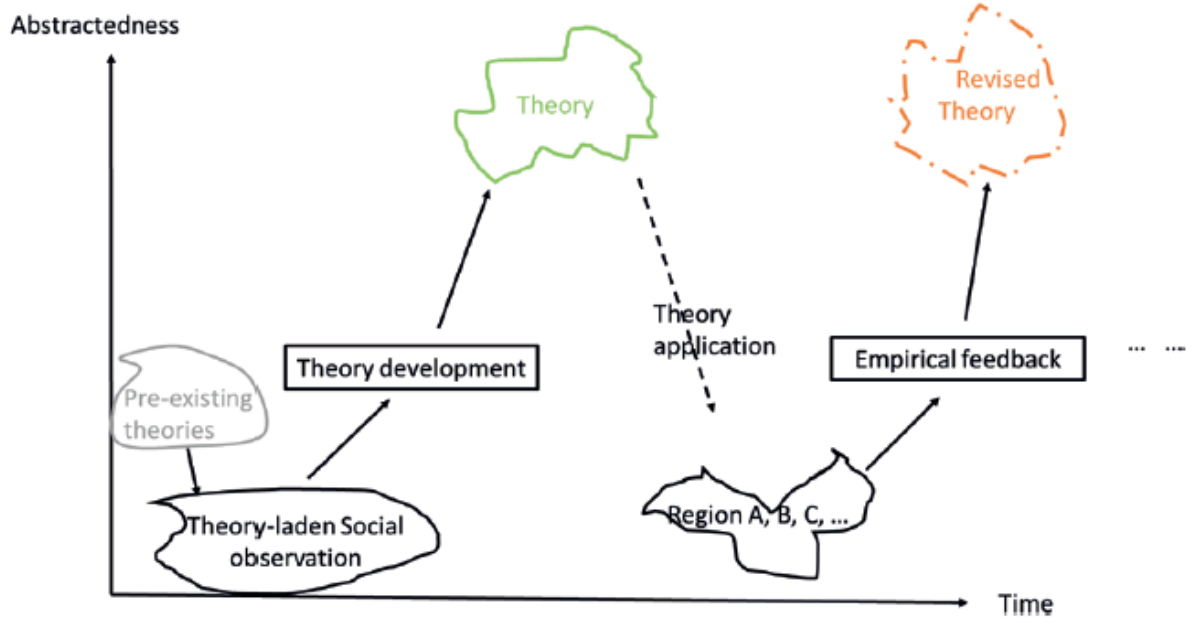

Figure 3: the process of (re)theorizing, based on contextualisation and decontextualisation (Gong & Hassink, 2020)

Such research fits itself very well to explaining and theorizing the past to present, but it remains a question if it also can be applied towards the future. While rich in the (practice of) spatial planning or urbanism, the broader conceptualisation and theorizing to understand and interfere with the future remains a challenge. Nonetheless, in times of austerity and amid a polycrisis, scholars increasingly call for researchers to first understand their relation or even part of future forming and making, and then the way research can or even should steer this future-making (Binz & Castaldi, 2024; Martin, 2021). To achieve the latter, a fundamental shift is needed in the intellectual paradigm that embraces a critical reflection, from instrumental to reflexive knowledge (and practice) creation, or towards a melioristic or normative turn embracing principles like fair and just development.

Such normative turn towards shaping the future differs from the past and present as the future is not (yet) evident. Consequently, factual statements cannot be made, observed, or falsified. In other words, there is no future fact, and it has to be sought in thought, visions, and plans. Therefore, the ontology of futures studies can be defined through *facta* and *futura* concepts and methodologies (De Jouvenel, 2017; Gong, 2024). Facta refers to the scientific approach which primarly performs extrapolation based on collected data about tangible past events. Futura refers to cognitive products, such as beliefs, ideas, and visions. While the future thus does not exist (yet), images of the future do; hence, one is able to study, interact and form these.

3.3 Conclusion

The evolution of spatial science has led to a more nuanced understanding of space and geography, transitioning from fixed regional classifications to dynamic, socially constructed, and relational perspectives. The relational approach provides a framework that combines contextuality, path-dependency, and contingency to understand how space is shaped through social interactions and networks. It serves as a middle ground between earlier, static models of space and more interpretative, discourse-oriented methods, enabling a deeper exploration of the processes that shape spatial reality. This approach emphasizes the importance of understanding the mechanisms and conditions that construct space, offering a comprehensive view that is essential for both analyzing past and present dynamics and for guiding future-oriented spatial planning and development.

4 Conceptual framework

For FABRIX, the conceptual framework should enable us to both acknowledge the existing structures, while simultaneously constantly reproducing and challenging them. We perceive scale as not only vertical (scaling up or down), but also horizontal (diffusing) and relationally. This allows us to understand not only how space is reproduced, but also allows us to meaningfully intervene in the shaping of the future of these spaces. In other words, we regard space as conditioned by (networks of) politics, culture, economics, governance, and power, and at the same time conditions the (future) mechanisms and eventual effects. In Figure 4, this is presented by the analytical two sides of the same coin that is first the space of networks, and the network of spaces. Derived from the attempt to normatively intervene with/in the reality, our framework explicitly makes the link to different forms of practice that is most related to these two sides of the same coin. Where the space (e.g. municipality, region, nation) dominates, it links mostly to 'fixed' practices and organisation, such as governments. Where the network of spaces dominates, we deal more with corporate or business-oriented organisations, such as multinationals that have many locations around the world.

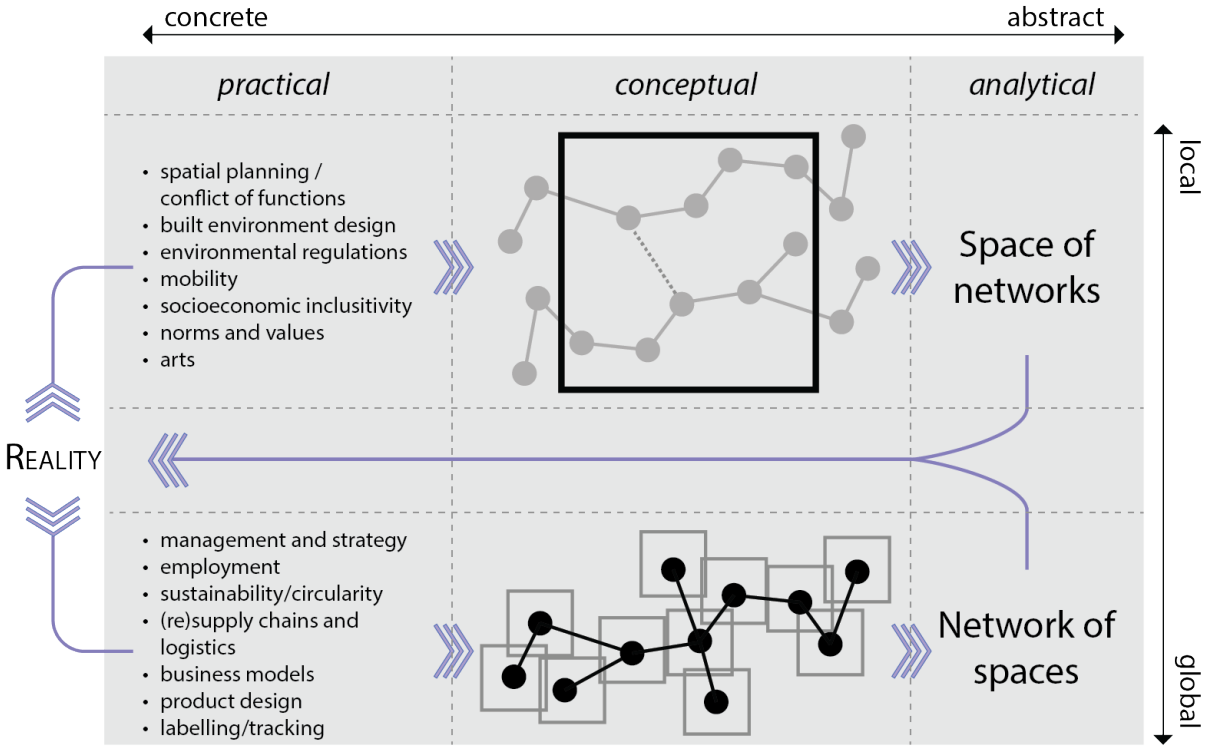

Figure 4: The conceptual framework defining the FABRIX project

It is important to note that the conceptual framework also explicitly embraces time and process as key elements. This not only acknowledges path-dependency, but also allows us to look towards future scenarios, as explained above. In the following, we explore these different elements further.

4.1 Network of space(s)

Every economic sector is in the first place a network of relations between actors, assets, and institutions (Coe et al., 2004) that cross administrative, regulative, and spatial borders. As many economic sectors, the T&C sector is characterized by numerous global consumption-production networks (cf. GPNs), that all together create many complex value chains. What is often forgotten, though, is that all the involved actors, assets, and

institutions have a specific location that in turn is part of numerous systems (culture, regulation, etc.) as explained above. Hence, questions of for example a circular designed T&C sector, that is predominantly addressed by research related to fields like business organisation or industrial ecology, do need a strong link to space if we in the end want to answer these questions successfully (Williams, 2021). FABRIX chooses the networked system of the T&C sector, but at the same time perceives the sector as a seed for more complex circular and regenerative community value chains. T&C production, while currently dominated by global brands and their global supply chains, is in fact grounded in secular traditions and identities within what is actually a highly fragmented sector characterised by a preponderance of SMEs. Indeed, as the minimum manufacturing unit is the home sewing machine, the more creative, innovative, and sustainable brands today are independent designer-producers working at the local scale. These flexible new production ecosystems are emerging independently of the sector's traditional industrial districts, drawing more on local creative energies than the infrastructural conditions that normally prevail.

4.2 Space of network(s)

The space of network(s) refers to the challenges and problems many cities experience regarding area development, and in particular the (re)development of urban (semi-) industrial areas. Spaces are confined, in most cases based on administrative definitions, but it can be broader. Nonetheless, spaces in reality are never completely closed and only exist because of actions and reactions with its surroundings. This poses a challenge for space-based policy makers and practitioners, such as municipalities or architects, that want to improve spaces and spatial design, but at the same time don't have full control on the relational networks (e.g. of people, goods, knowledge, arts, norms, values, and money) that interact with those spatial elements. In other words, "a space is a social construct that conditions and is conditioned by politics, culture, economics, governance, and power relations" (Paasi, 2010). A space therefore can be seen as first a 'local buzz, within global pipelines' (Bathelt et al., 2004), as described in economic geography for clusters, but arguably is comparable with any area and specifically areas within urban environment. This implies that a confined space is the result of the place-based effects of numerous networks that interact with that specific space.

4.3 Explorative or Normative Future(s)

Thinking of and/or steering the future is all but a new endeveaour (Bradfield et al., 2005). The way to think about the future is never fully objective, because it is always situated within a certain context, though two different strands can be distinguished. Exploration of the future implies one thinks and steers upon futures that can 'overcome' one (Figure 5). I.

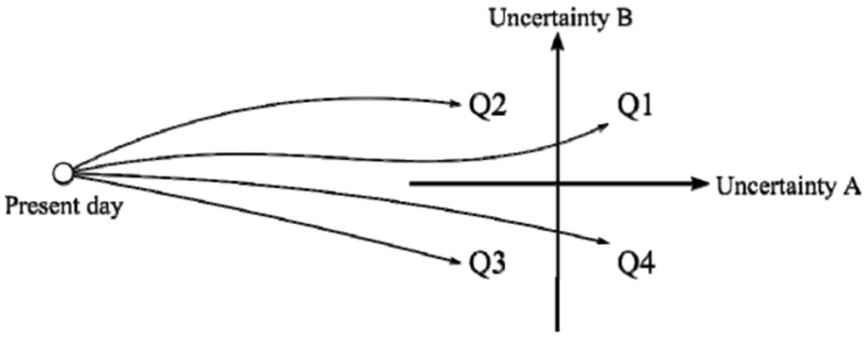

Figure 5: Explorative future thinking (Cardoso & Emes, 2014)

From the 1980s onward, the explorative exercise started to diversify between 'seeing' the future, which has the goal to contrast and challenge (implicit) assumptions about the future, and 'seeding' the future.

A drawback from explorative futures is that – and this is exactly inherent to this form of future thinking and dealing – it cannot prevent policy making of suprises (Postma & Liebl, 2005). To deal with this, and developed within the Centre d'Etudes Prospectives, normative future thinking and steering exists, whereby a vision of the future is a guidance for policy action (Figure 6). The basic notion is thus that the future can be created and influenced (Amer et al., 2013).

Figure 6: Normative future thinking (Cardoso & Emes, 2014)

5 FABRIX's context

5.1 From post-industrial to re-industrial cities

The rapid globalisation of the 20th century has seen major industrial activity throughout European countries become offshored to countries with more lenient (or non-existent) labour laws. The uncontrolled rise in demand for goods and services, particularly in the Global North, has led to unsustainable levels of resource and worker exploitation, especially in the Global South. While many pros and cons can be discussed with respect to this, an undeniable result is the global scale of high level of socio-economic inter-dependence (and inequalities) that, given unforeseen circumstances, like the global pandemic shutting down international trade in 2020, can lead to isolation and unmet demands on the local scale. The T&C sector is one of the major industries having undergone this process (Bell, 1964; Gershuny, 1977). Post-industrialisation refers to a transition of the local economy from one that is manufacturing-based to one that is service-based (Bell, 1964; Gershuny, 1977), a sector of the economy that has increasingly become relevant and defining of the evolving industrial revolutions. However, as Ferm and Jones (2017, p. 3381) highlight, "the notion of the post-industrial economy is misleading," as it implies an abandonment of industrial manufacturing activity, when in reality local manufacturing activity still takes place on a multitude of scales, the small, unobtrusive ones ,continuing to be locally active (although downscaled), while the bulk of the large-scale activity has been relocated outside territorial boundaries.

A key trend in industrial manufacturing in the T&C sector has been the prioritizing of efficiency with respect to lowering production costs and increasing collection turnover speeds, as opposed to valuing economically, environmentally, and socially sustainable processes, innovation in production, or retaining high quality (Bhardwaj & Fairhurst, 2010; Kozlowski et al., 2012). Due to the current high-speed production of new garnments and the normalisation of overconsumption (Camargo et al., 2020), a move towards ultra-fast fashion has emerged, where fashion trading cycles that used to renew with the major fashion weeks (every half year, split into Spring/Summer and Fall/Winter collections), have now become hypercycles, renewing on a monthly or even weekly basis (Niinimäki et al., 2020; Riesgo et al.). The level of competition in the T&C industry that results in a handful of dominating, global oligopolies controlling the market has made it difficult for small businesses to compete and survive. The competitive environment further dampens progress in innovation in the industry due to this individually curated knowledge bank often being the competitive edge that small businesses need to grow in the sector (Bressanelli et al., 2022). Therefore, while the post-industrialisation of European cities has supported the appearance of a sustainable future outlook (Jansen et al., 2021), it has failed to acknowledge the greater reliance of the economy's needs on global (linear) economic systems (Ferm & Jones, 2017), the dependence on fragile geopolitical dynamics (Van den Berghe & Dabrowski, 2024), and the reduction of economic opportunities for local actors as a result of low wentry barriers and high market competitiveness (Vincent & Brandellero, 2023). The reliance on tertiary (services) and quaternary (knowledge) economic activities as a result of post-industrialisation has furthermore set the conditions for a specialised economy, one that risks a crisis (or even a collapse) when a decline arises in the dominant sector (Van den Berghe, 2024; Van den Berghe, Peris, et al., 2022; Van den Berghe et al., 2024). Hereby, not only has the offshoring of industrial activity forced a redirection in the job market, it has also created an environment wherein local and cultural traditions related to hand-crafting items are being lost to time and not valued, while those still active in the sector are unable to pass down their techniques to the next generation of makers (Brandellero & Naclerio, 2024; Vincent & Brandellero, 2023).

The debate around post-industrial cities has therefore led to a renewed interest in localising "new", small-scale forms of urban manufacturing (Ferm et al., 2021; Grodach et al., 2017; Wolf-Powers et al., 2017), making industrial activity local in character, and placing an emphasis on self-sufficiency over long-distance (international) transport. From the retrospective critiques on the levels of hyper-globalisation of the 21st century that have irreversibly pressured local industries into decline (Bressanelli et al., 2022), it is proving an important way to keep important manufacturing functions within the city. Indeed, re-industrialisation is a chance to facilitate diversity in the local economy (van Bueren et al., 2022; Van den Berghe, Louw, et al., 2022) and provide more employment opportunities to residents with diverse skillsets, increasing socio-economic resilience of the local market, thereby achieving municipal economic resilience goals. Additionally, localisation of manufacturing activity can provide the much-needed opportunity for a greater control of local resource and waste flows, allowing for the formation of circularised production cycles (Jansen et al., 2021; Vincent, 2023). Localisation is thereby majorly identified as a subtopic under the overarching umbrella of circular economy and demands for localisation have risen among proponents of circularisation, striving to reduce waste flows within the economy (Van den Berghe & Verhagen, 2021), allowing the creation of a restorative and regenerative industrial system (EMF et al., 2015). Circular production outlines the ability to retain the value of products, materials, and resources in the economy for as long as possible and minimise the generation of waste along the value chain (COM, 2019; Tsui et al., 2021). Alongside production, circular consumption ensures the products that are used and have fulfilled their user's needs for as long as they can are fed back into the system to either be used by someone else or recycled and used as a resource for further production (Brandellero & Niutta, 2023). Currently, initiatives to circularise the T&C sector are often individual, small-scale of singular designers/manufacturers, who use their circular production methods as a differentiation tactic from the rest of the industry (Norris, 2019; Real et al., 2020), allowing them leniency with respect to their product price range in comparison with their competitors, while also allowing them to develop the market for evolving consumer habits (Bressanelli et al., 2022). For their ventures to maintain success, the networks they have access to for collaboration, promotion and marketing, and the direct connection with consumers is just as, if not more, vital than the products they develop (Kim, 2024; PBL, 2023).

More than just an alternative economic model, a circular economy ensures longevity in resource lifespans, decreasing the need for environmentally detrimental resource extraction, and creates a tight, harmonious system that provides a robust base for fostering socio-economic resilience through the levels of market competitiveness and the innovations needed to realise it holistically (COM, 2022b, 2023; Geissdoerfer et al., 2017; Kirchherr et al., 2017). Considering the scale at which it needs to operate to guarantee consistent, durable, and innovative products, a transition to a circular economy will ensure a reliable source of employment across the entire value chain and its implementation will generate a greater quality of life for consumers and for the flora and fauna in our environment.

Hosoya and Schaefer (2021, p. 27) refer to the term "industrious" as a concept bridging collective productivity and technological progress, acknowledging the tangible knowledge embedded in local individuals and communities that cannot be extracted. Highlighting the pendulum swing back towards industrialisation, they point out the need for new methods of cooperation, systems thinking and narratives (ibid), in order to be able to re-integrate industry in a different approach from before, that was damaging enough to the local environment to warrant its offshoring. In order to facilitate a healthier, cooperative localisation of circular manufacturing, the system it acts within and the habits that make

up that system need to transform to make space for the activities it entails (Leigh & Hoelzel, 2012; Williams, 2020), and make its holistic implementation successful. Localisation is further strengthened through valuing and empowering local knowledge, traditions, and practices, setting apart the products created in one place from those created in another. Through doing so, an appreciation of local traditions and cultures is embedded throughout the manufacturing process, creating one-of-a-kind goods as opposed to the generalised products perpetuated through globalisation.

5.2 The role of facilitators

Western European cities have seen a decline in local manufacturing activity in the past decades, deriving from a combination of the effects of a global shared economy and a series of local policies focussed on downscaling industry to transition towards the 'new,' economically lucrative post-industrial economy. The purpose of such endeavours generally is to be able to provide added value to cities and increase their development on the global stage, but in order to realise this (often societal) added value, proximity of actors is needed, sometimes temporary, but oftentimes permanent (Latour, 2022; Lavanga & Drosner, 2020; Matilde et al., 2024; Van den Berghe, 2024). As a result, when cities fail to create or provide this added value, their purpose becomes obsolete, and they can just as easily cease to exist. In this way, circularising production cycles is a major strategy with which to provide this added value. To achieve a decrease in rapid resource depletion and the effects of waste on the natural environment and urban living conditions, a certain level of proximity between actors is required, as the management of these cycles can easily become too extensive to handle efficiently when networks are stretched and obscured through the global chains. The complexity of developing and managing value chains can further be attributed to the overwhelming amount of data, combined with a lack of information and overview of which stakeholders are active in which ecosystems, and how they are spatially embedded.

As underscored by the examples of circular manufacturing in cities above, the need for proximity, network management, and a broader view of the full scope of activities across value chains highlights the vital role that facilitators, perceived as the actors that make actively an important connection within the existing ecosystem of networked actors, institutionas, and assets, play in the development of a circular system. Through their oversight in the management of their value chains and the resource loops within them, they have a significant impact on local opportunities to achieve a circular transition. A variety of digital tools and platforms on the market are available for aiding businesses in circularising their production, and leading consumers towards where they can find products that align with their values on sustainable consumption. A similar tool is, however, not available for facilitators, despite them representing a crutch, holding the system together. As such, understanding their needs as crucial local actors and aiding them where necessary through communicative support is vital for circularising local manufacturing activities (Tsui et al., 2024). In providing this tool, it becomes possible to view the T&C sector and those employed within it through a socio-economical lens, where the individual is positioned within the framework they are operating within. The emphasis is then on being able to view this framework from a human-centred perspective, centring the human experience throughout both the manufacturing activities themselves, as well as their spatial manifestations in cities; how facilitators, manufacturers, employees, consumers, and other users of the space interact with and are affected by the manufacturing space around them.

By setting up a framework that connects different elements of the T&C industrial ecosystem with one another through their resource needs and by-products, formed, more circular practices can be nurtured, whereby the by-products of one industry are used as the resource for production in another (Van den Berghe & Daamen, 2020). Municipalities can support the transition towards circular manufacturing in their local sectors; as a facilitating entity with an overview of the entire system and the power to set goals for the local economy, they can steer progress towards economic, social, environmental, and spatial circularity.

5.3 The urban dimension

In the meantime, there is a high demand for land within cities, particularly in highly urbanised inner-city areas, thereby creating scarcity of, and competition for, space as a resource. The competition for land-use designation is high, especially for functions that deliver lower economic revenue to the immediate economy. Due to the especially high demand for housing within cities, housing projects and transformations often take the priority over other urban functions (Jansen et al., 2021). While planners, policy makers, and designers encourage ideas of self-sufficiency and economic circularity through their publicly published urban development and the planning documents, including introducing concepts like the 15-minute city (Moreno et al., 2021), in practice it is mostly approached from a residential and commercial development perspective (Van den Berghe & Verhagen, 2021; Van den Berghe & Vos, 2019).

However, once execution of these plans comes into play, eventually economic revenue outweighs spatial ideals around efficiency and independence, resulting in similar developments throughout urban regions. In isolated cases this may not play a significant role, but when all regions propagate the same values for urban development in the grander scheme (focussing on revenue over necessary but less profitable spatial facilities), a shortage in these functions is created throughout the greater regional networks. Van den Berghe and Verhagen (2021) refer to The Hague as an example of this, where the importance of a local circular concrete plant is neglected, in favour of circular residential and commercial redevelopment, despite its importance in the area for developers to comply with laws around the use of freshly mixed concrete. While circularity is still lauded as a major value in the recently proposed urban development trajectories, a limited view of dimensions of circularity, as well as the places and networks that are entangled with one another, results in decisions being made that compromise parallel avenues of circularisation. As Van den Berghe and Verhagen (2021) reiterate, “policy measures taken to achieve a circular city policy goal, have effects not only on the policy area related to the policy domain (e.g. a municipality and its administrative area), but it also effects [sic] the (im)material relations coming to and from the city in particular (cf. the urban metabolism),” highlighting the necessity of assessing both political and network boundaries of any given circular city considerations.

As space is the avenue through which all actions are expressed and taken, the use and allocation of it is vital to consider for the promotion of different user patterns derived from a shift towards circular manufacturing activity. The critical element within the spatial aspect of integrating manufacturing therefore lies in doing so in a way that promotes the attractiveness of localised industry, while deterring gentrification through pre-emptive urban planning and multi-scalar policies protecting the designated site(s) (Lavanga, 2013).

As Ferm et al. (2021) have confirmed with their analysis of Inner London, manufacturing activities in cities can take on multitudes of spatial forms, and occupy space in a variety of ways, although the buildings will often be positioned along major infrastructural corridors,

regardless of the businesses that occupy them (Jansen et al., 2021). Throughout history, the attitudes towards manufacturing in cities have constantly shifted, from being closely related with alternative urban activities during the industrial revolution, to being zoned separately or moved to the peripheries as much as possible due to health concerns (among others), to now lying somewhere between these two extremes, depending on the scale of the industrial activity and their individual business needs. Because of the renewed interest in localising small-scale urban manufacturing, the manufacturers' relationship with the space they occupy is bound to become a critical avenue for determining the level of success and support of their re-integration (Bucci Ancapi et al., 2024; Ferm & Jones, 2017; Ferm et al., 2021; Lavanga, 2020; Van den Berghe, 2023). This leads to Ferm et al. (2021) research on industrial typologies, classifying the typologies of inner London according to level of flexibility and relation to the urban fabric of the surrounding city (Bucci Ancapi et al., 2022; Bucci Ancapi et al., 2024). They found that, while different building typologies served different purposes and needs of different industrial actors, some typologies were at risk of gentrification; those with very close embeddedness with the surrounding urban context, being in mixed urban areas, while others were more at risk of large-scale redevelopment plans; being too isolated from the rest of the urban context through zoned industrial districts. Ironically, while the historical development in urban industrialisation pushed for a larger separation between industry and other urban spatial uses, it is the same element of separation that is putting the land at greater risk of redevelopment, for being an inaccessible and blind area within the city. Furthermore, as more land is repurposed for residential projects, lightly-used industrial areas are often considered for encroachment. As a result of either the gentrified spatially-attractive industry or the redeveloped spatially-zoned industry, less space becomes available in cities for manufacturing activity, particularly ones that leave flexible space for manufacturers to grow and shrink as they need at the time. Space near or within city centres are most scarce where, due to the density of networks and high degrees of proximity, the access to the labour market, value chain actors, potential collaborators and/or competitors, and the consumer base is highest.

This prompts the question, in what ways can the spatial and circular ideals promised in policy documents manifest themselves in more sustainable and just socio-economic development within cities? There are multitudes of ways to go about this goal, though often the approaches that prove to be most successful and are accepted by those living with and experiencing the consequences of the decisions taken, involve some level of participative co-creation with the local stakeholders and future users (Matilde et al., 2024). As such, the method taken with the integration of manufacturing activities in urban spaces may be just as, if not more, important than the act of integration itself. It becomes crucial to develop policies that, while enriching and managing the future local manufacturing industry, can also support current actors while preventing displacement.

For example, a major driver for engagement with manufacturing activities within cities is when those activities are, in one way or another, related to the socio-cultural or historical identity of the city they take place in (Haezendonck & Van den Berghe, 2020; Van den Berghe, 2020). In such a way, what the city embodies is used as a tool with which to promote manufacturing as enriching the local cultural landscape and creating an emotional and physical link with the city (as seen in the case of Prato, refer to Del Bianco, 2023).

5.4 Conclusion

How do we define successful (re-)manufacturing practices in cities? This requires a critical analysis of the underlying goals at municipality, government, and the European Union level, as well as a deeper understanding of what more is needed to foster just and sustainable cities on the ground. In the same vein, an assessment of the current systems is also necessary, questioning their ability to support an equitable and environmental transition altogether. Meanwhile, we should also critically assess in what ways a system that works to increase circularity, job market diversity, and urban vibrancy can contribute positively towards the ambitions of local stakeholders for the local context.

These questions form the basis for defining the relational positioning taken within the project. While spatial events may appear unrelated and far from each other's sphere of influence when viewed in isolation, in reality they will affect one another in some form due to the network relations. Seen holistically and specifically, relationality within governance alludes to the formation of strong, reciprocal relationships, that are informal and collaborative, and "characterised by the exchange of knowledge and high degrees of mutual trust" (Sunley, 2008, p. 4). The relational approach emphasises the interconnectedness of networks and the spaces they inhabit and cross. As they are, relations between stakeholders and their structures are in themselves "causal mechanisms of socio-spatial change in economic landscapes" (Yeung, 2005, p. 38). As Yeung (2020) further emphasises, "collective action beyond individual actors can bring about transformational effects in society and space", as they are active on a meso-scale, as opposed to when an actor acts individually at a micro-level, producing concrete outcomes through 'action-formation mechanisms' that have a more limited effect due to the scale of the action. In this regard, collectivism within manufacturing can create conditions where initiatives to take risks are supported in the local economy. Please find FABRIX Deliverable 1.2 wherein we go deeper in the project methodology.

6 References

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