

# Circular Design: design-led innovation for circular territories

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Former vacant ground floors expand the street space with programmes that add value for the neighbourhood

Flat roofs are established or greened by house communities as common spaces

social network

The unconventional residual spaces are enlivened by self-initiated projects of the residents

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# Circular Design: design-led innovation for circular territories

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**Architecture and buildings are in the focus when we discuss how to reach climate neutrality, how to transform cities and territories, how to achieve inclusion. Here, links between circularity, design, and city-making emerge as one of the most promising fields of innovation. This outline shows that a Circular Design paradigm needs to start from an urbanistic perspective and why Circular Design can make cities more liveable.**

Of the total waste generated in Europe, 36 % comes from building construction and demolition (Eurostat 2020), a triple challenge for the aim of carbon neutrality: the wasted energy consumed for production and then for demolition, the use of finite and carbon-based resources, and the energy wasted in transport. Not at least, market volatility and raising prizes urge to rationalise material and energy input. The issue of construction materials—which seemed for the last 70 years an infinite resource—is becoming a driver for change in architecture and in the whole construction economy, with the aim to reduce CO<sub>2</sub> emission and climate impact (European Commission 2022a). Architectural research and practice is following up on other creative fields such as fashion, furniture, industrial, and product design to target the re-use of materials not only as necessity of our time but as a thrilling field of creativity, expression of new aesthetics, creation of new desires—which strongly influences economy. In fact, Ellen MacArthur Foundation (2021a) claims that “design is fundamental to a circular economy”. Designers promote “circular solutions”, establish new circular business models, and see themselves as frontrunner for an “irresistible circular society” (Creative Denmark 2021). It is exiting to detect new linkages between design disciplines and economics, material, social, and cultural sciences. The design sector—and architects are part of it—extend the concept of “recycling” to “upcycling” and finally to “designing for reassembly”, they try to include a further use already in the design process for the original product.

This essay—and this book—takes one step further and asks about links between circularity principles, design, and city-making: in order to develop a systematic approach what a *Circular Design* paradigm could mean, how precisely it could support for climate neutrality, and how it is bound to sustainability of cities and quality of life. To begin, we go back to the topic of waste and resources: should we not better re-use and recycle whole buildings, urban areas, and even cities instead of disassembling them for recycling? Do we not need more comprehensive approaches than only focusing on material recycling? But on a carbon-free and circular way to design, install, live, and think space? Hence, this essay focuses on the implications of an overall circular approach for city-making, for dealing with urban spaces and urban elements. It highlights the role of design since circularity in cities is bound to material, spatial, and cultural experience. Hence, the objective is to define a combined circular and design innovation for the way we analyse, interpret, and project the structure, shape, vitality, and meaning of cities and the ideas, processes, and mechanisms to shape their transformation. Since design and circularity are addressed in different disciplines and diverse scientific, political, and societal discourses with different definitions, roles, and perspectives, the aim of this outline is to contribute to a more systematic understanding of *Circular Design* and to relate it to city-making. In terms of city-making, urban design and planning is already reaching out to a territorial dimension, to spatial governance, engagement, and to new interdisciplinary linkages—at the same time highlighting its architectural vocation due the conceptual and concrete impact of material culture, visioning, shaping space, and organising processes of change. Furthermore, the essay targets at positioning not only architecture and urbanism but a wider range of creative disciplines for climate-neutral cities, in dialogue and collaboration with other sectors and society.

### **Methodology**

The focus of the research review offered in this essay is on urbanism and architecture, with appropriate linkages to other creative disciplines, to material and natural sciences, engineering, economics, social sciences and humanities. Based on a discussion of the the context of decarbonisation and the questions it raises for the role of cities, city-making, and liveability, the essay offers an outline that reviews current concepts and research about the links between circularity, design, and city-making, in order to identify and condense main characteristics for a *Circular Design* paradigm towards urban and territorial innovation. Novel approaches in narratives which connect experience with exploration, a new role for the creative and cultural sector in decarbonisation, and social innovation that merges activism, entrepreneurship, and public action are further contributions towards *Circular Design*, discussed in dedicated essays in this book. Remarks about the structure of the book and the use of studio work as “mirror” for theories and research follows at the end of this essay. In the outlook, further considerations for research in architecture and urbanism are offered.

### **Decarbonisation and cities**

Nearly 40% of CO<sub>2</sub> emissions worldwide come from the construction, use, and demolition of buildings (UN 2020). The European Green Deal needs to take these city-related topics into account to reach the aim to make Europe the first climate-neutral continent—even more, if we consider that also other CO<sub>2</sub>-relevant topics are deeply linked to cities and living spaces, most prominently mobility. Several initiatives already address decarbonisation of buildings: for example, the EU strategy Renovation Wave (2020) aims at higher energy-efficiency and decarbonisation through building renovation; the EU strategic research and innovation partnership Built4People is addressing a sustainable transition of construction industries (2022). Security and sustainability not only of energy supply but also of material provision, production chains, and of workforce are further challenging factors. The topic of inclusion has gained additional importance due to high energy prices and inflation. Demand for housing is raising, increasing social division is reviving the question of affordable housing and living—for example, of the 400,000 new housing units on the agenda of the German Federal

Government, 100,000 are planned to be social housing. Still, sectoral initiatives and policies need to be set comprehensively in the context of urban transition towards sustainability. In current architectural and urbanistic research, the importance of cities for decarbonisation is highlighted: cities are seen not only as a main stage where sectoral innovation and policies need to be coordinated, but also as a motor to accelerate decarbonisation through interaction, sense of joint responsibility, and increased quality of life for citizens (Schröder 2020c). The EU Horizon mission for 100 cities to become climate-neutral by 2030 (2022b) is already addressing a comprehensive view in the cross-sectoral access to energy-efficient construction and renovation, sustainable mobility and decentralised energy production and storage. In a further step, a new focus on human-centred urban design and planning will be necessary, highlighting inclusion, empowerment, sharing, and activation, as well as new governance and financing models and the broad and different aspects of digitalisation (JPI Urban Europe 2019). The innovative force—and, implicitly, the specific research approach—of the architectural and design disciplines is being addressed by the initiative New European Bauhaus (European Commission 2022c). It calls for combining sustainability with aesthetics, technology with arts, and for an overall cultural change to realise climate-neutrality.

### **Circular dynamics**

Interest in circularity has been part of research about a shift towards sustainability since the 1990ies (Camilleri 2018) when the open loops of linear material streams have been detected as a main environmental problem and closed loops to contain human impact on natural ecosystems have been proposed. Already in 2015, EU introduced a Circular Economy Action Plan to foster resource- and energy-sensitivity and the use of renewable and natural resources as field for work and business opportunities and competitiveness. Today, with the aim of the European Green Deal to accelerate decarbonisation and with the demand for secure and sustainable production chains, the shift to a circular economy becomes even more important. At the same time, we can observe that circularity principles are further extended. The impulse of circular economy is understood to induce a radical turn of the whole economic and societal system of cities (Ellen MacArthur Foundation, ARUP 2018) since, in the framework of a “performance economy” (Stahel, 2006), multiple societal impact and value can be achieved. Exemplarily, the creative research project “Creative Food Cycles” (Schröder, 2019b) offers an understanding of the topic of food as cross-cutting field of innovation for circular economy, leading to a redefinition of design approaches in multi-actor innovation processes. It identifies pathways to combine territorial resilience, entrepreneurial and social innovation practices, and technological innovation in order to operationalise linkages and impact of circular economy to society, culture, and space. The methodology is following the definition of Ellen MacArthur Foundation (2017) that circular economy needs to realise innovation in three dimensions: first, to design out waste from production processes; second, to be regenerative by design; and third, to decouple growth from finite resource consumption. A focus on city-making, as implied in this essay, leads to sharpen these dimensions of circular economy, already outreaching to culture and society:

- to design waste-less and carbon-free life cycles of buildings and cities as well as to keep houses in use and to repair;
- to relate the regenerative dimension not only to nature (Giradet 2015) but also to cities and communities, disrupting concepts of urban regeneration that aimed at a static vision instead of regenerative processual qualities (Schröder 2020a);
- and to use circular principles to secure and gain wellbeing and prosperity in inclusive, accessible, and affordable ways.

Based on this consideration, the term *Circular Dynamics* (Schröder 2021a) can express, on the one hand, the idea to create dynamic processes with impact also in other sectors and in the city and, on the other hand, the idea to enhance and create a dynamic cultural, economic, and social shift, not at least through breaking barriers between production and consumption and establishing new expressions, rituals, and aesthetics of a circular society. Based on material cycles—and on a new awareness for material culture—the concept of *Circular Dynamics* extends to other flows that are necessary to generate sustainability and to generate city: flows of energy, flows of transport, financial/investment flows, flows of ideas, people, knowledge, abilities, culture, and values, and, not at least, flows of space. The implication is, clearly, to refer cycles to meaningful flows between local, supralocal, and global dimensions: cycles in the sense that cyclical thinking towards values and sustainability is adopted. It is about overlapping, overlaying, interfering of cycles and flows from different sectors and scales, about fluidity and dynamics, and about digital and material dimensions brought together. Thus, *Circular Dynamics* refers to open systems and “Open Habitats” (Schröder 2018) oriented and in progress towards sustainability—and to a networked idea of proximity and auto-sufficiency. Three examples can illustrate this definition: new financing and investment models (crowdfunding and sharing) not bound to a geographical border; new knowledge and research flows over distances; or new multi-place living and working models that cross boundaries. Through addressing a multiplicity of flows, *Circular Dynamics* support systemic approaches to cities. They can trigger new perspectives on urban topics and establish coherent interrelation, e. g. between until now strictly separated perspectives on existing buildings—in spatial-social and economic sense (building stocks), in a cultural sense (heritage), and in an ecological sense (resources)—towards a new logic of urban transformation for climate-neutrality.

### **Circular territories**

In a next step, a territorial perspective in order to explore linkages between circularity, design, and city-making is motivated to widen the spatial radius as well as to widen the topical and methodological access. First-hand, it is about including human living places beyond what is commonly defined as city, i. e. urban centres with more than 50,000 inhabitants. Effectively, only 40% of Europeans are living in cities, the other 60% in towns, suburbs, villages, smaller settlements—linked in networks and cooperation, intersected by different forms of material and immaterial divisions and borders. Then, it is about dynamic change due to parallel and contradicting processes of metropolisation, centralisation, extension, and diffusion of settlement (Soja 2012, Servillo 2016, Schröder 2017). At the same time, various forms of peripheries—urban, suburban, rural, remote—can be identified not only as challenge for just transition, but as potential for overall sustainability and for innovation (Schröder et al. 2018). Current new development of housing (mostly in small units) and industry zones regards metropolitan agglomerations, but also, and considerably, mid-sized cities and towns, leading to the current amount of about 60 ha/day of new soil consumption in Germany: a major challenge for sustainability (Schröder 2020c). Furthermore, a territorial perspective can support to understand complex constellations formed by settlement patterns, infrastructures such as transport and energy, and topography and natural factors and spaces—in constant change, too. This complexity of constellations adds to the complexity of the task of territorial transformation towards sustainability and resilience (Viganò, Cavalieri 2019; Schröder 2020c). A territorial perspective based on concepts of urbanism has the advantage of a relational understanding of space (Secchi, Viganò 2009; Schröder 2017) in terms of changing interaction between space and society. It can support to understand the interplay of structural, material, imaginative as well as social, cultural, economic, ecological factors for analysis and for projection of pathways of transformation. Referring to Castell’s definition of a city “not (as) a framework, but a social practice in constant flux..., a source of contradictions” (2005), the interaction between actors and space, the concept of space as

active agent (Schröder 2021b) as well as values, cultural beliefs, lifestyles, and their change are identified to playing important roles for territorial innovation processes.

Contributions in research about circularity in relation to territorial and urban transformation have come, until now, from three sides: first, with concepts of “urban metabolism” (van Timmeren 2014, Wachsmuth 2012, Grulois et al. 2018) or “circular cities” (Williams 2019, 2020) resource and energy flows are addressed in a management and infrastructural approach, extended to eco-systemic thinking, the role of nature, ecological regeneration, and the topic of health (Furlan et al. 2022). Second, circular economy is addressed in the context of economic development, focused on circular business models, creative milieus and networks, upscaling, and innovation processes (Bourdin et al. 2021). Third, a circular approach to building construction for closed material cycles, disassembly methods, and the so called “urban mining” (Heisel, Hebel 2021) or the use of digital tools for the organisation of the material environment, setting up new market mechanisms and innovating public procurement in regard to used construction materials (Office Rotor, see Vanderstraeten 2021) area implying a decidedly passive understanding of the city. In most cases circular approaches remain sectoral, very small-scale, and fixed on material questions, not including a broader vision of *Circular Dynamics*. In particular, more holistic approaches to territorial governance in conjunction with circularity and life-cycle-thinking are lacking (Amenta, Russo, van Timmeren, 2022, p. VI). One of the few research contributions to conceptually link urban metabolism, circular economy, and territorial resilience proposes the concept of “Circular Land” for the Sicani area in Sicily (Carta 2017a, 2017b), stressing the necessary interaction between territorial governance, urbanism, and evaluation. If we understand human living places—settlements and built environment—as a main stage and agency for transformation, where different sectoral (and disciplinary) aspects converge, their future as *Circular Territories* needs to be based on circularity-activating concepts: starting from an urbanistic and territorial perspective, such concepts then can contribute to create development pathways (Schröder, Ferretti 2018), based on relational logics and the territorial potentials (and limitations) they need to take into consideration. For a comprehensive approach towards *Circular Territories*, agency needs to be combined—economic, social, ecological, cultural, and spatial agency—, taking a people-centred view which starts from everyday life, living spaces, urban spaces, daily movements, economic activities, social and cultural factors and activities, and cultural beliefs. Thus, working with a relational understanding of space and actors. In the logic of a place-based approach to territorial policies (Barca et al. 2012), then strategies, plans, and policies at different levels can be effectively oriented towards circularity. The shift from the concept of mitigation of climate change to a focus on urban transformation towards resilience and sustainability (Wolfram 2016)—calling for systemic change—is giving importance to working with capacities of space and society for transformation. Adaptivity, redundancy, and robustness of strategies and tools in territorial governance can be identified as important qualities (Schröder 2021a). Based on these considerations, concepts towards *Circular Territories* can be articulated as space-oriented and actor-oriented.

#### **Space-oriented concepts (space as active agent):**

- **Circular spaces** for Net Zero Artificialisation: this concept addresses the target of Net Zero Artificialisation of soils (Schröder 2020b), preventing further extension and diffusion of urban structures, infrastructures, and social tissues as well as eco-systemic and biodiversity damages. They can be qualified spatially in decisions where can be newly built if somewhere ground sealing is removed, in accordance to whether it contributes to circular transformation—possibly in market mechanisms similar to CO2 certificates; and qualified in terms to consider density and spatial qualities

of newly built or re-built areas. Hence, this concept gives a decidedly new perspective to approaches to limit soil sealing or aiming at compactness of the last 20 years.

- **Circular transformation:** as main concept for urban activation and intensification through urban projects under the Net Zero Artificialisation target, to put circular objectives in the foreground and therefore to recycle areas and building also beyond metropolitan centres; to think twice before tearing down existing buildings; to imagine and organise new forms of transformation strategies: much more diffuse, systemic, small and large scale; and, in particular, to contribute to regenerative processes for places, economy, society, and nature. This means not only to set recycled buildings and areas into new multidimensional cycles but to support acceleration of cycles, to link between sectoral cycles, even to start new cycles.
- **Qualitative Density** (Schröder 2021c): as conceptual answer to respond to current territorial concentration processes (not only in metropolitan centres, but also for smaller cities and towns) and in order not to extend infrastructural systems; qualitative in relation to the territorial context (calling for new density models also for urban fringes, smaller cities and towns); and qualitative in terms to foster advantages of social and cultural density for quality of life.
- **Circular proximity:** combines conceptually the targets of mix (in functional and social composition, in activities over time), accessibility (in social terms and regarding sustainable mobility), provision with social and cultural infrastructures, and public spaces; and orients them towards circularity, to contribute to new sustainable cycles and to use new cooperation and sharing models (e. g. in energy: district heat-electricity provision, storage; or in community, housing, shared work spaces).
- **Enabling mobility:** starting from the concept to set the possibility to move in the foreground, not the transport infrastructure, to foster foot, bike and public transport, to consider movements of people as well as movements of goods, to use digital innovation and new electric technology—and to support circular transformation, qualitative density, and circular proximity, answering to new living and working models, in particular for peripheries.

#### **Actor-oriented concepts (for activation of space):**

- **Circular innovation processes:** to orient territorial innovation and traditional strategies in regional economic development towards circular sustainability and innovation, e. g. fostering business models, entrepreneurship, skills, knowledge, upscaling, innovative milieus and networks, targeted investments and financing, targeted clustering and links to research and education—and to coordinate with space-oriented concepts; as well as, not at least, to foster new roles for cultural and creative industries (CCI) as driver of innovation in other sectors and for a cultural shift under a circularity paradigm.
- **Transformative communities:** new organisational and financial forms of community organisation (co-working, co-living, prosumer models, community land trusts, etc.) that are oriented to foster and enhance sustainable transformation and to adopt circularity principles, using digital innovation, sharing models, crowdfunding etc.
- **Circular construction economy:** oriented towards decarbonisation, energy-saving in all processes, use of renewable and natural materials; including a change in business models, entrepreneurship, clustering, procurement procedures, but also in knowledge, abilities, education, life-long learning for all involved actors.

- **Inclusive real estate:** new sharing and ownership models, improved accessibility and inclusiveness that contribute to a circular access to urban and territorial development; new business models in real estate enhancing circular economy (Ellen MacArthur Foundation 2021b).
- **Circular planning framework:** to revise, adapt, and extend regulatory, legal, technical, and funding frameworks for a circularity-driven transformative approach to the built environment—a very critical point, since most of our regulatory background comes from and is still guided by the influence of modernist ideas, e. g. about functional zoning, carbon-based engineering, and over-regulation.

### Design for urban strategies and territorial governance

Already for the definition of these concepts for *Circular Territories*, not only for implementing them, character, role, and meaning of design for urban strategies and territorial governance needs to be revised. While design is a central element of urbanism theories (urban design and planning), discussions about design are not really part of conventional planning theory, even if traditional forms of plans are being replaced with more adaptive, integrative, and processual formats since several years that adopt designerly approaches to organise processes (e. g. Healy 2006; Neuman, Zonneveld 2021; Schröder 2021b). New participatory, involving, activating, and cooperative forms to set up policies, strategies, and projects are already referring to design thinking. Even with the danger to provoke unrealistic expectations of participants in processes on urban and territorial scales under the label “co-design” which rely on a background from service design theories (Wilson, Tewdwr-Jones 2022; Steen et al. 2011). Theories and concepts for spatial strategies and governance, with new tools such as contracts, stakeholder and citizen involvement, cross-sectoral approaches, and decision support systems, offer several points to include design and design-thinking—still referring to diverse concepts of design, in a range from service design to urban and architectural design. A tentative framework for design in a territorial dimension (Schröder 2017) can be summarised in six dimensions:

- **explorative:** in systematic scenario building, e. g. adopting the agency and capacity of mapping as research tool (Schröder, Ferretti 2018; Corner 1999);
- **visionary:** to design visions as integrated and systematic imagination that interpret the existing and build projection towards desirable futures (Secchi, Viganò 2009; Phelps 2021);
- **coordinative:** to design new formats and processes of spatial strategies, protocols, agendas (Schröder 2021b);
- **human-centred:** the contribution of design in architecture and urbanism can be subsumed as the voice of place-based (Barca et al. 2012), site-specific (de Meulder, Marin, Shannon 2022) and human-centred factors in territorial governance;
- **multi-scalar:** to open up information regarding development paths, spatial potentials and limitations (Schröder, Ferretti 2018); not at least referring to the concept of the “territory as palimpsest” (Corboz 2001), the understanding of territorial and urban contexts as subsequent historical layers;
- **projective:** regarding innovative projects—linked to places and space—for urban and territorial governance (Palermo, Ponzini 2010), and their interplay with processes of social interaction and decision-making (Steinitz 2012).

### Circular Design: background

The term *Circular Design* is used already since several years in research and practice of product design, fashion, and furniture design, with a focus mainly on the recycling of materials. A comprehensive overview in research



is lacking, literature offers only sectoral and geographical quite limited studies, and only in few cases they combine research into creating material cycles with new circular business models or even further aspects of circularity (e. g. about fashion: Ellen MacArthur Foundation 2021a). IAAC in Barcelona can be seen as frontrunner to relate *Circular Design* to architecture (Markopoulou 2019), with a strong digital-technological and interdisciplinary notion, e. g. to merge biological processes with building elements, inspired by the “cradle to cradle” concept (McDonough, Braungart 2002). At the same time, product design recalls its modernist vocation for better life and better cities (Maldonado 2019) and promotes its role as “strategic tool” for urban transition, equality, and life quality (Helsinki City of Design). This includes the move from linear design—subsequently structuring information, finding the design solution, creating form—to design loops: as iterative loops of design with human feedback, involving coding, programs, protocols, profiles, data analysis, but also new rituals, relations, desire, conflicts (Schröder 2021b). The approach of IAAC extends conventional understanding of design as limited part of architectural processes (the phase to draft a concept) to design as activity which includes making and works with models, prototypes, protocols—thus, fabrication innovates design (and vice versa).

### **Design thinking, Design research**

A next consideration regards “design thinking”, a term that has become popular in management and economics in the last years. Linked mainly to theories of product and service design (Brown 2009), “design thinking” in this popular sense can be adopted to different sectors and tasks, as a creative problem-solving approach that aims at positive impact and (disruptive) innovation. Discussed characteristics are the orientation to users and to outputs, commonly referred to as “solutions”, and short iterative cycles of invention, realisation, and testing. Still, then questions arise if it is about transfer and theories: “design thinking” seems bound to specific cases; an “upscaling” of “solutions” is mostly understood with a quantitative notion to increase numbers and range. In this conventional form, “design thinking” remains a management technique. The relation of design to research is, in comparison, much sharper and clearly evolved in architecture and urbanism. As Nigel Cross puts it, architecture is to be understood as “design discipline” (2012) characterised by “desigerly ways of knowing and thinking”. This definition overcomes the modernist impetus to ‘scientific’ design. In the meantime, design research in architecture is established with adapted theory and transfer (Fraser 2013, Buchert 2014, Luce et al. 2022). It can be seen as the “missing link” in the specific constellation between theory and practice of the architectural disciplines, offering a theoretical framework for cognition-oriented, problem-oriented, and practice-related fundamental research. As well as, and also this is characteristic for the architectural disciplines, for the specific multi-actor innovation ecosystems between academia, offices, and a broad range of stakeholders (public bodies, enterprises, civil society and cultural organisations).

Thus, the architectural disciplines already developed a scientific understanding of design thinking that can be summarised in three points: First, a theoretical fundament is actively shaped, since “innovation lies in the convergence between the transformation of ideas and things” (Fagnoni 2016). Second, design thinking refers not only to “produce” but also to “create”, in the sense of Aristoteles’ distinction between praxis and poiesis (Jaeger 1957), thus addressing a decidedly larger range of values. And third, design thinking addresses space and context, thus the ability to comprehensively bundle and merge a multiplicity of sectoral, scalar, and social aspects is seen as a major characteristic. It is the synthesising power of architectural design thinking that makes it particularly appealing and effective for transforming the complexity of cities and territories, not only as systems, but as spaces (Schröder 2021a)—hence, as material as well as cultural and social construction (Rossi 1966). Similar to the discovery of the last years, due to the challenge of climate change, that architecture in

fact is a research discipline—as which was created academically for urban expansion in 19th century—, also its common and self-understanding as creative discipline is deeply changing. Since then, architecture was always seen as creator of something new. Now, we follow the mission “to recycle is to design”, as Mosè Ricci (2016) coined it. The impact of this shift not only for architects themselves but for the common image of architecture could not be more disruptive. And it is not only about using recycled materials or converting existing buildings (“re-use”, Stockhammer 2021): the novelty lies in setting them into meaningful cycles and creating new cycles towards sustainability—the major conceptual result of the Italian National Research project PRIN “Re-Cycle” (Ricci, Schröder 2016; Schröder et al. 2017). Effectively, if we seriously aim to create Circular Spaces with Net Zero Artificialisation and Circular Transformation of cities, it is quite clear that we have to overcome the traditional and strong borders between new construction and renovation/conversion, in research and practice, mindsets and ways to act. Even more, architects will need to combine always, and for everything they do, knowledge and abilities to work with the existing as well as to add, transform, extend with new spatial ideas. To install space: this will be the creative mission of *Circular Design*. Obviously, this newly comprehensive and holistic approach contradicts ongoing specialisation of the architectural disciplines. In this sense, *Circular Design* is a call to valorise, research, teach, and learn the comprehensive and strategic qualities of architectural thinking and work with new eyes.

### **Circular Design towards Circular Territories**

Hence, as a working definition, *Circular Design* would innovate how to install, to set space into cycles towards sustainability, and to contribute towards circular territories—first-hand, as new paradigm for urbanism and architecture, but also as impulse to ongoing discussions in other design fields, in territorial governance, and in collaboration with other disciplines and society.

Thus, *Circular Design*

- combines processes of inventing, making, and using,
- is people-oriented, performative, involving, communicative,
- sets spaces in sustainable cycles, accelerates cycles, starts new cycles,
- connects sectoral cycles,
- is trans-scalar in analysis, interpretation, and projection,
- works with design loops and human feedback,
- includes experimentation, prototyping, and testing,
- aims at a combined material and digital culture,
- is oriented to liveability, accessibility and inclusion,.
- realises climate neutrality through regeneration (for places, communities, and nature),
- fosters a new economy and decouples well-being from finite resource consumption,
- drives a cultural shift, imagination, and aesthetics.

Clearly, for this conceptual vision we will have to develop not only non-linear design processes but also new tools—along circular processes. Tools that are more interactive and communicate, that work with early tests and prototyping, human feedback, new forms of strategies, digital methods in different dimensions, new ways to organise resources, knowledge and abilities in urban and architectural processes with many involved

stakeholders. For a territorial level of *Circular Design* tools such as mapping, visions, and scenarios have already been mentioned. Infographics and diagrams, data interpretation, working with unconventional and open data, as well as videos and artistic approaches are also ongoing fields of innovation, in overlaying between digital and material methods and outputs. As underlying concept for several tools, narratives (Schröder 2020d) can bridge and mix between personal and cultural views in analysis and creative views in projection, visioning, transformation processes, and communication (see the essay about *Circular Narratives* on p. 30).

### **Mirroring with studio projects**

The research discussion about *Circular Design* in this outline and in the other essays of the book is mirrored with selected studio projects at the university in the second part of the book. To “mirror” means that it has been a vivid and stimulating experience for us researchers to explore topics and places and to discuss and sharpen approaches and concepts together with our students while guiding their work—that, also this is part of the “design thinking” in architecture and urban design, stands as studio project in itself, with a design research orientation in concepts and methodologies. And to “mirror” means, furthermore, to ask about necessary innovation in teaching, in content, formats, and methods, that we can draw from research. In this sense, the book also shows the outcomes of involving students in the innovation of university teaching, in particular in a strong orientation to design research and interdisciplinary linkages for their future in academia and in practice. This second part of the book is featuring case studies from all over Europe (and some beyond) which in different ways express and articulate ideas about *Circular Design*, in a certain sense it is a protocol of a joint discovery process. 16 studio projects and thesis projects (selected from over 200 we supervised in the last three years) are shown with a small part of their overall volume. Experimental graphic expression and communication—that we consider fundamental—are interwoven with discussions about focus, objectives, methodologies, and evaluation. All projects start from the existing cities and territories and from existing innovating initiatives, very near to the “Circular Transformation” concept; even if some of the projects seem more utopic than others—and in fact, disruptive thinking is one of the aims—they all tag precisely questions, actors, initiatives, trends, and movements in place. The projects are organised in chapters according to studio topics (Medways, Seaside, Mountains, New Bauhaus City) or are freely arranged for this book (New Systems, New Processes, Transformation). Between the essays and the projects, the chapter “Interface” offers a taxonomy of the projects, installed ex post, which links them to the theoretical framework and which can serve to access themes, strategies, tools, and places.

### **Outlook**

Since this essay is an outline for a *Circular Design* paradigm towards circular territories, it is necessarily open and not conclusive. According to the multiple culture of innovation in architecture, based on a multiplicity of actors, it aims to activate dynamic fields and networks of ideas, people, and space oriented to circular principles—targeting urban and territorial sustainability, climate resilience, and climate neutrality. Taking up on *Circular Design* can innovate architecture and urban design and planning and enhance new linkages with other design, creative, and artistic disciplines. At the same time, the outline can be read as a research manifesto: calling for new research projects, publications, exhibitions, prototypes, collaboration. And to examine further how a Circular Design paradigm can contribute to sharpen concepts of design research, for designerly ways to research in a cognition-oriented, performative, and transferable way. Thus, *Circular Design*, inspired by and working with the interaction of space and society, could support to (re-)establish fundamental research in architecture (Luce et al. 2022) precisely because societal questions urge to develop open research.

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