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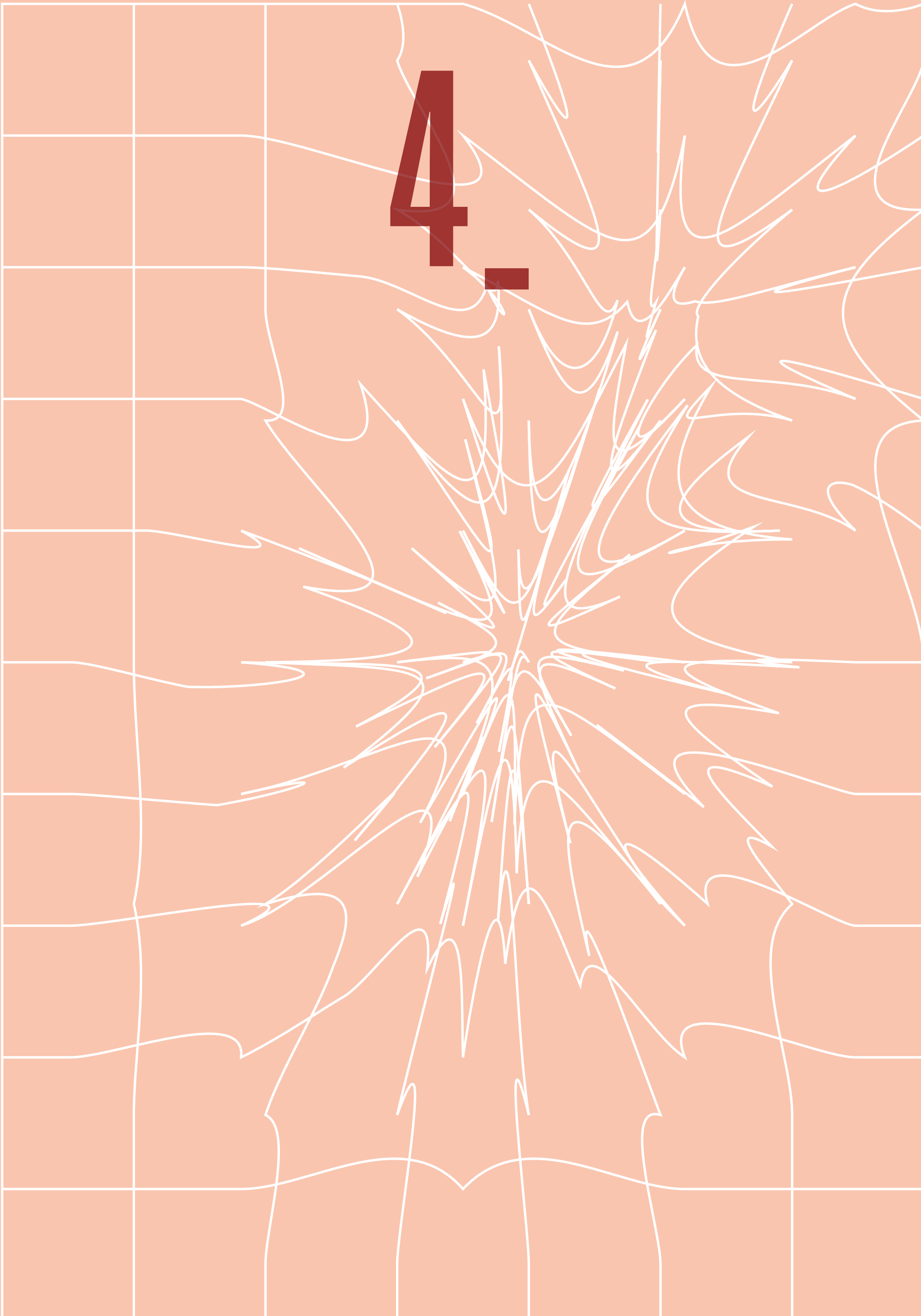


SUSTAINABLE TRANSITION

The search for a societal model capable of preserving the Earth and guaranteeing a high quality of life for the generations to come is the biggest challenge currently faced by humanity. Urban design can actively participate in the transition process by employing innovative technologies and materials, allowing a major leap forward, but first and foremost through the complete rethinking of its models and practices. Historical cores are not simply testimonies to the possibility of a development system respectful of human and natural resources; they can also become operational models for the exportation of their qualitative and quantitative character to entire urban environments. The very existence of historical patterns testifies to the fact that adaptive circularity processes were possible in the past and are still possible today.

SUSTAINABLE TRANSITION

4_1 EXPORTING THE HISTORICAL CORE

Applying the defined strategy will allow reconstruction processes to become a powerful tool for a transition toward a sustainable development model. Cities under pressure, extreme conditions that call for radical solutions and bold assumptions, are an extraordinary chance to identify, test, and apply the latest available technological advancements. It is fundamental to move away from a vision of sustainability as an easy slogan heralded as a panacea for all evils, and used as a screen for the inability to propose alternative development models. Technological advancements are too often seen as technocratic solutions capable of fixing all urban problems, without any regard for cultural specificities, and aiming at a total absence of political and social conflict (RACO AND SAVINI 2019). The easiest example is perhaps the hegemony of the smart city debate (HALEGOUA 2020; YAMAGATA AND YANG 2020), with the goal of transforming urban spaces into responsive environments where every behavior is observed, aided, or sanctioned by sensors and technologies. Smart cities hide under a utopian technocratic vision of the construction of urban spaces that transforms citizens into users and consumers, while “a true ‘smart city’ is not one that can do more with less—a great slogan for times of austerity—but one that is aware, and also proud, of its limitations and imperfections, one that respects minorities and their harmless diversities and does not violate the rights of its inhabitants, including that of using the city” (MOROZOV AND BRIA 2018). Technological applications in urban environments thus become tools for establishing coherence and a forced order within an urban landscape, which is by its very nature incoherent (LEFEBVRE 1968).

The necessary sustainable transition, however, can be guided by a possible alternative model, often poorly considered but still highly operational: it is the historic city, the scraps of preindustrial urban fabric, that stubbornly have come down to us—crossing, certainly not unscathed, centuries of urban history. It is clear that the preservation of the historic city is the first step toward a sustainable future, but it is certainly not enough. Indeed, it is necessary to develop practices capable of making historic cities the active operational engines of the construction of the contemporary city

(MURATORI 1960). The system of historical cores shows the possibility of investing in tangible and intangible assets that cannot be delocalized. It is an actual and physical contrast between local diversity and the indifferent homologation of globalization (MARINO 2021).

Historical cores cannot, and should not, be copied in terms of their materials and architectural forms; instead, they must be considered as precious lessons on a quest for a dynamic equilibrium of physical resources and community needs. The historic city is a model because it testifies that processes of refinement through trial and error can lead to urban quality solutions; and also because, as pointed out by David Harvey, "the question of what kind of city we want cannot be divorced from the question of what kind of people we want to be, what kind of social relations we seek, what relations to nature we cherish, what style of life we desire, what aesthetics values we hold" (HARVEY 2012). Historic urban environments are not simply physical artifacts; they make visible and embody the cultural and social models that permitted their creation. How to achieve in a relatively short time the resilience refined over the centuries by the historic city, without passing through generations of disease, hunger, error, and dramatic naivety, remains the main operational challenge of reconstruction processes (ALBRECHT AND MAGRIN 2015), an effort that tries to overlap and synchronize for short stretches what Fernand Braudel called the deep and superficial currents of history (BRAUDEL 1998).

We certainly know that "the (historic) city is at once the laboratory of environmental reconstruction and the guarantee that an undertaking of this sort is feasible, providing that the particular city dates from the not too remote past and continues at least partially to function" (BENEVOLO 1993), and again that "the still inhabited historical cores become a concrete demonstration that the post-liberal model is not inevitable; yesterday it was possible to build a different and still functioning environment, tomorrow it will be possible to build a new environment that respects the same essential values, of which the inhabited areas are already ideally part. Therefore (the historical cores) do not interest us because they are beautiful or historical but because they indicate a possible future transformation of the whole city in which we live" (BENEVOLO 1984). A manifesto toward a truly sustainable transition.

4_2 THE LEAP FORWARD

The historical cores are the key reference for the urban qualities desired in the reconstructed city, but they must be adjourned to the latest technological evolutions available in the global scenario in order to provide viable solutions for the complex challenges posed by cities under pressure. Only a reconstruction able to match the qualitative character of the historic city with the highest possible quantitative performance will allow a true sustainable transition. However, a third factor must be considered: the social im-

FEATURES OF THE HISTORICAL CORE

A. Materials. The selection of construction materials in historical cores has been done taking into consideration multiple concurring factors: available natural resources, the small dimension of supply chains, skills of local labor, and technological capacities.

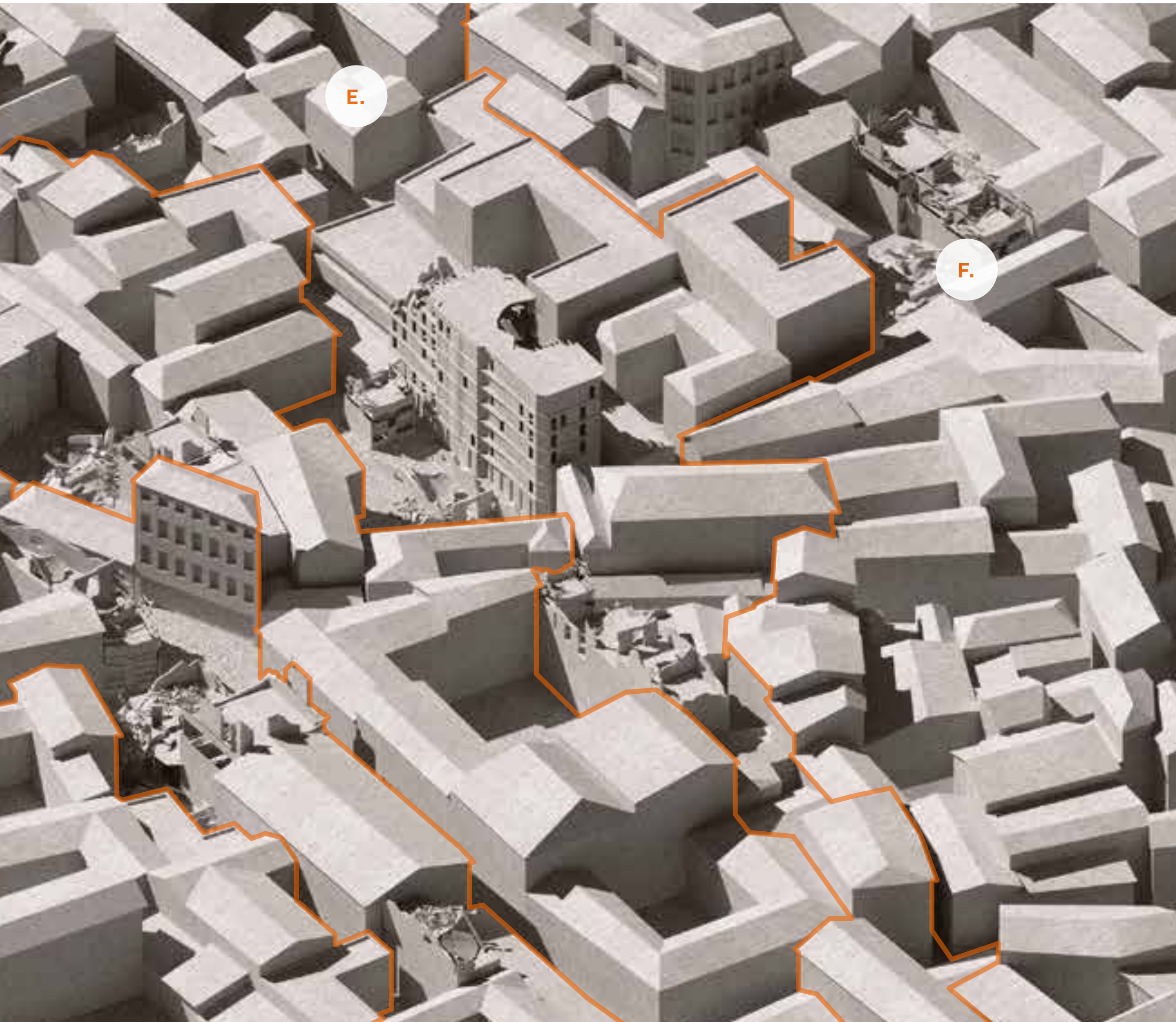
B. Event city. Public spaces in historical cores are easily adaptable to different uses. Temporary function can emerge and disappear with spontaneous or planned organizations and gatherings, a capacity to continuously generate new meanings and possibilities.

C. Commercial areas. In current urban environments, commercial areas are detached from housing and other functions, while in the historical cores they are directly linked to public spaces and private living areas acting as a diaphragm and mediation space.

D. Resilience. The slow process of trial and error that has enabled a refinement of technological and architectural solutions makes historical cores resilient to changes and easily modifiable in the case of extreme events, allowing an ecological relationship with the surrounding environment.

E. Multifunctional public space. Giambattista Nolli's Pianta Grande di Roma of 1748 showed continuity in public accessibility and a use of internal and external spaces, a deep character of the historical core that can still be witnessed today.

F. Density. Historical cores, regardless of their history, geographical location, or climate and cultural specificities, have on average a density (calculated as built square meters over total area) between 2.3 and 2.9; the same data calculated for urban sprawl is around 0.8 and 1.5.



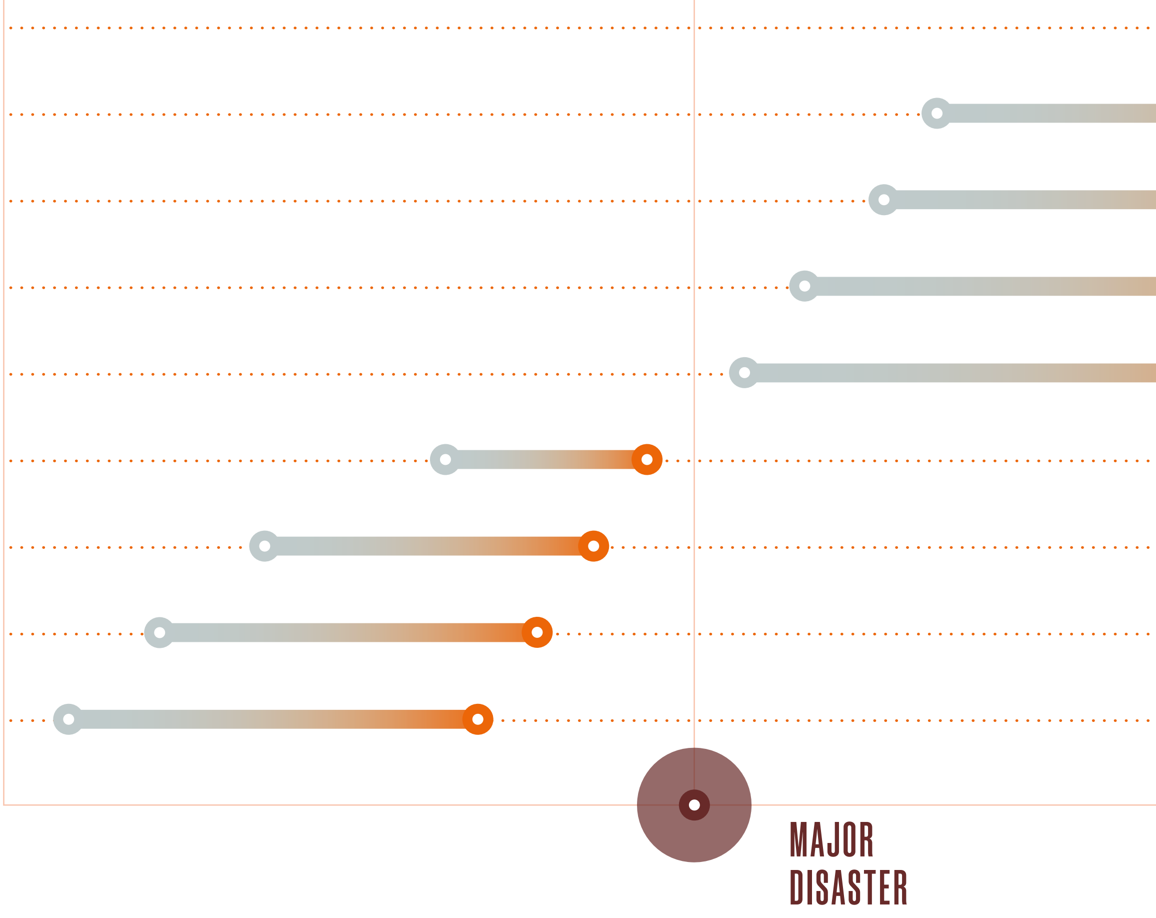
FILLING THE TECHNOLOGICAL GAP: THE LEAP FORWARD

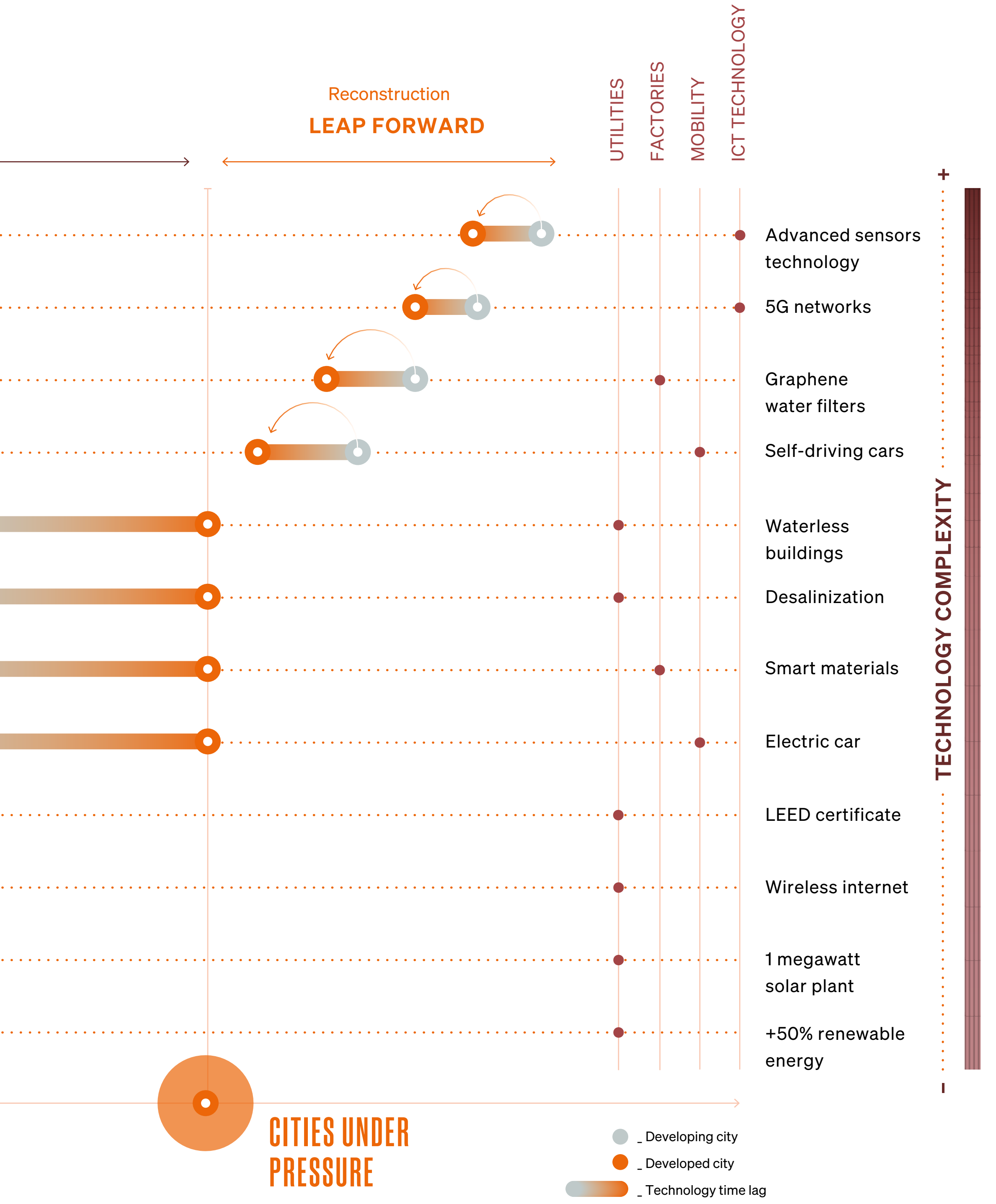
PRE-DISASTER

Response

POST-DISASTER

The scheme shows the period of adoption of selected technologies by cities in developed and developing countries: the distance between the dots is defined as a technological gap. In standard conditions, the gap is closing given the widespread global availability of the latest technological evolutions. However, major disasters tend to significantly increase the gap in very short time frames. The proposed strategy aims at a major technological leap forward by seeing the reconstruction process as a chance to immediately apply the most advanced available technologies, regardless of the current level of development.




Reconstruction
LEAP FORWARD
UTILITIES
FACTORIES
MOBILITY
ICT TECHNOLOGY
Advanced sensors technology
5G networks
Graphene water filters
Self-driving cars
Waterless buildings
Desalinization
Smart materials
Electric car
LEED certificate
Wireless internet
1 megawatt solar plant
+50% renewable energy
TECHNOLOGY COMPLEXITY
+
-
CITIES UNDER PRESSURE
_ Developing city
_ Developed city
_ Technology time lag

pact of technology and the different level of availability and adaptation in different geographical and social conditions (ARCHIBUGI AND PIETROBELLI 2003; UNCTAD 2006). A scientific and technological discovery is always socially constructed and always culture-bound, but it is never simply true, and technological transfer is never a purely neutral process (HEADRICK 1988).

Territories prone to violence, social conflict, or recurrent natural disasters are often subject to a technological time lag caused by the impossibility of developing or accessing the most updated technological advancements. Reconstruction can become an occasion to immediately access and fruitfully exploit the latest global technologies, making a leap forward without the necessity to pass through different evolutive phases. It is vital to be aware and control the social impact of technologies that might enhance violence or inequality (PIERSKALLA AND HOLLENBACH 2013; BAILARD 2015) or, on the contrary, to facilitate collective action problems and improve in-group coordination and cooperation (POBLET 2011; RAMSBOTHAM ET AL. 2011; MANCINI 2013). Within the proposed strategy, four main fields can allow technology to become a precious tool for sustainable transition:

a.

UTILITIES

Providing energy and water through integrated renewable sources and smart distribution systems in a vision that aims for a wise management of commons (OSTROM 1990; DE ANGELIS 2017) for the benefit of a whole community rather than for individual customers.

b.

FACTORIES

Producing light building materials on site that maximize secondary materials derived from occurred destructions and that involve the local population in transformation processes and self-construction mechanisms. The production of materials, while having the lowest possible impact on resources, should be inserted into a vision that reconnects productive cycles and construction types by working on sets of variation and customization within a unitary settlement principle.

c.

MOBILITY

Assuming that the future reconstructed city will employ a "mobility as a service" philosophy (HENSHER ET AL. 2020), banning cars from urban cells in favor of low-impact, self-driving vehicles (MOSS 2015). The transformation of low-quality infrastructural nodes (FOURIE ET AL. 2020) in public space liberated from traffic will significantly increase the density and compactness of urban environments.

d. ICT TECHNOLOGIES

ICT technologies have already been tested and applied in early warning systems (ASIMAKOPOULOU AND BESSIS 2010), but their capacity to empower the different actors in the reconstruction processes is yet unexplored. The bottom-up strategy can benefit from the definition and development of tools, such as e-learning systems, data-gathering and data-sharing platforms, online tutorials, ownership rights definition and GPS tracking, 3D visualization and augmented reality (AR), et cetera.

The horizon for the application of technologies allowing a true leap forward toward a sustainable transition involves the maximization of local employment favoring distributive policies (MATHEWS 1999); the definition of the dynamic equilibrium of urban space can be obtained through a mosaic of small-scale construction firms and service providers. In order to create employment on a large scale, labor-intensive sectors must be favored (IZUMI AND SHAW 2015), automation must be integrated with irreplaceable human action (SRNICEK AND WILLIAMS 2015), and innovation must be tamed by the careful respect of natural and social resources (BOOKCHIN 1989). "We want to accelerate the process of technological evolution. But what we are arguing for is not techno-utopianism. Never believe that technology will be sufficient to save us. Necessary, yes, but never sufficient without socio-political action. Technology and the social are intimately bound up with one another, and changes in either potentiate and reinforce changes in the other" (SRNICEK AND WILLIAMS 2017).

4_3 DECENTRALIZED MODEL

Reconstruction is a chance to define and build a development system that moves away from a technocratic vision of technology and embraces local self-development (MAGNAGHI 2010), a radical modification of current global paradigms that maximizes the decentralization of decision-making and urban production processes. Extreme events allow territorial management systems to be tested, in which policy decisions are made by groups gathered in assemblies with variable dimensions (region, city, neighborhood, etc.) and specific functions, a libertarian municipalism exposed by Murray Bookchin as a fluid conceptual framework, conscious that "how work should be planned, what technologies should be used, how goods should be distributed are questions that can only be resolved in practice. The maxim 'from each according to his or her ability, to each according to his or her needs' would seem a bedrock guide for an economically rational society, provided to be sure that goods are of the highest durability and quality, that needs are guided by rational and ecological standards, and that the ancient notions of limit and balance replace the bourgeois marketplace imperative of 'grow or die'" (BOOKCHIN 1991).

If the utopia of a world completely organized in small autonomous units appears unattainable, then certainly the construction of systems in which small-scale functional democratic bodies are governed by fully participatory assemblies and dialogue with larger-scale representative systems (DAHL 1990) seems to be the only possible solution to solving the current detachment of resources and production, communities and bureaucracies, territories and economies; and to tracing a path toward a "cosmopolitan democracy" (ARCHIBUGI 2009). The progressively growing importance of transnational governments and the global awareness of the need to jointly tackle global challenges beyond national borders (HELD AND MCGREW 2002) transform nation-states into subjects whose decision-making capacity is questioned. Neither national nor transnational bodies are capable of managing the complex entanglement of issues that characterize urban metamorphosis. Instead, this can be entrusted to self-government bodies placed in relationship and dialogue with representative systems, with the aim of widening the spaces of individual and collective autonomy (CASTORIADIS 2001) and of partially solving the issue of full inclusion (HABERMAS 1998).

Current technologies allow a level of global connectivity that provides the possibility of continuous decentralization and aggregation on the basis of transitory interests between intersecting and overlapping groups (KHANNA 2016). It is a condition well understood by the economists Bruno Frey and Reiner Eichenberger, who devised a system called Functional, Overlapping and Competing Jurisdictions (FOCJ) (FREY AND EICHENBERGER 1996, 1999; FREY 1994), a valuable tool for reconstruction processes. In a FOCJ, the administration of a certain service (mobility, water management, waste disposal, etc.) is guaranteed by voluntarily established associations that act with a single purpose, without clearly belonging to a defined territory. The individual functional units are overlapping and competitive, trying to attract the preference of individual citizens or entire communities. The reconstruction laboratories can operate as FOCJ, enabling one to attend to the will of the communities and to quickly experiment with and verify innovative ideas. The implementation of the FOCJ system makes it possible to form transient groups that coagulate around the preference for a certain factor (materials, self-construction, credit models, etc.) to verify the positive or negative implications of its application and steer its scale-up process.

4_4 ADAPTIVE CIRCULARITY

The defined fields for technological development are not to be considered as separate parallel elements but rather as a group of concurring factors working toward the common goal of sustainable economic, social, and urban transition. Reconstruction can be the chance to construct positive cycles that tend to join different design scales and subjects, thus reconnecting the production of urban spaces to the complex entanglement of technical and societal factors that define them. The definition and control of a settlement's principles and of its possible evolutive trajectories can be matched with the individuation and development of appropriate technologies (SCHUMACHER 1973), both in terms of sustainable transformation of natural resources and enrichment of social capital (PUTNAM 2000). Building construction can be linked to material production and constructive techniques in a process that aspires to the definition of circular models interconnected with each other at different scales.

Agricultural production, energy provision, water management, transformation mechanisms, industrial processes, and city-making can be imagined as crossed rings where intervention into a single element can trigger major changes in other parts of the mechanism. Technologies that require the smallest possible amount of external support should be favored, not in an anti-historical autarkic vision but in a process of maximization of local development (SACHS 1974) that matches large-scale knowledge and information networks with small-scale territorial and urban transformations. "It is therefore necessary to address the definition of rules for human settlements that do not require any external support for durable self-production. Hence the need to develop the concepts of 'local' and 'self-development' which underline the need to affirm a culture of self-government and care for the territory that is able to overcome the reliance of sustainable development to technological machines or heterodirect economies, through the reconquest by the inhabitants of the wisdom of production of environmental and territorial quality" (MAGNAGHI 2010). Technology becomes useful for development only in a vision capable of linking it to ecological and sustainable ethical guidance that guarantees its use as a means and not an end. The final goal is the definition of a development model capable of providing a safe and qualitative built environment through the capacity to continuously control the fluidity of urban metamorphosis by using technologies as indicators and boundaries of a wide range of chances.

Circular productive and technological systems can be defined in the abstract, but their application is strictly linked to the possibility of adapting the concepts to the specific conditions of each area involved in extreme events. Utilities, factories, and mobility choices are bound to the specificity of each social, economic, cultural, geographical, and historical condition, thus requiring a flexible management system (ELLRAM ET AL. 2022). On the one side, the presence of a reconstruction laboratory ensures compliance with the needs and aspirations of the local communities, but on the other, technical decisions might require a level of knowledge that exceeds that of local assemblies. The adaptation of technological means can be conducted through the transformation of resources and objectives in terms of input and output that can shrink and expand the conceptual model and its spatial implications. Design experts are called on to continuously define the porous borders of these processes, accounting for their impact on the modification of urban environments. Rather than a specific spatial configuration, the design aims for the definition of a fluid mechanism that can be continuously adapted and recalibrated while maintaining the clarity of its final goal.