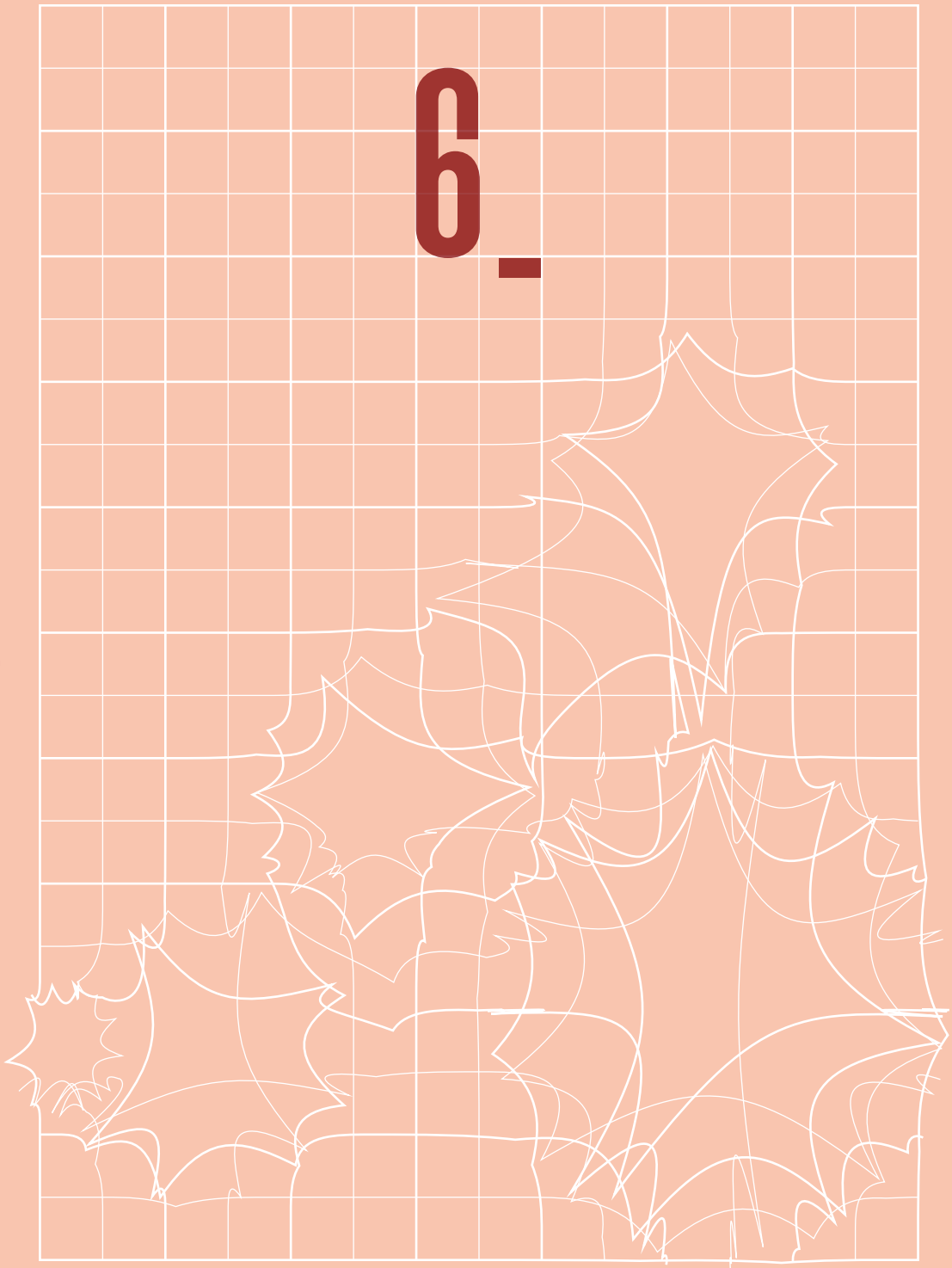
6_



DESIGN

Only a new design approach, with its specific design tools, may allow the fruitful application of the proposed strategy and its adaptation in different locations. Historical patterns, which on average amount to 5–7 percent of the total city, require an urban restoration approach, while postindustrial patterns, making up the remaining 95 percent, need processes of urban triggers capable of controlling urban metamorphosis through the definition of a public backbone and the guidance of private intervention using induced design mechanisms. The common trait is the necessity to define and apply a growing evolutionary mechanism that sees urban environments as fluid dynamic equilibriums to be continuously renegotiated.

DESIGN

6_1 URBAN RESTORATION

The design approach aiming toward the reconstruction of urban environments involved in extreme events is different in light of the nature of the destroyed patterns: historical cores and postindustrial cities require the application of specific design tools within a common strategic vision. On the one side, the goal is to conserve and ameliorate the existing urban form, while on the other, a different urban model must be devised and constructed, leading to a reconstructed city totally different from the pre-destruction one.

The conservation policy of ancient cities, of the material and immaterial heritage of the inherited city, was conceived, from the very first experiments, in a unified and organic way. It was an "integrated conservation" (CHOAY 1992) that considered historical urban environments as single organisms, made up of buildings, open spaces, and inhabitants whose restoration was to be faced as a single object. The development of integrated conservation policies permits a definition of the urban restoration method that has proved to be valid and adaptable to different conditions. Born in Italy after World War II (CEDERNA 1961; CERVELLATI ET AL. 1977), it was adopted around Europe (Council of Europe 1975) and became a conceptual guide for large international organizations (BANDARIN AND VAN OERS 2012). It is "a historically founded methodology for the study and modification of ancient and modern settlements" (BENEVOLO 2006). The goal is the preservation of the physical body of the city, and of what was left of the social body that lived in it, so that they remained, as far as possible, united with each other. The technical and administrative intervention rules were identified in numerous experiments (ALBRECHT AND MAGRIN 2015), allowing a preservation the past, the possibility of continuity of use in the present, and a future for the inherited physical heritage. Societies, like individuals, can increase the possibilities of fruitful relationships only in the custody of the "long time," which is the time of the future and of the generations to come, in the awareness of duration and in the ability to remember, as an integral part of daily life. The historic city, its urban heritage, is the hereditary property of a society that gives it the sense of an indispensable intergenerational gift.

Urban restoration is at the same time a cognitive analysis and an operative action defined by a technical standard of four maps that guide all the modifications of the urban environment. The drafting of the set of drawings is the true design effort, which provides a blurred but coherent vision of the future city, while the design of single elements can be entrusted to a multitude of different architects, provided that they have understood and applied the overall intervention rules:

a. **TYPES**

A map that identifies each building based on a list of building types defined in light of their form, size, and features. Types vary in each city based on local specificities, but the tracing ability of architectural types, which defines the history and consistency of the built environment, is accepted collectively, and it becomes a repeatable and comparable parameter in different situations.

b. **CONDITIONS**

A map that identifies each building based on structural integrity and level of preservation of the horizontal and vertical surfaces. The conditions allow one to define for each building the scope of intervention that can range from simple renovation to recovery, through philological or typological restoration, up until complete modification with typological or volumetric substitution.

c. **FUNCTIONS**

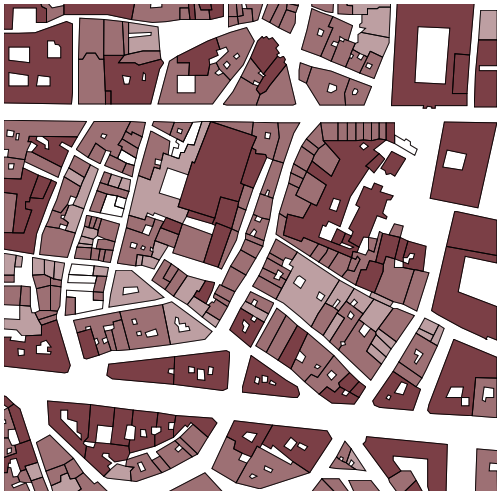
A map that identifies each building based on current function and possible future uses. The traditional mixed use that characterizes the historical city is to be preserved and revived, while a sufficient level of adaptability can allow unexpected and radical new interpretations.

d. **SURGERIES**

A map that identifies the specific area of the urban pattern where interventions altering the current urban form may occur; the surgeries are configured as shadow projects that would need to be further designed but that once carried out will significantly ameliorate the overall environment.

URBAN RESTORATION TOOLS

↑ Building types

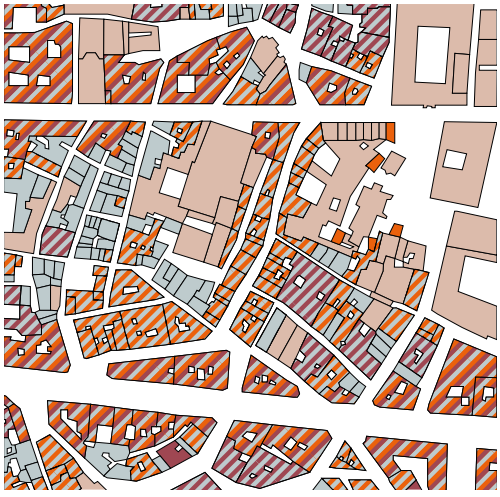


- _ Contemporary buildings
- _ Traditional houses
- _ Apartment buildings
- _ Small palaces
- _ Palaces
- _ Religious buildings
- _ Public buildings

- _ Good
- _ Mediocre
- _ Bad
- _ Footprint
- _ Housing
- _ Facilities
- _ Commercial
- _ Tertiary sector

- _ Restoration
- _ Renovation
- _ Philological restoration
- _ Typological restoration
- _ Demolition of additions and philological restoration
- _ Demolition of additions and typological restoration
- _ Non-reconstruction
- _ Development zones

↑ Levels of preservation



↑ Use

↑ Prescriptions and surgery

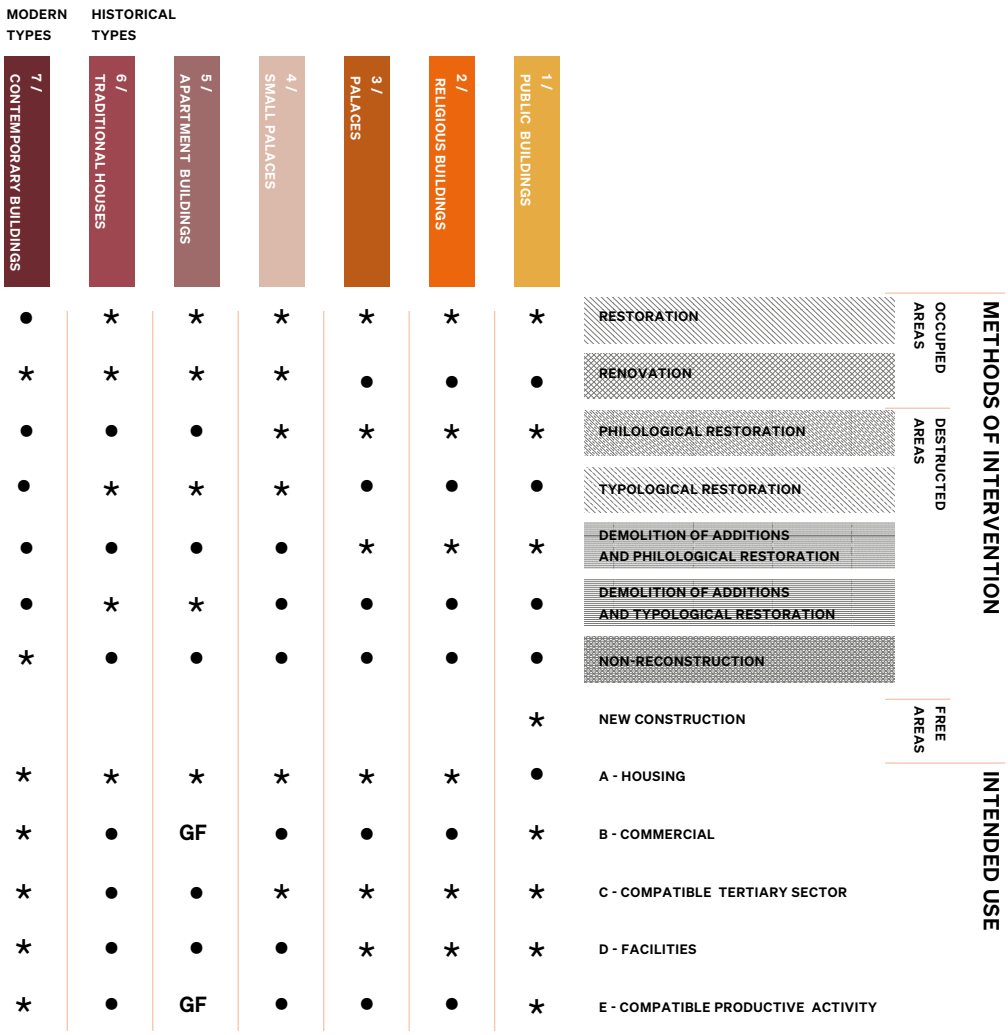
URBAN RESTORATION TABLE

The proposed operational framework is a 3D visualization of the possible interventions, built starting from the map of building types.

The transition from the analysis of the building type map to the operative prescriptions of the intervention model is carried out through the “implementation table,” which crosses the building types with the intervention

↑ 3D pattern visualization

methods (on occupied, destroyed, or vacant areas) and the functions (current and possible in the near future). For each building type, the table indicates whether the different interventions are possible (*), not allowed (•) or possible at the ground floor (GF). The matching of typology with interventions is the main design operation of the entire urban restoration process.



Once the four maps have been drafted, a table providing all the possibilities of intervention allows the architect who will be designing the single elements to immediately access the full scope of choices in terms of uses, volumes, materials, and features. Urban restoration is configured as a single design of a single organism that is carried out by multiple hands in different times, continuously controlling the processes of urban metamorphosis.

6_2 URBAN TRIGGERS

Intervening in postindustrial urban patterns, often of a poor spatial quality and with poor technological performance, represents a vast majority of design efforts undertaken in reconstruction processes. The key is the establishment of a methodology capable of having the same intellectual and operational clarity of urban restoration. We define this approach as urban triggers: a design system capable of controlling urban metamorphosis in space and time through the definition and construction of elements that will trigger a positive modification of the urban environment. The result will not be a single solution but only a possible path, accepting that further modifications and adjustments will be made by different designers, with their specific emotions, sympathies, and knowledge (FRY AND DREW 1964). It is a humble acknowledgment of the fact that no final result exists, nor will one never be definable, and that the only credible proposal is the continuous renegotiation of a dynamic equilibrium, in which the urban settings at a given time are only a temporary concretization of one possibility within a finite but extremely large number of chances that can be limited only by the careful design of the triggers and the continuous steering of the multiple responses to them.

The system of urban triggers painstakingly seeks a mediation between the "long time," which describes the transformations of the environment and the city, and the "short time" of men and their forecast abilities. The times of metamorphosing cities and territories are long, and in the long term the construction and adaptation of urban systems is measured and has been measured historically. Time gives value to physical and knowledge stratification, to a culture of non-homogenizing space, which acts on the structural differences of the various metamorphosis mechanisms of physical reality. The "long time" then becomes a design culture, a culture of localized space, with all the strategic, administrative, and technical implications that this entails. The adaptation and improvement of the environment and the city become a process to be triggered.

Urban triggers attempt to adapt to the discipline of urban design, which Karl Popper defined as "piecemeal social engineering," criticizing the historicist ap-

proach to the definition and planning of future scenarios and arguing that the only form of social engineering that can be rationally justified is one which is small-scale, incremental, and continuously amended in the light of experience.

> The characteristic approach of the piecemeal engineer is this. Even though he may perhaps cherish some ideals which concern society "as a whole"—its general welfare, perhaps—he does not believe in the method of re-designing it as a whole. Whatever his ends, he tries to achieve them by small adjustments and readjustments which can be continually improved upon. . . . He knows that we can learn only from our mistakes. Accordingly, he will make his way, step by step, carefully comparing the results expected with the results achieved, and always on the look-out for the unavoidable unwanted consequences of any reform; and he will avoid undertaking reforms of a complexity and scope which make it impossible for him to disentangle causes and effects, and to know what he is really doing (POPPER 1957).

Karl Popper's "piecemeal social engineering" is the conceptual base of Ernst Gombrich's chapter "The Beauty of Old Towns" in his seminal work *Reflections on the History of Art*. This volume can provide some further hints about the possibility of establishing a design approach which rather than leaning on deliberate planning creates the conditions for a fruitful, unplanned growth. Gombrich explains how the undeniable beauty and fascination of medieval towns is given by urban and architectural solutions "that evolved more or less as organisms do, through the survival of the fittest and the elimination of undesirable mutations" (GOMBRICH 1987) and that are unified under a common logic by the capacity of building types and construction techniques to limit the alternatives, and by the continuous possibility of alterations given to every generation to adapt to new requirements and new uses. A complex system built this way is naturally divided into subsystems, such that when one subsystem is modified, there is no cascading effect on others. This localizes the error and, as a result, makes the system, as a whole, more robust.

The traces left by Gombrich are intended not as romantic nostalgia of the past but as clues of contemporary design processes that must be able to re-propose, in the shortest possible time, operational tools that allow one to reach a fluid, dynamic equilibrium.

Urban triggers are a blurred definition of these design tools, allowing for democratic and shared community action guided by a collective intelligence to solve the complex entanglement of urban pressures. This is an anti-authorial, super-personal, and unselfconscious approach (ALEXANDER 1964) where the vain change for the sake of change is discouraged.

6_3 BACKBONES

Urban triggers operate in two main moments that tend to overlap, run forward, and catch up through adaptations: the public backbone led by communitarian action negotiated in the reconstruction laboratory; and the induced design carried out by private actors within a common framework of intervention. The public backbone must be shaped by urban designers as a system of hooks and suggestions capable of defining an open range of possibilities for the metamorphosis of the urban pattern through the fruitful mix of public and private spaces. The nature of the public backbone can be dramatically different in scale, type, and function and is the true keystone of the design process. Public backbones can belong to one or more of these broad categories, while unexpected solutions are always to be welcomed and embraced:

a. STREETS AND PATHS:

The ongoing transition in the mobility context with the "end of the car age" frees a significant amount of space that is currently occupied by vehicular traffic. Public intervention, which reshapes streets in terms of size and nature, can initiate a complete rethinking of the related visual and user relationship (BANERJEE ET AL. 2012) and of the overall urban features in terms of density and diversity, allowing "eyes on the street" (KANIGEL 2016) to generate a rich social life full of chances, risks, and possibilities.

b. CONSTRUCTION TECHNIQUES:

Construction choices suitable to economic, social, and cultural conditions and adequate to the current level of knowledge and skills can guide urban evolutions. Structural steps constitute the main set of measures of the urban environment, allowing one to unify under a common logic the multitude of design decisions to be made in different time frames. Construction techniques are fundamental in setting the pace for the modification of the urban form and directly involve local skills and labor, initiating positive economic cycles.

c. PLOTS AND PROPERTIES:

Ownership structures remain active engines of urban modification even in the most severe cases of tabula rasa (BERNOULLI 1946). The range of decisions from total maintenance of the grid to complete redrawing of the plots (HALLAJ 2018) foresees an infinite number of urban models, while the shape of the single plots suggests and implies specific architectural solutions.

d. SERVICES:

The provision of basic services must be reestablished after extreme events in the shortest possible time frame, and in the longer framework issues such as water accessibility, sanitation, and energy

can become precious drivers to attract or reduce density in specific parts of the urban pattern. Basic services can act as cores of incremental construction, while stand-alone mechanisms permit experimentation of innovative architectural and urban solutions.

e. **LEVEL OF PRIVACY:**

Courtyards, gardens, patios, cloisters, and "chahar baghs" (NARNE AND BERTOLAZZI 2012) significantly enrich urban patterns and act as mediation spaces between private and public areas, providing varying levels of privacy suitable to different lifestyles and cultural specificities. The use of these devices can provide precious traces for the reconstructed city, while actively engaging users in appropriation and transformation mechanisms.

f. **COMMERCIAL AREAS:**

Major commercial areas in selected parts of the contemporary city are allocated as depleted urban patterns of liveliness and complexity. Dislocated small commercial activities that are inserted organically into the urban environment can instead substantially increase the level of proximity (TORRE AND GALLAUD 2022). Commercial entrepreneurial activities, single or joined in markets, have social implications and can strengthen community bonds in reconstruction processes (HAEFFELE AND CRAIG 2020).

g. **PRODUCTIVE SPACES:**

Reconnecting productive chains and city-making can play a significant role in controlling urban metamorphosis. Light industrial plants can be placed temporarily in key areas of the city, used to significantly shorten reconstruction processes while maximizing local content and, in the longer term, be adapted to different uses. Agricultural productions can be inserted organically in the urban pattern and used to set limits to urban growth.

h. **UPGRADING:**

Existing nonhistorical patterns can be damaged but not fully destroyed and require mechanisms that allow qualitative and quantitative amelioration. Upgrading (SKINNER ET AL. 2004) can deeply alter the existing structures in terms of type, function, and features, and must always be considered in a larger framework of intervention, shifting the focus from single elements to a processual vision.

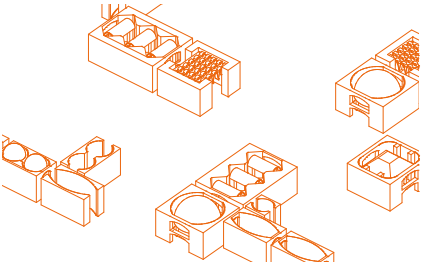
Urban triggers can intercept and mix the above-mentioned categories, the fundamental element being the sensible design attitude that allows their adaptive and progressive definition and fruitful application. The quest for the control of urban metamorphosis leads to a state of dynamic equilibrium to be controlled and continuously renegotiated with community needs and aspirations in mind.

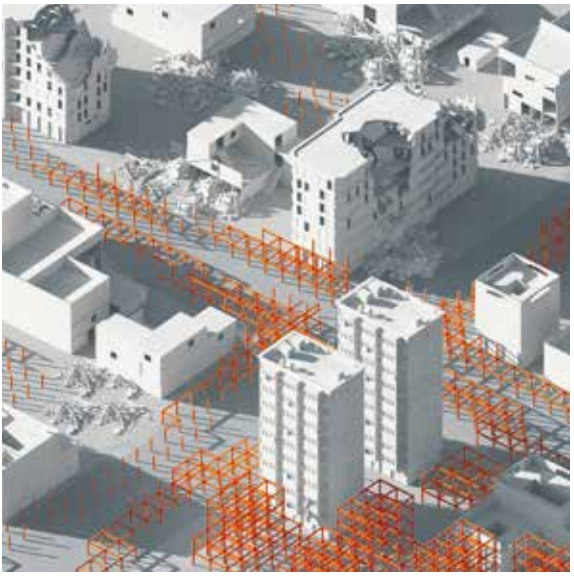
URBAN TRIGGERS: BACKBONES

STREETS AND PATHS

←

Public intervention reshaping streets in terms of size and nature can initiate a complete rethinking of the visual and user relationship in terms of density and diversity.

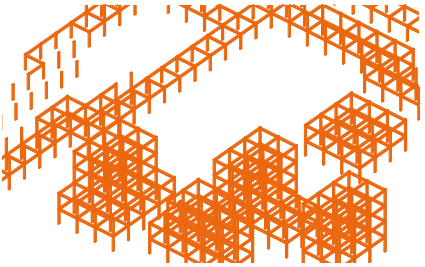




CONSTRUCTION TECHNIQUES

←

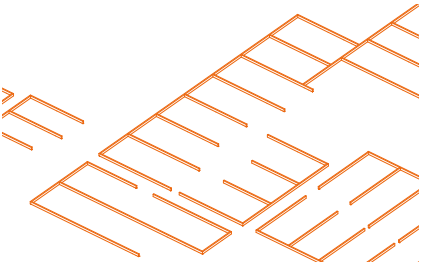
Construction choices suitable to the respective economic, social, and cultural conditions can set the pace for the modification of the urban form.



PLOTS AND PROPERTIES

←

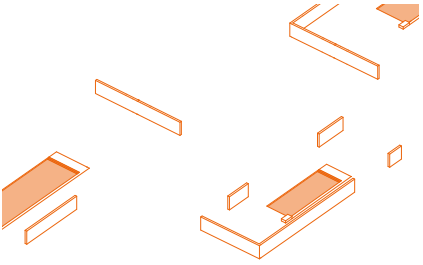
The range of decisions from total maintenance of the grid to complete redrawing of the plots foresees an infinite number of urban models.



SERVICES

←

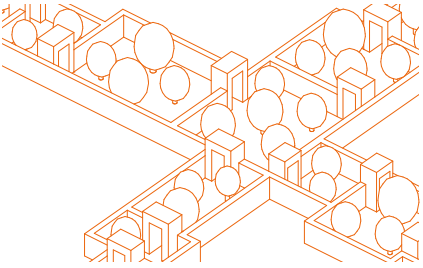
Issues such as water accessibility, sanitation, and energy can become precious drivers to attract or reduce density in specific parts of the urban pattern.



LEVEL OF PRIVACY

←

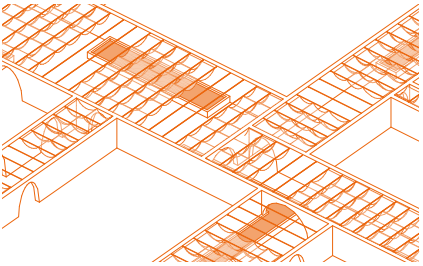
Empty spaces enrich urban patterns and act as mediation spaces between private and public areas providing different levels of privacy suitable to different uses.



COMMERCIAL AREAS

←

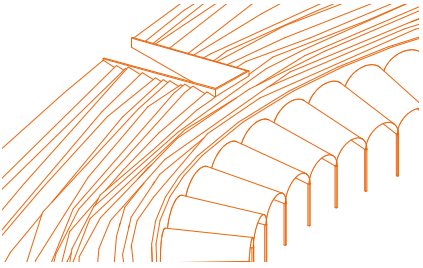
Dislocated commercial activities that are inserted organically in the urban environment can substantially increase the level of proximity and strengthen community bonds.

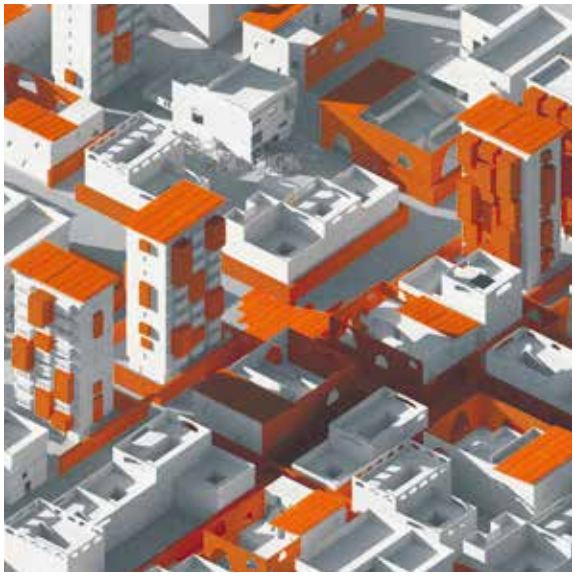


PRODUCTIVE SPACES

←

Reconnecting productive chains and city-making can play a significant role in controlling urban metamorphosis, thus maximizing the local content.

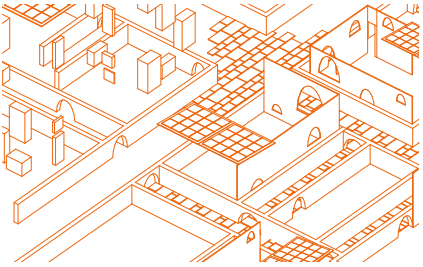




UPGRADING

←

Existing nonhistorical patterns can be damaged but not fully destroyed and require mechanisms that allow qualitative and quantitative amelioration.



6_4 INDUCED DESIGN

Once the public backbone has been defined, regardless of its level of complexity and design sophistication, the urban triggers design approach can evolve in a successful way only if the reactions to the public intervention are coordinated and controlled. The average level of technical knowledge and spatial awareness of the general public in most parts of the world, even in those places where self-construction remains the main building process, is insufficient to allow a spontaneous reaction to the public backbone. The traditional construction methods and building processes, which significantly limited possibilities, allowed historical cities to grow coherently with respect to social, climatic, and economic specificities in accordance with available resources, while widespread access to urban models globally has paradoxically homogenized and oversimplified city-making processes (LEMOINE-RODRÍGUEZ ET AL. 2020), thus transforming some devices into "mantras" (D'ALFONSO AND GALLI 2018) to be uncritically repeated.

Cities can be shaped in a way that adheres to the true needs of the local population only if a process of induced design is devised and applied. Design choices should not be forced on local communities, but rather defined jointly, through the use of laboratories of reconstruction, establishing spatial literacy as an element of general education, just like alphabetization (BENEVOLO 1976). It is fundamental to keep in mind that the asymmetry in the level of knowledge between professional experts and the general public should not be seen as an unavoidable destiny, but as a necessary evil to be always accepted with skepticism (ILLICH ET AL. 1977). Induced design mechanisms in relationship to the negotiated backbones can be defined through four main categories of intervention, which can be weaved and overlapped:

a. **STREETS AND PATHS:**

Architecture without architects (RUDOFSKY 1964) has always represented a vast majority of global constructions, and the possibility of extending local practices to face contemporary challenges has often been explored. Self-construction tools can be applied through processes of guidance that ensure quality and can also control the range of variations, while inserting construction into a wider production chain, thus ensuring a balance between formal institutionalization and complete spontaneism. Self-build is a powerful tool for economic development: the first step in knowledge recovery that can eventually lead to the establishment of numerous small-scale companies playing an active role in urban reconstruction.

b. **DESIGN MANUALS:**

The drafting of an organized set of prescriptions (GALLI 2019), adapted to the specific needs of each location, can provide the local community with the complete extent of possibilities

in terms of architectural types and physical features, as well as materials and technologies. The design toolbox provides design experts with quantitative parameters and qualitative advice that must be interpreted and included in their own creative process in an anti-deterministic vision that permits maximum variability.

c. **STRUCTURAL TECHNOLOGIES:**

The unification of the technological decisions, particularly those regarding structural elements and their pace (FANELLI AND GARGIANI 2002), allows one to foresee a general skeleton of the whole urban cell to be filled and modified according to single households and community needs. Technologies need to be selected in order to ensure a high level of flexibility and customization, while the establishment of light productive plants on site can substantially increase local economic development.

d. **DESIGNERS POOL:**

Local architects can be organized in groups that abandon authorial claims in favor of a collective intelligence experiment where the different buildings to be constructed are designed in a collaborative way following a shared and agreed set of basic principles. Design can become a shared action between different professionals who split resources, effort, and fees so as to allow a consistent increase in the average level of quality and to grow the civic value of the category.

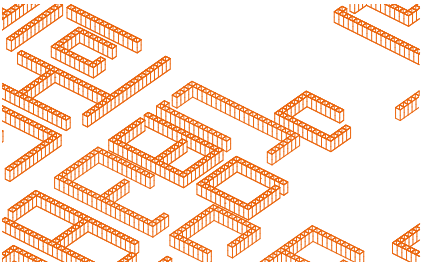
The public backbone triggers the pairing of private spaces in a process that tends to induct positive design decisions, maximizing urban quality and minimizing the waste of natural, economic, and social resources. Through the use of urban triggers and mechanisms, cities become generative systems, with public spaces acting as regulatory elements of the overall urban morphologies. This design approach defines a completely different time frame for design action, which, rather than being a process carried out in a specific period and leading to a set result, becomes a system of continuous care and control of urban metamorphosis.

URBAN TRIGGERS: INDUCED DESIGN

SELF-BUILD

←

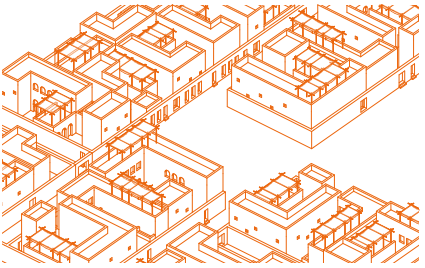
Self-construction can be carried out with processes of guidance that ensure quality, control the range of variations, and guarantee a balance between institutionalization and spontaneism.



DESIGN MANUALS

←

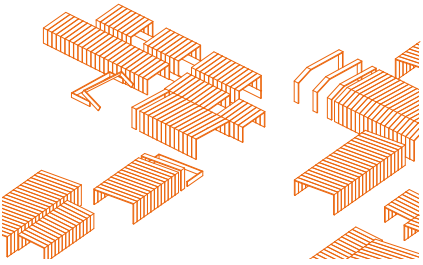
The drafting of an organized set of prescriptions can provide the local community with the complete range of possibilities (types, features, materials, technologies, etc.).



STRUCTURAL TECHNOLOGIES

←

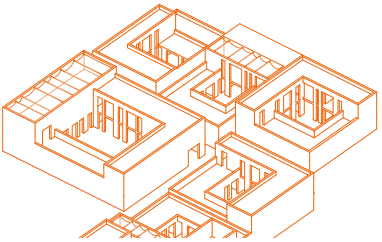
The unification of structural elements allows one to foresee a general skeleton of the city to be filled and modified according to single households and community needs.



DESIGNERS' POOL

←

Local architects can be organized in groups that abandon authorial claims in favor of a collaborative design process following a shared and agreed set of basic principles.



6_5 GROWING EVOLUTIONARY MECHANISMS

The design process in the urban triggers vision becomes the progressive definition of the deep character of the urban fabric, the identification and construction of devices capable of defining the urban framework, and the continuous control of the multitude of responses in the long time frame. It is a vision that abandons any kind of traced and obligatory path to instead fully embrace the uncertainties of an evolutionary process of growth, where open rules are set and can potentially be continuously updated and perfected, though the final results are not immediately predictable. It is an urban design mechanism that escapes any authorial and egotistic will, but does not in any way abandon the creative and unexpected contribution of the individual designer. Two types of radically innovative design operations are defined: on the one hand, the description and spatial configuration of the desired characteristics of the urban fabric and of the triggers, intended both as urban elements and as reference parameters; and on the other hand, the response systems that rely on the creativity of each individual designer, channeled in a coherent process that moves in a variable but defined range. It is not a heterodirected, deterministic process in which everything is decided beforehand, nor a deaf demand for futile creative freedom, but rather the transformation of the design process into an assumption of responsibility toward local communities, available resources, and future generations.

The growing evolutionary mechanism defined by urban triggers can generate a finite but still very large quantity of spatial configurations at the urban scale, and in general returns a dynamic state potentially subject to constant change. It is possible to establish systems of control and forecast of urban metamorphosis through algorithms that parameterize the design choices in the form of mathematical expression, systems that can generate the full range of different spatial configurations. The algorithms can be modified at any time, as the relevant external parameters vary and can be continuously readjusted to the pressures that characterize each site of application. The use of simulations coming from the mathematical modeling of biological systems such as birth-and-death growth models (ALLEN 2007; BATTY 2013; ROSSI ET AL. 2019) allows one to generate virtual cities and compare them to best practices such as historic urban patterns, which can be considered as benchmarks for high-quality solutions. The fine tuning and optimization of the algorithm (ROSSI ET AL. 2014) fosters an understanding of the optimal features of the public backbone, their ideal placement within the urban pattern, and the system of hooking private spaces through induced design, while the clear definition of a set of spatial parameters will significantly limit the volatility of the results.

Only through a new design approach does it become possible to imagine reconstructed cities from a perspective of true transition toward an urban structure capable of responding to the pressures caused by the global risk society paradigm. It is a radical but necessary hypothesis, given the demonstrated inability of current design systems to deal with the complexities of the contemporary world and their prefigurable increase in the near future. It is a profound and systemic change that involves multiple levels: administrative systems, professional practice, urban planning regulations, production, and transformation processes. But it is, above all, a deep change in attitude within a vision that painstakingly tries to reconnect society and urban spaces in order to return an alternative model to the future. The change will not be immediate and complete, but it will necessarily have to pass through courageous attempts, leaps forward, and inevitable failures. *Cities Under Pressure* traces a path: the point of arrival is dark, but the first lights can be seen in the distance and the road is mapped, so all that remains is to gather the courage to begin the journey.