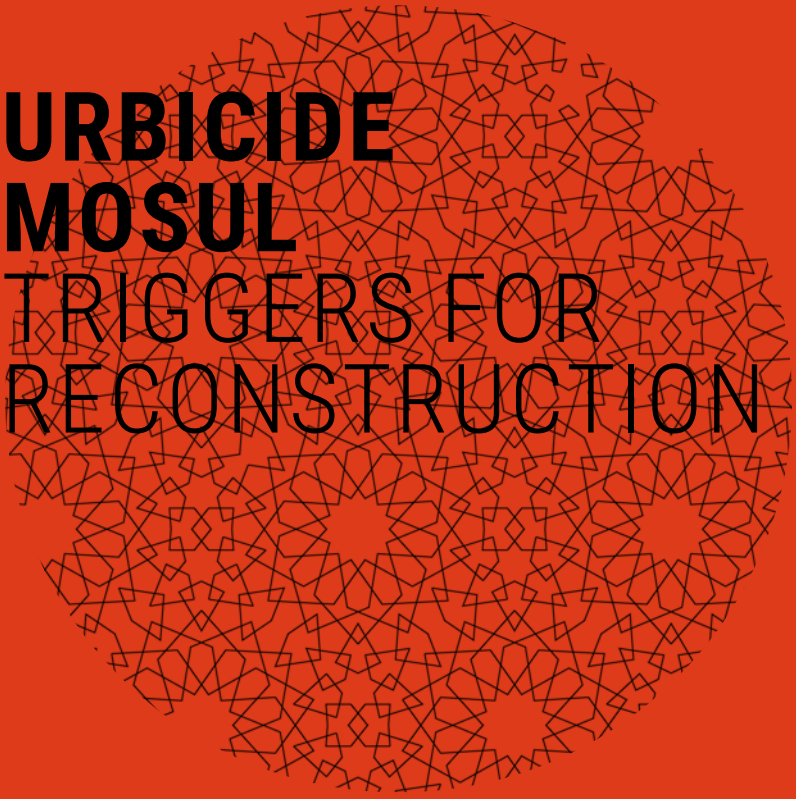
Università Iuav di Venezia

Urbicide Task Force

Benno Albrecht, Jacopo Galli

RECONSTRUCT – SENSITIVE EMPLOYMENT CREATION THROUGH BOTTOM-UP CELLULAR STRATEGY

URBICIDE MOSUL
TRIGGERS FOR RECONSTRUCTION



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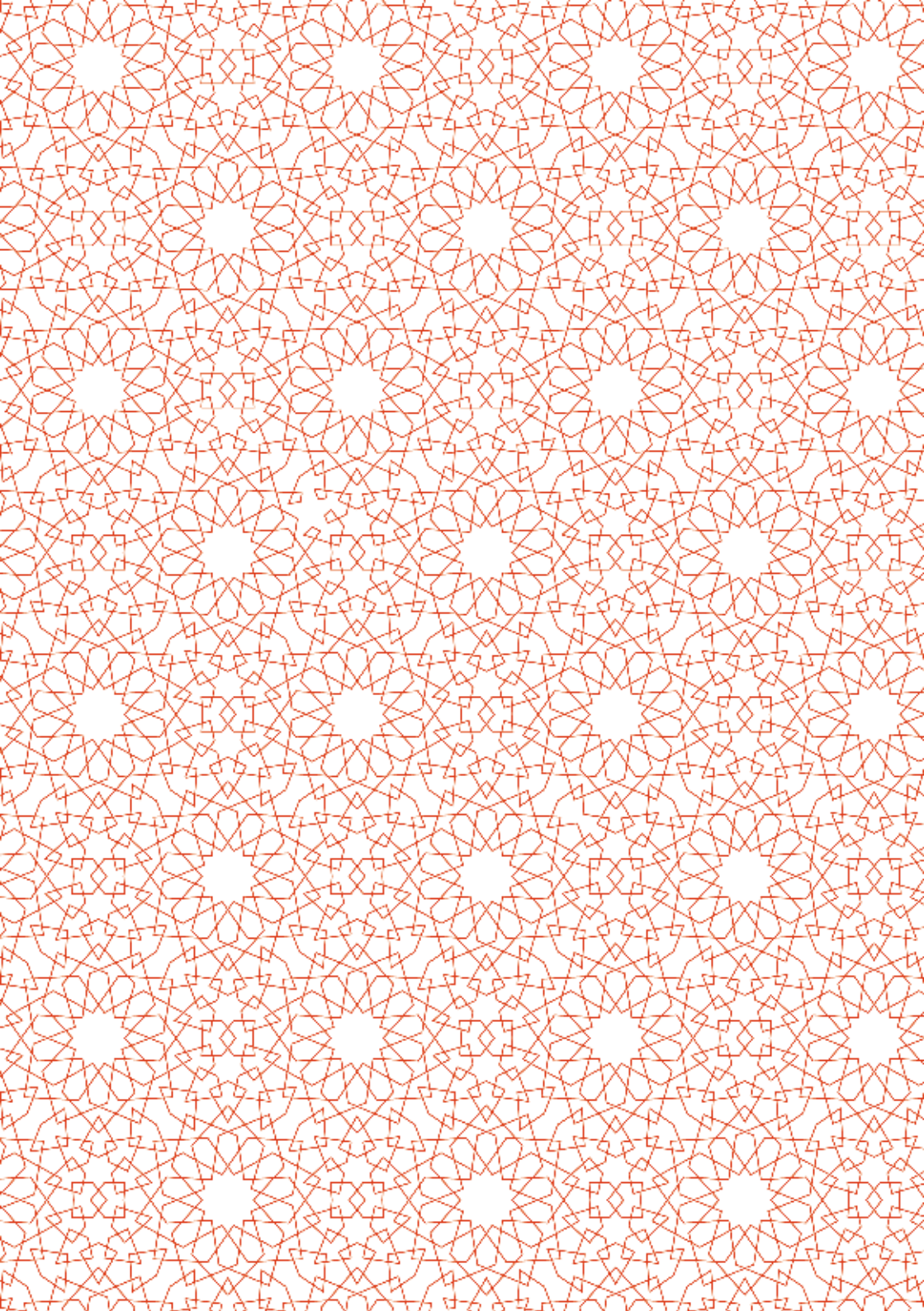

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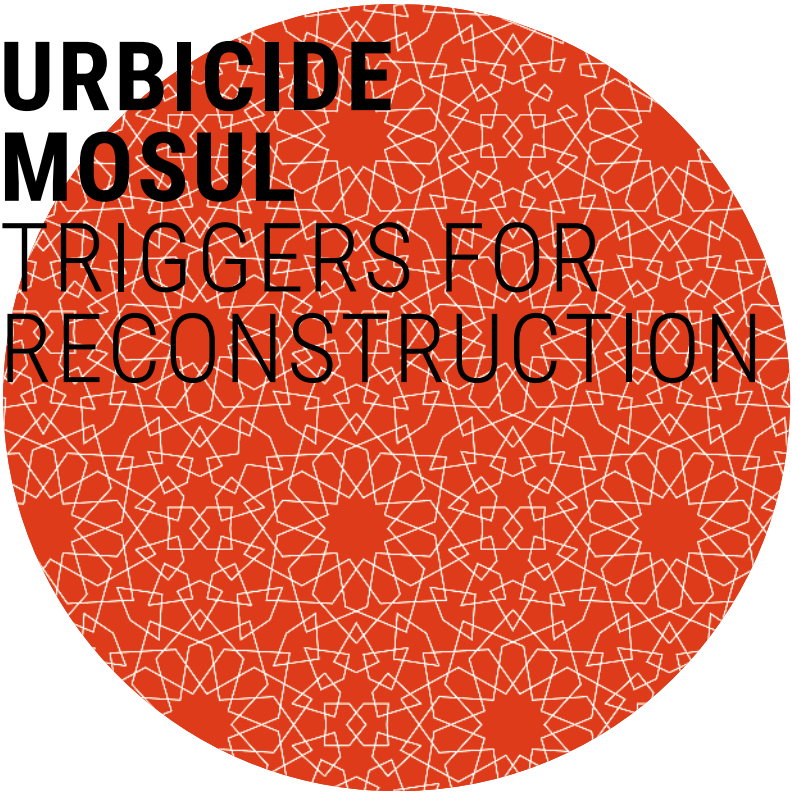

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Urbicide Task Force

URBICIDE MOSUL

TRIGGERS FOR RECONSTRUCTION

Urbicide Task Force, Università Iuav di Venezia

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Benno Albrecht, Jacopo Galli

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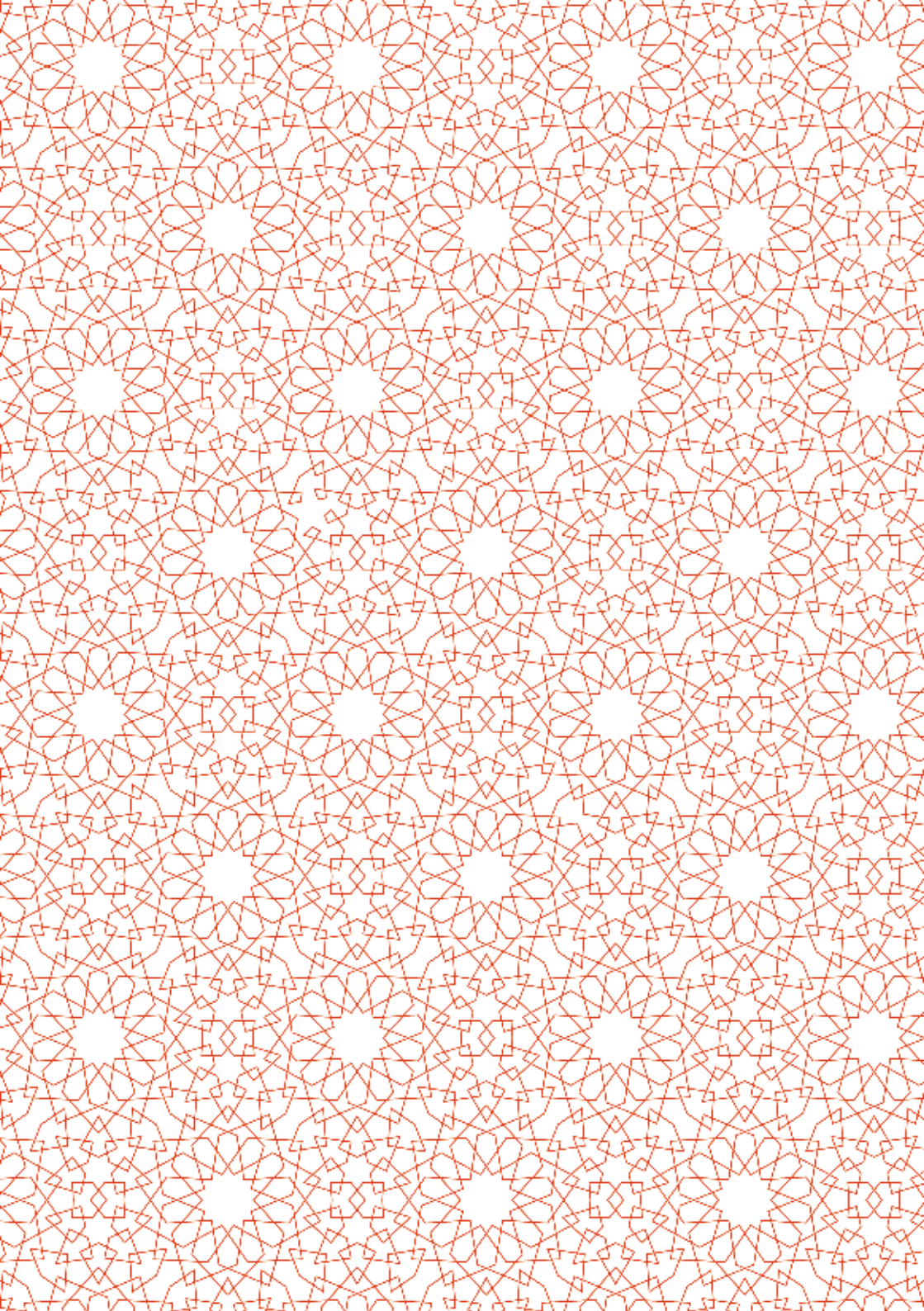
Urbicide Task Force is a research group based at Università Iuav di Venezia that devotes its effort to the definition of sustainable design strategies for the reconstruction of cities and territories involved in urbicides. Urbicide Task Force promotes researches, events and designs with the final goal of constructing a strong and fruitful debate on issues related to reconstruction.

Mosul, the oldest continuously inhabited city in the world, has been subjected to large scale destructions that fully display the complexity involved in the reconstruction of large contemporary metropolises. The historical core, the archeological area of Niniveh, the middle income neighbourhoods, the large scale industrial areas and the ecological system of the Tigri river represent a series of challenges to be faced with multiple strategies tailored on the specific needs of each area. The proposed projects have been produced within the Master Thesis Laboratory dedicated to the topic of reconstruction directed by Benno Albrecht at Iuav and represent the physical display of the conceptual approach presented in the texts.



CONTENTS

Rebuild with rubble

Emilio Antoniol

In a construction market like the MENA region one, characterized by “high prices and shortages of raw materials, transportation difficulties, poor quality of inputs, and frequent lack of electricity”[1] for the production of basic building materials - such as cement and concrete, bricks, steel, glass, plaster and plastics - the research for alternative constructive solutions, capable of exploiting unusual and innovative resources, is the only valid tool for a effective reconstruction of cities and villages destroyed by war. In this context, a waste material such as building rubble resulting from the demolition of buildings collapsed during the war, can be considered as a resource usable for the reconstruction of destroyed cities and for the reactivation of local markets.

Scraps and rubble from demolition and construction sector are important resources for the activation of local economies, as research and experience now

1 — Iraq National Housing Policy, Ministry of Construction and Housing (MOCH), 2010.

— On the previous page: Resource-driven Density, F. Bresin, G. Dal Bianco.

twenty years old show[2]. One of the most important topics in this research fields is the necessity to use locally the produced waste. Indeed, the "environmental effectiveness and economic sustainability - therefore ultimately the actual possibility of adoption - of waste reduction practices and selection of the residues at the origin, is strictly conditioned to the possibility of accessing an efficient network of conferment and recovery places, as close as possible to the place of production of the residue"[3].

In the MENA context, the demolition rubbles, result of the disposal process of buildings following war events, do not constitute a limit to the reconstruction process but, on the contrary, they are an important resource for future development of the area. Since ancient times, in fact, "the buildings have developed a natural system of control of their impacts" transforming the abandoned buildings in "quarry" and so into a resource for the construction of new buildings. Therefore, throughout the Mediterranean basin, "a sacco" masonry building systems were developed. In it, scraps and rubble from previous constructions were integrated into the new walls, giving rise to the first form of local recycling of waste from demolition and construction sector[4].

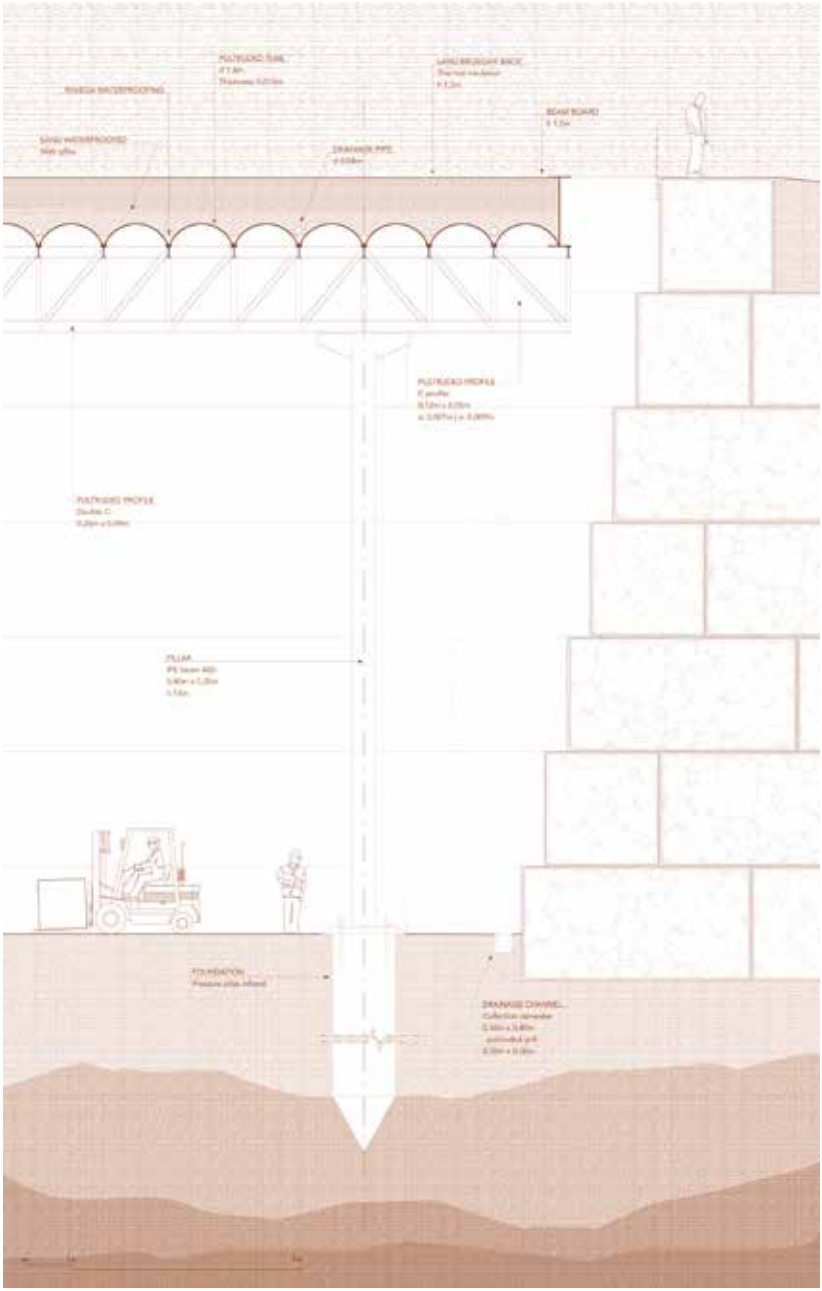
Research and experimentation in the MENA region must learn from this ancient tradition by recovering traditional construction solutions and bringing the innovations useful to meet modern housing needs. In fact, if on one hand building systems in raw earth or in "earthbag" can achieve excellent climatic performances thanks to the thermal inertia of the wall, they have limited mechanical resistance performances. For that reason they need a static reinforcement. The proposed solutions by the research, presented in some of the theses collected in this volume, exploit the use of light frames in composite materials,

2 — See in particular the VAMP research project coordinated by prof. Ernesto Antonini within the EU program Life-Environment (LIFE 98 ENV / IT / 033) whose results are collected in the volume "Residui da costruzione e demolizione: una risorsa ambientale sostenibile", edited by Ernesto Antonini, Franco Angeli, Milano, 2001. The volume also contains the proceedings of the VAMP conference held in Rome on December 14th 2000 with the presence of numerous international research on the subject of the recovery of construction and demolition waste. Among these we highlight the experience of the Catalunya in Spain, the "Building more with less" program of the King Country in Washington, USA and the experiences of Cork in Ireland and Bath in England.

3 — Antonini Ernesto (a cura di), op. cit., p. 10.

4 — Sagrera Albert, "L'esperienza della Catalunya (SP)", in Antonini Ernesto, op. cit., p. 161.

— On the next page: Productive Orography, M. Dufour, A. Giampaolino.



Rebuild with rubble

such as fiberglass, which constitutes an effective solution in terms of both production and application. These profiles are light, easy to assemble by bolting and can be produced locally from unskilled labor, in small and easily movable installations. The integration of a fiberglass pultruded frame with "traditional" block construction systems has pushed the research to study more efficient solutions also for these components, investigating the possibility of using rubble and other production waste as raw materials for the production of blocks and infill panels.

The first hypotheses have taken as reference existing solutions such as the earthbag system obtained by superimposing fabric bags filled with earth or sand[5], replacing the earth with demolition rubble or realizing fieldstone masonry with new production brick faces and the interior filled with compacted rubble.In this case, the rubble can be contained and stabilized by fiberglass nets, supported by the vertical fiberglass structure.

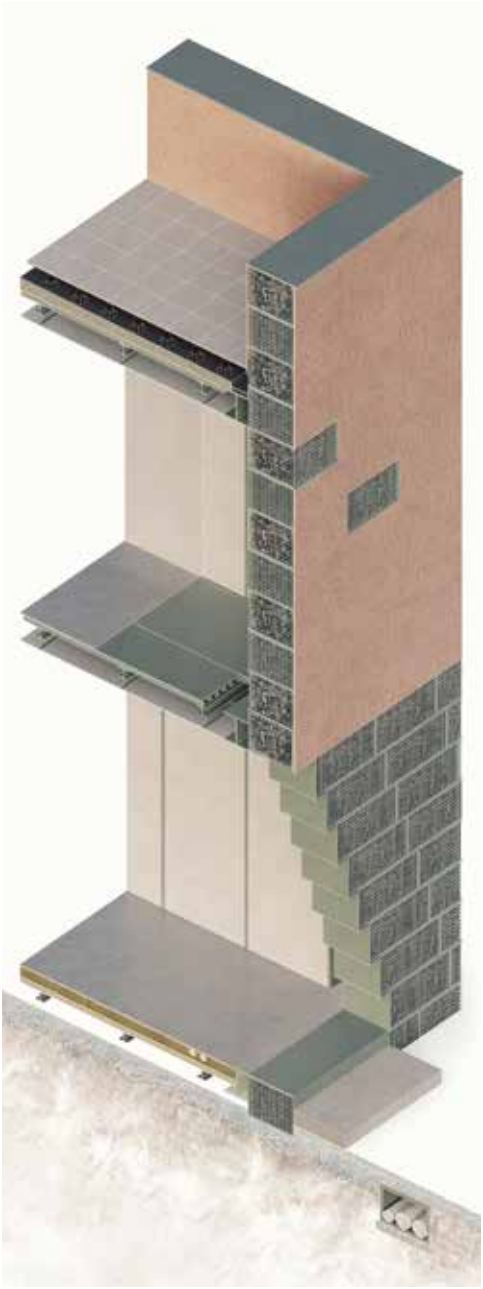
These first solutions were accompanied by more advanced research aimed at maximizing efficiency in the use of demolition wastes, mainly composed by concrete and plaster rubble. The experiments related to shredding demolition and construction waste and to compacting them in new blocks are already applied in some research conducted at the University of Florence[6], for the production of bricks by the rubbles obtained from the demolition of post-earthquake buildings.

The proposal of similar solutions in the MENA region has provided for the integration of some essential requirements for a possible applicability of these technologies, in particular the simplification of the production process, excluding the use of heavy machinery for the compression of the blocks, and the elimination of the aqueous component of the rubble mixture. Particularly this second aspect was solved proposing the substitution of water with a polymeric

5 — Giorgi Alessandro, "Guida pratica alle costruzioni in terra cruda", Aracne, Roma, 2014, pp. 54-61.

6 — This refers to the experimental tests conducted in 2017 on Ri-block bricks by the research group of the Department of Civil and Environmental Engineering of the University of Florence, scientific coordinator Ing. Andrea Vignoli on behalf of Catalyst S.r.l. an innovative Italian company active in this sector, which in 2016 presents at SAIE Innovazione Ri-Block, a brick obtained from the high-pressure compaction of demolition waste, designed for reconstruction in emergency contexts such as in the case of seismic events.

— On the next page: Evolutive Devices, F. Martini, A. Sato, S. Zugno.



polyester resin, used also in the production of composite fiberglass profiles. The addition of resin make the rubble mixture workable and allows the block to solidify without pressing it, therefore excluding the use of machinery during the production. The rubble-polyester block has characteristics of good mechanical compression resistance and it is totally recyclable as it can be grinded and reused in a new production cycle for many times. Their production can be carried out directly on site by local workers, or in any case near the areas to be rebuilt. The bricks laying can be carried out using a of various types of alloys: from traditional systems in clay and lime, to more innovative solutions involving the use of polyester-based glues. In this second case, the masonry can also assume load-bearing functions thanks to the homogeneity offered by the construction system[7].

The emblematic case of the reuse of building rubble demonstrates how the introduction of circular production processes can be applied also in complex and fragile contexts such as those characterizing the MENA region, where the scarcity of resources and the need for rapid development require efficient and innovative building processes. In this scenario, Italian companies, and in particular those with a vocation for research and innovation, can act as vehicles of a technical know-how transfer, capable of integrating with traditional construction practices to develop sustainable construction solutions, appropriate to the specific context but, above all, respectful of the local building culture. The export and transfer of skills and know-how can therefore constitute a new relations model between the West and the Middle East, triggering synergies and collaborations that find in innovation and in the sustainable growth a contact point between the two shores of the Mediterranean sea.

7 — In this first research phase specific tests on load-bearing strength of the masonry have not been carried out yet, but these can be developed in future phases of the research work.

— On the previous page: Resource-driven Density, F. Bresin, G. Dal Bianco. On the next pages: Urban Syntax, M. Santoni, G. Soini, G. Trivellin.

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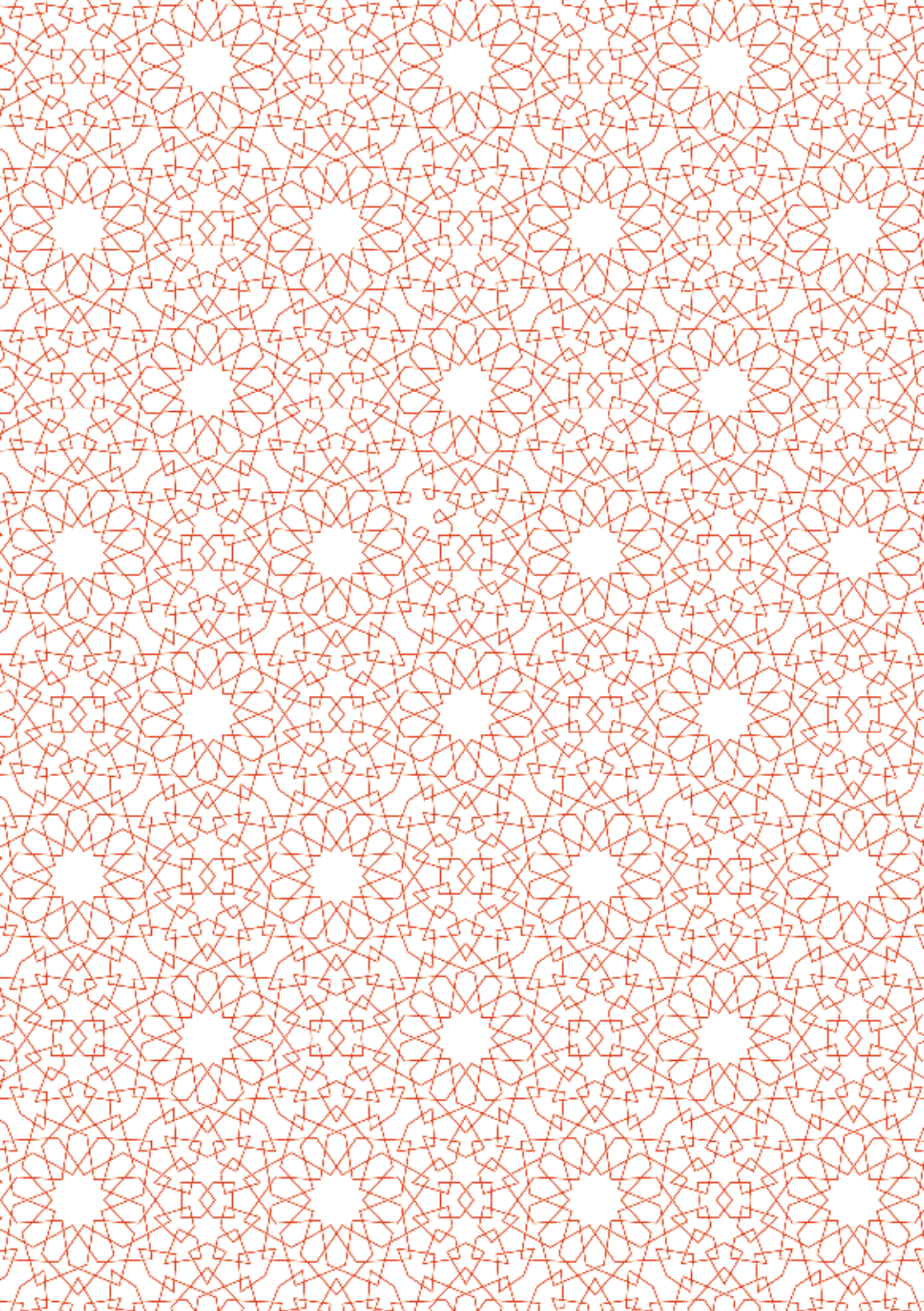

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