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Three Projects, Three Scales, One Vision: Regenerating Existing Architecture Through Green and Smart Technologies

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Abstract: By now it is clear that the future and beauty of contemporary city (in our case of study, usually European) is decided from the necessity to re-compose and regenerate urban spaces and buildings which have now been dismissed and relegated: architectural projects in these places have to attempt to re-define open spatialities giving quality to the urban space. This intervention illustrates various project experiences which were conducted inside a master degree thesis laboratories, an experimental workspace guided by our research group. It deals particularly with three interventions which are differing in context and scale, but whose trait d'union is the interdisciplinary design logic that shifts from a purely architectural standpoint to one which is more specialized, engineered, and capable of efficiently facing technological themes involved in the reanalysis of complex situations. The first project addresses the urban-territorial scale: It deals with a project of the requalification of Cabanyal, an ancient maritime neighborhood in Valencia. The heart of the project foresees the continuing of the Parco del Turia, which lies inside this neighborhood, introducing a new urban system capable of mending the construction fractures which have accumulated over time. The second moves to a level of more detail, concentrating its efforts on building scale: It is a project based on the regeneration of a social housing located on the outskirts of Ancona. This intervention is characterized by the technological elements used to minimize the ecological footprint of the structure, and more importantly the way in which these elements become the generating element of the formal aspects. Instead the third one reflects on the exception represented by the suburban centralities, real and actual satellites of the downtown city: in particular, it deals with the conversion of a dismissed brick furnace

located in the countryside landscape of central Italy into a contemporary hub for culture and recreation.

Keywords: green technologies, smart technologies, regeneration, rethink existing heritage

1. Introduction

Thought to be perfectly clear by now that the future and beauty of the city hinges upon the necessity of re-building and re-generating currently derelict or degraded spaces. The architectural project should endeavour to re-formulate the collective imagination so as to harmonise the pre-existing with the open spatial vision of the contemporary city, drawing inspiration from the actions and techniques most recently embodied in the concepts of smart and green city.

While the regeneration of the existing heritage seems to be the most strategic course of action for attaining a new sustainable development, it is nonetheless also true that projects and building techniques should be increasingly inspired by principles of long-term economic and energetic sustainability.

A recurrent topic in connection with the recycling and repurposing of the volumes and spaces of the past (both historic and recent), a topic upon which we're basing our current research, is the extension through volumetric addition, made necessary for a variety of reasons, not least the increased standards of use a building is subject to. This issue of superposing a new mesh over an old one is by no means new: in fact, every single one of our physical environments is the product of stratifications and manipulations which contribute to transform the city in a sort of palimpsest, capable of assimilating a wide range of meanings in the course of time. History abounds with remarkable examples of revitalisation and enlargement; a few examples, covering a wide range of architectural scales, are the Theatre of Marcellus in Rome, the Piazza delle Erbe square in Lucca, and more recently Ridolfi's skilful Roman works or Peter Eisenman's allusions and reprise of Le Corbusier's networks in his theory project for Cannaregio in Venice.

2. Method

Our interest in rethinking the topic of extensions and experimenting with the possibilities offered by repurposing existing structures is based on several lines of reasoning. The core of our method is the research for innovation in the inner system of the existing urban tissue and the curiosity for the existing buildings that have the right qualities to be re-thought, restored, reactivated.

The first reasoning then, is the stringent necessity of sustainability in and of itself, which in urban and architectural spatial terms means not so much to build less as rebuilding and reusing existing structures lying in wait for a chance to be repurposed. Second, the different approaches to the relationship between the new and the patrimonial. Beyond the due respect for history and the role and meaning of the architecture of the past, what exists now for us is mostly oriented towards the vast body of recent architecture whose character, though not lacking in richness of themes and meaning, can and must stimulate the exploration of new avenues and approaches. The third line of reasoning can be traced back to the role of crucial technical matters, in both the energetic and building areas, which have multiplied

with respect to the past and which have the potential to convey new modes of interpretation of the physical relationship between the extant and the new.

This paper describes some experimental projects developed within the multidisciplinary graduation workshop coordinated by our research group, which focuses on urban and architectural composition. We propose three interventions with a common philosophical foundation, namely revitalising degraded and/or derelict spaces through the activation of mechanisms and tasks capable of stimulating a regeneration of the property and its surrounding space. Though they share this common outlook, the three interventions, due to the different scales, constitute different instances of reflection.

3. Results and discussion

3.1 The urban scale

The urban scale implies the interaction and contrast of the project's rationale with a large number of components. Grafts on consolidated tissue will have to be characterised by actions capable of regenerating contexts and architectural organisms through a reinterpretation of their specific elements, joining them in synergy with precise actions capable of envisaging new modalities of use for a city and an active relationship between nature and the landscape. A synergy capable of relating pre-existent elements to one another, of creating new spaces and providing new interpretations of physical space compared to initial instantiations.

The proposed case study attempts a reinterpretation of the extant in the terms just described, conveying the operations towards the transformation of part of the city into an ecological and smart space. We are talking about the urban regeneration of a substantial neglected expanse inside the historical maritime district of Cabanyal, originally inhabited by fishermen, in Valencia (Spain).

The action, aimed towards the reactivation of the empty urban expanse created after the closing of an important railway stretch in the 30s, draws inspiration from the idea of greens intended as the veritable project, the use of which pursues, on the one hand, urban quality guided by a proper relation between green and artificial spaces and, on the other, a restrained energy consumption that use nature in his potential to be an active maker in the development of a eco-friendly vision of the city system.

The project's master plan contemplates the extension towards the project area of the Turia park, the green artery obtained from the dried-out bed of the old river which snakes through the entire heart of the city; currently the park ends in a unresolved banal way at the city of Science, missing its natural outlet closes to the Mediterranean sea and the coast. Our proposition envisages instead a new development that allows the river to flow towards the sea, absorbing in its path the derelict spaces copiously present between the city of Science and Cabanyal, drawing the beginning of a new urban disposition.

The green ring thus created runs through several miles of the historical and contemporary city, moving car infrastructures on the perimeter of the park, favouring the creation of sustainable mobility and the management of the urban microclimate. In the portion of the park running through Cabanyal the project stipulates new buildings in order to densify the existent urban grid, where formal language is inspired by the chromatic and material riches of the place.

Figure 1. (a) View of the new project buildings from the new Turia Park.

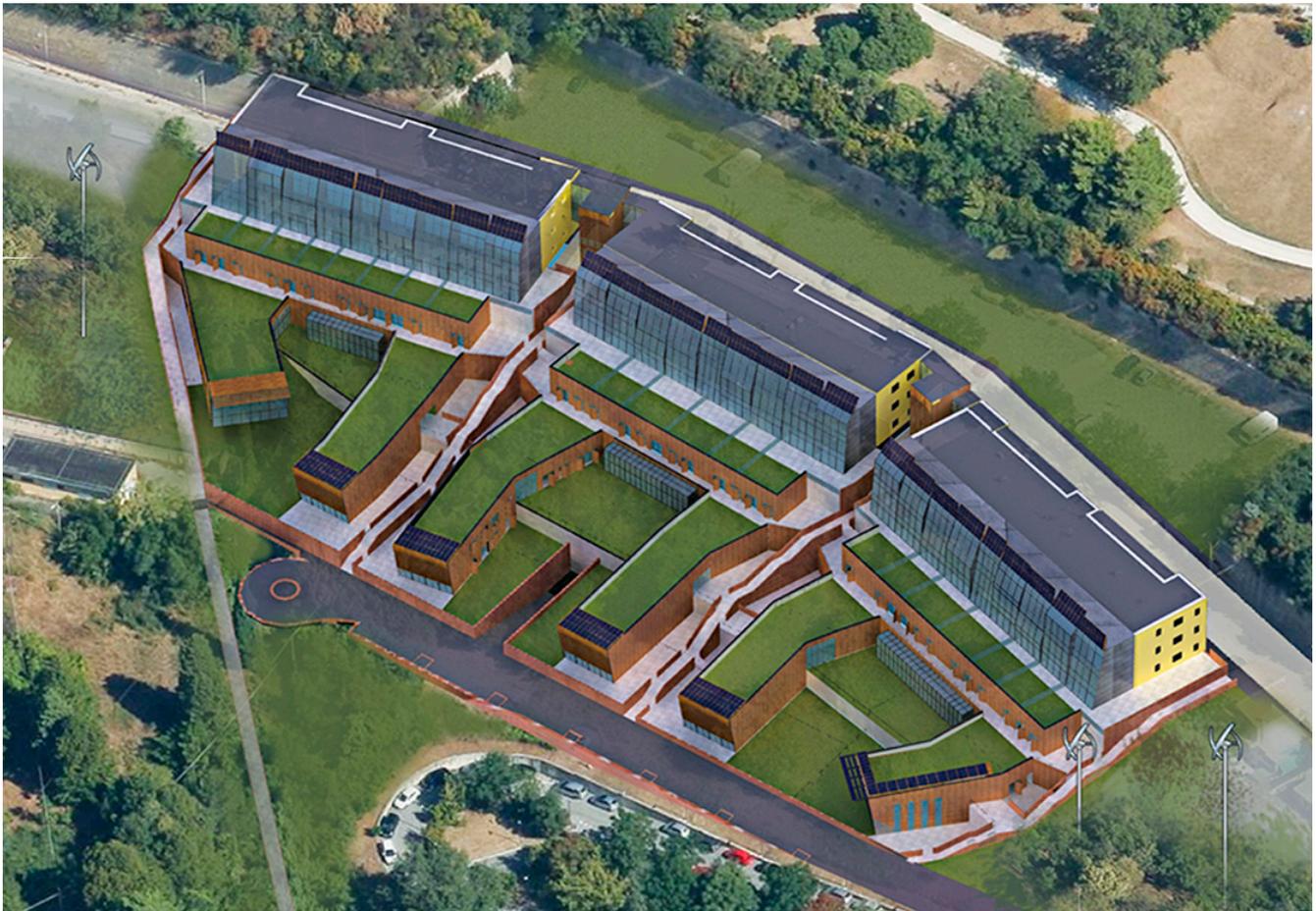
3.2 The building scale

Our reflexions on topics of sustainability which increasingly condition every aspect of the project, in addition to being expressed at the global level, need to be applied to the local setting. Hence, a change of paradigm must be applied both at the urban and the neighbourhood levels which places the concepts of green city and resilient urban environment at the centre of urban development.

As an example of a project exercise on a smaller scale we can mention a thesis which focuses on a small group of buildings meant to provide semi-public social housing in the town of Ancona in Italy.

In this case too the planning of green and the sustainable aspects have the leading role within the unfolding of the project's adventure: on the one hand, depending on the volumetric enclosures for which it is sometimes cover and sometimes vestment, the idea interprets the site's topology densifying the existing built-up areas, harmoniously linking them to the natural surrounding space; on the other hand, it develops vertically through the implementation of filtering spaces allocated to greenhouses that are placed adjacent to the building's old boundary, allowing its effective spatial expansion and at the same time a clever functioning of the glass walls in order to control the inside insulation; the space thus created between the old and the new external threshold is a quality space, aesthetically and technically, that nurtures a dialogue between the new and the existent, simultaneously improving the energetic performance of the organism as a whole.

As a supplement to the characteristics of sustainability of the operation other processes are activated such as natural ventilation control systems, energy production through renewable sources, passive cooling of the environment via thermal exchange with ground water, and finally dynamic adaptive control systems which, through a web of scattered sensors, can manage the technologies employed in the building process.

Figure 2. (a) Aerial view of the connections between constructed and natural areas.

3.3 The extra-urban scale

The contemporary city is characterized by a burdensome state of overall unsustainability, caused by the previous – too optimistic and often uncritical – unrestrained growth and also by the effects of the still on-going international economic crisis. In several contexts this situation has led to the existence of industrial archaeologies, productive and commercial spaces planned and built for a future which never materialised and now lay derelict at the gates of a consolidated city.

An attempt of re-activation of such spaces, inspired by energetic and financial sustainability principles, is illustrated by a collective didactic experimentation work focused on the recovery of an abandoned furnace in Treia, Italy.

The project's main focus of attention is an abandoned production complex (a furnace for brick production) which was originally a single unit but is now dimensionally unsuited for a single purpose; for this reason, the existing enclosures become the true connective system for the new functionality envisaged in the project. The new volumes, functionally distinct, relate in different ways to the pre-existent: extension through adjacent structures, in the case of school premises; superposition in the case of the common spaces allocated to a service hub for the whole area; grafting/insertion of spaces allocated to leisure, congress, shows, and well-being.

The superordinate system which integrates the compositional elements and the different annex functions, is once again a design for a public space; the system of paths and park which are its

constitutional elements, are inspired by the principles of sustainability we keep mentioning, through a plurality of active and passive tools among which there an impact zero system of walkability and carriageability. As examples of the measures adopted in this sense we can mention the introduction of an internal light traffic system with non-polluting vehicles, the installation of wind turbines which significantly reduce the energy requirements of the complex, and the use of green areas with multiple essences as an instrument of bioclimatic control.

Figure 3. (a) General plan of the renovated area.



4. Conclusions

Our community of architects and engineers can win the challenges of the contemporary city, only with a multidisciplinary, collective, hybrid approach. Our studies enlighten that the crucial field of action in the next future will be the reactivation of the dismissed part of the urban space, and most importantly, the ability to do it following the right methods.

Our experimentation brought us to the belief that the future of our discipline stands in the densification through a sustainable and green-oriented system of architectural additions, which have to be the clear expression of the multidisciplinary possibilities given by the dialogue between technologic and formal aspects of the construction. No matter the scale of intervention, this kind of approach can make a difference.

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