

Urban re-densification and regeneration: 21st century city strategies

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Abstract

The last century's urban-development objective is no longer pertinent. Yet our cities must continue to grow, but, above all, the quality of life of its inhabitants must be improved by reducing the ecological footprint, which in many cases is unsustainable.

In the on-going search for guidelines and strategic intervention, the need for the re-densification and the restoration/completion of a degraded urban fabric has emerged at various levels.

The restoration of existing heritage and the building densification are fundamental actions for urban enhancement and requalification whose *raison d'être* is the reduction in land consumption.

An INA Casa residential district built in 1958 in Trento comprising a series of buildings, with a variety of floor areas, has been analysed from this standpoint. It has emerged that, notwithstanding design proposals that would have made the district fully functional, some indispensable infrastructures were never built.

The analysis of the district has produced a qualitative cognitive map that addresses areas of intervention (from the technological and structural to environmental design).

Keywords: re-densification, regeneration, recycle, residential architectures.

1 Re-densification as a solution for urban and architectural sustainability

In the course of the last century, European cities encroached on their outlying territories with sprawling buildscapes that mainly comprised residential



constructions, and which, in many cases, were without allied infrastructures and services, such as schools, hospitals and sports facilities.

The all-pervasive globalisation produced increasingly homogeneous parts in cities, whose spaces and constructions often remained at odds with the formal parameters expected in present-day society such as functionality, construction, energy etc., that represent current requirements for a greater degree of “sustainability” in terms of town planning, architecture, technology and ecology.

Modern cities are a byword for insufficiency in surface areas, and scarce formal or functional qualities. Natural and recyclable materials have not been used in their construction and too much energy was, and is, consumed in their various phases – from construction, to operation and decommissioning.

Today we want our buildings to possess maximum levels of aesthetic and functional, economic and operational, environmental and energetic, and social and process quality.

After 1960 new city constructions were increasingly built on the basis of unsuitable models with the result that they now need radical overhaul or, in some cases, replacement.

For a number of years we have been searching for a multi-dimensional strategy able to embrace the scale (structural and process measures) and the scope of the measures (economic, environmental and social) needed, while bearing in mind that such measures would have to be continuous over time and sensitive to particular contexts.

The technicians, administrators, and politicians who worked on this question managed to produce some tools for this purpose, such as the Aalborg Charter (1994), the Leipzig Charter (2007) and the Toledo Declaration (2010), all of which implemented a series of initiatives, experiments, and good practices for the growth and transformation of the city, especially as regards residential clusters.

Starting from the Aalborg Charter (1994) an attempt was made to define the concept and principles of sustainability. The cities’ environmental responsibilities were set forth and on their basis policies and positive actions were outlined for building sustainable cities. The charter’s objective was to define those activities with which our cities could be reappraised. It also set out to promote reciprocal support between European cities on matters of design, development and the application of sustainability-orientated policies. Similarly, it aimed at: gathering and spreading information on positive local examples; promoting the principle of sustainability among local government bodies; increasing the number of cities adhering to the charter; organising an annual “sustainable city” prize; providing various policy suggestions to the European Commission; providing materials for reports on sustainable cities by the expert group on the urban environment; supporting local government administrators in implementing the recommendations and regulations issued by the EU in this field; and publishing a campaign information brochure. In actual fact very little of the above was actually achieved. While it is true that new settlements have been based upon the charter more or less nothing was done as respects the extant built environment.

The Leipzig Charter represented a new understanding that instead of building new city districts it was necessary to improve the physical environment in



problematic urban areas, by reinforcing their local economy and designing local labour market policies for distressed urban areas.

The charter suggested the adoption of integrated urban development strategies by using planning tools to identify: "...the strong and weak points of cities and their districts by analysing the current situation, defining practical development objectives for the urban area within a city-vision, coordinating policies and sectorial and technical projects for the various districts and by ensuring that investment programmes help promote a balanced development of the urban area as well as having funds from public and private actors converge upon the various urban spaces...". In order to achieve urban restoration, the Leipzig Charter auspicated greater coordination between city plans "...at local and city-regional level..." and the involvement of all citizens and partners in order to contribute towards enhancing the economic, social, cultural and environmental quality of each area.

The charter set forth the need to define an urban development based on strategies devised to create and ensure high quality public spaces, modernise infrastructural networks and improve their energy efficiency, improve the physical environment, enhance the local economy and the local labour market and promote efficient and accessible urban transport.

The Toledo declaration emphasises the strategic importance of integrated urban regeneration in order to achieve an "intelligent, sustainable and inclusive urban development" and suggests that research, comparative studies and statistics be put in place to verify its congruity.

Thus over the last twenty years and for the purpose of making our cities more sustainable, we have drawn up guidelines and strategic actions at various operative levels to be implemented in degraded urban environments.

In the last century, parts of our cities were built to an outstanding level of quality and convenience that can still be exploited to bring them even more in line with current needs.

In order to make quality urban districts more "sustainable" we can propose re-densification measures, which if rationally planned, could help reduce costs determined by uncontrolled land consumption and promote a renewed and more effective functional mix.

With this approach it follows that the adaptive reuse and maintenance of existing real estate and its functional reconversion may make the widespread distribution of services and infrastructure operate more efficiently and thus the city more sustainable.

The adaptive reuse of existing real estate and building densification are fundamental means for an urban reappraisal and redevelopment strategy whose primary objective is to reduce land consumption.

Experts have been requested to define strategies for the various action levels (planning, designing, building and management) to achieve a more compact use of the territory by increasing urban quality and convenience.

This approach has been adopted to analyse the residential INA Casa neighbourhood built in Trento in 1958 comprising a number of separately standing building blocks divided into differently sized apartments. This extensive complex

still lacks some of the indispensable infrastructures necessary to make the neighbourhood fully functional although they were part and parcel of the original design.

Based on an analysis [1] of the current state of the neighbourhood we conducted a qualitative cognitive reconnoitre of the areas requiring action (from technological to structural and environmental design).

The study revealed that it was necessary to define how to complete the area's residential fabric and redevelop its open and interactive spaces. The design is premised on the re-functionalization and exploitation of neighbourhood shopping facilities side by side with the various activities that complement residential living.

It is clear that public spaces and services must be suitably designed if the quality of life is to be improved by building places for social gathering and collective living.

2 The experience of INA Casa in Italy and the construction of sustainable social-housing neighbourhoods

In the immediate post-war period, Italy needed modern and rational social housing to accommodate the large number of agricultural workers leaving the land for the city. The great housing shortage, heightened by the damage sustained during the Second World War, led to policies for new social housing neighbourhoods.

With the slogan "...not all proletarians but all proprietors..." law 43 of 28th February 1949 (the Fanfani law) was passed whereby INA Casa was set up, an agency of the Istituto Nazionale delle Assicurazioni (National Insurance Institute) for the purpose of "giving a decisive impulse to economic activity... through a major state intervention in a sector, such as the building industry, whose consequence will be to reabsorb unemployment..." and, thus, in its turn, promoting the construction of housing for rent and mortgage purchase by employees [2].

Half of the houses were rented out and the other half earmarked for subsequent "redemption" by mortgage. The houses were assigned to applicant workers by a provincial commission that ranked applications by preferential circumstances, if any.

The income received by way of rentals and monthly mortgage payments was reinvested to carry new building work forward, thus guaranteeing a further source of financing for the Housing Plan.

INA Casa's objective was to construct autonomous and independent complexes and it intended to provide a precise planning, architectural and technological methodology that would apply to the whole nation and stimulate and guarantee efficiency and quality at the design and building stages.

The factors that differentiated INA Casa from other previous or subsequent social housing initiatives essentially refer to the organisation's deftness "...in mobilising fresh professional energies, in setting up research groups on techniques and principles that helped disseminate innovative design models.....".



The public agency was tasked to coordinate and control many building sector operators (INA, INPS, provincial and municipal administrations, INCIS, the Institute for Social Housing and other public bodies) to which its construction operations were entrusted.

In addition to administrating the financing accruing from INA Casa Management and appointing designers, these operators also undertook to find and purchase the building areas.

The choice of the areas, which could be either conceded free-of-charge or at preferential prices, was determined by the availability of service infrastructures (water, electricity, gas, sewers and roads). However, if a chosen territory was bereft of such infrastructures, the municipalities were required to foot the costs of urbanisation, which had to be completed before the houses could be inhabited.

Design work was mainly assigned by appointing professionals directly, especially self-employed professionals entered on a special register drawn up on the basis of a series of design competitions. If a tenderee was equipped with a technical office it could, itself, undertake the design work, but its solutions had to be approved by the governing council of INA Casa.

The population pressure of single urban settlements determined the size of the clusters: buildings (minimum units), buildings complexes, satellite neighbourhoods.

For large-size neighbourhoods or where particular solutions in terms of town planning, layout, altitude or innovative construction were decided upon *à priori*, national or regional public tenders were used. This approach resulted in the definition of innovative solutions that were carefully evaluated by examining boards appointed by the governing council of INA Casa Management.

Tenderees were required to conduct the technical and administrative work associated with tenders, contracts and inspection procedures. INA Casa Management paid for these services at rates based on the type of service and the percentages of the value of the work performed.

The INA Casa Plan set out to build autonomous and independent urban clusters and provide a precise planning, architectural and technological approach applicable to the whole nation in order to stimulate and guarantee efficiency and quality in design and construction.

For this purpose the architecture section of INA Casa Management produced a series of publications comprising recommendations, schemes and examples for designs at the single building and building complex levels, and for defining excellent construction solutions.

The contents and guidelines contained in these publications (1. Suggestions, regulations and schemes for preparing and presenting designs: invitations to tender; 2. Suggestions, examples and regulations for urban design: typical designs; 3. Guidelines for examining designs for INA-Casa buildings to be built in the second septennium; 4. Regulations for second-septennium buildings (taken from resolutions passed by the committee for implementing the plan and the governing council of INA-Casa's management) were not mandatory but their observation and application were strongly recommended for building habitable, high quality residential settlements. INA Casa Management also stipulated that the



neighbourhoods' population density should not exceed 500 inhabitants per hectare, which also had to include areas earmarked for public utilities. In order to ensure the best living conditions, buildings had to comply with specific interspacing ratios that avoided the creation of utility plant enclosures and small courtyards.

The "...conditions of terrain, sunshine, landscape, vegetation, pre-existing environment, and the sense of colour..." had to be taken into account in designing the complex's layout, as they had to be "...variegated, lively and multifaceted, such as to produce welcoming and relaxing environments, with views that vary from place to place and endowed with opulent vegetation, and where each building *could* enjoy its own distinct appearance...".

Moreover, indications on the housing units themselves were numerous and detailed; for instance, each unit's surface area was dictated by the number of its inhabitants. Various standard schemes (tower, multi-story, terraced and balcony-access buildings) were defined with either one or two-floor apartments of various sizes to meet different exigencies.

The distribution of the single housing units followed a simple, linear and non-redundant access pattern. The housing units, from the smallest to the largest, were to be supplied with non-residential spaces (gardens, balconies, drying rooms, lumber rooms, storage rooms, etc.).

One result of the experimentation conducted was, for example, to prohibit solutions such as "...buildings higher than 3 storeys, ground-floor housing, two-floor apartments in urban contexts, open communal stairways, and open relationships between internal and external spaces...".

The manuals also suggested materials and technologies for construction. Thus, all buildings had to have continuous foundations, reinforced concrete frames and concrete and masonry floors.

INA Casa Management promoted the use of industrial technology despite using non-specialised labour.

The construction skeleton was left exposed and its structural articulation thus became visible. All structural and finishing elements were reinterpreted in a figurative manner and each played an equal part in configuring the facade.

However, the re-invention in the details did not only concern the facade's composition but extended to all elements such as walls, enclosures, and areas for play and socialising, etc. which defined the overall aspect of the neighbourhood.

The facade's composition was the primary theme in the design's development. The composite and irregular walls had to acquire a domestic, familiar and spontaneous character. Each element had to be given its own expressive individuality. By proceeding in this manner, the building's facing was not only a technical solution to protect it from the elements but also to emphasise its domestic vocation: the loggias and the balconies, typical functional elements, i.e. the "pivots of daily life", became the facade's formal-constructive characterisation – openings could not just be an abstract interruption in the facade but an original, autonomous and artisan object functioning with respect to a room's surface and the quantity of light necessary for a specific lighting purpose. The window openings, besides being functional for rooms, also had to be functional for the location so as not to create a surface area which would entail excessive costs for heating or cooling.

From 1949 to 1963, this continuous housing production mode gave rise to residential settlements throughout Italy, and much of its notable quality in terms of planning, architecture and technology, survives today without having undergone major modifications.

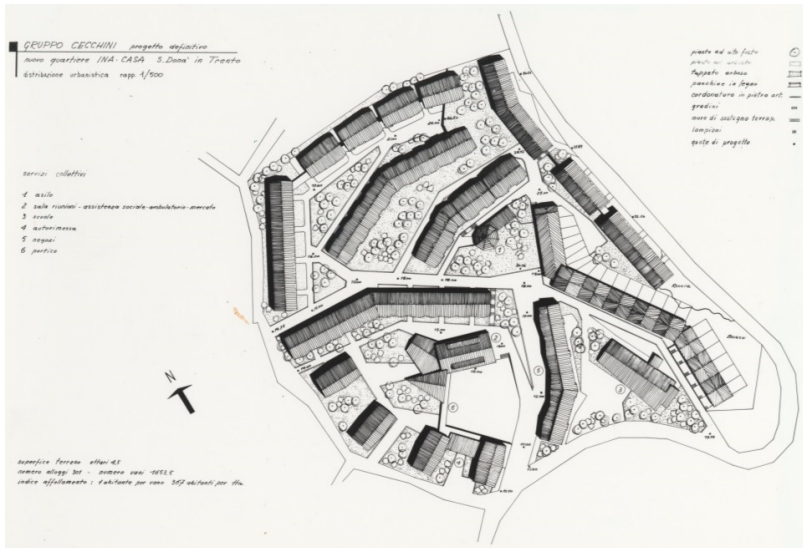


Figure 1: Layout of the San Donà village in Trento.

3 The INA Casa neighbourhood at San Donà in Trento

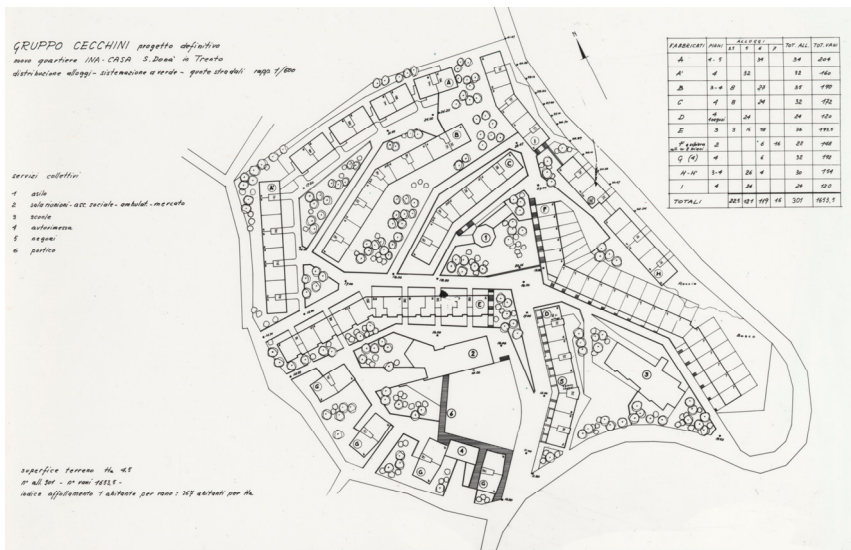
The Ina Casa Management also carried out intense work in Trentino. Various residential works were carried out in Trento not only to generate jobs but also to modernise long-standing real-estate property. It was decided to create small neighbourhoods in Trentino capital city as well as a satellite village, designed as an autonomous and independent community, situated halfway between the city and the town of Cognola, a scarcely urbanised area but traversed by a major road axis connecting it up to the historical centre.

The design was assigned to a group of young designers (engineer Renato Marchi, architect Mario Kiniger) coordinated by the architect Libero Cecchini from Verona. These professional designers having received design commissions from INA Casa Management had already worked on the residential settlements in various towns in Northern Italy.

For the INA Casa village at San Donà [3], this group of designers adopted a modern interpretation of the traditional structure of the Trentino town, namely buildings gathered around a central space. The town's services were situated along a curved axis that moved between residential buildings: the nursery, the social centre, the shops and the primary school.

Right from the start of the design, areas were identified for private and public landscaped area and for sports facilities.

By adopting the condominium- and terraced-type buildings slightly fewer than 250 apartments, of varying sizes, were built to meet all the various spatial needs of their inhabitants.



The waterproofing of the foundation structures was carried out by applying bitumen cardboard and hot bitumen.

The wooden closing fixtures were also subjected to detailed design.

All the buildings were equipped with central heating facilities, electrical wiring and plumbing.

The San Donà village was built with good quality materials and by the use of technologies that would reduce construction time and subsequently require only limited maintenance work. The use of traditional and hence natural materials, and good building practices made it possible to construct buildings that are still fully functional today.

Therefore, as this village demonstrates, the requirement to follow all the technical design and construction indications contained in the manual made it possible to build a complex that we can, today, define as sustainable in planning, architectural and construction terms.



Figure 3: View of the San Donà village.

4 Conclusions

From a reading of the features of the San Donà village at Trento not only its modernity emerges but also the quality of its various parameters: environmental and energetic; economic and managerial; social and process; aesthetic, morphological and functional.

Over fifty years old and still inhabited, the question now facing the complex is how, in the light of new needs, can it be made more sustainable?

Its limited vertical development and low residential density suggest elevating the building blocks; an operation that is quite possible in planning, architectural and structural terms.

The re-densification proposal [4], if rationally planned, can help reduce costs generated by uncontrolled land use and contribute towards a renewed and more effective functional mix.

Reconsidering both the existing real-estate property and residential density has become a fundamental guideline for urban improvement and regeneration as this, first and foremost, entails the rational deployment of existing infrastructures and services.

Densification proposals, moreover, will make it possible to contain city growth within its existing limits and hence operates as a strategy for combating urban sprawl.

In pursuing this objective it is important to establish a methodology for identifying the residential complexes suitable for re-densification.

The choice of such complexes within cities must be carefully assessed in planning, infrastructural, architectural, structural and social terms – and certainly legislative measures alone will not be sufficient to allow for the extension of buildings.

It is clear that densification and urban completion activities as also social sharing constitute – within the current research scenario – one of the possible thematic solutions to such real needs as more rational land use, more appropriate life-styles and social integration, apart from the current and urgent need for housing, especially social housing.

The challenge facing us is to find various spatial qualities in the urban landscape able to accommodate and foster environmentally sustainable life-styles as well as achieving objectives in terms of maximum economic exploitation.



Figure 4: View of the neighbourhood's social centre.

References

- [1] Gatti M. P. & Cacciaguerra G., Il nucleo edilizio Don Bosco a Bolzano (Chapters 2 and 3), Capomolla R., Vittorini R., L'architettura INA Casa 1949–1963. Aspetti e problemi di conservazione e recupero, Gangemi Editore: Roma, ISBN: 88-492-0533-3, pp. 264–275, 466–471, 2003.
- [2] Di Biagi P., La grande ricostruzione. Il piano INA Casa e l'Italia degli anni '50, Donzelli: Roma, ISBN: 88-7989-656-3, 2001.
- [3] Beretta Anguissola L., I 14 anni del piano INA Casa, Staderini: Roma, 1963.
- [4] Gatti M. P., Cacciaguerra G. & Battaino C., Smart towns and homes in the early 20th century. The design of a modern urban environment, *Iahs 2014*, ITeCons: Coimbra, ISBN: 9789899894907, 2014.