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ISSUES OF HISTORIC TOWN SURVEYING: VISUALIZING URBAN VALUES

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Abstract

Aim of the paper is a reflection on the concept of Historical Town and on the issues in its surveying. The background is analyzed to state the more significant topics and to trace an operational line of study. The point of view is the historical-critical methodology for architectural analysis. The urban heritage is seen as a work of art made by the sylloge of architectures and urban spaces, defined by the modification and stratifications processes occurred during centuries. In particular the values of the urban heritage roots on a "relational" system; it can be studied with historical synchronic and diachronic interpretations and values' judgments, useful to make evident the current characteristics, i.e. what we have to preserve.

Keywords

Urban Survey, Historic Town, Urban Heritage, Values, Typologies.

1. *Making a Choice in Heritage's Complexity*

During the XIX century there has been a convergence between human and natural environments knowledge and protection issues. Nowadays we are still witnessing the awareness of extending the concept of cultural heritage, both increasing the categories of objects to be protected and underlying their interrelation.

In this way the relationship between environment, territory, and buildings is ineluctable. Thus the idea of landscape changed and the human component has acquired an important role. In fact, the "European Landscape Convention" (2000) says that: «"Landscape" means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factor» (Art. 1)[1]. The definition puts together the tangible idea of "an area" with the intangible cultural concept "as perceived by people".

In fact UNESCO'S defines the Cultural Heritage as «the legacy of physical artifacts and intangible attributes of a group or society that are inherited from past generations, maintained in the present and bestowed for the benefit of future generations». Thus it ratifies the inescapable importance and interconnection of the tangible and intangible characteristics of cultural heritage.

And the cultural heritage is one of the nodal characteristics of the present era of globalization, mass communication, and mass content production (Schafer 2014).

About the historic town, it is useful what the UNESCO "Recommendation on the Historic Urban Landscape" (2011) says: «The historic urban landscape is the urban area understood as the result of a historic layering of cultural and natural values and attributes, extending beyond the notion of "historic centre" or "ensemble" to include the broader urban context and its geographical setting. This wider context includes notably the site's topography, geomorphology, hydrology and natural features, its built environment, both historic and contemporary, its infrastructures above and below ground, its open spaces and gardens, its land use patterns and spatial organization, perceptions and visual relationships, as well as all other elements of the urban structure. It also includes social and cultural practices and values, economic processes and the intangible dimensions of heritage as related to diversity and identity»[2].

[1] http://www.convenzioneeuropeapaesaggio.beniculturali.it/index.php?id=2&lang=e

[2] http://portal.unesco.org/en/ev.php-URL_ID=48857&URL_DO=DO_TOPIC&URL_SECTION=201.html

Tangible contents are related to physical ones[3]. The words "Urban Heritage" – that could include also urban archaeological heritage – can be interpreted according to multiple and different approaches.

In particular a general definition of Historic Areas in given by the UNESCO "Recommendation concerning the Safeguarding and Contemporary Role of Historic Areas" (1976): «'Historic and architectural (including vernacular) areas' shall be taken to mean any groups of buildings, structures and open spaces including archaeological and paleontological sites, constituting human settlements in an urban or rural environment, the cohesion and value of which, from the archaeological, architectural, prehistoric, historic, aesthetic or sociocultural point of view are recognized. Among these 'areas', which are very varied in nature, it is possible to distinguish the following in particular: prehistoric sites, historic towns, old urban quarters, villages and hamlets as well as homogeneous monumental groups, it being understood that the latter should as a rule be carefully preserved unchanged»[4].

In this paper "Historical Town" is referred to urban areas still alive and composed by artifacts that "embody" past and present events and cultures. Anyway Urban Heritage includes the Historical Towns. A definition of Urban Heritage is presented in the European Union Research Report n°16 titled "SUIT Sustainable development of Urban historical areas through an active Integration within Towns" (Dupagne, Ruelle, Teller, & Cornélis 2004)[5]: «Urban heritage comprises three main categories: (a) Monumental heritage of exceptional cultural value; (b) Non-exceptional heritage elements but present in a coherent way with a relative abundance; (c) New urban elements to be considered (for instance): The urban built form; The open space: streets, public open spaces; Urban infrastructures: material networks and equipments» (p.11).

Remembering that the «Tangible heritage includes buildings and historic places, monuments, artifacts, etc., which are considered worthy of preservation for the future»[6], in this paper we want to analyze the issues related to the study of historical towns, intended as tangible heritage made by historical – and historicized – buildings and open spaces.

In particular the study of historical centers can have an own disciplinary approach, that is the one of the disciplines of architectural survey and history of architecture. Therefore the representation of values – related and non-separable from the immanent "physicality" of tangible heritage and from information given by historical documentation – it is fundamental for its study and historic-critical understanding, as well as for its protection, management, enhancement, and correct fruition and enjoyment.

2. *Urban Surveying: What are We Looking For?*

Although the urban survey can be attributed to the general theory of architectural survey, practice highlights specific issues deriving from the analysis and representation of values and complexity of the historical and environmental relationship between the elements that configure the "landscape" of historical centers.

In order to focus on the peculiarities of urban heritage surveying, it is useful to recall some definitions.

The ICOMOS "Charter for the Conservation of Historic Towns and Urban Areas" (Washington, 1987)[7] says that: «Qualities to be preserved include the historic character of the town or urban area and all those material and spiritual elements that express this character, especially:

a) Urban patterns as defined by lots and streets; b) Relationships between buildings and green and open spaces; c) The formal appearance, interior and exterior, of buildings as defined by scale, size, style, construction, materials, colour and decoration; d) The relationship between the town or urban area and its surrounding setting, both natural and man-made; and e) The various functions that the town or urban area has acquired over time. Any threat to these qualities would compromise the authenticity of the historic town or urban area». These recommendations are helpful to highlight the characteristics of urban fabric, and so what we have to survey, analyze, and represent.

[3] See also the Historic Urban Landscape site: http://www.historicurbanlandscape.com/index.php?classid=5356

[4] http://portal.unesco.org/en/ev.php-URL_ID=13133&URL_DO=DO_TOPIC&URL_SECTION=201.html

[5] http://www.lema.ulg.ac.be/downloads/Suit.pdf

[6] http://www.unesco.org/new/en/cairo/culture/tangible-cultural-heritage/

[7] www.international.icomos.org/charters/towns_e.pdf

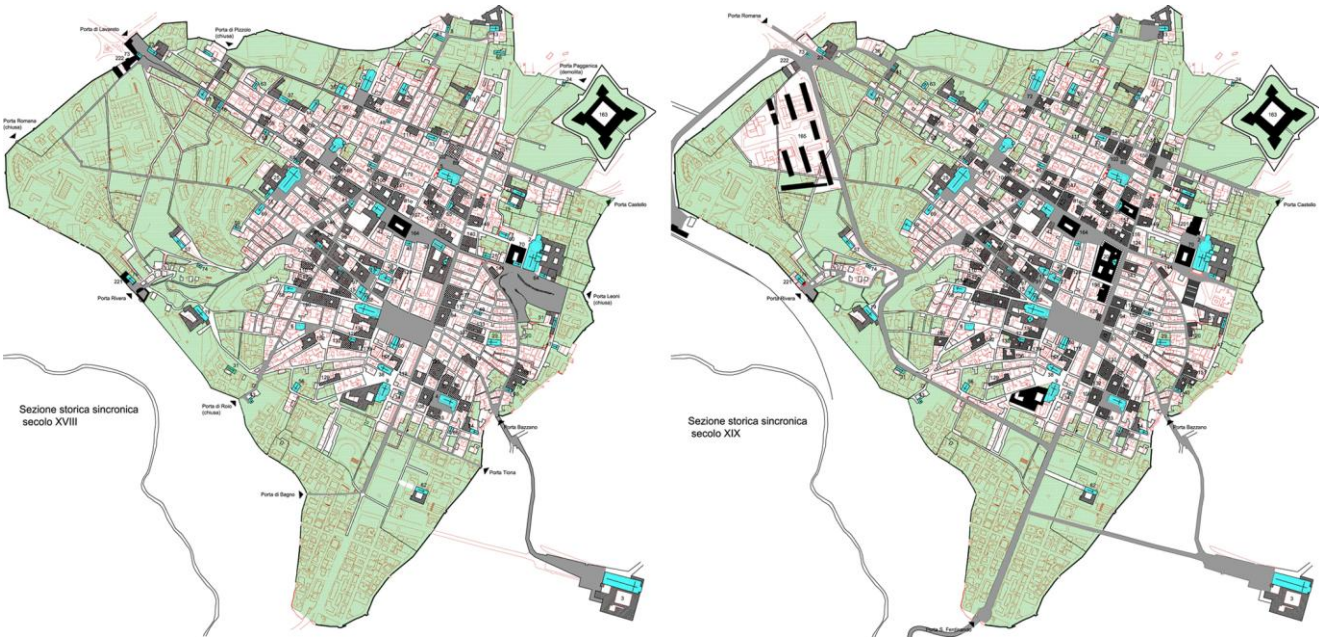


Fig. 1: Historic maps of L'Aquila at the XVIII and XIX centuries, critically realized according to the current survey (red lines). The aim is to analyze urban historical values. The more important buildings (churches, places, etc.) and public spaces (streets, squares) are indicated

Presenting the theme of urban survey, Docci and Maestri (2009) underline how the city is a «complex organism, in which buildings, monuments, spaces, street furniture, colors, etc., coexist in relation to each other; it is a structure extremely diverse, where the original environment and society that followed one another have contributed to configure a particular scenario. Then, the city isn't a simple summation of buildings, but a set of spatial and constructive relations vivified by History. Therefore, the urban centre knowledge cannot derive from the one of specific buildings, but it must take account of their chore and of the unique way to form the urban space, in order to reach the depth reading of it» (p. 155)[8]. The authors highlight how the urban survey has to be referred to the study of the spaces and relationships defined by the buildings.

At the beginning of their treatise on urban heritage survey, Coppo and Boido (2010) write: «The main factors differentiating urban surveying from architectural surveying can essentially be attributed to the observation that fabric of a consolidated urban area or a historical town center has reached its current state of definition as a result of a series of urban planning and construction interventions, be they for the purposes of completion or restoration, which are difficult to relate to documentable design hypotheses. Hence, the very concept of surveying within an urban context of complex morphological and formal structures must be interpreted as an open investigative process, aimed at defining the current consistence of the material examined through a system of studies employing different disciplinary skills: surveying, history, urban planning, architecture, sociology, administrative policies. [...] Firstly, the analysis method can thus be divided into the following main stages: identification of the cartographical baser, identification and representation of morphological and formal construction characteristics, construction of technical maps, identification and representation of temporal sequences of individual construction events and related socio-political motivations, definition of the overall formal image, definition of the purposes behind the proposed intervention, building of a database.» (p.11).

It is evident the importance they give to the study of the processes of transformation and design of the urban system. It's much more clear considering their studies on Turin, i.e. a city whose image largely derivers from a unique operation of re-planning. Moreover we remember that from the many years' experience of the

[8] Author's translation from the Italian text.

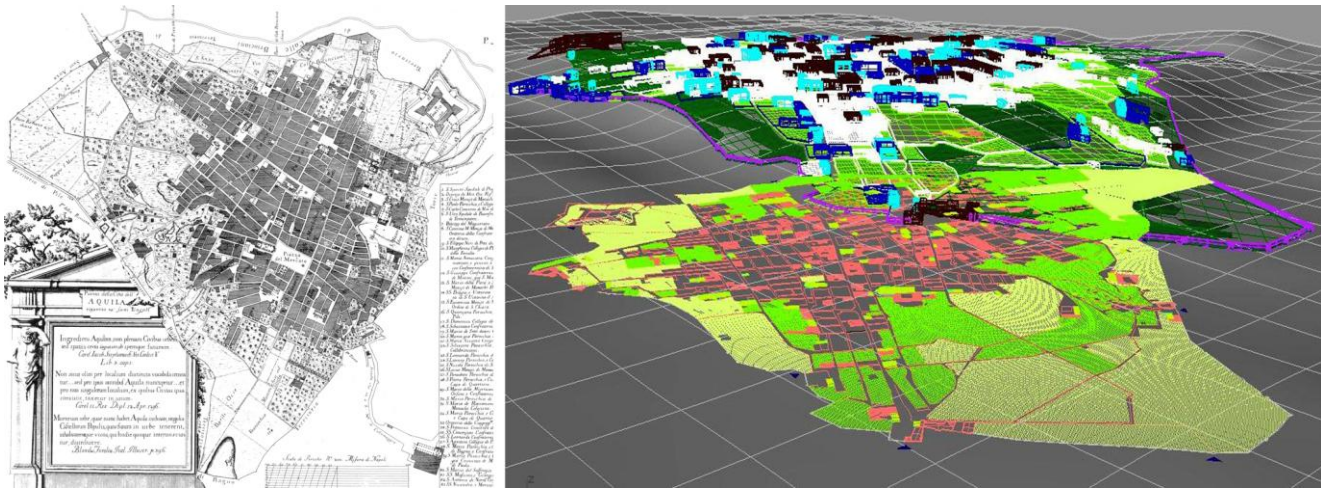


Fig. 2: Map of L'Aquila by Antonio Francesco Vandi (1753) and 3D model. It is built through the comparison between the old map and the urban topographic surveying.

School of Turin University derived the "UNI 7310/74 Standard: Conventions and methods for surveying historical urban fabrics". In particular this standard requires the indication of the following elements: covered areas of public utility (churches, theaters, hospital corridors, etc.); circulation spaces inside the built volumes (porticos, entrance hall, corridors, galleries, stairs, etc.); the position of the openings (doors, windows) between covered and uncovered spaces. These are elements that correlate public and private spaces, influence both kind of spaces (their use, their spatial organization), and suggest their typological characteristics.

Bertocci and Bini (2012) start from the concept of "multi-stratified site" – derived from the archaeological filed – to analyze the issues related to urban heritage surveying. In this way the multi-layered city is the product of the events and of the micro and macro histories that left – as its sediment – the "calcareous shell" made by buildings. It origins from the actions of the individuals who lived inside and that configured it like a palimpsests (p. 360). Hence the need to consider in depth both buildings – that individually or in groups constitutes the urban fabric – and the "void" spaces between the buildings (p. 361). It follows an eminent interest in urban areas and in the elements that define these spaces: Very important is the relation between outside-inside, namely the enclosure of the space, and therefore the role of the "wings" of building's facades. The authors underline the importance of the analysis of the connections between single building phenomenon and urban fabric, of the characteristics of each building, of the current use and the activities carried out within the urban fabric (p. 364).

According to the previous background, historical centers can be defined as complex system of spaces and buildings, modified and stratified during centuries, witnesses – in their present condition – of the cultures and actions that have formed and transformed them over time.

Therefore, the shape of urban heritage is the synthesis of historical and architectural events, made immanent by the building's construction and by established relationships through the juxtaposition of architectural and spatial phenomena. We quote the words of Benedetti (1981): The historical centre has the quality of the art work, but where its unity of image can be intended as derived from the sylloge of the single architectural works.

That is the urban heritage has a "relational" value that can be scientifically studied and understood in particular with historical synchronic and diachronic interpretations, useful to make evident the processes and explain the present meaning.

3. Beyond Measurements: the DIKW Hierarchy

The growth of the more advanced digital technologies of architectural and urban surveying has allowed important tools for data collection: First of all metrical ones, but also on colors, materials, degradation, etc. The number of

measurements given by laser scanning, the quality of photorealistic models, the engagement of interactive maps and environments, and the potentialities of informative systems are useful instruments for historical centers documentation.

About the documental analysis, if we consider the amount and complexity of archival historical data and the number of essays written on the buildings of an historical centre and on their context (authors, builders, clients, similar buildings in other cities, manuals and treatises, general theory of architecture, etc.), the quantity of the information increases enormously. Than before, the number of available data and information is increased by digital archives and by network and applications on the Internet.

The "power" of instruments and the "quantity" of data highlight a critical problem of information collection and sharing, of phenomena knowledge and understanding, last but not least an issue of "wisdom", that is the capability to develop – also in planning solutions – what have been learnt and elaborated.

It may recall the well known DIKW problem, i.e. Data – Information – Knowledge - Wisdom hierarchy (Ackoff 1989). This hierarchy is usually represented by a triangle with "data" on the base and "wisdom" on the top. The triangle suggests the claim for a wise understanding in moving from the base to the top. In this way, architectural surveying – and in particular urban heritage surveying – could configure a similar problem. First of all an acknowledgment problem, but knowledge moves to wisdom if we overcome the issues of data and information collecting, aiming to the understanding of "values", that is of what makes the architectural and urban heritage an "artwork". As "value" we intend the recognition of the historical and aesthetic characteristics (Brandi 1963), owned by the buildings, made tangible – and made perceptible – by the matter and spaces of the artifacts.

The scholar has to share the wisdom state with all those who are involved in the heritage management and protection, not least the citizens and tourists. This concept remembered by an old but still interesting essay by Tielden: "Interpreting Our Heritage" (1957).

However, often the employment of advanced tools doesn't moves to an adequate critical study on historical, architectural, and material values. It follows the relegation of the fundamental issues on "value's judgment" to a second division.

The recognition of values requires the definition of a scientific operative method: the theory of architectural surveying – that recalls the historical critical analysis methodology – helps us to define it.

About architectural and urban heritage, Docci and Maestri (2009) underline how the aim of a surveying process is the understanding of the heritage's values and their appropriate graphic documentation. Thus surveying configures as an analysis, selection, synthesis, and visualization of a real building – i.e. a sort of DIKW hierarchy – never forgetting the characteristic of uniqueness of the artifact under study.

It follows that the measurement step is a necessary condition but not sufficient for an adequate heritage's knowledge, protection, and restoration. In fact the critical interpretation of data and information, and the communication of the critical achieved understanding are necessary.

4. Rome Wasn't Built in a Day: The Historical-Critical Analysis Applied to the Historic Town

The historical-critical approach provides a methodology for the scientific study of the architectural heritage (Bruschi 1984). It is intended as a built organisms characterized by historical and aesthetical values. Compared to the other kinds of tangible cultural heritage (statues, paintings, etc.), in architectural and urban heritage the historical values acquires a particular relevance, because their spaces, surfaces, matter, technologies, and uses are the synthesis of the transformation and stratification occurred during the life of the building.

An example of the application of the historical-critical methodology for historical town analysis is provided by Spagnesi in his study on the historical centre of Rome (1979). He writes that the only scientific instruments in the knowledge phase must be identified in the historical-critical methods of analysis, while the aim is the acknowledged of the "value judgment" on the whole city regarded as "work of art": i.e. the historical centre is intended as an inseparable whole of architectural poles, urban spaces and building structures, where the scholar recognizes the testimonies of the transformations, made by the succession of cultural ideas, and by political and social structures of historical periods. In particular, Spagnesi states that the knowledge of the historical centre derives from the value of the whole urban organism and, at the same time,

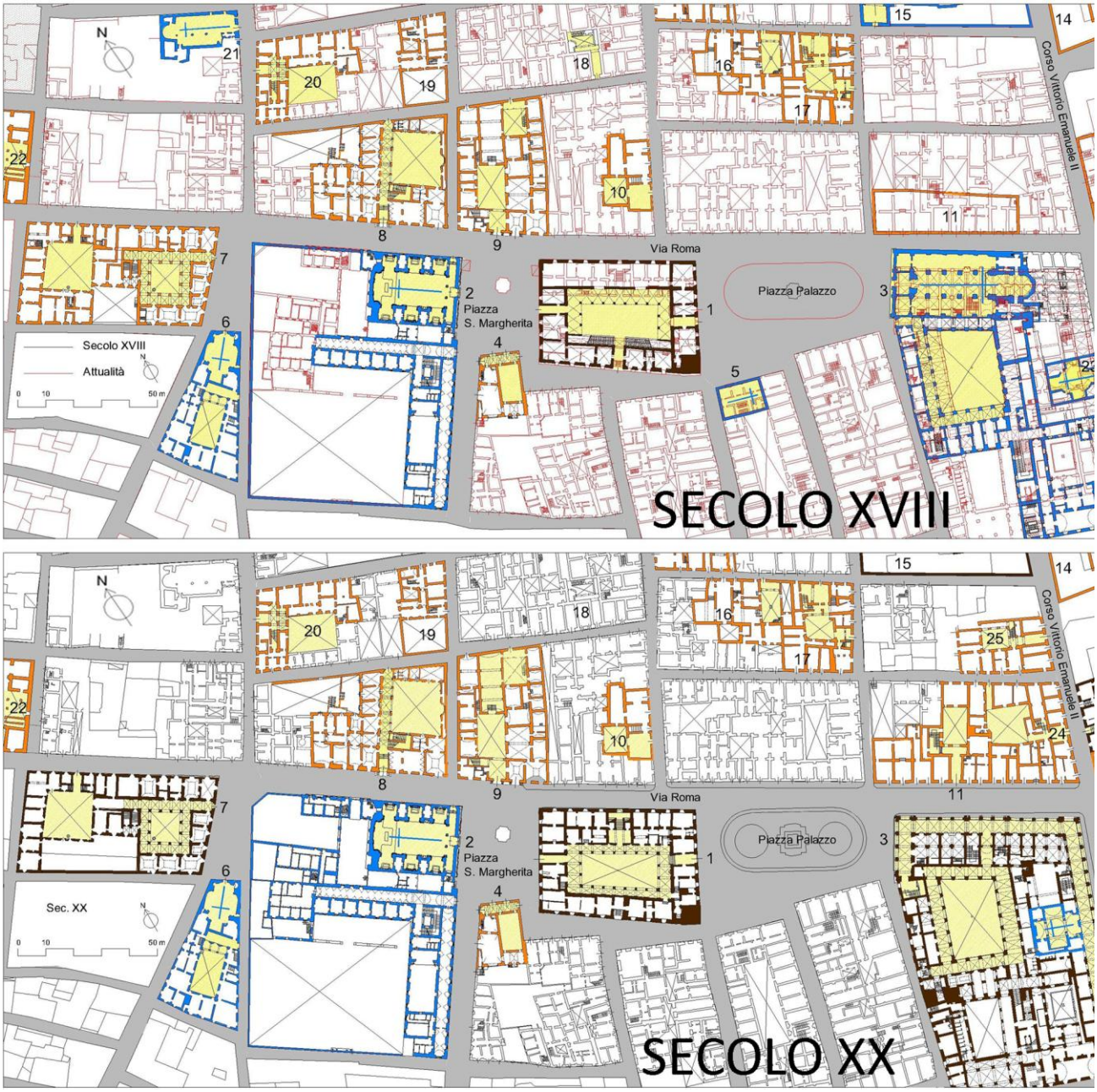


Fig. 3: Historical maps of a portion of L'Aquila centre on Margaret of Austria palace, with the two squares of Piazza Palazzo e Piazza S. Margherita. They are realized on the surveying of the current ground floors of the buildings. The main architectural typologies, spaces (also inside the blocks) and "entrance-hall-yard-scale" systems are pointed out.

from the ones of the buildings, urban fabric and urban spaces. And they never have to be separated (p. 13). Moreover he defines the "urban shape" as the result of successive moments of synthesis in an ongoing relationship between old and new, and not as the final effect of an evolutionary logic (p. 22).

Therefore, the tools for the study of the historical centers are synchronic and diachronic maps representing the main phases of city transformation. They are accompanied by visualizations at a closer scale, useful to grasp the modifications even at the architectural level. The maps are realized by the critical re-drawing of historical representations on the actual surveying, by documental and archival studies, and by the analysis of the building's typologies and of the urban space's characteristics.

Moreover church's plans, building's entrance halls and courtyards are presented.

It's important the concept that every synchronic and diachronic map is not a re-construction of the city in a particular moment of the past but its aim is to highlight the historical center's typical elements, philologically known, and chosen on the basis of their possible identification even in the current reality. The purpose is not the visualization of the past, but to have a tool for the study of the present.

5. *Eye Witnesses: Typologies for Historical Values*

The tradition of typological studies founded by Muratori (1960) – diffused in the last decades of the XX century – presents a point of view that can be referred to structuralism.

Although their "positivistic" approach to the buildings, anyway they have focused the attention on the whole urban fabric, intended as an overall system where buildings conjugate with monuments.

Otherwise, considering each building as an individual, typologies can be seen as witnesses of the historical values. In this way the typology isn't a model that can be repeated exactly identical in several copies, but as a concept, a practice, where each architectural artifact acquires individual characters, becoming unlike from others and also different from the "type".

Therefore the results derived from the study of the "type" – i.e. comparing the individual characteristics of each building – cannot substitute the direct knowledge of the single architecture; rather the study of the "type" implies the surveying of each artifact. In this way the acknowledgment of the complementarities between general and typological knowledge of each building is a prerequisite for the use of the type with a knowledge function (Progetti e ricerche della città di Pesaro 1980).

Similarly, Spagnesi (1979) writes that we haven't to intend the typological analysis as a tool for the classification of urban and building fabric modalities of transformation, but it is one of the elements that contribute to the knowledge of the architectures, ever considered in the actuality of their consistency (p. 14).

The type should be seen as an adjective that points out the characteristics of the current building. Therefore the typology presents the synthesis of the transformation processes, in the actual definition of the architectural characteristics. In this way, the typological analysis helps to define the historical values. Moreover the study of the today types favors the historical-critical analysis of the buildings and, at the same time, the highlighting of the relationships between buildings, both inside the building's blocks and in the definition of the urban context.

6. *Visualizing the Tangible Past and Present of Historic Town: Digital Advanced Tools for Architectural Methodologies*

The actual surveying methodologies, based on point clouds, produced a partial inversion of the traditional surveying process, with the first step defined by the measurement, and substantially postponing the critical act of architectural analysis and restitution to the post-processing phase.

Obviously the point cloud – although a raw metrical data – is a first document for surfaces' studying, because it has information on architectural characteristics, materials, degradation, etc. It should be considered an advanced version of the traditional photographic documentation, now in a three dimensional way, where the points are intended as 3D pixels.

Similarly the photo-textured mesh surfaces – mostly derived from computerized photo-modeling processes – are really useful in architectural and urban heritage documentation and analysis (Apollonio, Gaiani, Fallavolita, Ballabeni, Guidazzoli, Liguori, Baglivo, Felicori, & Virgolin 2013). The photorealistic models allow the representation of the urban heritage – in particular of its spaces and buildings wings, also with the overall interactive 3D visualization of historical centers (Bertocci, Parrinello, & Picchio 2014).

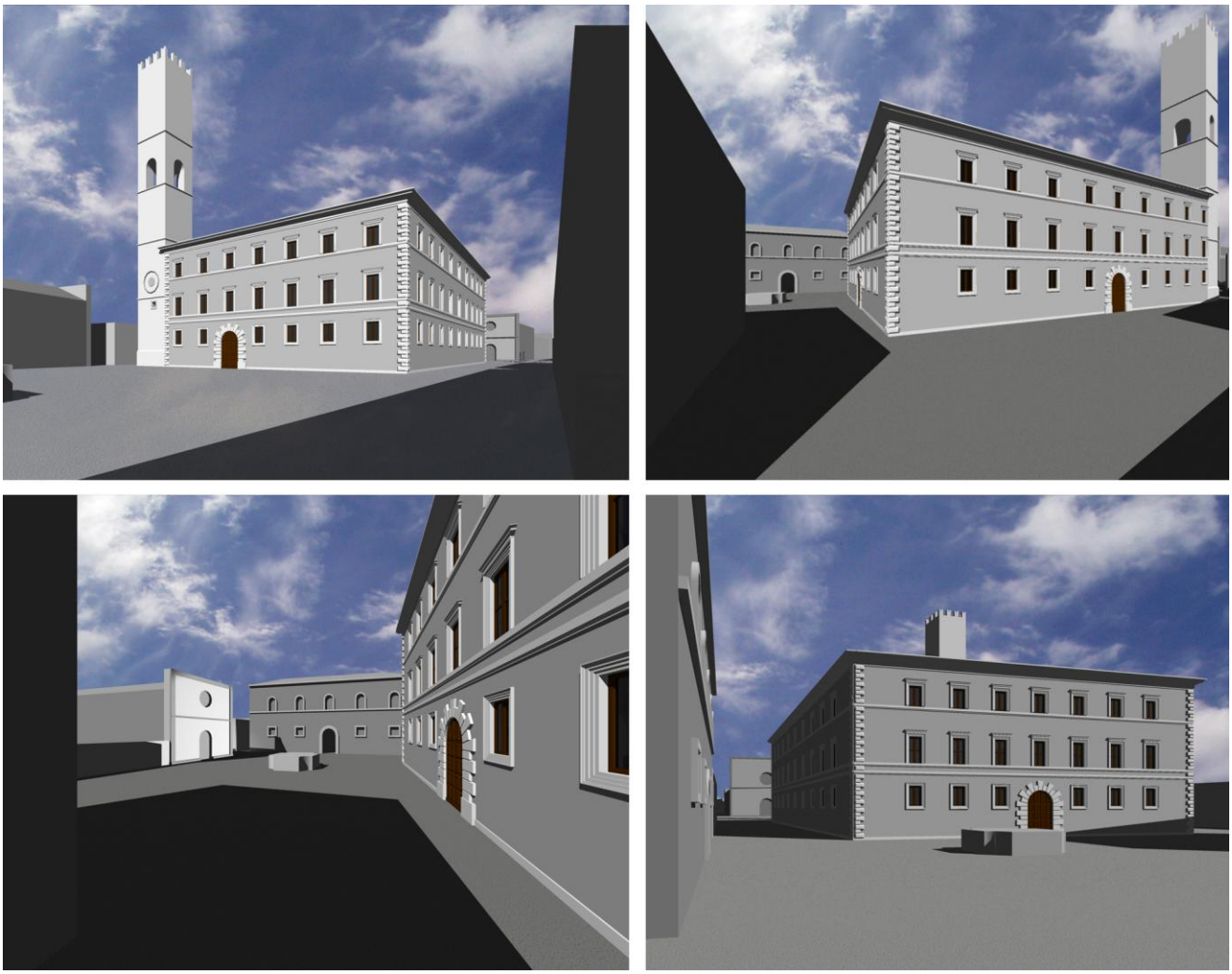


Fig. 4: Digital Historical 3D Map: Virtual walk around the Palace of Margaret of Austria (in its old configuration before the transformations occurred in the XIX century) through the squares and streets at the XVI century (in particular with the two no more existing churches of S. Francesco and S. Margherita).

Moreover digital tools favor the philological reconstruction of past urban configurations, thanks to the scientific critical realization of urban 3D synchronical models, for example like the studies realized at Sapienza Rome University follow the line traced by Spagnesi in urban heritage historical-critical knowledge, with the virtual reconstruction of urban environments as they were configured in past and compared with the current state (Albisinni, Carlevaris, Catizzone, De Carlo, Di Stefano, & Micucci 2011; Fantozzi 2013).

There are many applications of GIS technologies in urban heritage studying, often aimed to the analysis of urban quantities (that is topographic areas, volumes, etc.), according to the usual use of geographical systems for territorial applications. These researches should be useful, but in particular GIS can be declined also to analyze information and implement the dataset for historical critical analysis (Brusaporci 2010; Brusaporci, Centofanti, Continenza, & Trizio 2012; Brusaporci 2013; Cigola 2015; Ferrighi 2015). In particular we cite the experience "Visualizing Venice - Exploring the City's Past"[9] (see also Calabi 2013).

In particular, the theme of the three-dimensional reconstruction of the "historical sections" of historical centers raises questions of philological nature: be built from the architectural survey, and from archival, bibliographical, cartographical and iconographical studies; be diachronical, that is to allow the re-constructing of the processes of urban definition.

While the need to conduct visualizations based on historical documentation and guided by

[9] www.visualizinvenice.org

an historical-critical approach is well known, the relationship between "Trasparency" and "Philology" is still not completely solved in digital representation – and often conceptually it is not addressed in the architectural field –. In this regard it is useful to refer to the experience conducted in the archeological field on the theme of paradata (Bentkowska-Kafel, Denard, & Baker 2012). The issue has become evident when the scholars of archaeology moved from three-dimensional models for communication to their use as research's methodologies (Frisher 2008).

The title of a famous work of Lowenthal "The Past is a Foreign Country" (1985) could be useful to underline the importance of a philological trasparency in scientific historical representations. It's interesting a definition of heritage given by Silberman (2008), and his parallel consideration on the concept of past: «Heritage is an ever-changing array of objects and symbols, a complex mosaic of artifacts, images, monuments, and customs that demand our attention and demand that we give some meaning to them». While «The Past – in contrast to heritage – is one of the most virtual of the realities we have to content with. It is an untouchable phantom: a once lived reality that survives only in fragments and can be experienced only in retrospect» (p.18).

This last remark in particular recalls the archaeological experiences primarily aimed at the re-construction of a past no longer existing. In the architectural and urban field, heritage has a different quality of immanence and physicality compared with archaeological remains and we think that this characteristics moves to peculiar issues in visualization (Brusaporci & Trizio 2013). In particular, aim of the historical representations of a town is the study of actual values, and it isn't the re-discovering of values today no more existing: compared to archaeology, the critical perspective of the historical reconstruction is inverted.

7. *From the City to the Buildings / From the Buildings to the City: Interpretative Models for the Historical Town*

The relationship between buildings, blocks, lots, streets, and squares design the urban "landscape".

Inside the historical urban fabric, the single buildings implement – with their articulation – the historical, spatial, figurative and architectural "values", derived from their relationships. These relationships are established inside the building's blocks – where usually buildings articulates seamlessly – and in the urban spaces. In particular the facades play an essential role in the definition both of the public space's quality (streets, squares) and in the relationship between internal and external spaces (i.e. covered/uncovered - indoor/outdoor - private and public spaces).

Obviously, in urban heritage surveying, a particular attention have to be paid to the spaces between the buildings, where the urban environment is physically defined by the relation between built artifacts, the planning of the streets and squares, and the ground characteristics.

According to the concept of historical centre as a "sylloge"[10], we propose a study developed on L'Aquila's historical centre[11].

It is based on a contemporary multi-scale approach, with an iterative workflow from the city to the buildings and – at the same time – from the buildings to the city. The aim is to point out the present historic and architectural values of the urban system.

The three main tools are:

1. The analysis of the historical urban system's transformations, made by historical maps, to highlight modification and stratification processes of urban fabric that produced the current shape. The historic maps are traced on the surveying of the present buildings because they are the constant reference to the actual situation (i.e. the only one physically knowable and of which we want to establish values). Historic maps are realized at the urban scale (Fig. 1) and at the architectural one (Fig. 3). The second ones represent the block's ground floors at each age. The maps at different ages and with different scales are tools to focus on the historic values of the architectures – studied in relation to each other – and of the public and private spaces.

[10] It is important to consider not only buildings but also other kind of spaces – for example orchards or parade ground – as components of the "sylloge".

[11] The research group of Architectural Surveying and Representation, principal investigator Prof. Mario Centofanti, L'Aquila University – Department of Civil, Construction-Architectural and Environmental Engineering, by long time carries on a research line on urban heritage surveying, in particular applied on L'Aquila city historical centre (198 hectares) (Centofanti 1984; Centofanti & Brusaporci 2005; Centofanti, Ruggieri & Brusaporci 2005; Centofanti & Brusaporci 2009, 2011a, 2011b, 2012b; Centofanti, Brusaporci, & Cerasoli 2014).



Fig. 5: Study of an urban block's facade: architectural and constructive elements, materials, colors, and degradation. The 3D model favors the analysis and visualization of the architectural characteristics. (A. Gaeta, M. Mattei, P. Pifano, F. Tresca – Prof. M. Centofanti, Assistant S. Brusaporci).

The visualization of the urban fabric favors the analysis of the relationships between buildings and spaces.

2. The study of the current single buildings with the acknowledgment of building's typologies and the expression of a "judgment of value" on the architectural quality of the whole building and of facades. This is achieved through the compilation of survey forms for each individual building.

3. The study of the characteristics of the urban spaces, both public and private (streets, squares, porticos, patios, gardens, vegetable gardens, etc.): pavements, urban furniture, fountains, perspectives, facades' value (above building's surveying forms), etc.

These three kinds of analysis are interrelated.

The representation of the block's ground floors (composed by the entrance level of each building) and of the facades have particular importance: the firsts are useful to analyze typologies and the different kind of relational space; the seconds are the interface between inside and outside.

According to their nature, facades can be considered on one hand as the "wings" of the urban spaces, and on the other hand they are indissolubly related to the architectural characteristics of the buildings to which they belong. Also when the facades are realized as uniform recasting of distinct building units, they carry the architectural, constructive, and figurative culture from which they derive.

In addition to the voids between the blocks, there are other kind of relational spaces: the system "entrance-hall-yard-scale" – typical of historical architecture and variously articulated case by case – correlate the exteriors and the interiors of the blocks. Therefore it plays an important role in the articulation of urban heritage's spaces. It is the same for the private spaces, covered and uncovered, inside the blocks, such as courtyards, cloisters, gardens, etc.

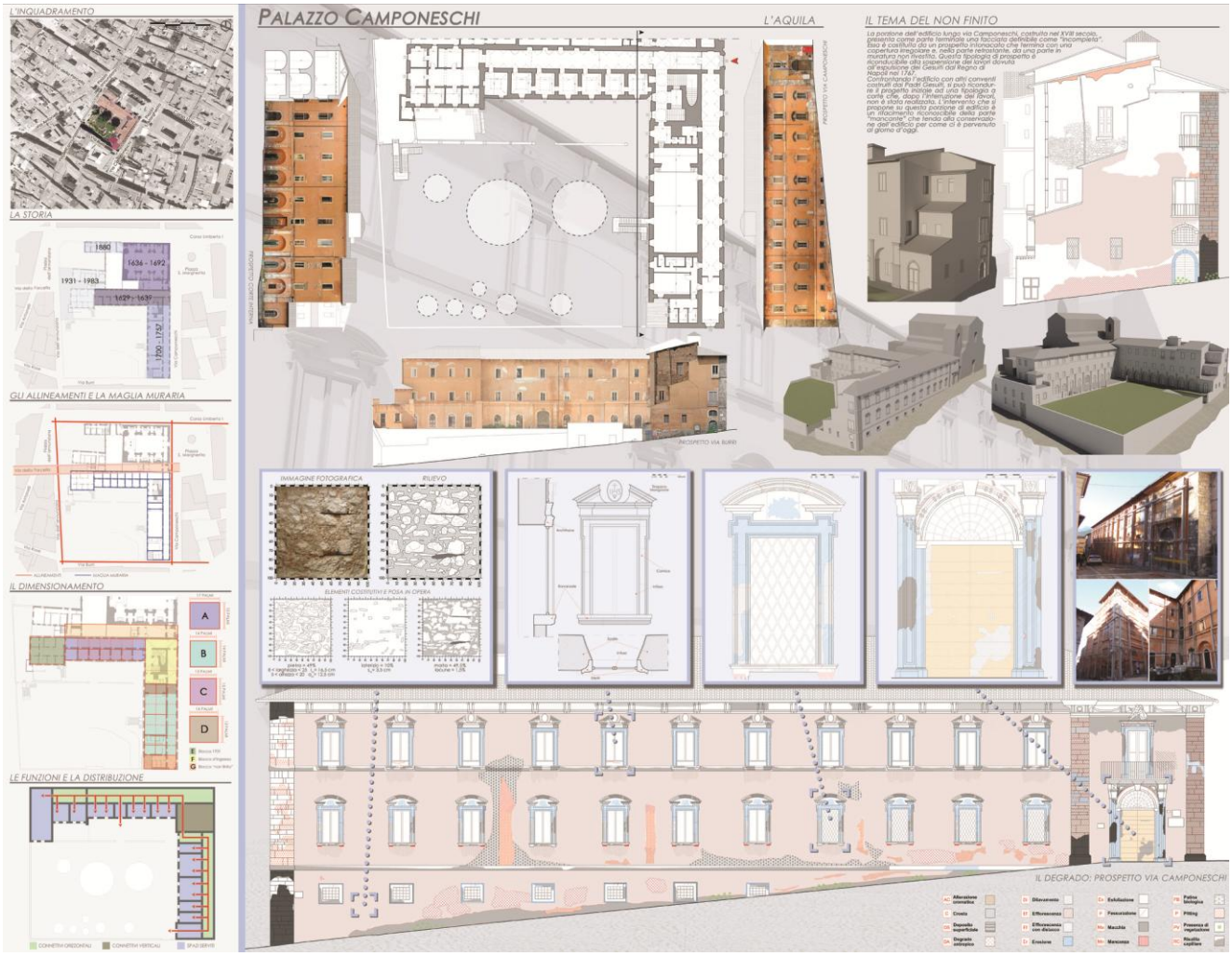


Fig. 6: Study of an urban block's: historic transformations, typological study, analysis of the facade (constructive characteristics, architectural elements, and degradation), 2D and 3D visualizations. (D. Capricci, M. Di Ferdinando, E. Roncari – Prof. M. Centofanti, Assistant S. Brusaporci).

Last but not least, the typological analysis itself roots on the system "entrance-hall-yard-scale".

In L'Aquila city surveying, the historical maps have been re-drawn, critically referred to the actual planimetric surveying: they are synchronical and diachronical maps (so called "Historical Sections"), referred to the more meaningful periods, to describe the transformation of the urban heritage (the sixteenth century, the eighteenth century, the first half of the nineteenth century, the second half of the nineteenth century). At the same time surveying forms have been compiled for each building. The form collects a synthesis of the historical information, the photographical surveying, the architectural surveying, archival and bibliographical references. (Fig. 6). The form guides the surveyor in gathering and analyzing data and information, and helps in comparing elements of different buildings and in highlighting building's characteristics – that is in characterizing typologies and historical and architectural values (judgment of values).

In the case of L'Aquila's historical centre, the typologies are:

- Churches and related appurtenances: outbuildings, convents, service buildings for religious institutions;
- Noble palaces: representative residence of the owner, usually typologically characterized by hall-courtyard-scale, with paths for reception, also associated with renting shops in the ground floor (XV, XVI, XVII, XVIII centuries);

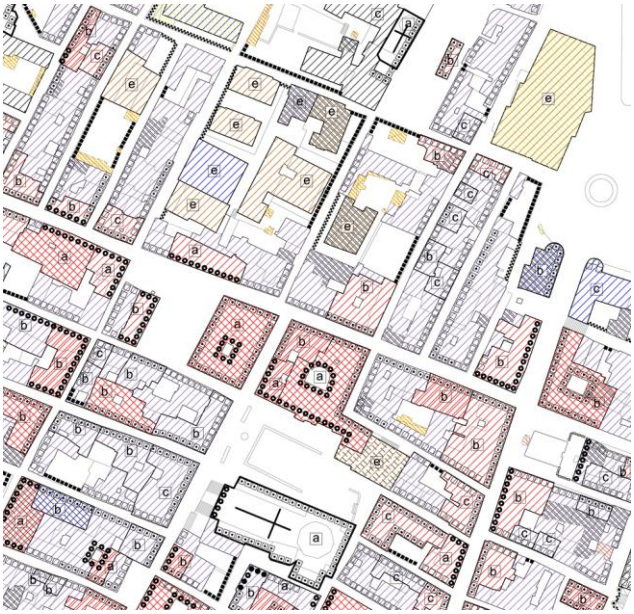


Fig. 7: The Historical-Architectural Values Map. Contents: Typology of each building (colored hatch); Architectural value's judgment on buildings (lowercase letter); Architectural value's judgment on facades – also on internal spaces – and on block's enclosures (lines with square and circular symbols).



Fig. 8: The Environmental Values Map. Contents: Urban spaces (public and private and their architectural value); Urban spaces pavements and urban furniture; Architectural value's judgment on facades – also on internal spaces – and on block's enclosures.

- Palace houses: for owner residence, with typological, architectural and formal characteristics similar to noble palaces, but not all simultaneously present and with decidedly smaller dimensions (XV, XVI, XVII, XVIII centuries)
- Bourgeois palaces and apartment houses: multiple residences in function of revenue (house for rent), with leased shops on the ground floor (XVIII, XIX, first half of the XX century);
- Residential buildings: court houses, terraced houses, pseudo-terraced houses, line houses, pseudo-line houses (XIV, XV, XVI, XVII, XVIII, XIX, first half of the XX century);
- Bourgeois villas and small palaces: manor house, with any housing for rent, organized in isolated volumes usually with garden (first half of the XX century);
- Villas, small villas and single-family civil buildings: newly formed (second half of the XX century);
- Line or block civil buildings: several floors with shops on the ground floor (newly formed, second half of the XX century);
- Outbuildings of residence, box, garage, small service buildings: made with interventions of clogging and / or superfetation (newly formed, second half of the XX century);
- Princely residences, palaces for the government, buildings for public administration;
- Laboratory, factories, craft workshops, warehouses, buildings for production activities, garages;
- Specialized buildings: military buildings, civil buildings for public services, management offices, headquarters buildings of industrial or business (XIX-XX century);
- Unclassified buildings.

On the contrary of quite all the other typologies, the residential buildings have a low specialization type level, because it collects quite all the residential types belonging to the so called "base buildings". This apparent generalization has a specific explanation in the peculiar characteristic of the historic fabric, usually characterized by stratification. Hence it's difficult to date building, except when all formal, figurative and structural elements.

The identification of the typology means the assignment of an historic judgment to the building.



Fig. 9: Focus of the Historical-Architectural Values Map on S. Maria Paganica and Chiarino squares. In particular the building's types are presented both on the plans and on the facades.

The studies are associated with the surveying of facade's architectural, material, color, and degradation characteristics (Figg. 5, 6).

According to all the previous analysis, the outcomes of the critical process of urban values' surveying are: the historic maps and two "Values Maps". The contents of the values maps are:

(1) The Historical-Architectural Values Map (Figg. 7, 9):

- Typology of each building (intended as definition of the historical characteristics at the actuality);
- Architectural value's judgment on each building: (a) with preeminent historical-artistic value; (b) with historical-architectural value; (c) with historical-environmental value; (d) recent buildings with historical-architectural value; (e) buildings incongruous to the context.
- Architectural value's judgment on building's facades (also on internal spaces) and on block's enclosures: (A) with peculiar historical-architectural value; (B) with defined architectural characteristics; (C) with defined historical-environmental characteristics.

(2) The Environmental Values Map (Fig. 8):

- Urban spaces (public and private) and their urban value judgment.
- Kind of urban spaces pavements, urban furniture, fountains, panoramic views, main urban axis, etc.
- Architectural value's judgment on building's facades (also on internal spaces) and on block's enclosures: (A) with peculiar historical-architectural value; (B) with defined architectural characteristics; (C) with defined historical-environmental characteristics.

The Urban Historical Sections, the Historical-Architectural Values Map, and The Environmental Values Map are complementary tools for the study and representation of urban values, and they have to be read in parallel and in relation one to each other.

This defined methodological approach has been developed with the integration of digital surveying and modeling (Centofanti, Brusaporci, & Lucchese 2014; Centofanti, & Brusaporci 2014, 2012a). The 3D models implement the two-dimensional critical studies, through the representation of the buildings in their material characteristics and their role in urban spaces conformation in different ages (Fig. 2, Fig. 4). 3D models of historical center's blocks have been realized according to architectural surveying and archival information. They are modeled with the integration of CSG (Constructive Solid Geometry), B-Rep (Boundary Representation), and mesh



Fig. 10: 3D model of a block of the historical centre. Its articulation is useful for the study of architectural values, of the inside and outside spaces, of building's typologies (F. Cerasoli).

surfaces. Specific attention was paid in model's semantization, using layers related to the constructive-architectural system. The LODs (Level of Detail) correspond to 1:50 scale (Fig. 10). Aim of the digital model is to represent the architectural and urban heritage but, firstly it is intended in its heuristic quality of visual computing tool: thanks to the digital modeling iterative process it favors the study of the artifacts and of their historical values. The communicative stream given by the iconic text of the model – connected with its simple visualization, manipulability and interpretability – makes it a smart, friendly, and power interface for information access and analysis. On the contrary of textual structures, there is a simultaneous communication coming from frames, zooming, intersections, transparencies, spatial and temporal skips – i.e. non sequential access modalities. It is a flow that finds its structural logic in the three-dimensional architecture of the model (Brusaporci 2015).

In particular the 3D model is intended as scientific tool for the "objectification" and "measurement" of architectural and urban values, and at the same time, as support for the development and the pre-definition of design choices.

8. Conclusions: Wishing the Wisdom

The earthquake that hit the city of L'Aquila in 2009 has highlighted a number of issues on historic town surveying practice.

First of all, the concept of building – as an individual within the urban context – in part is challenged by issues of both structural (continuity of the walls between the buildings) and historical stratification (for example buildings with facades recasting different units or the assembly of units to realize a single building). Similarly, typological analysis can not escape from the architectural study of what lies behind the facades. From these considerations derives the opportunity to consider the blocks in their entirely (Centofanti, Brusaporci, & Cerasoli 2014).

Thus the theme of the historic town surveying is becoming more complex, at least conceptually referring to an extension of the architectural survey to the whole city. This raises the question whether the urban survey is to be understood simply as an extension of the architectural survey to the urban scale, also considering that the theoretical-methodological premises are the same. Actually, the difference between architectural and urban surveying is simply conceptual, because the methodologies don't changes, but only the aims are different.

In any case the urban complexity points out the problem of data, information, knowledge, and wisdom hierarchy. But in this case what could be defined as "wisdom"?

Firstly, the awareness of the values is the most important purpose of a scientific and critical knowledge.

Therefore the knowledge has to be the reference point for protection, safeguard,



Fig. 11: The 3D model favors the restoration's design (F. Cerasoli).

management, enhancement and restoration of the historic town.

In his "Theory of Restoration" (1963) Cesare Brandi wrote that knowledge is the first act of restoration. In this way it is to be configured a specular relationship between knowledge model and project, where the last one has to rise directly from the surveying interpretative visualizations (Fig. 11).

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