Chapter 14

Handbook of Research on Urban and Territorial Systems and the Intangible Dimension:
Survey and Representation

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ABSTRACT

Surveying has always been closely linked to the definition of cognitive framework to which it is connected. Carrying out a survey has always meant representing the geometry of the context of interest but also thoroughly investigating the historical dynamics, the tangible, behavioral, and performance-based characteristics. The dimensions of comfort, usually associated with the private, domestic environment, now extends to the urban and territorial context too: perhaps going beyond the sense of the threshold referred to by Walter Benjamin when he described the city as a house with its living rooms. A new concept of habitable city has developed, where we can live, according to Ortega y Gasset, not simply a place for estar (being) but for bienestar (wellbeing).

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The basic materials of city planning are: sun, sky, trees,

steel, and cement, in that strict order of importance.

Charles-Edouard Jeanneret-Gris, dit Le Corbusier

INTRODUCTION

In 1960 Kevin Lynch published The Image of the City. The text disseminates the doctrine of George Keepes and had an immediate success. For the first time, they are introduce graphic expressions that can substantiate and represent thoughts and considerations that were previously only argued. Lynch talks about figuration (imageability) in terms of a sign that can evoke in the reader a strong image that refers to concepts of form, colour or location. These facilitate the formation of vividly identified environmental images that are powerfully structured and highly functional (Lynch, 2013). The author analyses the structure of some cities while representing the weaving of the elements characterized by ideograms. These are introduced via special symbols relating to Paths, Edges, Districts, Nodes, and Landmarks.

The Paths are the paths through which the observer looks at the city. They have different characteristics depending on their usability features, size, decoration, importance, etc. The Edges, i.e. the margins, are paths that serve as a boundary between different areas such as neighbourhoods in different characterization—these can be as permeable or impermeable to the transverse movement. The Districts are relatively large urban areas that are recognizable for the observer depending on their internal characterization in terms of social structure or physical. They are then identified with specific notations of the Nodes (connecting spaces, real hinges between different elements or points of thematic concentration) and the Landmarks—elements that are distinguished in urban areas because of their marked individuality. However, the graphic language is limited to the development of ideograms of extreme synthesis postponing any reference to the volumetric and architectural consistencies of the buildings.

Around the same time in 1961, Gordon Cullen published Townscape—the title of the book introduces a new paradigm—many things that would have been impossible for a detached building take place in a set of buildings (Cullen, 1976). This time the architectural space and urban space become one[1] but often symbolical notation, abstract and reasoning leaves room for subjective iconic description that is geared to a "vedutistico" approach. The study analyses the sensitive features of urban agglomerations but most of the time the plant representations are more of a key plan that supports views rather than an autonomous survey system.

Later, in 1968, Augusto Cavallari Murat—the director of the Institute of Technical Architecture of the Politecnico di Torino—organized the full-bodied study Architecture and Urban Form in Baroque Turin. This research is characterized by its objective rigor. The language combines the discussion of the architectural space and urban space in the light of the lessons by Zevi with strict principles of scientific universality. Cavallari was aware of the studies of Lynch and Cullen (Cavallari, 1968a) and moved by a strict ordering principle at the same time to develop a language addressed to the urban survey with notations organized on three encryption levels.

The first one (which in 1974 becomes UNI 7310/74) is based on the representation of objective facts that are analysed according to the principles of the Vitruvian triad *commodus*, *firmitas* and *venustas*. Attention refers to volumetric characteristics, functional, and ornamental distribution. The second level is also marked by objectivity and analyses the destination of use and the technical and stylistic qualities of the individual building cells.

The third level of coding is based on directly readable and recognized architectural elements. It tends to establish a bond of relationship between these and the urban space proposing the introduction of ideograms specifically targeted to the definition of urban monumentality—a topic very near to the subjectivity themes. Thus, it is a triple diagramming that, with reference to a well-detailed historical context such as that baroque, appears to describe the urban and architectural space in specific and defined terms. In terms of representation, it should be noted that the cognitive process developed by Cavallari may terminate the urban survey as an immediate activity with walking-sticks and paper, but it becomes a patient work of laboratories. This work was later transported into detailed elaborations including controls, conjectures and experiments (Cavallari, 1968b). The road thus identified has had a number of developments and applications over the years—just think of the research led by Dino Coppo, where he developed new graphic codes concerning both urban contexts built in different historical contexts from the Baroque period. These concern the city of the nineteenth-twentieth century—both at ephemeral and repetitive size such as those of urban markets (Coppo & Davico, 2001).

Given the vastness of the analyzes to be conducted on a territory as strongly anthropized as Italy, and mostly characterized by historic buildings constructed without specific seismic prescriptions, this research aims to propose a methodology of quality and expedition analysis, such as to acquire, in a reasonably short time, sufficient information to activate a top-level decision-making process.

The proposed method is related to the important initiatives launched in the 1970s by scholars such as Salvatore Di Pasquale (a true innovator in the verification of the behavior of historical walls), followed by Antonino Giuffrè. These were followed by the studies of Davide Benedetti and Vincenzo Petrini (who developed a building assessment in 1984 to define a vulnerability index, later used as reference for the 1994 CNR-GNDT data sheet). In 2011 (Formisano et al. 2011), the switch was made from analysis of the individual buildings to an urban aggregate dimension. However, it was only in 2012 (Council of Public Works, 2012) that the issue of seismic vulnerability on an urban scale became the subject of attention of national organizations, which are mentioned for the first time within the legislative framework of Stability Law. 147/2013.

Tools, Procedure, and Objectives

In general, if we summarise things, we can think of elements of investigation retraceable to three categories. The first is related to the urban geometric plant, construction and mechanical features of buildings, the hydrogeological characterisation of places and the survey of chemical-biological characteristics, such as the presence of pollutants. It should be then highlighted that the urban geometric plant, when related to the construction features of buildings and the geological characterisation of the territory, can allow second level assessments. For example, it is possible to carry out assessments related to the seismic vulnerability of cities (in their entirety or related to parts) or, in the case of intervention by parameters relating to use, even estimates relating to risk factors. In this latter case, we are dealing with elements that are definitely not tangible in geometric terms but are made visible by the use of appropriate systems of representation and can be reported in direct and easily expressible terms. As far as the survey of pollutants dispersed underground or released into the environment is concerned (and this is the case, for example, of roofs made of fibrocement containing asbestos fibres), electromagnetic pollution due to electricity lines or other sources, these are geometric and other entities retraceable to dimensions that can be objectively measured using the language of classic science. The presence of storage deposits and industrial uses of products that are potentially harmful for man and the environment are closely linked to risk factors that are, in turn, related to natural events or human error, as well as non-compliance with scheduled safety levels.

The second category concerns the social system and regards the surveying of parameters which can contribute to the condition of psychological and cultural wellbeing enjoyed by the individual in terms of relationship with the context. This involves surveying aspects which, while being closely related to geometric, material and physical entities that are objectively measurement, are perceived individually in different terms. This research is fuelled by the desire to implement a system of surveying and communication of the data investigated which is capable of systematising the cognitive system in terms of "urban decorum" (considered as a widespread and pervasive attitude) and, more generally, of the minimum living standards of spaces with reference to general availability of seating, thermal, visual, tactile comfort, etc.) (Scudo, 2007).

The third category concerns the environmental system. The experience indicates that, in order to gain a complete picture, an urban space has to be investigated, known and studied – not only as a geometrical architectural element but also with regard to air, sun, shade, smell and sound – in other words, as an impalpable and "beneficial" flux which carries the cultural values that reflect individual and collective urban behaviours, through forms and materials. The growth of the culture of the urban survey and its complete satisfaction of modern requirements is also achieved through the development of assessment tools which allow us to measure the performance in terms of thermal, light, acoustic and environmental, i.e. general multisensory, comfort, of public spaces. These are dimensions which are investigated in the mutual contextual relations using the geometric language while not being intrinsically geometric. The interactions between islands of urban warmth and vegetational and material components, between road noise and natural screens, become open to investigation only when they are represented. Design creates the network of conceptualisation right from the acquisition of the data and becomes the creator of a selective, additive and corrective synthesis but also of a formative, systemic and encompassing nature (Nunziata, 2016).

Survey Method and Case Study

For the practical verification of the method being outlined, the research team progressively identified significant spheres of elaboration that represent the system of buildings at national level, on the basis of the constant outcomes. First consistent application was represented by the old part of a town within the metropolitan area of Turin, Chieri (analysis on an urban scale).

The category of "arched buildings around a square", considered in this new development of the method, meets the criteria highlighted and the considerations that emerge can be generalised, while complying with the need to locally specify, case by case, the individual and peculiar features that historical Italian districts constantly present. It contains structural types and arrangements that can be applied on a vast scale in town centres, with more evident shared specificities for cases of a vast area in towns bordering with that considered.

The studio tools are first tasked at the operational level. If the "survey by sight" is fast, then many actions that take place after the site visit are dedicated to the return of slavishly observed facts and the integration of these facts with the assets of pre-critical knowledge that are gradually formed and strengthened. We therefore reasoned that making this first collection effective will result in a better reconstruction process. We try to reduce the mere compilation time and dedicate it to more timely and in-depth audits. The selected way has characteristics that closely resemble those that are complying with devices that are employed on a daily basis, i.e., smartphones and tablets. This is done via interactions and the constant exchange with the telecommunication network.

The definition of the survey method has seen successive integrations in terms of content. This has involved a substantial shift from detection to those almost exclusively conducted “on sight” (an analogue system then brought back to the entire discreet set that is formalized in early versions of the tables above0. This is mediated by the sensitivity of the researchers and the opportunity to integrate that first full-bodied set of data with other data of “pre-processed” nature.

The Intangible Dimension and the Survey Categories

The complexity of the contemporary city creates specific situations regarding the study of settlement systems. Alongside the study of the organisation of the *urbs* (the physical city) and of the aspects in terms of *civitas/polis* (analysis of urban fabrics with reference to social organisation as well as lay and religious governance structures), the research illustrates surveying codes and methods that refer to aspects that haven’t been covered in the past. The study tackles the subject of investigation and the knowledge of spheres such as urban-landscape quality, the economic-social appeal of the context (looking not only at the geometry but also the *dispositio*, i.e. the *ensemble* that characterises the multifaceted relationship between groups of buildings), individual wellbeing (depending on sensory perceptions and risks), environmental sustainability and people’s biological health and safety. In this sociocultural setting, numerous fields of investigation have to be covered when surveying the city. The extensive experience matured leads to the belief that *as the urban reality is structurally complex, the image create has to be a mental synthesis* (Coppo, 2010) expressed in an encoded symbiological representation, where design becomes a relative thought and a diagnostic assessment at the same time.

Contemporaneity has cancelled much of the social and physical differentiation which, from classical times onwards, has distinguished *cives* from *vir*. Social living acquires new and more complex conformations linked to the ways in which we use public space. Talking about urban comfort means investigating the mechanisms that reconcile the need for wellbeing with the pleasure of feeling part of the *urbs*, of the cultural and social opportunities that it offers, of the need for a functional layout that guarantees accessibility and comfort. Until quite recently, the investigations that were prioritised were metric, aimed almost at identifying urban quality exclusively according to the quantitative confirmation of measurable physical dimensions, and this was necessary but not enough. For a long time, there was a failure to pay attention to comfort in terms of the quality of the built environment as individually perceived. It is now widely believed that the quality of the urban environment can be traced back not only to figurative, historical-critical aspects and to a close observation of materials and construction techniques, but also to aspects that concern the appeal of the cultural landscape, the presence of facilities and services and their utilisation, the chemical and biological nature of the context and, more generally, the overall safety and physical wellbeing (in terms of noise limits and temperature, above all). These are all themes of investigation which, having no inherent geometrics and consequently lacking direct visibility, are considered intangible.

Due to the fact that knowledge is related to contemporaneity in additional and not substitutional terms (given that the complexity facing researchers today is expressible mainly through the concept of multiplicity, i.e.: with the simultaneous contribution of related and concurrent forms of knowledge) it is necessary for the discipline of surveying to investigate, know and represent what is described as intangible. The journey of knowledge pursued up to now and implemented largely using a language (in some cases not codified but shared and available to the masses) capable of directly representing in terms that can be verified *de visu* what we see, is joined by the demand for an additional capacity for investigation. The research in question shows how survey drawings require a new and additional scientific contribution. What emerges is the awareness that, by resorting to the disciplines of representation, it is possible not only to classify and codify what is visible (according to the teachings of Saint Augustine, sight is the lady of knowledge), but it is also possible to make the intangible suitable for figuration. The topic then shifts from the more inveterate dimension of the representation of the visible to that of which can be at most suitable for figuration and which only assumes the dignity of existence in cognitive terms through representation.

Topics configured in this way necessarily encounter aspects and problems linked to knowledge considered as specialised reading and interpretation of complex and stratified situations. The discipline of surveying also becomes an opportunity for relations between different contexts.

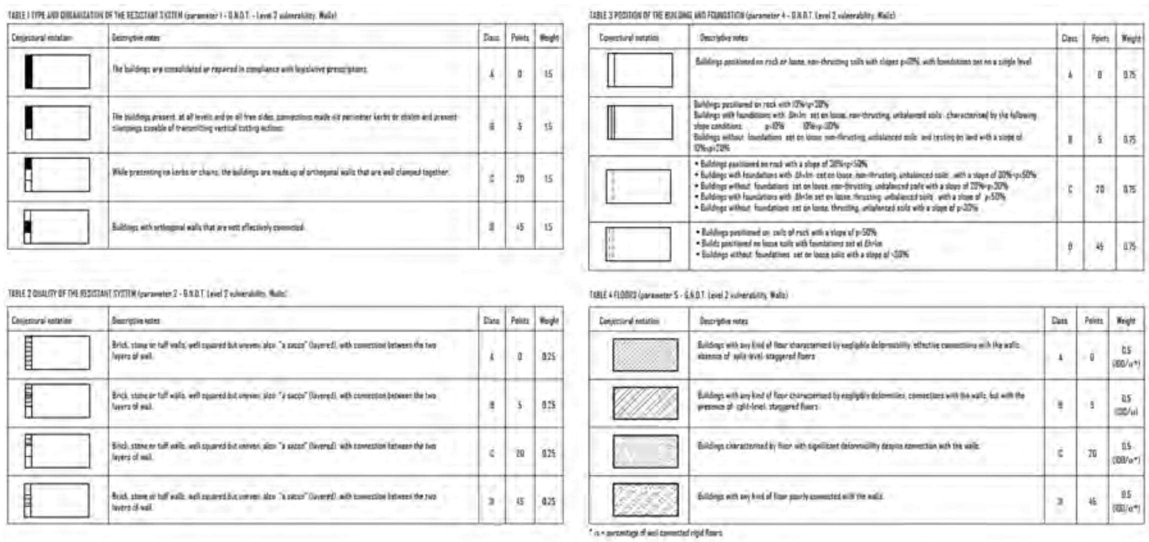
The Survey of the Geometrical, Physical and Chemical Entities Within Urban Systems and the Representation of the Relative Performance Behaviours

In this case too, as always, the topic is the relating of levels of knowledge and methods of representation. Given the aims of the research and the need to make constant updates, it is considered essential to use a basic map right from the start, to provide adequate support for the new models and new forms of representation on an urban scale[2].

As regards the method of knowledge of the urban geometric layout and the constructive and mechanical features of buildings, the research presented is the report of a study carried out in relation to historical construction, while the procedures and methods of investigation of contemporary construction are still being perfected[3].

With reference to towns characterised mainly by construction with brick structures and vaulted roofing systems, first of all an exploratory analysis process was put in place, to identify the elements that make up each building and/or construction unit. The procedure consists in examining, with reference to the construction under investigation, fifteen parameters that represent the geometric and mechanical features. Each one is assigned a graphic code, capable of describing and specifying its qualities. As shown in Figures 1-3 Tables 1-15 findings related to the process of cognitive analysis are gathered and critically arranged into ideogrammatic notations which describe the mechanical features of the apparata. The coding system proposed pursues the aim of reducing survey data (representable with stereometric maps, particularly with regard to the analysis of interactions between the various buildings) to the representation of plans using ideogrammatic notations. The organisation of these sometimes refers to the geometrical mechanical concepts that they want to express. An example is provided by notations relating to the jutting of ceilings, the variation in heights or the mutual planimetric position between adjacent buildings within the urban aggregate. It has generally been found that the use of ideogrammatic notation prioritises both simplification and normalisation as well as the possibility to create maps on different themes. This is functional to the computerised processing of survey data.

Figure 1. Synoptic framework of the tables relating to the ideogrammatic notations pertinent to the resistant system of each individual building (edited by Giorgio Garzino)

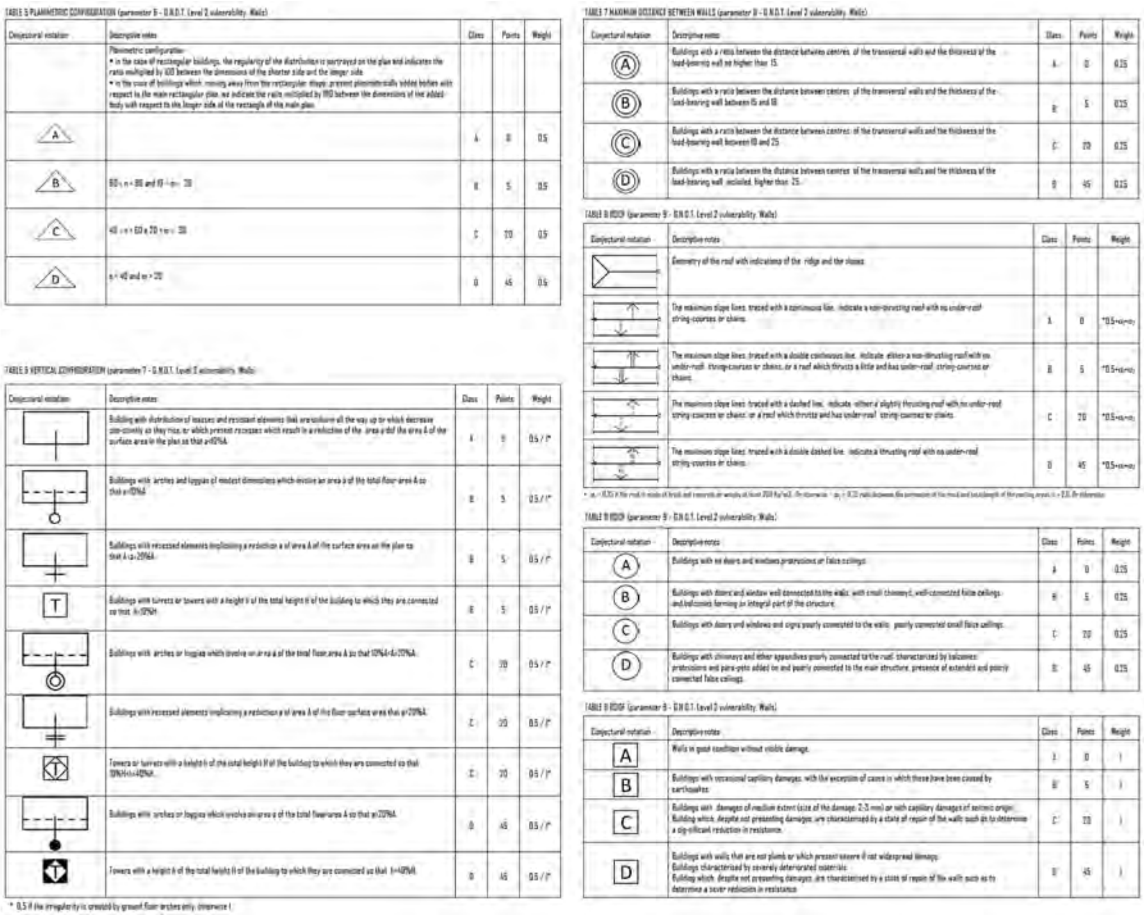


Each parameter is assigned to one of four vulnerability classes (A – B – C – D), defined inn growing order of danger, each of which has a score. Every parameter is associated to a weight factor: the vulnerability index is triggered by the sum of all the scores identified by the attribution of the various classes multiplied by the relative weights.

Up until now, these indices have always been contained in tables annexed to the datasheets of each building. The particular nature of this research consists in creating a graphic code on which to base the preparation of maps capable of representing the seismic vulnerability of aggregated buildings, using the scientific procedure and method indicated. This procedure is related to the specific methods of urban survey, aimed – by vocation – at representation of an area in squares. First of all, it is possible to add together the values corresponding to the seismic vulnerability of each square that makes up the urban aggregate, then dividing the result by the number of squares and obtaining a mean vulnerability value for the aggregate. We decided to represent mechanically standardised territorial units, using five conditions. Mapping can highlight the worst situations (indicated in bright red), the intermediate situations, identified in orange, light green and green, and those that offer better guarantees (dark green). For more details see the classification contained in Figure 3 Table 16.

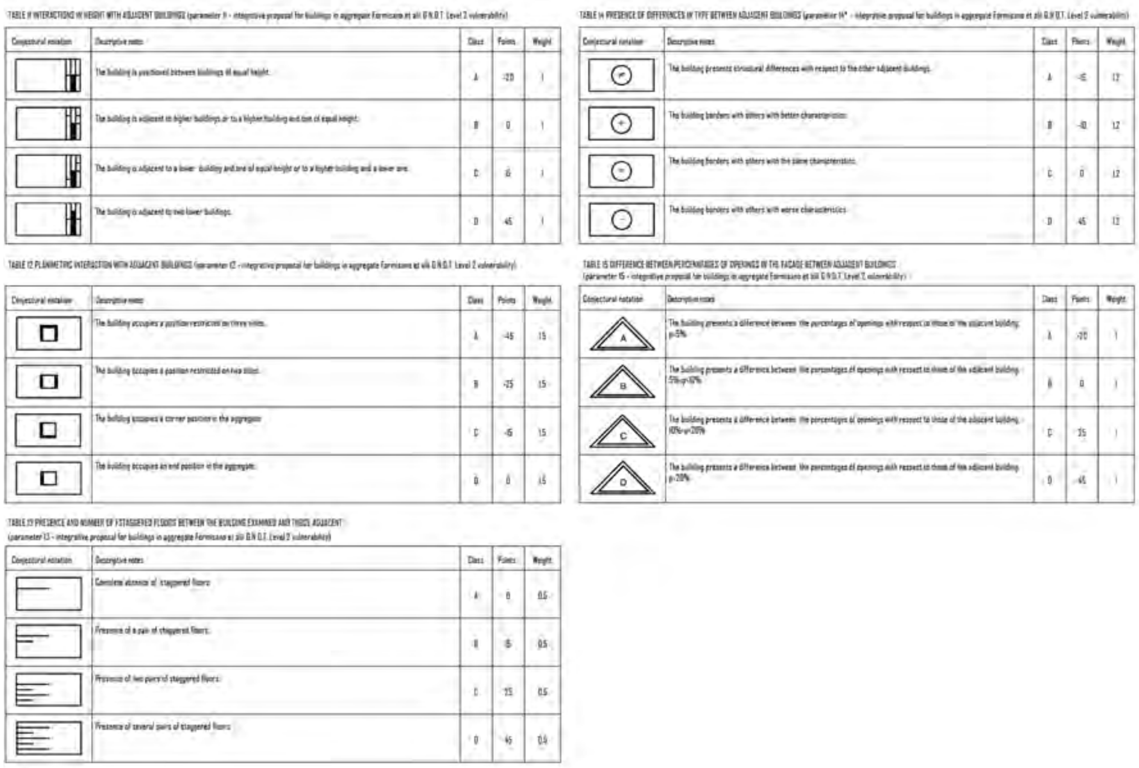
However, following a more in-depth analysis, we can see how this first level of investigation is not sufficient to thoroughly describe the complexity of an urban system. It is necessary to distinguish, in terms of mechanical behaviour, between direct vulnerability, consisting of the different reaction to damage of a building or a complex of buildings, and vulnerability projected onto the system by certain elements characterised by singular behaviour. The latter depends as much on the specifics of the individual constructions as on the morphology of the urban systems. Recurring examples are towers, whether they belong to medieval buildings or are simply bell towers from different historical periods, the particular conformation of gates to walled cities, triumphal arches or arches built across streets, and the façades of baroque churches. Depending on the plan of the urban fabric, a tower, bell towers or construction element could be an element of additional vulnerability for a territorial unit adjacent to that to which it belongs,

Figure 2. Synoptic framework of the tables relating to the ideogrammatic notations pertinent to the geometric conformation and the condition of each individual building (edited by Giorgio Garzino)



due to the possible involvement in the event of collapse. In this case it is necessary, as proposed in Figure 4 Table 17, for the mean score relating to the mechanical classification of the segment, or a portion thereof, be increased in relation to the area involved in the collapse and indicated on the map with an outline, depending on the height and the geometry of the construction element concerned. We decided to graduate the amplification factors in relation to the intensity and the destructive capacity estimated in relation to the potential collapse of the construction elements referred to. The subject of planning roads and public spaces in general is a case in its own right. A road can be analysed from numerous viewpoints. For example, it can be considered in relation to its constructive nature (flat, close to a level crossing, supported by buttresses, etc.) and be catalogued as such within a vulnerability class. With this in mind, a coding system is proposed, as indicated in Figure 4 Table 18, organised according to a score system with five levels of decreasing vulnerability, from violet to light blue. However, a road can also be subject to induced vulnerability, caused by possible collapses of the buildings overlooking it: the narrower the road, the more severe this vulnerability becomes. So, for access routes too, we also have to forecast a multiplicative factor of vulnerability, expressed this time using a double entry matrix (see Figure 4 Table 19), which simultaneously contemplates the geometric parameter related to the width of

Figure 3. Synoptic framework of the tables relating to the ideogrammatic notations pertinent to the interaction between adjacent buildings forming in building aggregate (edited by Giorgio Garzino)



the road and that related to the mechanical vulnerability of the adjacent buildings. These buildings are considered in relation to the mechanical vulnerability characteristics of each square, given the predominance, in this specific behaviour, of the main features of each building with respect to the mean value of the similar territorial units. Another very important aspect is the interaction between the built system and infrastructural networks. Most historical urban systems were built with no infrastructural networks and subservices. The presence of medium voltage grids, underground or otherwise, the development of gas networks, the provision of systems for the distribution of drinking water or of collection pipes for the waste water and sewage were mostly added subsequently, making the best of a poor situation, with lots of pipes being bundles together, crossing over and overlapping. A seismic event can trigger technological vulnerabilities, such as explosions, fire, pollution, etc… Moreover, once underground pipelines have become disconnected due to seismic action, they can cause overflows and flooding. The presence of a dense infrastructure in a very limited space can increase the vulnerability of the system of roads and public spaces within urban systems (see Figure 4 Table 20 and Table 21). Each urban morphology is characterised in relation to its specific features in terms of method and intensity of interaction between buildings, infrastructural networks and outdoor spaces.

Maps based on geometric documents, such as the cadastral maps of urban areas, have been created. During the performance of certain tests relating to the calibration of the method proposed, we found that the cognitive journey is completed and unravelled also with the development of graphic codes, which

Figure 4. Synoptic framework of the tables relating to the ideogrammatic notations pertinent to seismic vulnerability on an urban scale (edited by Giorgio Garzino)

TABLE 16 : MECHANICAL CLASSIFICATION CRITERIA OF HOMOGENE TERRITORIAL UNITS

CLASS	COLOR	SCORING OBTAINED FROM THE FORMS OF THE CNR-GNDT GUIDELINES UPDATED ACCORDING TO THE CRITERIA OF INTERACTION BETWEEN BUILDINGS BELONGING TO THE SAME ISOLATED
I		0 ÷ 199
II		200 ÷ 299
III		300 ÷ 374
IV		375 ÷ 424
V		425 ÷ 515

TABLE 17 : MORPHOLOGICAL AMPLIFICATION FACTORS RELATING TO MECHANICAL CLASSIFICATION OF HOMOGENE TERRITORIAL UNITS

Area affected by the possible collapse of towers / bell towers and church or basilica's pediments	2
Adjacent / proximity to gates of murals and / or triumphal arches	1,5
Contiguity with building arches crossed the streets	1,3

TABLE 18 : CRITERIA FOR THE MECHANICAL AND MORPHOLOGICAL CLASSIFICATION OF THE VIARY SYSTEM AND THE PUBLIC SPACE

CLASS	COLOR	TYPE OF ROAD SYSTEM	POINTS
I		Flat roard and predominantly straight / open flat plane constituent a square or a widening ($p \leq 8\%$)	0 ÷ 199
II		Street with limited slope and predominantly straight / open space with limited slope ($p \leq 8\%$) constituent a square or a widening	200 ÷ 299
III		Road predominantly in slope ($p > 8\%$) with curve	300 ÷ 374
IV		Road in slope ($p > 8\%$) located alongside a slope / cliff	375 ÷ 424
V		Road in slope ($p > 8\%$) located alongside a slope / cliff characterized by a change of direction, supported by male walls and buttresses	425 ÷ 515

TABLE 19 : MORPHOLOGICAL AMPLIFICATION FACTORS RELATING TO CLASSIFICATION OF THE VIARY SYSTEM AND THE PUBLIC SPACES

ROAD WIDTH AND PRESENCE OF BUILDINGS	MECHANICAL CLASSIFICATION OF BUILDING UNITS				
	I	II	III	IV	V
Buildings on one side of the road with a width greater than the maximum height of the construction faces	1	1	1	1,2	1,3
Buildings on both sides of the road having a width greater than the sum of the heights of the forward facing facades	1	1	1	1,3	1,5
Buildings on both sides of the road having a width equal to the sum of the heights of the forward facing facades	1	1,1	1,1	1,4	1,5
Buildings on both sides of the road having a width equal to or less than the sum of the heights of the forward facing facades	1	1	1,2	1,5	2
Buildings on both sides of the road having a width less than the sum of the heights of the forward facing facades	1,1	1,2	1,4	1,7	2

TABLE 20 : CONVENTIONAL SYMBOLS CONCERNING THE CHARACTERIZATION OF THE SUBSERVICES

TYPE OF SUBSERVICE	CONVENTIONAL SYMBOL
Black sewers	■■■■■
Foul water sewers	□□□□□
Aqueduct	– – – – –
Gas network	++++++
underground elettrical line	* * * *
aerial elettrical line	o o o o

TABLE 21 : MORPHOLOGICAL AMPLIFICATION FACTORS RELATED TO THE COMPRESENCE OF SUBSERVICE NETWORK

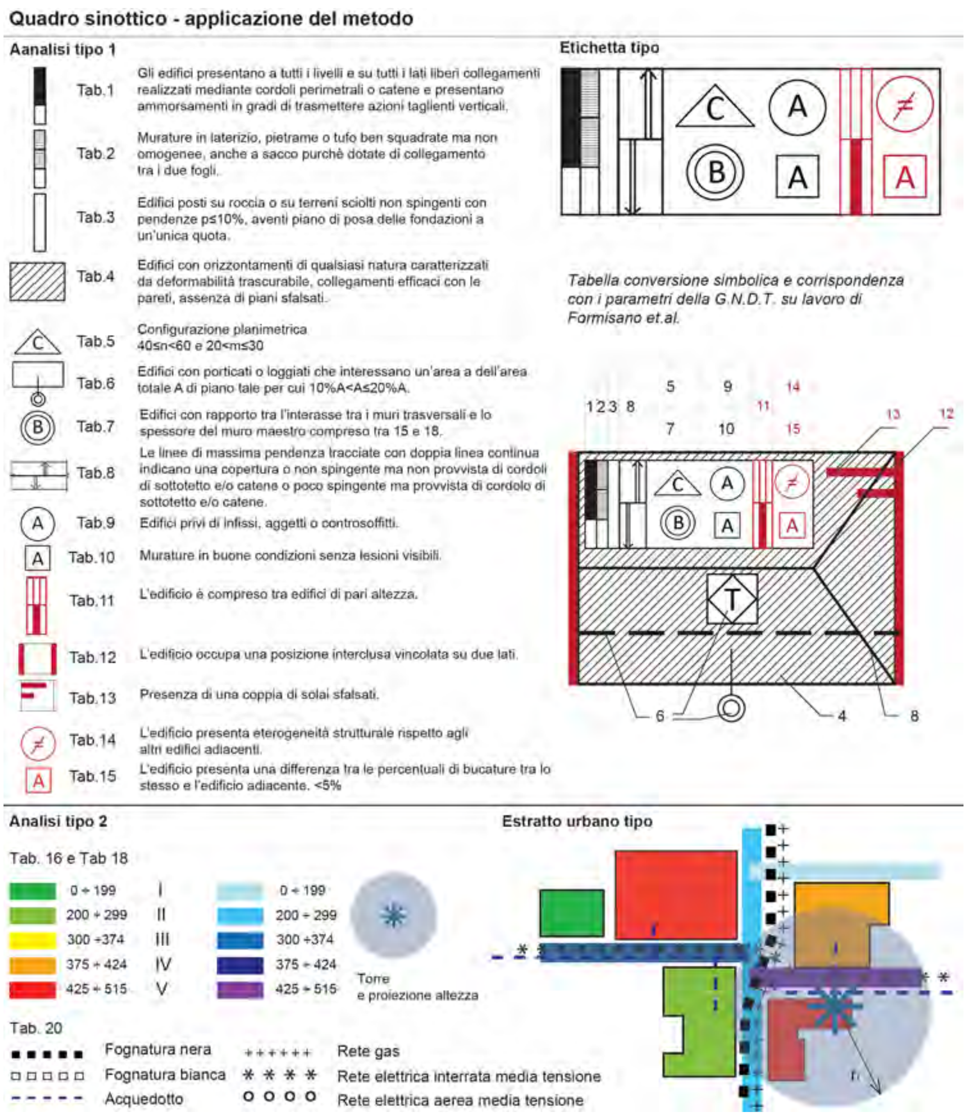
CONTEMPORARY PRESENT OF SUBSERVICE NETOWRK TYPE	ROAD WIDTH (l)			
	$l<4m$	$4m<l<7m$	$7m<l<10m$	$l>10m$
Black and foul water sewers	1,1	1	1	1
Aqueduct and mains medium voltage underground	1,3	1,1	1	1
Gas network and underground electrical line	1,5	1,3	1	1
Aqueduct, gas network and aerial electrical line	2	1,5	1,3	1
Black sewers, aqueduct, gas network and aerial electrical line	2	1,5	1,3	1

are not only visual representations of concepts that are otherwise expressible in more articulate terms, but an opportunity to collect and analyse, approximating and then summarising, what has to be grouped together and what has to be separated. The language of representation becomes a form of thought through which to perform the cognitive process (Figure 5).

As regards the survey of geometric and other entities, retraceable to objective measurable dimensions using the language of classic science, it is felt that the subject can be treated, firstly, with the use of symbological notations for use in the preparation of topical maps which can be integrated into an urban information system. This has to be capable of gathering information which can be acquired through big data systems and structuring it in such a way as to identify, on one hand, the univocal characterising morphology, and, on the other, be constantly updatable.

During the initial phase, the study subjects are investigating via an analytical breakdown of the complexity investigated. Then squares are prepared for collecting the data analysed in rational, orderly terms. To this end, it is important for all the information to be built on the same unified base which governs the entire system (the base map) in order to simplify the recomposition of the information in an overall picture. As far as the graphic language is concerned, we tried to organise a code where there is no predominance of symbological notations to analyse reality, breaking it down more and more using different

Figure 5. Synoptic framework of the tables relating to the ideogrammatic notations pertinent to the preparation of a standard survey for a building in relation to surveys on a construction and urban scale (edited by Giorgio Garzino, Maurizio Marco Bocconcino and Vincenzo Donato)

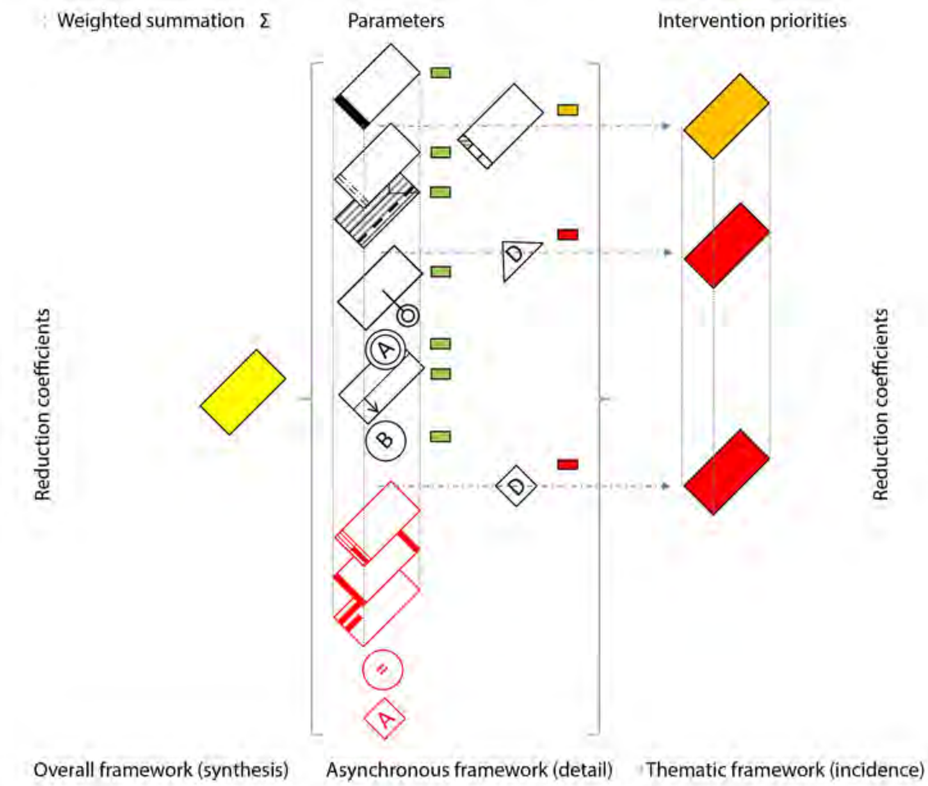


filters, each with their own structural rule. The result would be a condition of impossible recomposition within an overall, general picture of the various aspects investigated (Figures 6-8).

Case Study: Arched Buildings in Piazza Santarosa in Savigliano (CN)

The medieval Piazza Vecchia, now Piazza Santarosa, presents a continuous curtain façade (tower houses dating back to the 13th and 14th centuries), most of which have been restored, and some architectural highlights.

Figure 6. Layers, cognitive levels, synthesis, framework of impact (intervention priority) (edited by Maurizio Marco Bocconcino)



Built on a previously existing settlement, it presents an irregular, elongated plan following numerous transformations and rearrangements of the individual buildings. The origin of the urban installation dates back to the beginning of the 13th century, when Savigliano became a free commune and the noble families that moved here set up home in the outer area, building "fort houses" facing the square. The arches didn't exist at the time. The buildings occupied two storeys and the ground floor was occupied by shops.

In 1470, a municipal order was given for the progressive reorganisation of the square, which had become the administrative and economic centre of the town. New constructions were built, up against the existing façades, creating the arches we see today, and consequently reducing the area of the square; part of the pre-existing façades can still be seen on the interior walls of the houses.

During the 15th century, the Municipality carried out restoration works, regulating the market and the advance of the houses, opening up arches and creating new prospects.

Other transformations took place in the 17th century, especially with the construction of loggias, and in the 19th and 20th centuries, when there was a tendency to make the façades of the buildings more uniform.

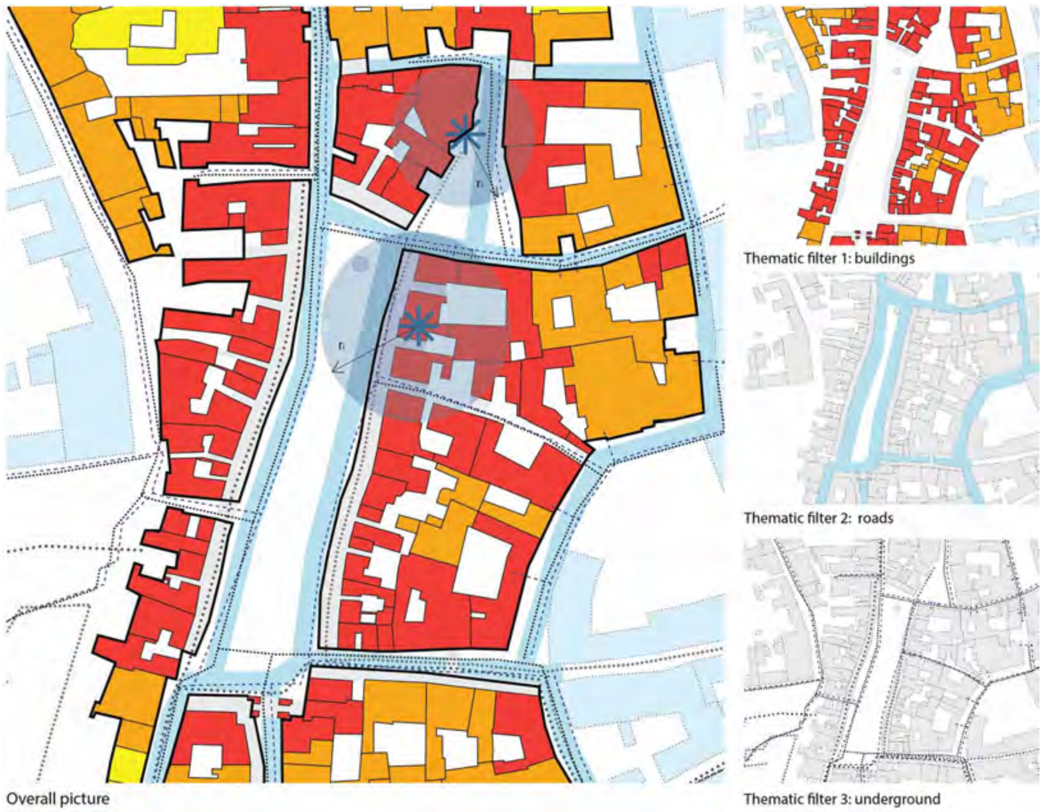
Since the 1990s, the area has undergone considerable architectural recovery of buildings, with the creation of pedestrian areas. The square is now completely arched, with covered public spaces dedicated to trade, social activities and leisure facilities (Figures. 9-12).

Figure 7. Overview relative to the case study of Piazza di Santarosa – Savigliano: resistant system, geometric conformation and conditions relating to the single building and interaction between adjacent buildings forming a standardised aggregate (ref. Tab. 1 – 15). (edited by Vincenzo Donato). Enlargement of quadrant I: case study of Piazza di Santarosa (ref. Figure 7) - (edited by Vincenzo Donato)

The transformations and changes that have taken place in the buildings in the square have determined the analytical methods and procedures, as well as the critical considerations that will be helpful to subsequent developments of the research, particularly in relation to the qualities of the expeditious survey and its efficiency.

The application of the investigative method requires data collection activities on site and from bibliographic and iconographic archives, in compliance with the traditional method that sustains urban survey. Its objective, as mentioned earlier, concerns the identification of structural elements for the analysis of seismic risks, via deductions triggered by the geometric and topographic identification of the elements. In our case the operational flow involved:

Figure 8. Summary of the application relating to the seismic vulnerability on an urban scale (ref. Tab. 16-21) (edited by Vincenzo Donato)



- Identification of a first significant case study for the category “arched buildings around a square”;
- Critical pre-comprehension of the case study:
- Discovery of bibliographic and iconographic sources;
- Identification of historical stratifications in the urban and construction systems;
- Basic map analysis (last available update of the municipal technical map);
- Onsite inspections;
- Design of ground-level installations;
- Association of the cognitive elements of the survey;
- Application of the support graphic code.

As can be easily seen from the case study presented, the extremely complex structuring of the town, while limited to the geographic dimension of the so-called “old town”, required an investigation developed into numerous areas and thematic sectors, each related to a process to break down the town into parts. This is hard to summarise within a single type of survey, or, to put it better, it requires detailed investigation on a case-to-case basis and with regard to the specificities of the analyses to be carried out. Consequently, it is necessary for all the information collected to be appropriately structured and made congruent, with the construction of networks of relations between data that can be examined later. Hence the need to use, as in the case study in question, informative systems in which the information

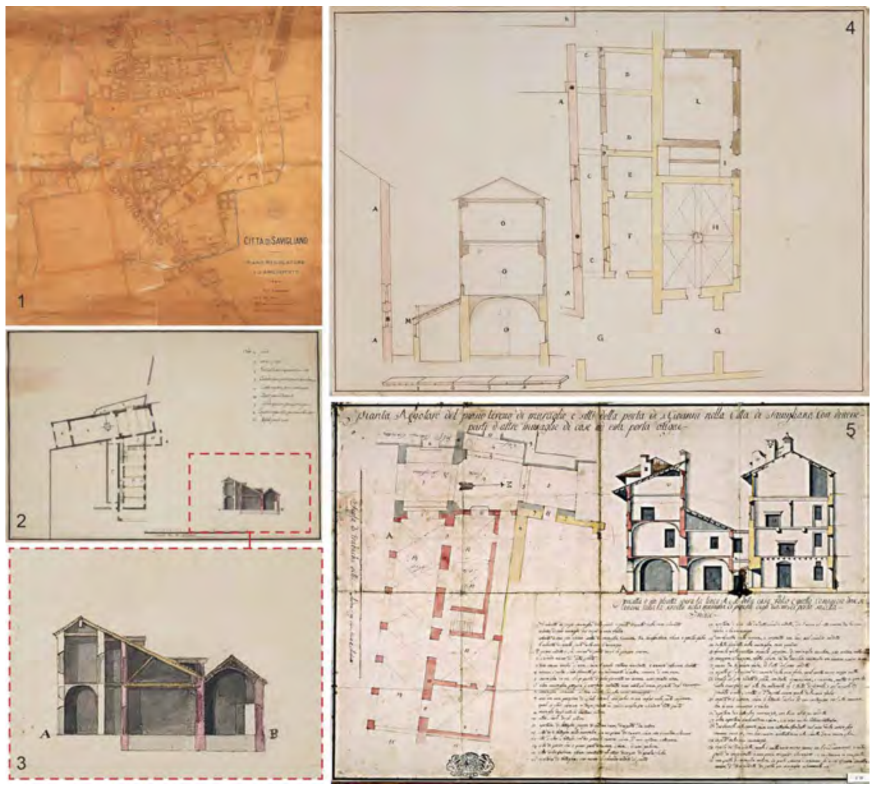
Figure 9. Important buildings in Piazza Santarosa in Savigliano, Province of Cuneo (edited by Maurizio Marco Bocconcino and Vincenzo Donato)

collected is available and relatable. More often than not, availability and relatability are achieved by building databases linked to computerised maps which make it possible to systemise the analyses carried out. In the light of the considerations disclosed, it is obvious that the contribution of the disciplines of representation within a project to define the seismic risk of a town involves aspects ranging from survey-related knowledge to the creation of multi-relational banks for the processing of data and to interaction with GIS systems (Figure 13). On one hand, it is necessary to prepare maps capable of representing in summarised form, deductive logical conceptual elaborations, while making immediately available data that has not been interpreted and tools to analyse said data, in order to allow the various players to carry out analyses which might not be predictable in the research project as initially conceived.

Survey and the Representation of the Social System[4]

In relation to the image of the city, its cultural assets and its built landscape, remembering the lesson of Renato Biasutti (Biasutti, 1962) it is possible to distinguish between a sensitive landscape and a geographic landscape. The first is made up of everything that can be perceived by the senses, and particularly by what the eye can embrace: a landscape that can be represented by a painter in a painting or a by an author in a short and concise description. The geographic landscape, on the other hand, is an abstract summary of sensitive and visible elements, using them to reveal its nature. While the sensitive urban

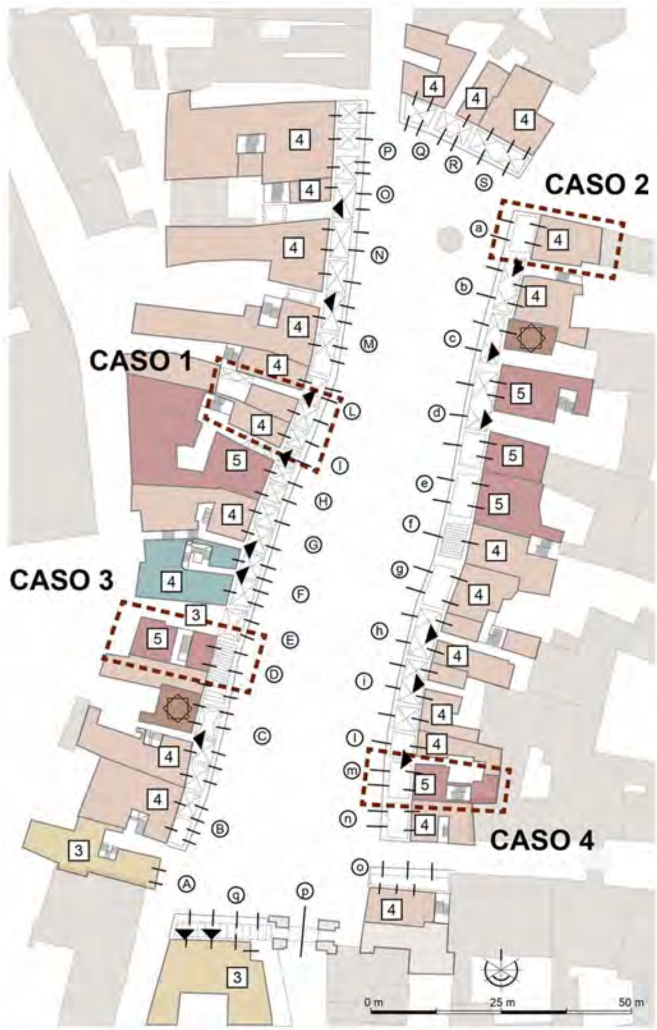
Figure 10. Archive analysis for the survey of the construction types and original load-bearing structures (1. Regulatory and expansion plan - first half of 20th century. 2 – Plan and prospect of the "filanda del Cristo", then Cinea Ritz – first quarter of the 19th century. 3 – Enlargement of section 4 – Plan and prospect of three-storey house with lean-to, 18th century. 5 – Regular plan of the ground floor of walls of the gate of S. Giovanni of the City of Savigliano, with different parts of other walls of houses next to it. With a view of the Falco and Canavero houses, 18th century.) (edited by Maurizio Marco Bocconcino and Vincenzo Donato).



landscape is that linked to individual experience, related to the comforts of individuals via what we call an existential sphere (the factors that influence people's quality of life are unweighted and not limited to the sphere of aesthetic values, being linked more closely to personal memory and symbolic values, habits and affections, etc.), the geographic landscape revolves around the sedimentation of history in characteristic, universally recognised forms, which convey a particular identity to the physical space. The representation of the urban environment requires the development of a language which acts as a link between the description of the detailed phenomenology of buildings and the simple, not entirely thorough description, of the cognitive panorama. To this end, we have chosen to take an approach that continues on from previous researches (Garzino, 2017a), trying to implement the linguistic wealth used said previous researchers, to which this study refers, with the introduction of certain methods of description/representation of the parameters of comfort, referring also to contemporary buildings.

The following parameters have been considered[5]:

Figure 11. Configuration of Piazza Santarosa in Savigliano, Province of Cuneo, with indication of case studies and recurrence of the construction types (edited by Maurizio Marco Bocconcino and Vincenzo Donato)



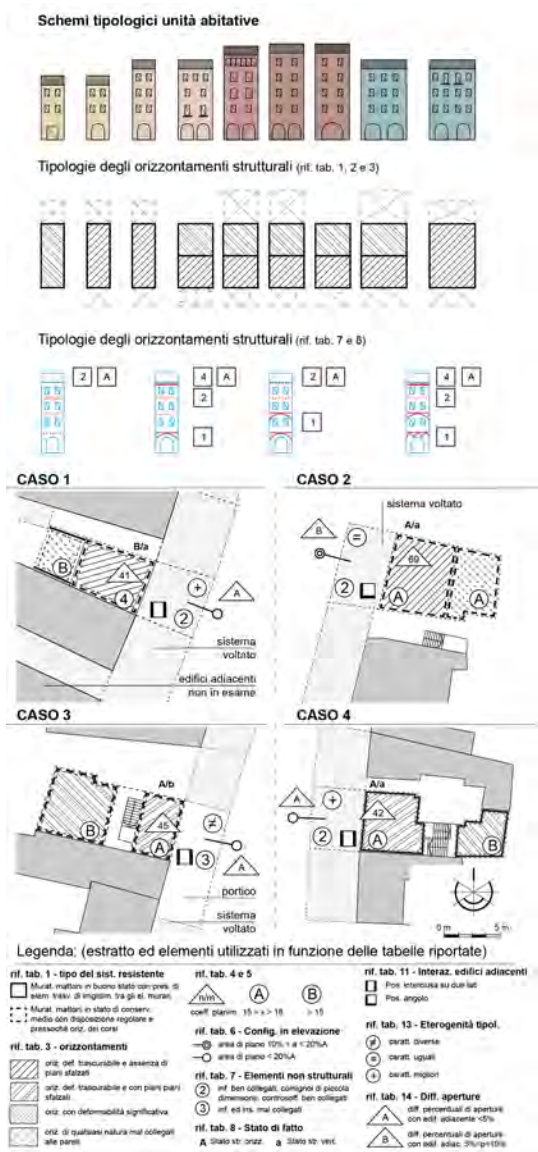
1. Aspect
2. Utilisation

For *aspect* in particular, we chose to consider the requirements of:

1. *Elegance* of the buildings that make up the built environment, and
2. *Visual complexity* of the built environment.

As far as elegance is concerned, during the performance of the research, we developed an awareness that, when the context is dilated compared to a strongly characterised historical context, for the sole

Figure 12. Typological schema of existent buildings and application of graphic notations (tables in figg. 1-5) to the case studies chosen in Piazza Santarosa in Savigliano, Province of Cuneo (edited by Vincenzo Donato)



purposes of the analysis of environmental comfort in terms of identification and belonging to a place (and this has to be stated), the symbol can dominate the space, as taught in the lesson of Robert Venturi. Figure 14 Table A presents a synthetic, inclusive and actualized description of the morphology of the buildings. The formal connotations of the contemporary city are investigated according to an actualised methodological approach inspired for the most part by the studies of Cavallari Murat and his school on the historical city[6].

Figure 13. Diagrams of the DB-GIS_WEB system: areas of elaboration and graphic representation. (edited by Maurizio Marco Bocconcino)

In terms of continuity with UNI 7310/74, there is an indication of the open spaces on the ground floor, however, the symbiological code implemented, in order not to be historically characterised, does not distinguish between vaulted systems or pilotis. This is followed by notation related to the presence of recessed attic floors. From the 1930s onwards, elegant residential units move upwards from the traditional first/second floor "noble" level. The parameter related to the height in metres of the cornice from the ground appeared. This figure has dual value: if related to the number of floors, it also allows a derived reading of elegance and, assumed in absolute terms, it enables a practical analysis of environmental utilisation related to the exposure of the building façades to the sun. Then there is a notation that indicates the number of lifts for each stair (a parameter which, in the case of contemporary buildings is also use for tax purposes to characterise elegant buildings). The next proposal, also contained in UNI

Figure 14. Table A - Graphic symbolical notations relating to the nature and the location of buildings in the urban context .) (edited by Giorgio Garzino)

e h f	The e value indicates the number of lifts for each upstairs system. The h value indicates the height of the building to the cornice, on the public road side. The f value indicates the number of floors.
e h f	"Low" building volume, coefficient hc <0.50. hc = H / h where H = maximum significant height of buildings in considered urban context [m] h = height of the building considered at the cornice on the public road side [m]
e h f	"High" building volume, coefficient 0.51 <hc <1.00. hc = H / h where H = maximum significant height of buildings in considered urban context [m] h = height of the building considered at the cornice on the public road side [m]
e h f	"Very high" building volume, coefficient 1.01 <hc <1.50. hc = H / h where H = maximum significant height of buildings in considered urban context [m] h = height of the building considered at the cornice on the public road side [m]
e h f	"Skyscraper " building volume, coefficient 1.51 <hc. hc = H / h where H = maximum significant height of buildings in considered urban context [m] h = height of the building considered at the cornice on the public road side [m]
e h	Building volume of monumental character with a specific individuality.
	Presence of portico space on public road.
	Backing at the top of the building volume (attic floor).
a	The a value indicates the albedo.

7310/74, should be an approximated graphic notation which indicates the height of the buildings using a different background of the construction cells. This ideogrammatic notation stereometrically illustrates the volumes of the single buildings without putting the solid geometry into perspective[7]. It was proposed according to an articulation on four levels: low volumes, high volumes, very high volumes, skyscrapers. With reference to some case studies elaborated by Gordon Cullen, a notation that introduces a different background of the construction cells in shades of grey is introduced. This makes it possible to identify the buildings of interest or mainly for commercial/tertiary use compared to others. In this way, alongside the stereometric reading, a functional description of the urban context is also presented.

As regards *visual complexity* this can be defined as the measure of the "quantity of variety" (Porta, 2002) of elements that characterise the urban space, describing the visual wealth of the main façade. "Man is constantly aware of his position in the environment, he feels the need to have the sensation of the place where he is, and his sense of his identity is coupled with his awareness of it" (Cullen, 1961). In the light of these reflections, elements such as the colour of the façades are analysed (in terms of contrast and brightness), along with how attractive they are and their formal variety, taking care to record "what we see as we glance over them" (Cavallari, 1968c). The symbiological notations used refer to possible visual itineraries between the labyrinths travelled by the eyes which span from the open field of streets and squares to the atria and internal courtyards of buildings. We decided to indicate the various characterisations of the façades with lines of differing thickness and continuity, reintroducing some notations (as indicated in the synoptic picture of Figure 15 Table B already experimented by Cavallari Murat. For example, particular scenographic episodes are represented by a continuous line which is not seen inside the buildings, with a branch ending with a small circle if the atrium, while being closed, is ornamental. If the atrium of the building is visible from the street, the notation presents a U-shaped branch if the atrium opens out onto an open area, or an H-shaped branch is the far wall ends with a covered area, as happens in the case of a church, for example. The elements of the urban setting which have a particular volumetric individuality are indicated with two overlapping squares, one of which rotated by 45°. Building façades considered to be of importance are highlighted with a continuous line of variable thickness depending on how attractive they are. This is a notation which does not refer to a specific formal characterisation and is based on findings which are constantly updated to take into account interactions with an urban information system and with big data bases. And here we have to consider the request made by Robert Venturi! […] *We need techniques to abstract an archetype of casino or of urban fabric rather than specific buildings, to represent twinning phenomena or demonstrate general concepts or schemes, for example. The beautiful photos that we and other tourists have taken in Las Vegas just aren't enough* (Venturi et al., 2010).

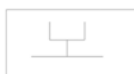
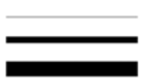
In terms of study and analysis of buildings, using the method proposed, it is possible to overlap the critical reading of the urban architectural sphere using urban survey tools and the confirmation of the recognisability of the elements considered to be characterising due to their appeal (as proven by the number of passages, photographs, etc. which we become aware of through big data). The same can be said for the analysis of traffic systems, the passion of Kevin Lynch. In this case, the entity of the passages represented by the increasing thickness of the lime, can be calculated no longer using the interview system (as in the case of the study published in 1960), but using information supplied by integrated urban systems. As a side note, it should be said that, also in this case, it is appropriate for the graphic coding language to be structured in such a way as to univocally identify the characterising morphology which is susceptible to continuous changes.

As regards *utilisation* the following specific requirements have been examined (Cooper, 1990):

1. B.1) Suitability for equipment
2. B.2) Accessibility
3. Suitability for equipment can be investigated using the indicators of:
4. B.1.1) Suitability for sitting
5. B.1.2) Presence of children's play areas or areas where food can be eaten and for socialising (tables, gazebos, etc.)

Suitability for sitting indicates the seating available in an urban space, distinguishing between primary seating (benches and chairs) and secondary seating (walls, fountain edges, grass, etc.). American handbooks establish that the requirement is met when at least 30 linear centimetres of seating are available for every 3 m^2 of urban space, and when there is a variety of seating. The installation of specific equipment, such as refreshment areas, kiosks and gazebos where people can take a break, etc., is an

Figure 15. Table B - Graphic symbolical notations related to building characteristics with manufacturing and flows (edited by Giorgio Garzino)

	Building front characterized by chromatic variety compared to adjacent buildings and by attractiveness and formal variety.
	Building front characterized by chromatic variety compared to adjacent buildings or by attractiveness and formal variety.
	Building front not characterized by chromatic variety compared to adjacent buildings and such as not to present attractiveness and formal variety.
	Not visible covered entrance hall but characterized on the outside by particular importance.
	Visible covered entrance hall constituent the optical cone, towards the interior of the building, of a scene in an open environment.
	Visible covered entrance hall constituent the optical cone, towards the interior of the building, of a scene in an closed environment.
	Element of the urban scene having particular values of volumetric individuality (dome, tower, ...)
	"Rating" of the building (estimation method to be defined). Graphic sign to be juxtaposed to the main front of the building.
	Intensity of traffic of pedestrian origin (number of steps, to investigate the presence of bike paths, the estimation method to be determined). Graphic sign to be placed on cycling and walking paths.
	Intensity of traffic of vehicular origin (number of steps, estimation method to be determined by further differentiation public and private transport). Graphic sign to be placed on vehicular roads.

important indicator of urban comfort. Moreover, urban spaces which, being located near to residential areas, are equipped with children's play areas, as well as well as areas for mothers present an added value. The presence of good paving in the area concerned (soft in some places, so that children don't hurt themselves if they fall) means that the information regarding the satisfaction of requirements is described with specific notation.

Accessibility is defined as the aptitude of a spatial element to be reachable and available for use, particularly by people with temporary or permanent disability. There is also a type of accessibility linked to the functions and destinations of use of places: for example, in the case of outdoor market spaces, these must be easily accessible by vehicles for the movement of goods to the sales area.

As regards representation regarding the level of performance-related satisfaction of the requirements, reference is made to the codes proposed in Figure 16 Table C.

Establishing an Analytical-Graphical Information System for the Survey of Urban Comfort

There was a most ingenious architect who had contrived a new method for building houses, by beginning at the roof and working downwards to the foundation. Gulliver's travels and other thing, Jonathan Swift.

The survey of the urban comfort is articulated according to the significant parameters identified in the above defined setting, thus different the expected outcomes. The development of the research has among its objectives to "setting up" the various components (surveyors, scholars, designers, tools, data and information assets), exploiting the efficiency value that can derive from the IT formalization of the aspects related to the support of the analysis and the related graphic-numerical result (Amoruso, 2018).

This last consideration (relating to transparency, dissemination and participation) is a discriminating aspect for the success of the analysis processes underlying the evaluation of the comfort of urban spaces; drawing is a field of comparison within which it is possible to activate comparisons and debates because, by its nature, it highlights the different points of view through an appropriate graphic language that derives from an ordered set of elements and procedures.

The following Figure 17 illustrates a first application development of encoding, a work in progress, as a result of reasoned and subsequent experimental tests that confirm the new interpretations of the methodological setting (Amoruso, 2018).

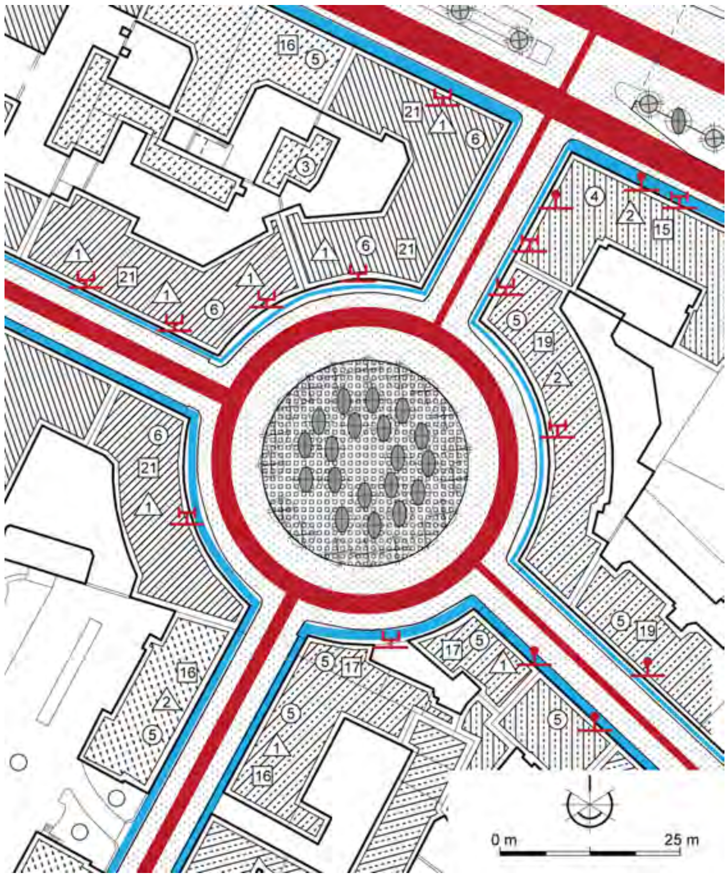
The tools that the studio is setting up have a first task at the operational level; if the visual relief has a character of rapidity, many actions that take place after the inspection are dedicated to the repetitive return of the facts observed and to the integration of these with the heritage of critical pre-knowledge that gradually builds and consolidates itself. We therefore reasoned on the possibility of making efficient this first process of collection and reconstruction, trying to reduce the time of mere compilation to dedicate it more to the punctual verification and in-depth analysis. The chosen mode has characteristics very close to those that in the uses are conforming the devices that we daily use (smartphone and tablet mainly), through interaction and constant exchange with the network. Two processing areas have been identified: one more properly dedicated to the preparation of the urban information system and "hard" data processing (production system or back office), and the other related to the graphical interface (the front office), which allows interaction between different actors, surveyors and scholars, providing a consistent recording tool (which transmits data and information, textual, numerical and photographic observations to the database) and a constantly updated field of comparison (Amoruso, 2018).

To bring the graphic interface of this production system - the epidermis with all the nerve endings able to bring the signals, the stresses, to the computer brain - in a shared web space, requires a first substantial implementation of the tools: in addition to the machine on which the basic services operate, above all the data flow must foresee the presence of a serving machine and a series of peripheral users (devices), connected to the network. If we want to enter into the problems inherent digital formats that allow us to interact with the geometries and data associated with them, we can state that they are numerous, different, and substantially vary their efficiency. Through graphic interfaces, the detector has first the possibility to record the observations on a "sensitive technical map" and to associate, linking the photographic memory and the archive and bibliographic documentation to them. It is possible to activate

Figure 16. Table C - Graphic symbolical notations related to the characteristics of public and private spaces (edited by Giorgio Garzino)

	Public space characterized by the presence of equipped areas and by the good quality of the pavement and accessible.
	Public space characterized by the presence of equipped areas or by the quality of the pavement and accessible.
	Public space not characterized by either the presence of equipped areas or by the good quality of the pavement and accessible.
	Public space characterized by the presence of green areas equipped with carpet of good quality grass and accessible.
	Public space characterized or by the presence of green areas or by carpet with good quality grass and accessible.
	Delimitation of children's play areas equipped with specific flooring.
	Public space characterized by the presence of equipped areas and by the good quality of the pavement but not accessible.
	Public space not characterized either by the presence of equipped areas nor the quality of the pavement but not accessible.
	Private and / or condominium garden, characterized by the presence of green areas or by a good quality grass carpet.
	Private and / or condominium courtyard, characterized or by the presence of green areas or good quality of the pavement.
	Covered private courtyard and / or private galleries with glass cover.
	Pedestrian paths characterized by the good quality of the pavement.
	Vehicular routes characterized by good quality of the pavement.
	Public space characterized by building fronts with consolidated formal structure.
	Public space characterized by building fronts with fragmented formal structure and not consolidated.
a	The "a" value indicates the albedo.

Figure 17. Application to the urban environment related to Largo Montebello in Turin. The first test concerning the introduction of colours for the themes of Figure 16 Table B, building characteristics (red), pedestrian (blue) and vehicle (red) flows (edited by Maurizio Marco Bocconcino and Vincenzo Donato).



the parts of the cartographic representation that have been previously arranged and to associate the semantic characterization. This possibility makes even more pronounced the vocation of the expedite survey imagined in its methodological approach, without subtracting anything from the mental re-elaboration, but rather leaving this time to express itself, having delegated to computer automatisms the processing of data and the association of coding graphics. The consistency of the system also lies in the fact that, supported by the methods and tools of the science of automatic data processing, it is possible to produce alternative scenarios and new views of the investigated reality. In addition, it is possible to network the results of the analysis (those in progress and those more defined), finally provide and receive data from other fields of interdisciplinary processing and studies (psychometric studies related to the perception of urban well-being, statistical processing of the persons in charge to the social survey, etc.). The graphic coding illustrated above supports the methodological approach as mentioned; moreover, it allows the outcomes to be extracted, an application rule that recomposes the parameters and indicators identified in a syncretic view, which almost pertains to the perception (that mental synthesis mentioned above), as determinants for the multi-level definition of well-being values. good life in places. The set of data, in the step by step definition of the method, has therefore been reconfigured to include different kinds of sources. The heterogeneity of the reading levels reassembles itself within the synthetic vision supported by the paper, but it requires in its elaboration of integrated processing environments (systems) aimed at the analytical-graphic restitution of the individual elements. The opportunity to access banks complex data has finally made the need to set up a processing environment that raises the detector from all those paper-making operations (the dressing of basic cartographic plans) (Amoruso, 2018).

The widespread application of the survey method and graphical representation of seismic vulnerability requires the system to be set up of a series of investigative and restitution elements. If, on the one hand, the progressive refinement of the parameters to be detected and the way in which these could be synthetically collected and represented with "a single glance" was supported by processing tools that today we consider them to be "artisanal", sewn on a case by case basis, manually set up and edited until the correct proportions are established between symbols, annotations and graphic signs, on the other the need to make consistent the number of case studies to be submitted to verification and standardization of the use of graphic rules, requires the preparation of specific protocols, this time of computer type, which allow to delegate to the computer the aspects related to the graphic synthesis and analytical weighting of the results of the relief survey(Amoruso, 2018).

The case study has allowed the graphic definition of a frame of reference for the support and the restitution of the seismic vulnerability first seen at the building level, then brought to the level of agglomeration of buildings, finally weighted as a summation within an entire homogeneous urban space. The iterative work of defining the graphic codes, application to different scales in-depth analysis, calibration of the graphic components (types and thickness of the lines, sizing of the texts according to information hierarchies (Amoruso, 2018).

The stitching of the "graphic dress", in fact almost manual, allowed the time to mature on paper, and then there, to decant, the observations collected with the field experiences (and with the conspicuous photographic archives set up, variegated and distributed over time) (Amoruso, 2018).

To support the back office, we propose two state-of-the-art technologies that are well established but not yet sufficiently tested in relation to survey of urban comfort: geographical information systems (GIS) and building information modelling (BIM). One can promote a basic instrument or decide whether to use them in an integrated manner as already seen in other studies (Bocconcino et al., 2016) and (Bocconcino & Lo Turco, 2017). Both housings provide interaction with a relational database management system (RDBMS) of both local and distributed type (typically via intranet or Web). The following figure illustrates a first application development of coding, a first definition point within the overall work in progress of the research undertaken; the case study presented below is reason and the result of subsequent experimental tests, confirming the revisions of the methodological part (Figure 18) (Amoruso, 2018).

Survey and the Representation of the Environmental System[8]

The subject here is the study of dimensions that can be retraced to the second category, that closest to the aspects defined as intangible and immaterial.

The study of the relationships between climate and city has ancient origins.

Before marking the walls of a city, it is essential to choose a place where the air is excellent. This will be the case if it is high, neither foggy nor frosty, and, as regards the sky, neither hot nor cold, but temperate: and in addition to this, if it has the right direction in terms of roads and alleys, according to the proper aspects of the sky. The direction will be right, if it blocks entry to the lanes by the winds; which, *when cold, re offensive: if hot, stifling: if damp, harmful. So, it is necessary to escape this defence, and ensure the prevention of what happens in many towns: these include the town of Mytilene on the island of Lesbos, which is both magnificent and beautiful, but not wisely situated. When the Austro blows, the people fall ill: with the Mistral, they cough: with the Tramontana they recover: but in the lanes and roads one cannot endure the vehemence of the cold… (Marco Vitruvio Pollione, 1854).*

More recently, in 1833, Luke Howard published *The climate of London*, a study which clearly reveals how, regardless of the influence of meteorological phenomena on a grand scale, it is the town itself, with its structure and composition, that profoundly influences the local climate in terms of anemological flow, of distribution of humidity, temperature range, etc. Only recently, however, perhaps due to the problems that are triggered by the global climate change, have we matured an awareness of the fact that the city form must also be studied from a physical viewpoint.

To this end, starting from certain structural aspects of the relationship between urban morphology and environmental flows (solar radiation and wind), it is possible to make maps that create relationships not only between open spaces and built-up spaces, but also with the height of the buildings, to establish a link with the factors of the view of the sky, with the shadows cast by the sun and with the number of hours of sunshine that fall on a specific surface. Studying the relationships between the morphology of the buildings and the direction of the winds, it is possible to study the streams of the winds, identifying calm areas and flow spaces. Likewise, it is possible to draw indications relating to the acoustic environment and the propagation of noise in the urban environment. Considering the characteristics of the materials present and their colour, we can gain indications relating to the light field.

It is now a shared opinion that, as sustained by Bosselman (Bosselman, 1984), the environmental acceptability of an urban space is based mainly on thermal comfort. Thermal wellbeing, the basic requirements of which essentially regard the control of solar radiation, heat radiation and wind (the perfect condition is one which minimises radiation in summer and maximises it in winter, encouraging ventilation in summer and reducing it in winter), can be investigated by analysing certain parameters which characterise the urban and micro-urban scale.

Since the town planning department of the municipality of San Francisco imposed the observance of certain microclimatic parameters for the approval or otherwise of construction projects in the 1980s, in the United States, urban morphology assessments have become part of the design process. The turning point came when we became aware that buildings alter the urban microclimate by altering the wind flow and the presence of the sun on the ground, as well as inside the buildings. The utilisation of direct sunlight has been regulated not only in many cities of the United States, such as New York, Boston and San Francisco, but also in cities in other countries, such as Montreal, Toronto, London, etc.

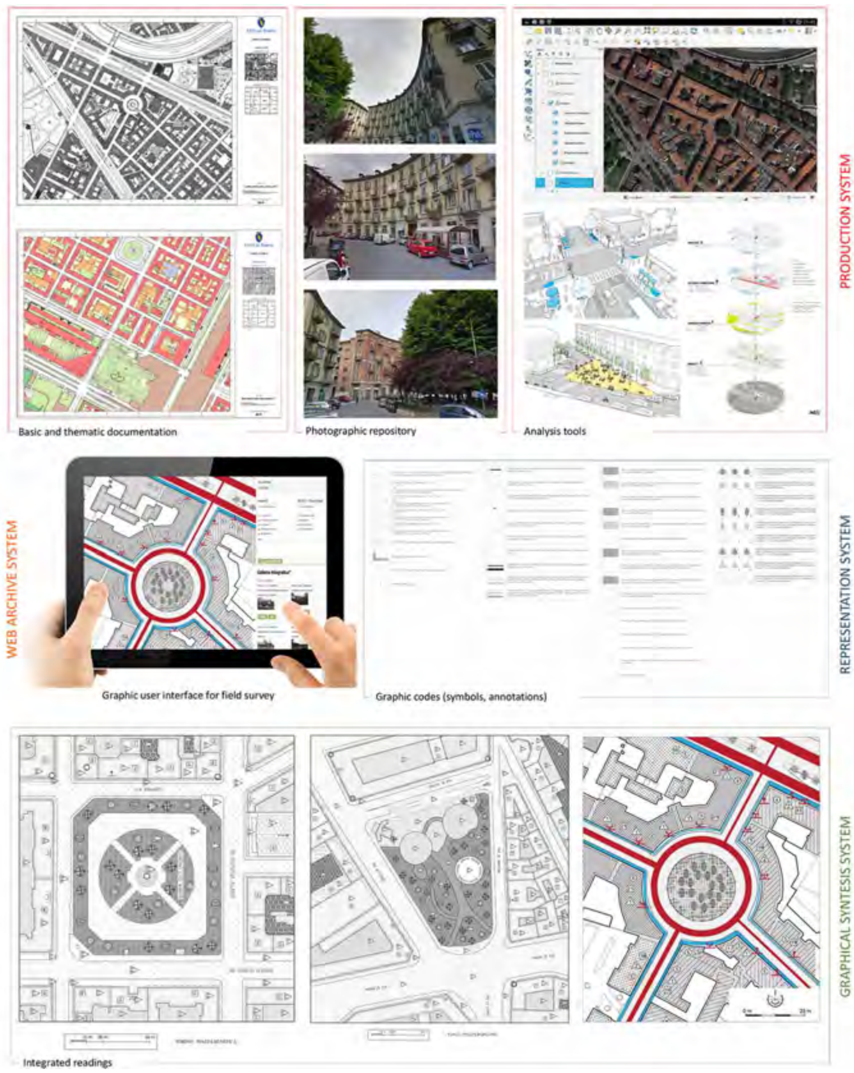
In particular, the categories of gents that influence thermal wellbeing can be grouped into three big categories:

1. C.1) morphological parameters
3. C.2) characteristics of the material present
4. C.3) user comfort factors

Morphological parameters can be investigated, paying attention to:

5. C.1.1) orientation and localisation of buildings

Figure 18. Instrumental components of the integrated system for the survey of urban comfort (SICUR) (edited by Maurizio Marco Bocconcino).



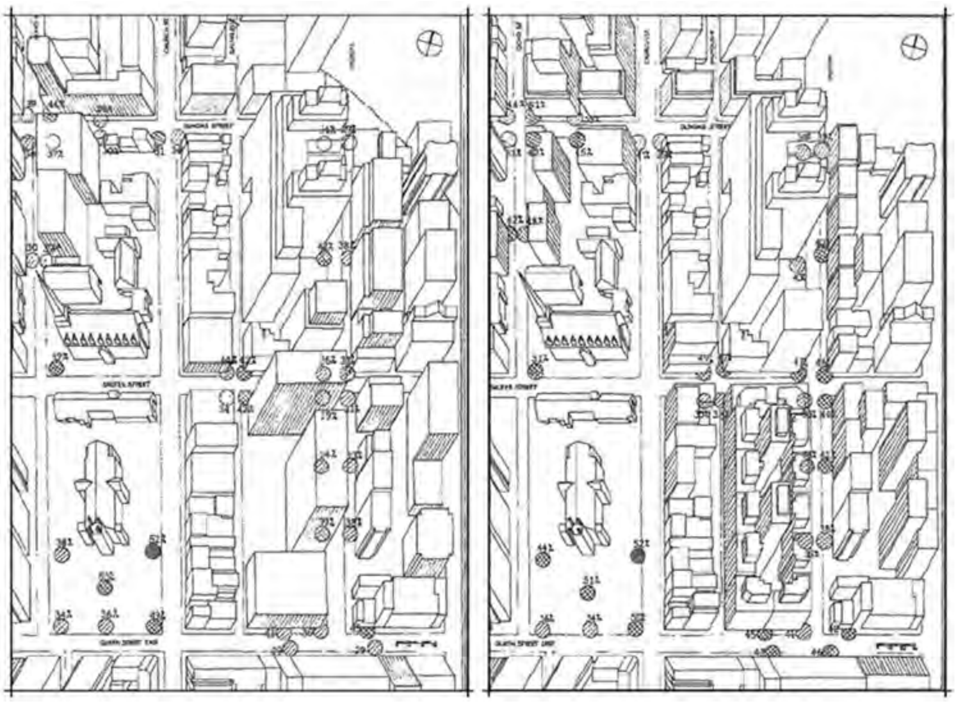
6. C.1.2) dimensional relationships between the height of buildings, the width of roads and the width/ size of squares
7. C.1.3) orientation, localisation, dimension and characteristics of the vegetational elements present
8. C.1.4) exposure to dominant summer and/or winter winds.

During the survey phase, it is appropriate that, in table A, where the buildings that outline the urban space are indicated, a notation also reveals the height of the building to the cornice (indicated in numeric value in a square box against the background that defines the shape of the plan of each building). This research, during this phase, merely proposes an encoded graphic system for the collection of data with environmental characteristics, aimed at the preparation of direct survey maps without any elaboration. On the contrary, researches carried out at the Martin Centre in Cambridge (Corinth & Steeners, 2005) have shown how it is possible to apply 3D modelling techniques to data relating to the urban morphology surveyed, in order to establish a relationship (also at quantitative level) between urban morphology and microclimatic characteristics. Building a Digital Elevation Model-DEM, for example, we can measure the Sky View Factor-SVF. This parameter consists in the 3D measurement of the solid angle of the sky view from an urban space and determines the exchange of heat radiating between the city and the sky[9]. After carefully surveying the geometric configuration of the urban space (characterised by the presence of the of the various physical elements that make it up) it is possible to determine, knowing the latitude, the areas of shadow on the ground in relation to the seasons and the time of day. In this case, it is a matter of applying certain geometric constrictions, made easily accessible by the fact that every software program for computer-aided architectural design allows the construction of the shadows cast by the sun. It is possible to create much more refined representations than those introduced in 1984 by Peter Bosselman, (an example is shown in Figure 19) that mark a turning point in the sphere of surveying urban comfort. The shadow projected onto the ground by a building depends on the height of the building and the position of the sun in the sky. Moreover, in the case of several buildings facing each other (not necessarily running parallel), it is necessary not only to verify the distribution of the shadows on the ground, but also their projection onto the façades. To then determine the entity of the shadow it is necessary to remember that the reduction of the shadow's height is proportional to the distance of the element that projects it. Midway between the highest point and the point of height = 0 (earth), the shadow will be half the original height, and so on. In the light of these considerations, which describe the phenomenology in terms of areas in which the shadow is more permanent than in others, and introduce the matter of the amount of energy irradiated and the quality of the shadow in relation to the screen characteristics, the issue doesn't just concern visualisation but also the capacity of energy calculation (Grosso, 2008).

Likewise, it is necessary for the survey of plants, as represented in Figure 20 Table D, to supply information regarding the size, stance and permeability of the plants present. Plants are indicated with a circumference traced with a faint line, where the mutual layout of geometric signs indicates the type of planting arrangement (rows, clumps, etc.). The circumferences then contain a second circumference (if the stance is rounded), an oval (if it is scattered, a column or an oval shape), or a triangle (if it is conical or pyramid shaped). The body and the nature of the line used to trace the figures indicate the class of size of the plants: the thickest line corresponds to class 1 (tree with $h>16$ m), the fine line corresponds to class 2 (tree with $8 \text{ m}<h<16$ m), and the dashed line identifies class 3 (trees and bushes with $h<8$ m). The background of the geometric figure in dark grey indicates extra compactness, while the light grey shade indicates average permeability and the absence of a background indicates a high level of permeability. The presence of a spot, a cross or two crosses aligned but slightly rotated describes the type of plants.

As far as the characteristics of the materials present are concerned, it is necessary to pay attention to the floors and the façades of the buildings. The physical characteristics of the materials determine both energy consumptions and the conditions of thermal comfort, particularly albedo, i.e. the capacity of materials to reflect solar radiation (shortwave) and emissivity for the re-emission of thermal radiation (longwave), have a very high impact. Radiation that is not reflected is converted into heat, which is partly accumulated and partly re-emitted, depending on the physical characteristics of the materials. The part of radiation re-emitted by the floor and façades is then intercepted by other buildings, remaining inside the urban pace, particularly in canyons. The radiation at stake is increased by the multiple reflections to which it can be subject. Wanting to carry out an analysis to create a classification of the materials used in construction, we have found that the parameters which indicate emissivity are almost always the same and that the differences observed are always due to albedo. Albedo is calculated as the ratio between

Figure 19. Toronto, East Downtown. Analysis of thermal comfort (sun and wind) according to the variation of the morphology. The darker the dots, the greater the exposure to comfort conditions. (drawing by Peter Bosselman).



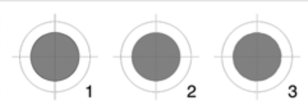
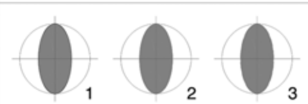
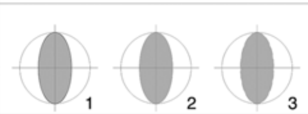
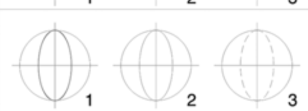
reflected radiation and total radiation, so the indicator parameter varies between 0 and 1. For example, an asphalt surface with an albedo of 0.2 reflects 20% of radiation, returning it to the atmosphere, while it absorbs the remaining 80%. We have chosen to introduce a notation which allows the measurement of the reflectance parameter. The numeric value (which varies, as we've seen, from 0 to 1) is written inside a triangular box, in the case of buildings, near that which indicated the height of the building (see table A), while it is located against the background for spaces on the ground (see table B).

The combined analysis of all the morphological data indicated above allows the elaboration of charts which are real microclimatic matrices of the urban environments.

The Parameters to Be Assessed in Order to Determine the Conditions of Thermal Wellbeing in Outdoor Spaces Characterised by Complex Interactions

We must assess different variables in order to determine the conditions of thermal wellbeing in outdoor spaces and these span from changes in radiation (short and long waves), to air speed and from the temperature of the air and surfaces to the humidity of the air. To allow a synthetic assessment that can be used for the survey, we can use indicators such as PET (Physiological Effective Temperature), and thermal body balance[10]. These dynamics fall within a cognitive process that belongs to a further level of investigation, where the processing of data has to be represented on charts which are real graphic matrices relating thermal wellbeing.

Figure 20. Table D - Graphic symbolical notations related to the characteristics of the vegetation elements (edited by Giorgio Garzino)

	Vegetation element characterized by differences of colors, perfumes and fragrances, with rounded bearing type, with high compactness.
	Vegetation element characterized by differences of colors, perfumes and fragrances, with rounded bearing type, with average permeability.
	Vegetation element characterized by differences of colors, perfumes and fragrances, with rounded bearing type, with high permeability.
	Vegetation element characterized by differences of colors, perfumes and fragrances, with discontinuous deportment, columnar or ovoid, with high compactness.
	Vegetation element characterized by differences of colors, perfumes and fragrances, with discontinuous deportment, columnar or ovoid, with average permeability.
	Vegetation element characterized by differences of colors, perfumes and fragrances, with discontinuous deportment, columnar or ovoid, with high permeability.
	Vegetation element characterized by differences of colors, perfumes and fragrances, with conical or pyramidal deportment, with high compactness.
	Vegetation element characterized by differences of colors, perfumes and fragrances, with conical or pyramidal deportment, with average permeability.
	Vegetation element characterized by differences of colors, perfumes and fragrances, with conical or pyramidal deportment, with high permeability.

The ultimate aim of the research project is to develop a comprehensive graphic encoding system, capable of grouping all the data processed into a single representative matrix, used to draw up charts that thoroughly describe the context of urban comfort.

This document is not the first report of the research in process, in which the language of design aims to define simple relationships, helpful for an exploratory survey, to be prepared before the data assumed has been processed.

New Forms and Models for Gaining Knowledge of the Environment and the Territory, Representation Methods, and Practices: From the Titans to Olympus

An increasingly pressing need encourages the study of methods and tools which improve the use of the territory and must also make the environmental impact of the various activities organised less aggressive. The development of specific attention to the quality of the transformations allowed and to the formulation of strategic plans for the verification and control of the actions to be taken with this aim, is urgently required.

These few rather banal and currently very fashionable phrases, considered abstract until not so long ago, are aimed at researchers and operators engaged in activities related to the environment, territory and resources. The action stems from the need to deepen the level of awareness required with regard to the role of the supports and tools currently developed for territorial and environmental planning and management, to investigate the opportunities and restrictions associated with their use, to assess the potential offered by an evolution which seems to be closely linked to information technologies. In short, it stems from the need to actualise the methods and forms of research and action to defend the environment in relation to contemporary culture. On the subject of territorial and environmental planning and management, I don't intend to invade a field that isn't mine. All I want to do is propose a few comments in relation to Design and Representation, with the aim of providing a link to the conceptions of other areas of research, without overlapping them, with the greatest respect for the different cultural specificities. The author feel as though he, along with other experts, has learned that it isn't a question of configuring an external governance of situations, but more a matter of exploiting the potential offered by a new cognitive model, which is organised and theoretically conformed through the solidarity and the contribution of various scientific disciplines, and is structured around the strong core of the processing of information, based also on technological mediation for elaboration and communication.

It's easy to export these considerations to many other areas in addition to the Environment and the Territory, and also to identify a confirmation of the problems inherent in the organisation of the work and the instrumental assets that support it in contemporaneity, sustained by broad spectrum IT and increasingly widespread telecommunications.

Technological innovation, specifically IT and telecommunications, developed quickly and continues to do so, with progress so fast and so complex as to go beyond the confines of operational techniques. It's easy to record everything that's being implemented: witnessing an interaction between practical development and an equally significant and hard to predict evolution of theories. In this alternating and beautiful relationship, which seems to have always existed, between practice and theory, technique and science, doing and saying, there is a well-known and historical contraposition, which now seems to be imposed more evidently due to the possible occurrence of certain unexpected effects. It has always been hoped that dialectics will take on a successful form, possibly even dynamic, and that, particularly during the process of adaptation to the vast applications connected to the urbanistic, territorial and environmental fields (with the various aspects embraced by them), the results of the development of new IT platforms will include getting used to cooperation and ensuring that it becomes essential, as well as confirming the specific skills and preparing for professional qualification in order to achieve the integration of methods and expertise. Some recent experiences have already produced very interesting results.

The different forms used to represent information and the traditional processing of geometric, alphanumeric and iconographic data, these formats being those usually preferred for the knowledge of the physical world, of phenomena and their relationships with other social, economic and political organisations, have long been considered as complementary elements, but it is now conceptually and operatively simpler to associate, manage and process them. The new opportunities for exploiting them within a system capable of maintaining the informative potential of the single entities and simultaneously facilitating introduction into a group of alternative aggregations, the capacity to be memorised, updated and transmitted, offers a scenario with an outstanding cognitive impact, which is triggering important sociocultural transformations.

For example, we have learned that the wonders of graphic design and elaboration that we've always been used to but which never fail to astound us with their ability to carry synthesised information, can be flanked by other cognitive media or other analytical languages, as long as they are suitable for strengthening those principles of reliability, flexibility and accessibility which are needs that have become absolutely essential. In fact, in the formation of Informative Systems of any level, the statute that defines their nature seems to be their special analytical, yet synthetic, interdisciplinary and multi-disciplinary character, while the possibility of different levels of elaboration allows their extended and direct exploitation. When, in the design of an informative system, this aptitude to absorb and favour the development and representability of relationships, rather than the simple maintenance of the memory of the data or of individual data items, is promoted as a main qualification, a virtuous vision of their use is proposed. But when this strategy is conformed using management systems that can be easily accessed and do not require an excessive alteration of the elaboration methods, specific to the various skills, the author thinks we could say that this isn't just good, it's great!

The Aesthetics of Representation for the Ethics of Governance

Understanding, communicating and transmitting while gaining experience is much better than sustaining the weight of the world from the outside, but it requires a collective intelligence, which replaces the Titans, which manages to recompose harmony in synthetic visions rather than favouring the diaspora of knowledge, or at least supports the attempt to help the cognitive integration process. Thanks to practical experimentation, formulating hypothetical procedures and then trying to put together those areas of knowledge that are capable of linking up with this vision, it is possible, more so today than before, to design research and working procedures based on the actuality of exchange, so that the paths can really be followed and verified via methodologically founded operativity. Can the digital revolution and telecommunications favour these processes? To avoid giving a direct and banal answer, the author suggests that, first of all, we mustn't be afraid of continuing to try out new methods. Then the author'd continue by proposing that it could be a good idea to start by analysing the presence of the disciplinary specificities, respecting the prerogatives of the different contributions, and waiting to mature shared experiences without expecting to achieve common abilities. Lastly, I think I can quite safely say, as I have done in the past, that the IT version created as a very high-capacity container doesn't have to be a Pandora's Box, if we know how it works!

Let try and offer a better explanation of similar proposals, which I realise might be leading, but definitely slightly hermetic. The author intends to do this by presenting the role of some of the disciplinary components that are part of the general structure of GIS, along with some interesting performance profiles that identify their flexible nature. I should point out that I am going to summarise some things, as I've talked at length about the matter in the past, disclosing the experiences that accompanied the research activities. And I'm going to interpret the key concepts according to my own personal vision, using a slogan which I still find valid: I think that, even if it's not the only one, a good role for informative systems is to simplify the simulation of time and space stratifications related to a product, a town, a territory or the environment, which make up the basic cognitive reference framework of every analytical action (survey) and every forecast (project), for the sustainability of operations and transformations. This process has to be one of cognitive accumulation rather than collection. It has to mingle possibility for review but base itself on a body of stable elements, at least in terms of methodological profile, so that the experience can be matured and the process be refined over time.

GIS, SIT and, to a certain extent, some SIL, are sustained by IT, telecommunications and electronics expertise, used for the most varied cognitive applications, which are, in turn, sustained by a shared platform made up of a map, defined by its role within the cognitive model. That special map which, adapted to numerical processes in its varying version, identifies the distinguishing feature of the entire system in geographic qualification. Modern measuring systems and tools, along with their adaptability to increasingly detailed surveys which aren't too much of a problem for the elaboration process, are the elements that have made it possible to combine quality of information with the quantities of data implicated in the project and/or survey, from the architectural and construction sphere to that of urbanistics, planning, territorial management and environmental control. This map, which, as I said, is structured within the process, can be considered over time as representation and knowledge, being a basic tool and also a system of information that develops and is used while working, undergoing constant updates.

The possibility to create a non-aprioristic definition of scales of representation and level of detail, brings back to the fore the need to involve the sensitivities deriving from surveying and project-related experiences that can be ascribed to the area of Design and Representation, including those experiences accomplished through collaborations between several experts in the past and which can perhaps count on a tried and tested exercise in complementarity. So, if the integration between data from sources of varying nature, with separate characteristics and attributes of formalisation, is made increasingly possible, thanks to an intense action of cooperation and support offered by local government authorities, for the same reason, most of the problems of direct accessibility to certain documentary heritage seem to have been solved, as their archives can be consulted and used on a remote basis, thanks to specific accrediting procedures. If we accentuate, as is the intention here, the aspect of environmental quality and defence, the need to set up alternative evaluation scenarios, for strongly recursive decisional choices, has, thanks to the augmented power of calculation of processing systems incorporated into informative systems, found a way to solve the matter of comparison and dynamic confrontation, being able to present different panoramas of definition in space and time. The sustainability of certain operations cannot be determined in absolute terms. It would make little sense to define the impact of transformations in relation solely to certain fixed and stable circumstances, and the method of summarises problems tackled analytically through calculation and the series of simulations deriving from modelling processes can be applied successfully to numerous different situations.

For environmental matters, the integration between descriptive and iconographic databases, including documentation deriving from remote surveys and relative historical series, has become essential, and operational applications continue to sustain the theoretic objectives, while more sophisticated experiences develop. Being able to structure the information into modules and according to defined standardisation methods, it is also possible to overcome certain questions relating to quantitative reliability, circumscribing the role with an attentive and rigorous use of the principle of complementarity, so that the data can become significant and valid.

I would like to conclude by reflecting on a quality that I feel is being imposed with evidence: the most interesting limit that has been overcome, sustained by methods of production that seem to be becoming increasingly oriented towards this principle of integrability, concerns the method used to disseminate the databases that are being formed through the most intense experiences on Informative Systems. This is the new concept of accessibility to a shared cognitive heritage implemented thanks to the commitment of more active and farsighted administrations and of more generous researchers, which appeals to people, generates involvement and deserves reinforcement. This seems to be the finest heritage of the best past of the world of IT, a continuity which takes us back to the first pioneering adventures of a discipline which has become a method: born in support of science, IT developed mainly in support of the activities of organisations, thrusting its way into the "commercial" market of goods and services. For the future, we would like to see it make a return to those original noble objectives. To make moves in this direction, we need to make a considerable commitment and an equally considerable investment of resources. I think we have to keep risking and daring to invade new areas, learning from what we do, humbly ready to critically review the results in compliance with an open and constantly changing method, like when we draw something, ready to be amazed by the result or to cancel it and start all over again.

FUTURE RESEARCH LINES

On the basis of the program outlined above, it is evident that the research in progress aims to develop a tool with which to analyze the building heritage, where empirical, experimental and logical-deductive data (supported by an analytical assessment that presides over the governance criteria) mutually contribute to the result. The role of representation, as a means of definition and transmission of knowledge through images, plays different roles in this context, which are related, of course, to the method of investigation applied, at the specific time of the path of knowledge and critical judgment. We can, however, say that the graphic documents produced, regardless of the processing technique, constitute the language in which the whole path of analysis and knowledge is formalized.

As easily deduced from the case study presented, the extremely complex structure of the city, though limited to the geographic dimension of the so-called historic city, requires a survey developed for multiple thematic areas and themes, each related to a process of de-structuring parts of the system. This is hard to assume within a single type of survey, or maybe it would be better to say that it requires detailed analysis depending on the individual case and the relative specificities. Consequently, it is therefore necessary for all the information gathered to be appropriately structured and made congruent, by building relationship networks between data that be can questioned at any time. Hence the need to use information systems, as in the case study in hand, where the information collected is available and relatable. Most of the time, availability and relatability are obtained through the construction of databases connected to computerized cartographies that allow systemization of the information and the analyzes carried out. In the light of the above considerations, it is clear that the contribution of the disciplines of representation within the project regarding the definition of the seismic risk of a town involves aspects ranging from the knowledge of surveying to the establishment of multi-relational banks for the processing of data, and to interaction with GIS systems. On one hand, it is necessary to create maps capable of summarizing logical and deductive conceptual elaborations, but at the same time, it is necessary to instantly provide uninterpreted data and tools to analyze said data which are capable of allowing the various players to carry our analyses that can not necessarily be predicted in the research project, as assumed at the start.

CONCLUSION

The research activity performed, starting with the experience matured within the urban, architectural and construction sphere, shows how Design can continue to be, also in this field of study, the language with which the various aspects of engineering knowledge communicate. Representation takes on a systemic role: a constantly developing medium, in which moments of analytical analysis become an opportunity for the transmission of results which, in turn, contribute to the definition of levels of knowledge and analysis pursued only in relation to the inclusion of the data gathered in the system.

It becomes possible to build a territory where the space is organised according to principles of knowledge which become more important the more they are indirect. During the research, a graphic language was created, based on a representative code capable of going beyond the physical view perceived by the eye, considered as the synthesis of the knowledge acquired through direct experience (the Greek autopsy, i.e.: the fact of seeing with your own eyes), reaching the mediated experience (*akuein*, meaning the acquisition of data from indirect sources), accessing a deeper level of knowledge.

This is a journey under development which is still being defined, with regard to which the disciplines of representation are called upon to contribute in constitutive terms: it is possible to imagine a new season for urban survey, destined to implement the scientific content of mapping representations, which not only explain the analyses but allow us to achieve otherwise impossible levels of knowledge via the representation of multiplicity.

The graphics coding illustrated above claims the methodological approach; moreover, it allows one to extract the results and apply the rule that reassembles the parameters and indicators identified in a syncretic vision. This closely pertains to the perception (that above cited mental synthesis) as establishing multi-level definition of quality-of-life. The set of data have a step-by-step definition of the method. It can be reconfigured to include different natures of sources. The heterogeneity of the reading levels is finally reassembled inside the synthetic vision supported by this paper, but it requires development of integrated computing environments (systems) aimed at analytical and graphical depiction of the individual elements.

The opportunity to access complex databases has made the need to set up a computing environment critical—especially one that raises the surveyor from all those "put in paper" operations (dressing of basic cartographic plans). The widespread application of the relief method and graphical representation of the urban comfort system requires the development of a series of elements of investigation and restitution. If the progressive refinement of the parameters to be detected and the way in which these could be synthetically collected and presented with "a single glance" was supported by processing tools, then they could be considered artisanal and sewn case-by-case and manually curated until the correct definition of proportioning between symbols, notes and graphic signs is achieved. On the other hand, if it is important to make a substantial number of case studies to be audited and to standardize the use of graphic rules, then this requires the preparation of specific protocols. This time is supported by automated information systems, and the issues related to the graphic synthesis as well as analytical weighting of the results can be delegated to the computer.

The seam of the graphic dress, in fact almost manual, requires time to mature on paper. It then settles there. The observations collected with field experience have considerable photos archives, but these vary with time and distribution.

The definition of the survey method has seen successive integrations in terms of content. This has involved a substantial shift from detection to those almost exclusively conducted "on sight" (an analogue system then brought back to the entire discreet set that is formalized in early versions of the tables above0. This is mediated by the sensitivity of the researchers and the opportunity to integrate that first full-bodied set of data with other data of "pre-processed" nature.

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KEY TERMS AND DEFINITIONS

Civitas/Polis: Social organization as well as law and religious governance structures.

Districts: Relatively large urban areas that are recognizable for the observer depending on their internal characterization in terms of social structure or physical.

Edges: The margins, are paths that serve as a boundary between different areas such as neighborhoods in different characterization—these can be as permeable or impermeable to the transverse movement.

Graphic Language: The development of ideograms of extreme synthesis postponing any reference to the volumetric and architectural consistencies of the buildings.

Landmarks: Elements that are distinguished in urban areas because of their marked individuality.

Nodes: Connecting spaces, real hinges between different elements or points of thematic concentration.

Paths: The paths through which the observer looks at the city. They have different characteristics depending on their usability features, size, decoration, importance, etc.

Urbs: The physical city.

ENDNOTES

[1] In 1948, Bruno Zevi matures full awareness of the role, competences and mutual cooperation of the disciplines of architecture and the construction of the city. For the first time, we talk in disjointed terms with competitors when discussing architectural space and urban space. The three-dimensional languages include humans. [...] Every building contributes to the creation of two areas: 1) the interior is entirely defined by the architectural work and outdoor spaces, and 2) the urban that is enclosed in this work and the other adjacent work. Thus, it is obvious that all those issues have been excluded from the real and proper architecture [...] . This especially favours the facades of the buildings. These all fall into play for the formation of urban spaces. See Zevi, B. (1994). Saper vedere l'architettura. Torino: Einaudi. p. 29.

[2] See the following paragraph on the subject of *New forms and models for representati*on.

[3] To this end, a significant report on the results achieved is contained in Garzino Giorgio, Metodi di indagine e codifiche grafiche ideogrammatiche per il rilievo della vulnerabilità sismica alla scala edilizia and Garzino Giorgio, Metodi di indagine e codifiche grafiche ideogrammatiche per il rilievo della vulnerabilità sismica alla scala urbana in Garzino Giorgio, Bocconcino Maurizio and Donato Vincenzo, (2017), Survey methods and graphic codes for significance of seismic vulnerability at architectural and urban scale, DISEGNARECON, vol 10, n. 18, ISSN 1828-5961. The publication illustrates a method of investigation articulated into phases, carrying out an analysis aimed at identifying the elements that make up each building or construction cell, following each of which there is a graphic code capable of describing and specifying the properties. Once this has been done, it is possible to proceed with the preparation of maps capable of representing an overview with a level of multiple knowledge. The results obtained with this exploratory analysis allow the creation of a classification of building heritage of a determined heritage according to a scale of vulnerability.

4 The consideration exposed mainly offer an update and an analytical scientific path relating to the methodological foundations contained in Garzino Giorgio, (2010) Il rilievo del comfort per gli spazi urbani: prime riflessioni per analisi speditive, in Dino Coppo, Cristina Boido (edited by), Rilievo urbano. Conoscenza e rappresentazione della città consolidata, Florence: Alinea Editrice, p. 170/185, ISBN: 9788860555366.

5 As regards assessments of the aspect and utilisation of urban contexts, the decision was made to refer particularly to American handbooks and the work of Cooper Marcus. Cf. Cooper Marcus C., People places: design guidelines for urban open space, Van Nostrand Reinholds, New York, 1990).

6 Cf. Cavallari Murat Augusto, (1968). Architettura e Forma Urbana nella Torino Barocca, Torino, Istituto di Architettura Tecnica del Politecnico di Torino, Turin, 1968. From the viewpoint of representation, it should be noted how, on average, the cognitive process developed by Cavallari urban survey stops being an immediate activity with meter sticks and map and becomes a patient task to be carried out in laboratories, involving a sequence of detailed processes, checks and conjectures relating to work and experimentations. The road identified in this wat has undergone numerous developments and applications over the years. Just think of the researches directed by Dino Coppo, which develop certain graphic codes referred both to historical urban contexts in different historical contexts (relating, for example, to the 19th-20th century city) and to dimensions that are ephemeral yet repetitive, like those of the markets.

7 This choice allows the adoption of 2D basic mapping, organised on different levels of graphic presentation. This brings us out of the stalemate often encountered when choosing the types of representation present in the reference map, marked by uncertainties between the 2D approach and the 3D approach.

8 The considerations presented mainly constitute an update and a scientific analysis of the methodological foundations contained in Garzino Giorgio, (2010) Il rilievo del comfort per gli spazi urbani: prime riflessioni per analisi speditive, op. cit.

9 If the SVF is 1, this means that the sky view is complete, outdoors for example, with the consequent close relationship between temperature and meteorological values. If the SVF is 0, this means that the sky view is completely blocked and, consequently the temperatures are closely linked to the urban context. Therefore, in a medieval town with very narrow streets we can expect the SVF to be high, around 0.8, while in a more open urban environment, with wide roads and open spaces, the SVF will be around 0.2. (Cf. Corinth Marylis Ramos C., Steeners Koen, Indicatori morfologici della qualità ambientale nei centri urbani, op. cit.)

10 For a detailed description of these indicators, see: Scudo Giovanni, Valutazione del benessere termico degli spazi esterni, in Grosso M, Pretti M., Piardi S. and Scudo G., Progettazione ecocompatibile dell'architettura, Sistemi Editoriali, Naples, chap. 3.3, pp. 109-128.