The drawing as a knowledge instrument

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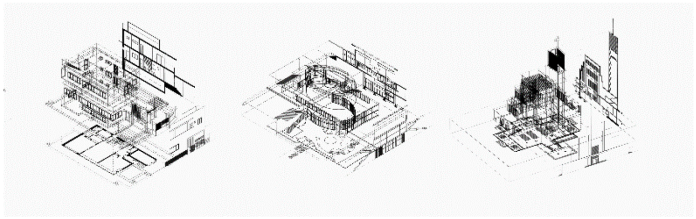
Keywords: analysis; concept; spatial simulations

The theme of this paper regards the conceptual visualization and the research for a general method that evaluates the key elements of an architectural composition. The methodological experience here demonstrated refers to a specific case study that belongs to the scientific research. The research, begun in October 2010, is the result of a work about the bohemian architect Josef Gočár (1880-1945), done by a group of research at the Milan Polytechnic, within the Architectural Design Laboratory. The investigation method plays a role of a knowledge instrument that verifies the structure that subtends compositional procedures. The graphic processes used are the tools for conception, verification, evaluation and communication of the individual project components and the architectural space.
First step: the first step consists in to select the architecture by principles that follow the main aim of the research. It is necessary to have enough documentation for a proper investigation. Following the identification of the primary sources it is necessary to proceed with two-dimensional drawing reconstruction of the design according to the traditional representation of the architectural project: plans, sections, elevations. Second step: after re-drawing, a work of interpretation based on the proportioning of the elements that compose the project is developed. The resulting schemes are geometric reconstructions checking the correct reproduction and also the critical reading of the architectural work. This allows us to go back over the process used by the architect in the conceiving design project, from the idea to the concept. Third step: finished two-dimensional drawings we proceed to three-dimensional reconstruction of the project, through conventional graphics programs, focusing on an overall reading of the architectural form. Fourth step: it involves the combination of three significant bi-dimensional drawings (a plan, a section and a façade) with the exploded axonometric view derived from the three-dimensional reconstruction and drawn using main construction lines. The proposed work aims to purchase a method also useful in the design phase. In this way, the design becomes a device that helps prefiguring a clear idea of architectural space. This procedure makes it possible to trace the original intuition underlying architectural work, where the ideation is translated into clear typological choices. Form and construction are summarized symbolically in a form of language closer to the formulation of the architectural idea.



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ADL: Architectural Design Laboratory

The research, begun in October 2010, is the result of a work about the bohemian architect Josef Gočár (1880-1945), done by a group of research at the Milan Polytechnic, within the Architectural Design Laboratory.

Josef Gočár was an architect who worked mainly in Bohemia, his figurative explorations are rooted in the particularly intense and fruitful period of the early years of the twentieth century. He was one of the most original architects of the "Bohemian Cubists" and subsequently one of the most convincing interpreters of Czech Rationalism. The research group at Milan Polytechnic have contributed to this study by reconstructing some of his key projects, which in the interests of greater clarity have been schematically referred to his original idea of architectural composition.

The study worked from primary sources and in particular on a detailed analysis of the author's own archive material regarding the individual projects.

The photo reproductions of the studio models, ground plans and other original drawings, including the important colour perspectives, were the primary source for the graphic reconstruction of the designs: plans, cross sections, elevations.

In the first phase of the study, critical re-drawing was accompanied by interpretation of how each project was developed and progressed based on the proportioning of the elements making up the individual projects.

This interpretative approach helped us reconstruct the evolution of the architect's ideas, from the choice of typological blueprint to the individual figurative aspects.

The interpretations were carried through to the designs, which had been fundamental not just for the correct reproduction of the architecture but also for the critical analysis of the examined works.

Once the two-dimensional plans had been reconstructed we moved on to a three-dimensional reconstruction of the projects where we have tended to emphasise the mainly compositional and figurative aspects, including in the graphical reconstructions.

Critical approach

Despite the recent overflow of information, images, symbolic language, we can't appreciate a growth of the global knowledge or – in our discipline – a deep understanding of the architectural project. Indeed, the architecture is not exonerated from this practice.

This process is ascribable to the general marketing rules that establish the unclear diffusion of a remarkable number of works and building projects often overestimated. But can we say that to a nice picture corresponds a good architectural project?

Is it the quality of the project the principal reason of the architecture success and diffusion, or is it the opposite? Anyway, are we able to define the principles that determine the quality of the architectural process?

These considerations call into question the role of the architectural drawing as an instrument in the formal concept of architecture. In contrast to the past, the drawing doesn't seem to be the main tool used by the architects to communicate their ideas and their own projects.

It is necessary to become conscious of the importance of the drawing as a knowledge instrument, essential for the architectural process and the design planning which help us not to lose the consciousness of our work and keep alive the critical sense on the architectural creations.

Several years ago, Alessandro Anselmi defines the drawing as a necessary art in a significant titled essay. He wrote: "*the culture of images, following the present information technology revolution, is one of the cornerstones of the current behaviour*". For him the negative element lies in the quantity excess: "*that is in a sort of all-encompassing figurative magma (...). Moreover this seems to grow naturally out of the easy/effortless use of the computer and from the loss of the project as an instrument to research and to construct space*"(Anselmi, 2000).

Starting from this, it's clear that the drawing and the thought can't be separated as well as the thought and the formal concept of the architecture. "*It is an indispensable and fundamental basis*

of the modern culture, an important freedom element compared with the historical heritage. (...) It is no longer necessary to take care to organize the formal aspects except the pure spatial logic of an individual work of art or an individual project (...). We can therefore say: thought strictness and representative freedom." (Anselmi, 2000).

What seems increasingly called into question is the comparative principle as a critical instrument, already considered very important, and clarified by R. Venturi when he was writing:

"*Architecture is open to analysis like any other aspect of experience, and is made more vivid by comparisons. Analysis includes the breaking up of architecture into elements, a technique I frequently use even though it is the opposite of the integration which is the final goal of art. However paradoxical it appears, and despite the suspicions of many Modern architects, such disintegration is a process present in all creation, and it is essential to understanding"* (Venturi 1966)

Conceptual simulation of analytical process

The procedure adopted in our research activity was the three-dimensional reconstruction of the building of the Saint Wenceslas Church, by Josef Gočár, a new Catholic church in the Prague district of Vrsovice, taken here as a study case.

First step. In this phase of the study, the critical re-drawing was accompanied by interpretation of how each project was developed and progressed based on the proportioning of the elements making up the individual projects. This interpretative approach helped us reconstruct the evolution of the architect's ideas, from the choice of typological blueprint to the individual figurative aspects.

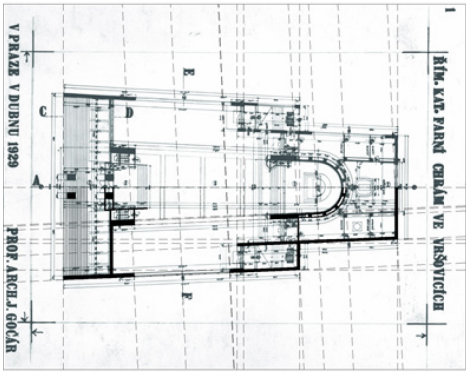

Fig. 1 Plan reconstruction

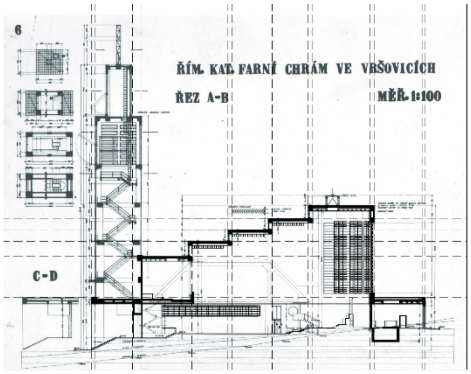

Fig. 2 Section reconstruction

At this stage we have selected the available picture of the plans and sections, and through a "digital acquisition", we scaled them and eliminated all graphic distortions. So we started to produce a digital CAD design, where each two-dimensional representation, plan, section and elevation, were detected with surveys on the existing building. Once obtained the two-dimensional drawings, we verified the correct projection of the plans with the sections and elevations, and eliminated all the inconsistencies between the various elaborate drawings.

The interpretations were carried through to the designs, which had been fundamental not just for the correct reproduction of the architecture but also for the critical analysis of the examined works.

Second step. At this stage, we arranged a disposition of two-dimensional drawings, previously prepared: plans, sections and facades, positioned on their vertical and horizontal own planes.

This preliminary operation has allowed to represent the idea of a first three-dimensional prefiguration of the building. This result was possible thanks to the two-dimensional drawings arranged to simulate the stereometric architectural mass. This level of processing allows us to perceive the essential elements of the volumetric composition of architectural space. These geometric shapes are sometimes complex structures that can be visualized as the addition of several simple shapes.

This operation, "the decomposition of architectural mass and subsequent reassembling" is possible to pre-figure through the simply intuition of the three-dimensional view of the elements, that are commonly displayed in the two-dimensionally space. On the different planes on which the drawings (plans, sections, elevations) were placed, it was possible to identify flat shapes, which generate primary solids.

These figures correspond to the architectural space and are clearly identifiable in a figurative and typologically way. Each of these masses was shaped in an imaginary reference system, based on the set of planes and axes of reference, generated by the correct positioning of the two-dimensional drawings in three-dimensional space.

Third step. In this phase every single mass of the building begins to take shape. After making all the geometrical matrices, the architectural mass is determined by subtraction and addition (or intersection) of individual elements, constructed through the identification of geometric figures that describe the shape of the space.

The architectural details assume, at this stage, intentionally a subordinate role as the three-dimensional representation of the elements. Walls, beams, pillars, etc. are initially left out of the three-dimensional representation because of the will to express the architectural mass of the building.

The objective is to re-draw the architecture considering the architectural space, according to the analytical and descriptive categories, typical characteristics of the architecture lexicon that go beyond the technological aspects. The architectural space becomes self-sufficient and the main and essential element of the project.

Forth step. In this step, it is possible to determine the shape of every construction detail, which is useful to clarify the structure of the architectural space. These items are not always crucial for a proper reading of architecture.

The contribution of the individual components should be evaluated for each case analysed, in order to understand the structure of the architectural space. Sometimes it is important to have a correct definition of individual components in order to grasp the meaning of the architectural composition.

In other cases, however, it is sufficient to stop the definition of the overall structure, without describing unnecessary details that may compromise the meaning and the sense of space.

Fifth step. At this stage our work allows us to extract all the necessary information to produce even a physical model, a mock-up, through the construction of the components that make up individual parts. Each part of the three-dimensional drawing can be de-composed into single elements to build the mock-up, manually or mechanically.

In any case it is possible to isolate and extract the main solids of architectural structure, and from these obtain all the information about the geometric developments necessary for the implementation of mock-up.

In these five stages we have summarized the main tasks that illustrate the procedure adopted in our work. The idea of the two-dimensional decomposition of the architectural volume and the arrangement of the three-dimensional space, made up by planes and surfaces like an architectural “ensemble”, are dealing with the Neo-plasticism experimentations.

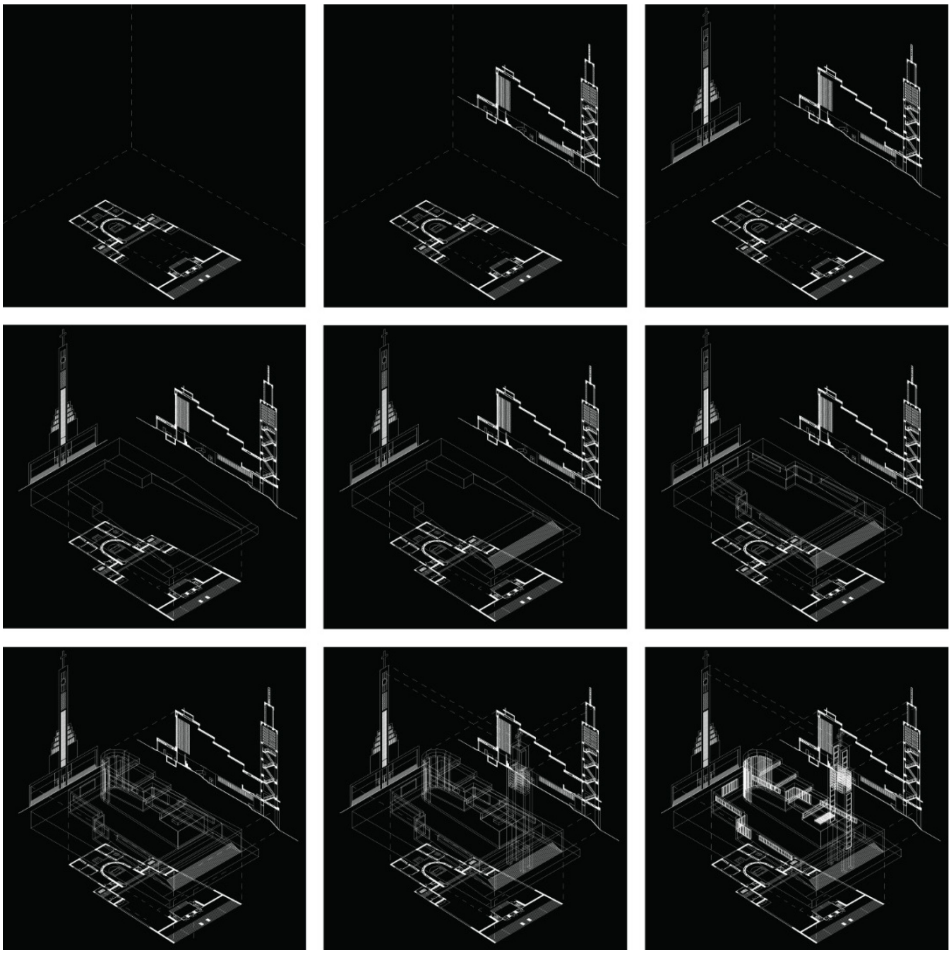

Fig. 3 Tridimensional Reconstruction

An important case of study in the architectural history is the Schroder-Schrader House, realized in 1924 in Utrecht by architect Rietveld. This House is considered the symbol of "*the 16 points of the neo-plastic architecture*" theorised by Van Doesburg and disclosed to the public in those years. In this case, the procedure adopted was aimed to find a new expression of the form through the decomposition of the mass unity, underlining the individual surfaces.

On the contrary, in our case the procedure try to reconstruct the architectural figure and mass both related to a specific creative process. This operation is done trought the disposal into the space of the individual projected surfaces such as plans, sections and elevations: all two-dimensional drawings. These projections are commonly conventional plans used to read an architectural project. The arrangement of these projections into the space allows to prefigure in advance the substance of the mass.

Once the projections are correctly placed and get closer to each other it is possible to go back to the "generating forms" of the basic solids, which are useful to the three-dimensional representation of the project, and to reconstruct the build process of the architectural form.

In this way it is possible to identify the steps of the architectural process through a backward path starting from the two-dimensional drawings (conventionally used) and followed by the three-dimensional properties of the architectural space.

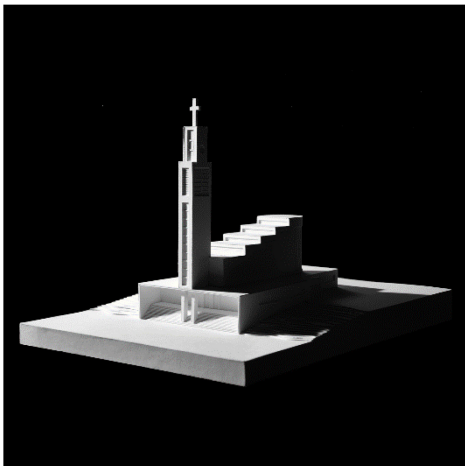

Fig. 4 Cardboard model photographs

Fig. 5 Cardboard model photographs

Peter Eisenman highlights a similar sequence through his research when he was planning the houses I-IV.

The sequence from the concept to the representation determines the actions that give shape to the idea. "*In Eisenman's architecture the process of design is a process of research into formal structures and shake which do not exist prior to the design. At the beginning there is an idea that is both formal and conceptual, and the shape. The 'idea' is the organizing force; it is the energy which determines the design of a structure of empty positions which will be occupied by shapes* " (Bedoni, 2001).

Similar to this process, but in the opposite direction, our research aims to trace, through the re-composition of the architectural structure, the creative process that generates architecture.

The main intention of this study is to make clear the creative process through highlighting the generating steps of the design procedure.

We are not able to determine if the requests of the expressiveness of the architectural mass, which are detectable from the outside of the building and from the relationship with the context, have influenced or prevailed on the original idea of the internal space. The interesting thing to highlight is the centrality of this relationship within a critical architecture analysis. It is important to investigate it from the re-drawing operation with the main purpose to retrace the project's reasoning accomplished by the author.

The intent is to use a technique of representation the closest as possible to those of the building design, definitely characterized by a schematic representation or even by a symbolic space representation, deliberately ignoring the correct representation of the constructive architectural elements, for investigate other properties such the spatial, typological and figurative aspects.

An essential precondition of our work, looking at the documents and materials that we were able to have, was to pay close attention to those signs that have been handed down from one material to another.

These signs could be, for example, traces of the reasoning design let on a sketch in the drafting of a floor plan or in other graphic preliminary drawings which then are preserved in subsequent versions and are recognizable, most of the time, even in the final project or in the realized building. This interest was especially important in cases where was necessary a strong

interpretation to re-draw the building, especially when the information contained in the available documents was varied.

Regarding the three-dimensional work representation, we wanted to consider the drawings in the same way, as evidences of our project interpretation and as operational tools.

The three-dimensional assembly of the documents produced in the first part of the research was fundamental for the construction of the digital model of the building: a set of signs – traces, evidence of an interpretation and design work which integrates and completes the information of the three-dimensional model that could not be exhaustive regarding details on the conformation of the architectural space.

In the case of Gočár's theatre, for example, without the 2D drawings we wouldn't have the information needed to draw the main space, the stalls, characterized by a double balcony order, because the three-dimensional model was left empty to analyse the more general aspects of the architectural composition.

It was therefore necessary to make the construction of the three-dimensional model comprehensible and clear, like the spatial composition of the two-dimensional objects: floors, surfaces and lines, without the solid mass that would otherwise acquired a predominant form of representation in relation to these items.

For these reasons, we left the mass of the building in wireframe view as if it was the X-ray of the building. We also wanted to highlight for this reason the dialectic between full and empty spaces, between darkness and light, choosing black and white representation technique in order to address the survey on architectural experimentation to its most simple and immediate perception.

Conclusion

The drawing is the most effective tool to represent the cognitive reality, both measurable and easy perceptible, through discrete and synthetic models. In this work we tested the possibility of bringing back the instrument of representation beyond its critical threshold of descriptive intelligibility. We have attempted to investigate, through the iconic nature and intuitive drawing the creative aspect of the design process, otherwise not recognizable by the codification of technical languages. We focused on particular stages of the design process where the drawing assumes not only the objective aspects, described by the convection of the graphics, but gets nearest to the creative process.

Therefore we tried to formalize the ideation of architectural space through some exemplary steps of representation, highlighting a formal parallel between the meaning (signified - the project) and the signifier (sign - the drawing). The graphic description of the elements, the choice of technique binary (binary technique), black and white, technical drawing as means of representation, tend to draft a generalized procedure, because the convention adopted includes a few elements of uncertainty with respect to the graphical conventions, commonly used recently in the representation of architectural design. This convention, contrary to the techniques currently used, overlooks the use of colour. As G.C.Argan describes, the reality could be represented by descriptive images, which favour the colour as a distinctive element, unlike the drawing, where the stretch expresses a concept, that implies a knowledge beyond the appearance.

The low attention to the colour in the conventional representation reflects some prejudices rooted in architectural culture, which recognized the role of drawing to express the knowledge of the forms as a synthesis of a concept, and painting the ability to recount the sensitive experience, belonging to the world phenomena.

The conventions of the technical drawing are more easily transmitted and the contents generalizable, in particular for two aspects: first, they readapt the methods of scientific representation based on the projective process; secondly this conventions schematize the elements not otherwise recognizable to the scale of representation, identifying in each case, symbolic representations easily perceptible.

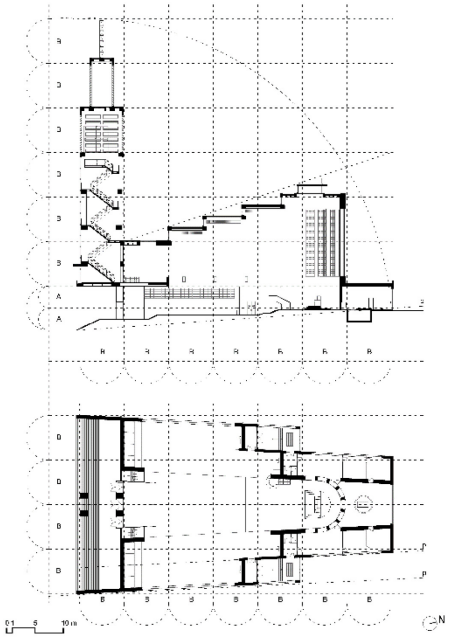

Fig. 6 Final two dimensional drawings

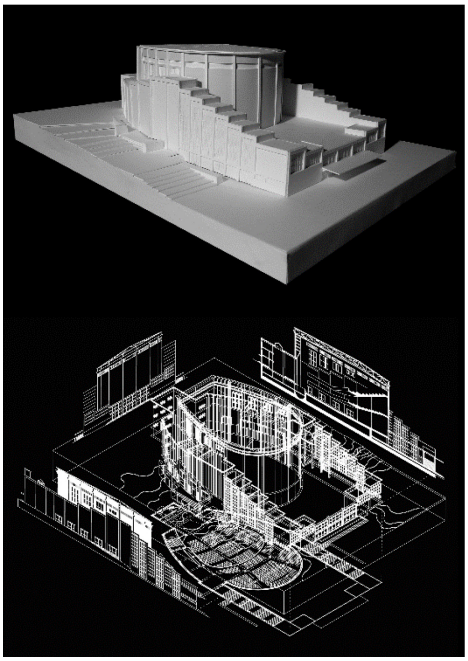

Fig. 7 Tridimensional drawing and cardboard model photo

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Telltale: visualizing the use and perception of cities through digital traces

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Abstract Novel means for understanding our lives, organizations and societies are coming from the digital world and the Internet: a massive amount of information is emerging from the digitization of contemporary cities, through technologies embedded into streets and buildings or carried by people and vehicles. This stratification of experiences demands new modes of inquiry and synthesis: a new generation of city maps capable to define and visualize both physical and social environments, as well as individual and collective narratives.

Telltale is a research project conducted among three different departments of Politecnico di Milano (Design department, DAStU department of Architecture and Urban Studies, DEIB department of Electronics, Information and Bioengineering) aiming at disclosing and exposing emerging issues, discourses, and uses of the cities of Milan and New York. This is done by observing and visualizing the digital traces coming from the direct experience of people who live in, visit or just pass through the city, and the news that narrate its stories and rumors, expecting to support and improve policy-making practices and to provide all the stakeholders with new insights about their cities

While traditional methods used for acquiring and processing information about the cities and its fruition seem to be inadequate to meet this need, the necessary challenge for urban studies lies in the integration of available digital knowledge bases together with innovative uses of traditional data, aimed at capturing the variety of changes in urban practices.

To us, sustainability can be interpreted also as the possibility to listen to people's attitudes and perceptions about their surroundings trying to return multiple and overlapping dynamic images of the city as it is used by its citizens (residents and temporary users). This, to help stakeholders and decision makers at the urban scale to achieve more responsible decisions both at the micro (local) and macro (city) scale.

The paper presents the on-going research project aims and intermediate results enlightening:

- a general framework we built to organize the actual knowledge we can extract from user generated content,
- the most meaningful urban questions possibly to be answered through those data,
- the description of the platform we are building to extract urban knowledge,
- actual applications of Telltale methods and platform for supporting decision making processes at urban scale.

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Digital traces and urban environment, state of the art

To depict an urban space means to present it through visual systems able to capture its throb and to bring it back in form of images. The contemporary critical urbanism movement has proposed new models to describe the city: an extended model that replaces the idea of structure with the vision of a soft-city based on concepts similar to those of biology rather than the static categories of traditional urban planning (Pickles, 2004).

The underlying idea of this approach undertakes the experience of reality as a network of multiple, fragmented, and temporary data, and information generated by human-place interactions: cities seen and lived by local media, international media, tourists, or citizens. This stratification of experiences demands new modes of inquiry and synthesis: a new generation of city maps capable of defining and visualizing both the physical and the social, as well as the individual and the collective narratives. From a urban planning perspective, there is a significant lack of data able to describe adequately contemporary city urban dynamics and time-dependent variations in intensity of urban spaces usages.

Emerging disciplines (e.g. mobile positioning, space-time movement studies, life-map geography) are involved in the analysis, visualization and interpretation of people's presence and movements in urban spaces through digital data, as promising sources for urban investigations based on data streams.

In fact, even though traditional data collection methods such as surveys, interviews, questionnaires and, more recently, data harvesting and analysis (e.g. on the use of mobile devices) have provided interesting insights on the social life of urban spaces, recent technological development and the emergent participation of internet users in terms of social interactions are leading us towards a redefinition of the possibilities of gathering and sharing first-hand information (Lupi et al, 2012).

Today citizens produce and share public information about their everyday experiences and they actually do so, mostly using social networking services and websites, such as Twitter, Facebook and Foursquare. By investigating and depicting this information, certain “invisible dynamics” of our cities may be observed, providing new insights to reshape spaces, policies, flows and services that define the city.

A series of unconventional mapping initiatives with such data have already been initiated by research institutions (e.g. Casa Lab the University College London, SIDL Lab at the Columbia University, Senseable City at the Massachusetts Institute of Technology, Urban Age at the London School of Economics), independent scholars and design firms (e.g. Stamen Design, Bestiario) with the aim of creating new ways to observe city-making processes.

Despite the growing attention received by recent projects we feel that a lack still exists in methodologies and tools able to support and improve policy-making practices and to provide all the stakeholders with new insights about their city through these novel sources of information. In fact, in urban research and practice there is a wide and growing concern about the inability of conventional data sources to describe adequately city dynamics and time-dependent variations in intensity of urban spaces usages by temporary populations. Among the limitations of traditional data sources, it is possible to cite the high cost of surveys, the difficulty of data updating, the absence of time-related data on the usage of cities. In this general context, the use of innovative data generated by users can contribute to a better understanding of urban behaviors and to the definition of more user centered policies.

Moreover several urban research topics (e.g. urban populations behaviors, daily mobility analysis, nightlife, big events monitoring, monitoring and evaluation of urban policies), do not have adequate analytical support and new sources of information are needed to provide empirical arguments on these.

Telltale, the project

Telltale is an ongoing research project leveraging the collaboration between computer science, social and urban studies and design disciplines at Politecnico di Milano.

As an attempt to fill the existing gap, the Telltale project crosses the computational ability to extract meaningful information from digital native sources, the sensibility on catching the behaviors of the city and the design attitude to organize information and visually communicate complex and relevant issues.

The project relies on a scalable software framework that is used to acquire information from heterogeneous digital sources. A general source of digital information can be viewed as a collection of acquirable facts. Those facts express one or more dimensions (e.g. geo-location, date and time) or attributes (e.g. users, or propositions expressed) that identify each of them in an unambiguous manner. At the current state of the art, since we are mainly interested in User Generated Contents, we acquire and store heterogeneous facts from four different social media: Twitter, Foursquare, Flickr, and Instagram. Furthermore, we decided to narrow down the acquisition, up to now, to facts concerning the cities of Milan and New York. An investigation has been conducted to highlight the peculiarities of Twitter, Foursquare, Instagram and Flickr users' sharing behaviors in order to enlighten which specific urban issues would benefit from an analysis based on these media. Potentialities and drawbacks in adopting UGC for urban knowledge purposes have been investigated through a matrix we built through several interviews with stakeholders (urban decision makers and urban planners), working with social media experts and directly experimenting on the cities of Milan and New York.

The matrix displays a selection of meaningful urban issues (main area plus specific concerns) according to the 4 geo-social applications' characteristics (sharing behaviors, relation with places, available metadata from the API), pointing out how to inquire and analyze data for each promising intersection (Fig. 1).

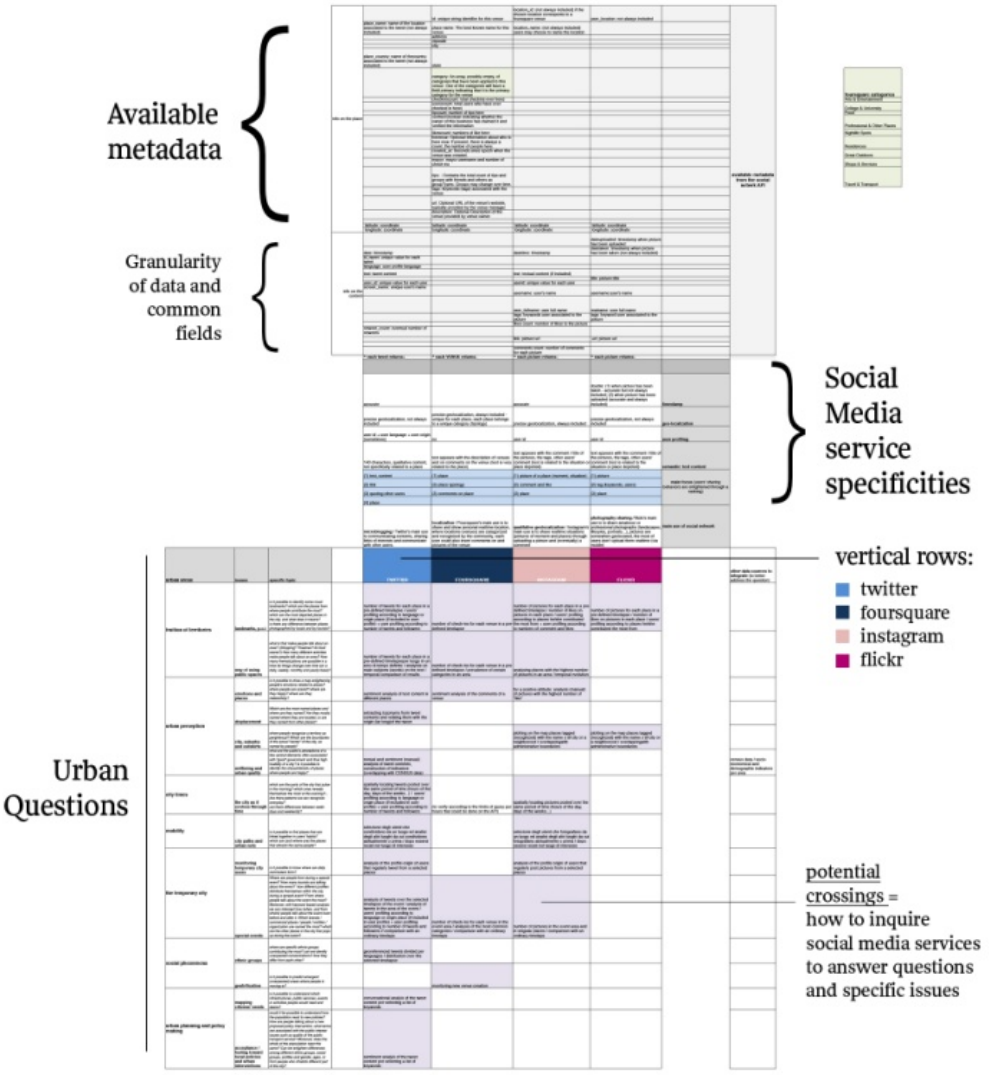

Fig. 1 Matrix of promising intersections between urban questions and social media data

Social media data: interpretation of urban dynamics.

As we investigated and as the matrix displays, UGC differs from conventionally produced geographic information in several aspects: the source of the information, the technologies for acquiring it, the methods and techniques for working with it and the social processes that mediate its creation and impact.

Therefore, a wide set of research questions (that have been partly investigated for "conventional" geographical information) need now to be re-investigated.

Even though UGC are not representative of the whole population they are an actual trace that has to be investigated: such novel sources of information need then to be compared and

overlapped with traditional ones (like ethnographic survey and on-field observation, data provided by census, by the public transport or by telephonic companies) or interpreted for their own specificity.

Several experiments were performed to test and validate our assumption on the city of Milan during 2012. In particular spatial analysis techniques have been applied to social media data in order to evaluate its potential in describing city dynamics by means of Geographical Information System (GIS) technology. Conventional urban data such as land use patterns, infrastructures, residential and employment densities, distribution of urban activities have been integrated with the novel data with the aim of facilitating the interpretation of specific patterns and spatial distribution emerging from the geo-located digital traces provided by the Telltale project.

The aim was to determine whether or not this novel information might represent an indirect indicator of what happens in urban spaces in terms of activities distribution, people behaviors and temporary city usages. Due to their fine spatial and temporal resolution, these data cannot be validated with conventional information that is usually available at the spatial level of administrative boundaries and, in the best of cases, on an annual basis. For this reason, it is more fruitful to consider social media data as clues of urban phenomena that must be interpreted by means of expert knowledge and certainly by means of conventional GIS layers, that can help in the reading of the spatial distribution emerging from social traces.

Each social media has its own peculiarities and characteristics:

- Twitter is a social networking and microblogging service that allows sharing conversations and contents while moving. Geo-located tweets can be used to map the concentration of people in spaces and in time according to their languages and nationality;
- Foursquare is a social network of places more than users. Members note their locations with a mobile phone and can find out where friends are. It describes a city made of geo-located and categorized unique places (parks, places, commercial activities, bars, etc...), named venues. Each venue has, as an attribute, the number of times, named check-in, a Foursquare user enters in. The analysis and the visualization on a map of the venues show a city of frequented locations and put in evidence new unexpected hierarchies of significance. (Fig. 2);
- Instagram is an online photo-sharing and social networking service that enables its users to take a picture, apply a digital filter to it, and share it. A user can upload a picture only right after its' caption (i.e. pictures cannot be stored and uploaded later on), and each picture is geo-referenced by default. For this reason this social media proposes an instant city and captures active moments of urban life;
- Flickr is a picture gallery web service. It offers a more reflective city since the upload of the geo-located pictures is subsequent to the shoot. Typically, a Flickr user (in many case a tourist) takes pictures, and then selects the best ones and finally he uploads some of them on the web site. The result is a city of "sedimented" places that have been carefully chosen to be shared with the on line community.

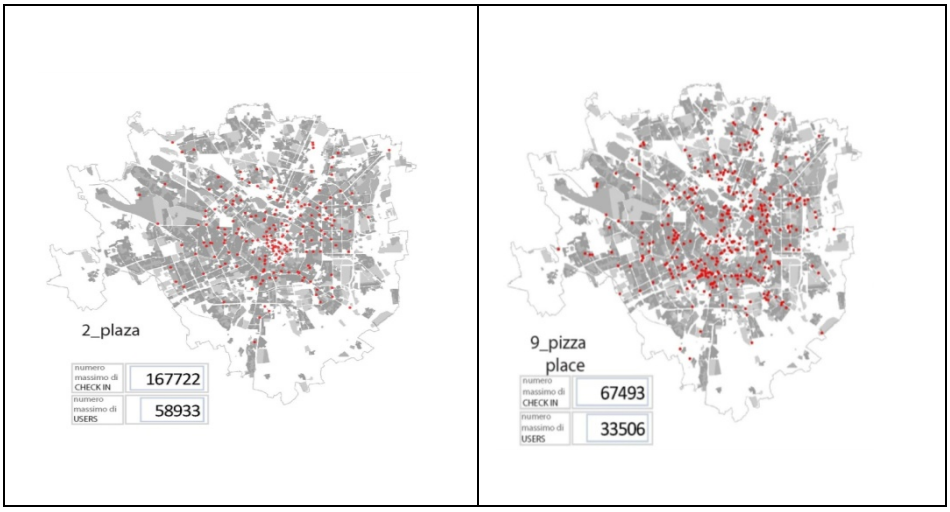

Fig. 2 Foursquare venues for the plaza and the pizza place categories

Technological framework and visualization engine

The architecture of our framework is composed of four main modules: (1) an acquisition framework, which takes care of integrating data from heterogeneous sources (in our case the four social media, which all provide their data through APIs) into a single knowledge base; (2) a database management system, where the actual data is stored; (3) a data analysis system, able to derive new knowledge from the gathered data; and (4) a visualization module, providing different types of visualizations according to the type of information that needs to be shown.
(Fig. 3).

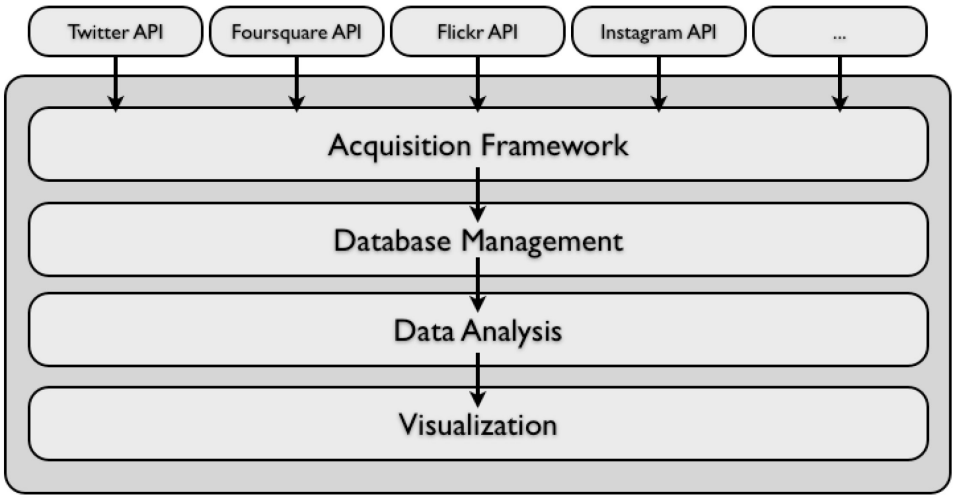

Fig. 3 Architecture of Telltale framework

The final goal of the project we will pursue during next months, is to build and release an intuitive visualization platform able to drive users (e.g. stakeholders with urban interests) through the process of performing specific queries on Social Media data and represent results through space and time.

We envision a final system able to suggest users a series of meaningful operations and views coming from our former analysis and interpretations of such information; leading then users to customize their path throughout knowledge discovery.

Since the integration between User Generated Content and traditional urban data source appears necessary, the platform will allow users to upload and represent any kind of other geo-referenced data source as well as suggest some meaningful overlapping of such datasets providing novel qualitative urban indicators.

Moreover, since we see visualizations not only as an outcome of the project but also as fundamental aspects of its analytical phases too, we already investigated different representational approaches, methods and techniques.

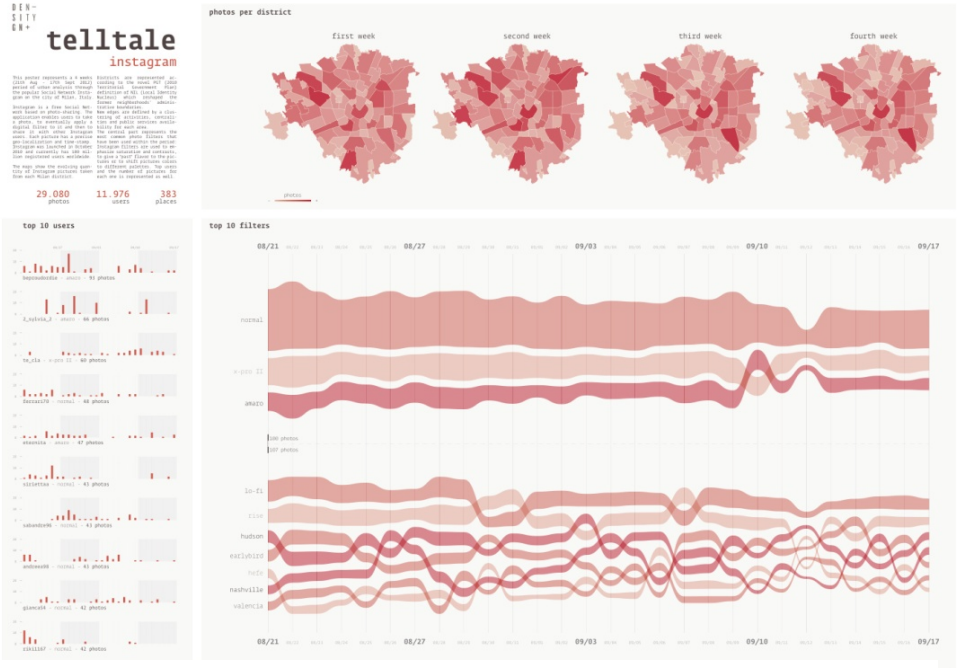

Fig. 4 Instagram analysis and representation, Milan 21th August – 9th September 2012

Fig. 4 represents a three weeks long (21th August - 9th Sept 2012) urban analysis of the city of Milan through the popular Social Network Instagram. Each picture captured by the user has a precise geo-localization and time-stamp.

The map shows the evolving quantity of Instagram pictures taken from each Milan district.

Districts are represented according to the novel PGT (2010 Territorial Government Plan) definition of NIL (Local Identity Nucleus): which reshaped the former neighborhoods' administrative boundaries.

New borders are defined by a clustering of activities, centralities and public services availability for each area. The central trends part represents the most used digital filters that have been used within the period: Instagram diverse filters are used to emphasize saturation and contrasts, to give a "past" flavor to the pictures or to shift pictures colors to different palettes. Top users and the number of pictures for each one are represented as well.

Similar experiments have been carried and visualized on Twitter and Foursquare during the same period. Twitter analysis returns general trends: the most "Twitter spoken languages" in Milan within the whole period as well as top users and the number of contributions for each one is represented as well. Foursquare analysis returns the most checked-in categories of places in Milan within the whole period as well as top users and the number of check-ins for each one.

Conclusions

City usage intensity and rhythm change in time and in space. It is the result of different daily practices carried out by temporary urban populations, that are difficult, if not impossible, to grab through traditional analytical tools, usually available for geographers and urban planners.

Recognizing and mapping the places that are “meaningful” for an individual, in their spatial and temporal dimensions, could be a major achievement in the understanding of contemporary city dynamics for urban studies and for urban planning. The experiments carried out in the present project go exactly in this direction and represent a promising and innovative research field that could provide the urban planning community with new insights on urban dynamics.

By visually describing the temporal rhythm of spatial behaviors and spatial movement patterns, we identify four main scenarios of use for Telltale:

- Providing urban planners, transportation authorities and traffic engineers with meaningful data useful to refine citizens’ spatio-temporal behaviors, bringing new perspectives on decision-making and policies building at least for the specific target population using social media;
- Supporting the exploration and the generation of new questions about the city, by the use of an interactive web platform, where visualizations are conceived as a *built-in* part of the investigation process, capable to grasp the attention of city’s stakeholders, while stimulating the dialogue about its current state and stretching the imagination on its future;
- Contributing to the definition of new sustainable urban indicators capable to intercept current urban dynamics, in a faster, less expensive and unobtrusive way, boosting Milan to become one of the first pioneering cities in a cutting-edge experimentation;
- Helping decision makers, planners and designers to discuss and share research findings through visualizations conceived to be coupled with languages commonly used to communicate urban plans and accessible to the non-expert public.

This collection of scenarios will rely on further technological improvements of the acquisition architecture: the development of tools.

The semantic analysis of textual sources (as Twitter tweets and Foursquare venue comments) is actually the more interesting challenge we envision. Through a wise combination of statistics and natural language processing tools we will in fact derive emotions and feelings coming from specific location and related to specific contents and users, providing the final audience with such integrated knowledge to be drawn by Telltale’s interface.

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