THE COURTYARDS OF THE *SEMINARIO ARCIVESCOVILE* AND THE UNIVERSITY OF TURIN: INTEGRATED SURVEY TECHNIQUES AND REPRESENTATION METHODS.

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ABSTRACT

The aim of the research is to better integrate survey instruments, methods and graphic representation tools. They have been compared studying two similar courtyards in the City of Turin: the courtyard of the University Of Turin belonging to the first baroque enlargement of the City (XVII century), and the courtyard of the *Seminario Arcivescovile*, sited near the Cathedral and the Royal Palace.

This work starts from Survey and History of Architecture courses carried out by the teaching staff of the Department of Building Engineering and Territorial Systems of the *Politecnico di Torino* (DISET); the Department of Land, Environment and Geotechnologies (DITAG) organised the metrical and instrumental survey steps.

During the research the purpose was to promote a synergic work between the two Departments in order to optimise methods and results.

The courtyards have chosen because of their similarity from the typological, volumetric and style features point of view (they both have a square shape and two levels of portico), so that the comparison would have been more interesting.

Thinking over the content of Drawing, the research suggests a comparison on survey techniques, representation methods of metric data and on media for graphics products.

Going into more depth, the relationship between symbolic and photographic languages was analysed. Thus, the potency of traditional drawings (plan, elevation and section) and the added value of 3d models were studied .

1. INTRODUCTION

In 1713 Vittorio Amedeo II created a new University centre, put in *via Po*.The work was financed with regal money and with a loan of the Municipality.

Figure 1. The courtyard of the University

The project of the building was made by *Michelangelo Garove*, (his last project). The works began in 1712 and finished within 1730 with *Antonio Bertola*, *Filippo Juvarra*, *Francesco Vittone* and *Giovanni Antonio Ricca* contributes.
Michelangelo Garove had the difficulty to build on an irregular lot; moreover the building code imposed to *via Po* the presence
The *Seminario* is a building characterized, as the University and the Academy, by a courtyard with double order of portico.
The paternity of the project, already attributed to Filippo Juvarra, is today recognized to *Pietro Paolo Cerutti*.

of continuous portico and the height of three floors for all the buildings.
Giovanni Antonio Ricca finished the courtyard, adorned by busts of people belonging to ruling class, researchers and scientists.

Figure 2. The courtyard of the *Seminario*

The completion of the building happened in 1728-29 with the part towards *via Cappel Verde*.
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2. REPRESENTATION TECHNIQUES

The didactic experience gives the opportunity to formulate some considerations on the most effective representation techniques used for drawing historical buildings belonging to the world's cultural heritage as those chosen for this article.

New instruments were partially used both in surveying and in drawing architecture (e.g. laser scanners or cad software). This shifted the operative and cognitive possibilities towards a more detailed and punctual description of physical entities.

In this research, the Cad drawing integrates direct and indirect survey techniques: starting from survey data traditional bidimensional representation (e.g. plan, elevation and section) and three-dimensional models were produced paying attention to the representation scale for the final results.

A topographical survey was necessary in order to have a reliable point grid.

Based on the measurement phase, the survey was integrated by the production of digital geometrical rectifications. This technique speeds up the restitution work, in which the operator overdraws the digital image and works out the selection data on the studied object.

Otherwise, using direct survey, the logical selection data for drawings is chosen during the metric survey phase.

This technique presents many problems on both of the monuments. The particular shape of the courtyards is developed by different parallel levels: therefore it was necessary to carry out different rectifications for the interior of the portico and for the front.

A 3D model gave a final more complete picture of the monument.

It is currently under discussion which types of digital products are most suitable in different specific contexts for the drawing of architectural elements.

There are two broad categories of software used in graphic representation.

The first is the CAD category, very widespread especially for 2D drawings, thanks to the high precision and the possibility to verify metrical data in a fast way. Using this restitution technique, the drawing is only defined by simple entities: the objects are modelled starting from basic standard shapes and volumes, (such as lines, circles, polygons, boxes, spheres, cylinders, etc...). The compound objects are obtained using Boolean operators (union, subtraction and intersection).

The second method is based on meshes; the meshes are constituted by triangular-shaped surfaces that are a schematic discrete representation of the real object.
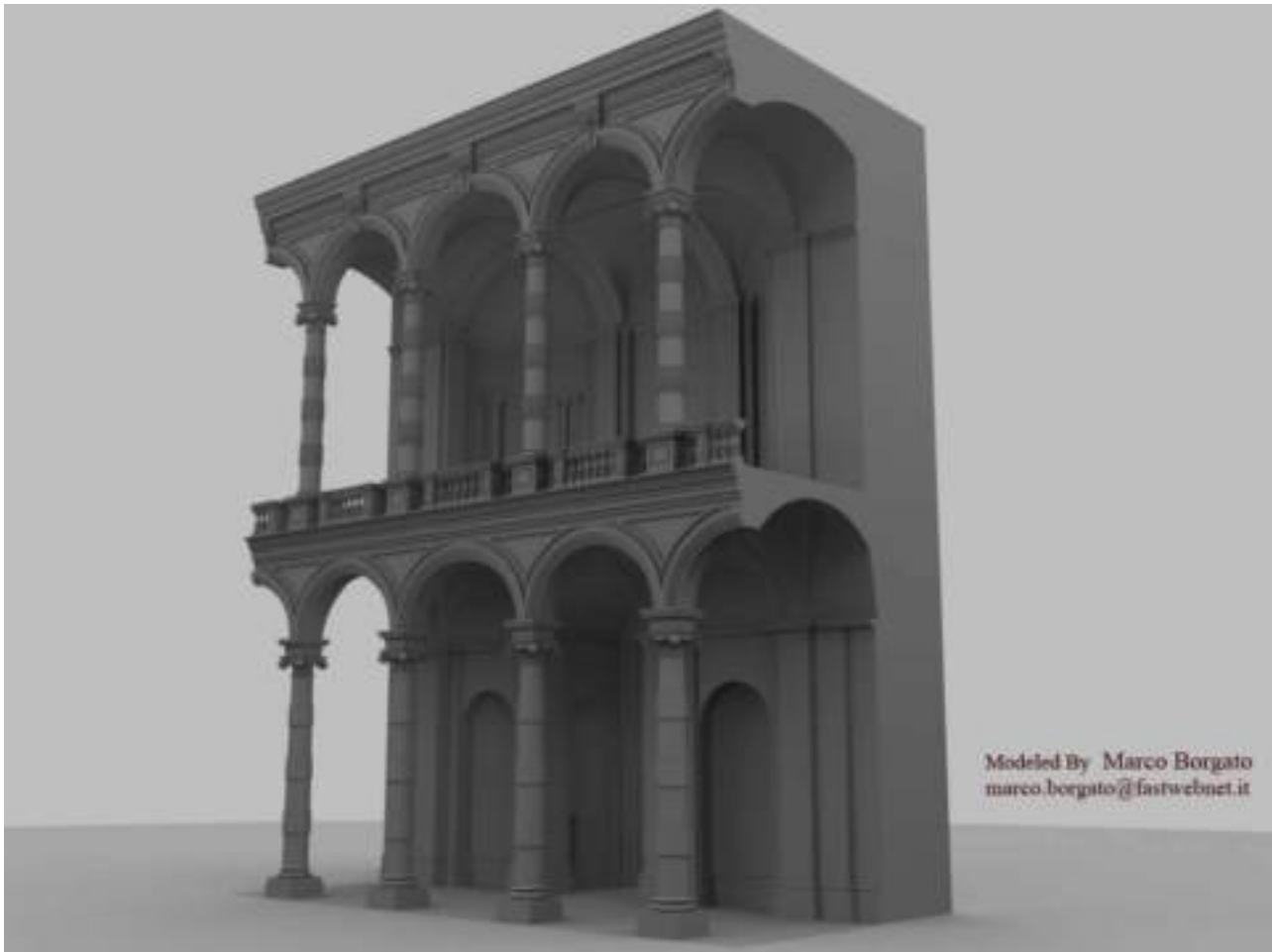
Figure 3. The courtyard of the University

Moreover, there is a more flexible technique, which can create NURBS (*Non Uniform Rational B-Splines*), curves and surfaces able to faithfully reproduce complex objects, like decorative elements and turned surfaces.

Starting from the aims of the didactic experience, the best choice for a 3D model has been directed a geometric reconstruction; therefore the way of represent the monument turns out from photo-realistic effects.

Some geometric abstract models were conceived by simplifying the object into basic geometries.

In the context of the current digital culture, it is necessary to consider that the communication of the architectural survey and the project are influenced by the spreading diffusion of digital static or dynamic models.

This creates integration between artistic and technical representations that belong to the traditional drawing.

The search for clarity and intelligibility in drawings and in the digital culture lead to new graphic codifications, an increased comprehension of the building and the push towards virtual models and technological innovation.

The aim of virtual design is not to replace the paper drawings, but to integrate the representation of the survey: the use of dynamic representations allows to show 2D or 3D views, choosing the right visualization to demonstrate the required data.

It is possible to establish a direct relationship with the model, and easily produce traditional drawings and perspective views.

Besides the transcription of geometry and the wireframe visualization, the virtual model goes further by assigning lights and materials to the scene for the rendering process.

As is known from the theory of the drawing, the last goal is to simulate a real object in order to obtain a model produced by our perception, and therefore subjective. The proportion between symbol and adherence to reality is imposed by the graphic code used.

The drawing loses its peculiarities of control tool of the survey., and the final product appears more and more virtual.

The current prerogative of digital representation techniques is to speed up the user's perception with less images and a lot of information contained.

The rules in architectural planning are changing: it's necessary to seek a different way to communicate it, even based on the virtual and the digital model, speeding up the process of perception.

When outlining a new rule of drawing in restoration it must not be forgotten that restitutions finalized to the state of art, with the tematismis proper of the analysis of the degrade and of the architectural characteristics.

 In this way, the collaboration between DISET and DITAG allowed to inquire some aspects of the survey intended as an "open instrument of knowledge" .(COPPO et Al., 1999)

It is hoped to continue the research in order to improve the synergical action between different skills.
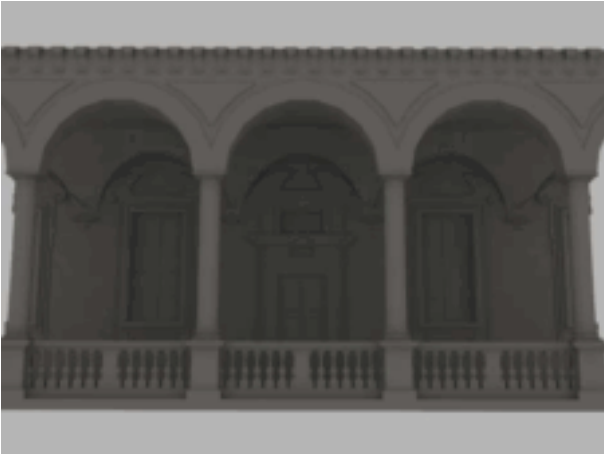
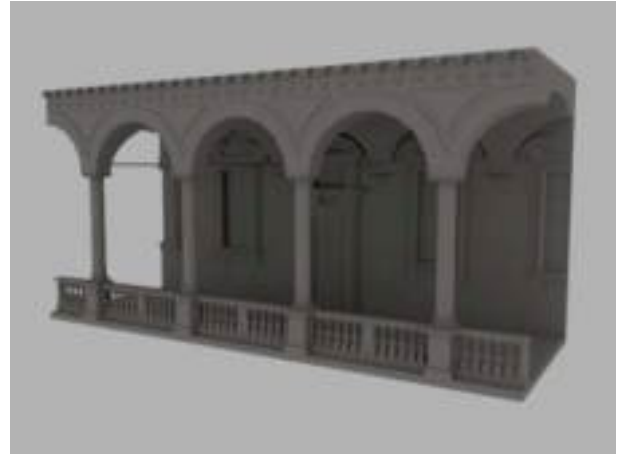Figure 5-6. The courtyard of the *Seminario*: the second floor of the portico and the balustrade

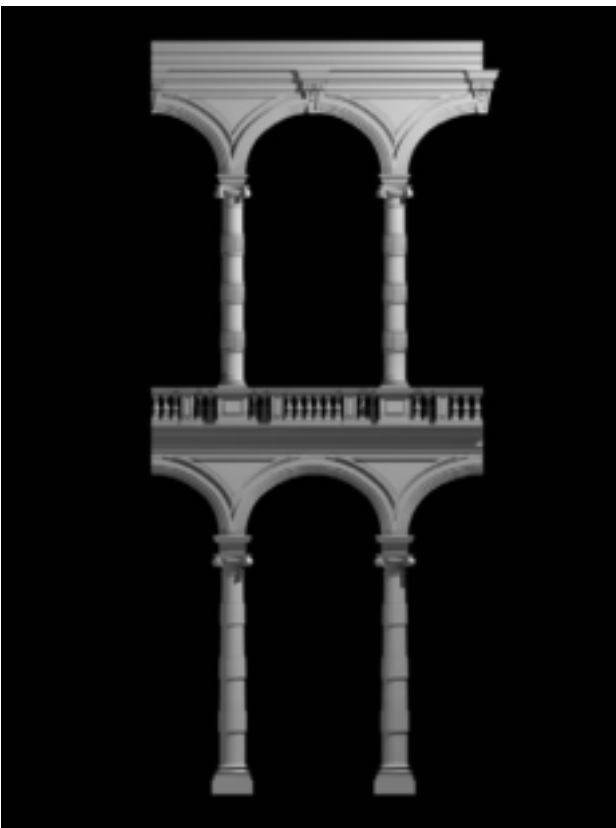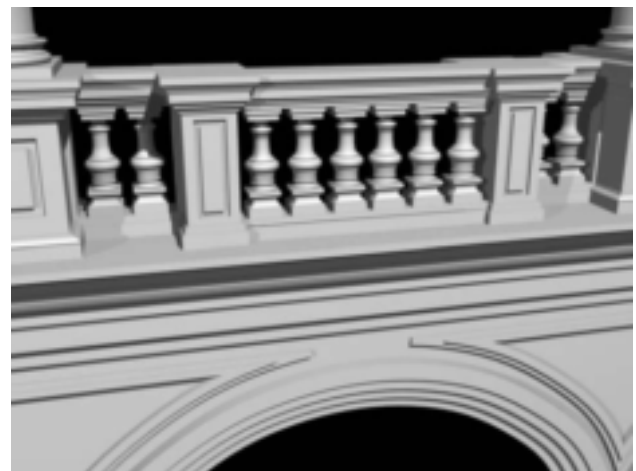Figure 8. Front view of the two orders of portico (the courtyard of the University)

Figure 9. Detail of the balaustrade (the courtyard of the University)

3. CONCLUSIONS

The choices on the ways of outlining architectural elements still constitute today the essential part of the planning of a process of knowledge of the monument; these choices condition the way the metric data is acquired and the architecture is represented.

It is wrong to consider survey and representation as separate and sequential phases, to be delegated to different subjects.

In fact, a strong relationship exists between the strategies and the ways of handling both the processes.

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