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ABSTRACT:

Granada Council's Rehabilitation Institute has sponsored the implementation of a digital model of its historic centre as it was at the beginning of the 19th Century. This organism has made the effort of a digital model’s creation of the Granada historic centre. The project's objective is to bring the citizens closer to their history in a simple way, providing information from the huge volume of documents in Granada's archives. The mesh try to allow the population to know and understand the city how it was two centuries ago.

This research focuses on recovering the lost city in the urban transformation. The model will allow us rediscovering the forgotten spaces at the romantic prints of the 19th Century. This is possible graces to the news technologies, the infographic techniques.

The research co-ordinated historic planimetry, photographs, prints and drawings by the Romantic travellers, as well as bibliographic descriptions to obtain a new cartography from which the digital model has been developed. Ethical and scientific criteria had to be established that would render a sufficiently truthful outcome, to transmit and convey the space and urban atmosphere of the time.

Handling images and animations of such dense geometry and textures also meant establishing a methodology able to economise on the resources of the respective meshes. The objective is to put the project on-line in the Institute's Web page to disseminate knowledge about the history of the city. The multimedia package will later be available at Interpretation Centres located in strategic touristic and cultural points. The novel aspect of this investigation has been to respond to the assignment by creating a mesh with urban features based on the combination of different graphic and bibliographic sources.

The project goes on to the next phases to get the digital recovering of the historical urban layout and it will be available to the people of Granada.

1. INTRODUCTION

This article is an in-depth analysis of one of the areas studied and developed for a digital scale model, designed for Granada Council's Rehabilitation Institute, which includes an important part of the historic centre of Granada.

We have carried out an in-depth study of Plaza Nueva, an urban space whose layout has greatly changed during the 19th century, to show how useful this type of work is in understanding urban changes and recuperating the city's lost layout with virtual reconstruction. In this way the citizens of Granada will not forget their recent past.

We will describe the context in which this project was conceived. We will analyse Plaza Nueva's current situation and as it was at the beginning of the 19th century, as well as the changes that have transformed it over more than a hundred years. We will refer to the methodology used for the analysis, the development of the hypothesis, the designing of the model and how the final images were rendered.

We will conclude by reflecting on the use of new technologies for the understanding of historic centres, their changes and evolution and the possibility of virtual recuperation through the use of infography.

1.1 The Elvira-Gomérez Project. Granada Council's Rehabilitation Institute

Granada Council's Rehabilitation Institute is a body devoted to heritage conservation in the historic centre of the city. It protects the historic city centre and manages any intervention in it to prevent its loss.

It also carries out activities to foster knowledge of the historic layout of the city, paying special attention to residential heritage, as it considers that the citizen's awareness is fundamental for the conservation of our cities' historic centres.

One of the strategies developed by this Institute, to raise social awareness, is the implementation of a Documentation Centre of the Historic City, as well as a network of Interpretation Centres. Thus contributing to the conservation and dissemination of the...
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Historic aspect of the city, while avoiding loss of identity due to lack of knowledge of one’s own history. Buildings are the only tangible evidence of a city, that’s why they should be protected while they still remain physically or even when there is only documentary evidence of their former existence. According to these principles, the Institute has established a programme that includes the conservation of what still exists and the virtual recuperation of what has already disappeared through the interpretation of sources from the cities’ archives and libraries.

1.2 Description of the present urban space

Plaza Nueva is one of the most emblematic spaces in Granada. It witnessed and was host to some of the most interesting and dramatic episodes of Granada’s history. Popular revolts, shows and all sorts of celebrations began, happened or ended in it.

It stretches from Calle Elvira to the church of Santa Ana. It is an elongated square enjoying one of the best views of the Alhambra and the Torre de la Vela, which, dominating the Sabika hill towers above this unique urban space. Its current layout dates from the last century, following a series of urban planning interventions which included the realignment of its entire perimeter, between the 1870s and 1880s, and some minor interventions in the 20th century.

1.3 Description of the urban space in the 19th century

Plaza Nueva as an urban space already appears in Seco de Lucena’s Plan of Arab Granada under the name Ramba Al-Hattabin or Woodcutters’ Square (Seco de Lucena, 1910). It ran between the bridges Qantarat Al-Qadi (Santa Ana or Cadi bridge, as it has been known since the 16th century) and Qantarat Al-Hattabin (Woodcutters’ bridge) also known as Qantarat Hammin al Tay (Crown Baths bridge) and conserving that name until the paving over of the Darro river.

It was uncovered until 1499, when the bridge was widened for the first time. In 1506 new works were undertaken to extend the pavement over the river up to the current Cuesta Gomerez. Later, it reached as far as Santa Ana church. Plaza Nueva stretched from the end of Calle Elvira, the main street in the Islamic medina, following the river along another important street which joined Plaza Bibrambla with the old Puerta de Guadix gate.

With the arrival of the Christians the square lost its regular shape and groups of buildings appeared giving, for almost four centuries, a divided configuration with two linked spaces in the style of historic Italian squares.
1.3.1 Singular buildings in Plaza Nueva during the 19th century

First the church of San Gil was built on what had been the Hattabin (Woodcutters') mosque next to Calle Elvira. A considerable number of houses were built against its walls, establishing the limits of the Placeta de San Gil, the first of the areas that constituted Plaza Nueva. The church was erected in 1543 and was one of the most beautiful in Granada, with a façade designed by Diego de Siloé and ground plan by Francisco Hernández de Móstoles. It had a high and solid tower in the mudéjar style.

In 1593 the local authorities ordered the construction of the Pilar de Santa Ana, a monumental composition carved in marble with sculptures and ornaments. Until well into the 19th century this construction formed one of the square's sides (Barrios Rozúa, 1999).

The Hospital de Santa Ana or Encarnación was founded by Hernando de Talavéra with the support of the Catholic Monarchs at the beginning of the 16th century. It was built on the paved area on the very edge of the river when this reached right up to the Pilar de Santa Ana. It was a building with a central patio and wooden galleries that looked onto Plaza Nueva. There is an illustration from the 18th century by Meunier showing the building with a surrounding gallery.

In 1835, an engraving by Girault de Prangey (De Prangey, 1983) shows the building without the galleries and with the same appearance it presented well into the 20th century. At that time the building was no longer a hospital but had been a fine arts school since 1776. The same year that Prangey did the engraving the Darro river flooded and probably caused serious damage to the building.

The Real Chancilleria was built around 1531 to serve as premises for the High Court which had been moved from Ciudad Real to Granada by decree of the Catholics Monarchs in 1500. The building is still preserved and houses the High Court of Andalusia (Gallego y Burín, 1982).

The rest of Plaza Nueva's boundaries were residential buildings which were lost during the 19th century, with the re-alignments of the square.

1.4 The modification of the layout during the 19th and 20th centuries

The first project to enlarge Plaza Nueva was drafted by the architect José María Mellado, although the project actually carried out was designed by the local architect Cecilio Díaz de Losa in 1872.

It was thought that the Church of San Gil with the attached buildings and the irregular perimeter of the square should be modified.
By 1862, the possibility of tearing down the church of San Gil was already being seriously considered to enlarge and harmonise Plaza Nueva. Its decay was obvious and it was demolished in 1868.

Years before, in 1835 and due to the flooding of the Darro river, the Pilar de Santa Ana was already in ruins as well as the block of houses built behind it. This situation lead to the local authorities removing it the following year. These two initiatives cleared the space and brought about it's enlargement, but it was not until 1878 that an agreement was reached to pave over the river, from the site of the Pilar de Santa Ana up to the church of Santa Ana. These building works truly enlarged the square and helped, in a way, to palliate unemployment in the building sector at that time.

The last transformation Plaza Nueva underwent wasn't until much later, in 1944, when the city mayor Antonio Gallego Burin decided to demolish the Hospital de Santa Ana in a new intervention for the enlargement and harmonisation of Plaza Nueva.

2. METHODOLOGY

2.1 The documentation process

We began research by revising the general bibliography, in order to be able to locate the originals of each representation later on. The aim was to have the best quality information at our disposal.

The date chosen to represent the historic city was 1835, a crucial year in the city's history. At this time the Darro river flooded the city and irremediably damaged most of the buildings surrounding the top end of Plaza Nueva. This lead to a serious consideration of the enlargement of the square by the paving over of the river up to Santa Ana Church.
There was an updated and quite accurate planimetry from that year, based on a city map drafted by Francisco Dalmau in 1796. A few years later, all the re-alignment projects carried out in the city centre area had changed its layout definitively. There were radical interventions such as paving over the Darro river along its course through the centre of the city.

We started by superimposing the contemporary cartography, obtained by orthophotography, onto the historic plan, taking as axial points relevant buildings: the Cathedral, Santa Ana church, and Del Carmen convent. It was remarkable to discover the precision of Francisco Dalmau's planimetrics, which confirmed our idea of using his work as the primary source for the project. Of invaluable help also were the drawings of the alignments made by the Council's technicians in the 19th Century, drafted while paving over the river and designing the new plan for the main avenues. These drawings, of great precision and even numbered by lots, were decisive in those areas for which there was no photographic or pictorial data.

The co-ordinated use of all the documentary sources, literary, graphic, planimetric or romanticised views, finally allowed us to design a digital model of Granada in the 19th Century.

2.2 The construction of the model. Ground plans, elevations and finishes

To make the model the most accurate possible planimetry of the analysed urban space was required. We began by superimposing the ground plan of modern day Granada, made by orthophotography, with Francisco Dalmau's plan. We aimed at making the best known and probably the most accurately represented reference points coincide, the Cathedral, the Del Carmen Convent (now the city's Town Hall) and the Real Chancilleria, in Plaza Nueva itself.

Once the general planimetry had been superimposed we continued by overlapping fragments of plans from the re-alignments carried out by the urban planning technicians in the 1870s (Anónimo, 1870). The documents had been safely preserved in the city archives and became of invaluable help in the making of the model thanks to their accurateness.

With this detailed planimetry we were able to digitalise a ground plan from circa 1835 and begin our task. To make the building's elevations for the square we had to work with photographs, drawings, prints and old descriptions (Clifford, 1862, García Ayola, 1880, Gómez Moreno, 1892, Lewis, 1835). We knew the dimensions of each lot as this information was included in the ground plan. We only had to define the heights, window openings and doorways, and finishes.

Some of the most important buildings, such as the Chancilleria or Santa Ana church, are still preserved and we were able to make exact models. However, most of the buildings had disappeared and the documentary sources in which they were described lacked accurateness. In these cases we decided to use an average three and a half meter storey and depict the number of storeys that the documentation said these buildings had. We did the same for the roof treatments, keeping them coherent.
with the dividing walls, when they weren't evident in the images we had.

Then we drafted a planimetry elevation of the square, which, along with the ground plan allowed us to begin the process of making the scale model. However, the finishes were almost totally unknown, since most of the information didn't show colours. We decided to use a selection of the different types of finishes typical to the area, using the little documented information available and choosing a range of soft tones, from white to ochre.

2.3 Hypothesis for the lost spaces. Documentation voids

Despite having a great deal of information some lots lacked any information at all, here we had to decide upon a typology that would volumetrically represent the unknown building.

Fortunately, the ground plan was complete which meant that we had the exact perimeter of the square and we only had to establish a hypothesis about the number of floors. Given the fact that in the rest of the square the heights were quite homogenous, usually two or three storeys, we didn't consider it unreasonable to use a three storey building type which we fitted into the undocumented plots. The window and door openings were regularly placed according to a composition obtained from the study of the rest of the elevations. In this way we were able to complete the basic information needed to make the model.

2.4 Hypothesis of the atmosphere and details

When dealing with a model of this type, which strives to be reliable and historically accurate, deciding on the details is a fundamental problem. A digital scale model allows us to render even the smallest details. Moreover, up to a certain point it demands these details to become credible. However, the more we go back in time the more difficult it is to obtain this information. This is particularly true in the case of residential architecture which lacks the elements that capture the interest of their contemporary historians and painters.

That's why we had a great deal of information pertaining to important buildings or constructions such as the Pilar de Santa Ana. For the more ordinary buildings we only had basic information such as dimensions, disposition of window openings, and only in some isolated cases the type of doorways and their features.

We thought that it would be advisable to catalogue the most common features: carpentry, window bars, balconies, etc., as these would be repeated throughout the scale model in order to make clear that it was representative and not a complete and faithful rendition. However, preserving the atmosphere required this depth of detail.

At a later stage, the final renders would be retouched image by image to introduce more realistic decor, like plant pots and shutters, bringing them closer to the true aspect of any city.
which depends on the every day activities of the people who live in it to give it its character.

Another problem was deciding on whether to use different levels of representation that would become different layers of information like in archaeological and architectural restoration to point out the textural changes of any work carried out or added features.

This approach can be extremely useful and clarifying in order to reconstruct specific buildings and delimited archaeological sites. However, taking into account that our main purpose was to achieve a re-creation of the city's atmosphere, we decided not to use it. We decided that this type of differentiation would lead to more confusion than clarification. Instead of presenting this information, where there is a differentiation between the hypothetical and the real, we designed repetitive modules that were inserted into their allotted places in the mesh and were easily recognisable.

2.5 The making of the model

The scale model was made using perforated boxes, modelling window openings and doorways, carpentry, window bars, and ornamentation where it existed. Unlike other projects in which an overall texture is used, that is, with all the elevation elements applied to a straightforward box, we decided to give volumetric consistency to the objects. This would allow us to make closer images, as well as providing basic information like shadows and relief, so important in architecture.

The work was carried out on two Pentium computers, using AutoCAD and 3D Studio. The bitmaps were handled using both Adobe PhotoShop and Corel Photopaint and Architectural Desktop was used for the roofs.

3. OUTCOMES

3.1 The rendering of images

Once the scale model was ready we produced a series of renders, for which we used their current equivalents. We wanted to highlight the changes the square had gone through. The identification of the current images with their representation in the 19th century isn't always clear, since there are only three points - the Chancilleria, Santa Ana church and the Alhambra - that have remained spatially unaltered. It is surprising to see the profound changes which have taken place in only a hundred years.
Another significant feature we notice when comparing the images from past and present is how the city has been filled up with objects: trees, traffic signalling, publicity, urban furniture, cars, etc. While the old images we used for the project showed large, open and semi-deserted spaces with a few pedestrians and stalls on the market day. We used that information to make the scale model.

As has already been mentioned, the views obtained were handled with an image processor to add the appropriate atmosphere, mainly found in the façades of the residential buildings.

3.2 Understanding the urban space

In our cities we are used to seeing how certain buildings, or sometimes complete blocks and neighbourhoods, disappear victims of new urban planning projects or land re-categorisation. These actions drastically change the historic layout of a city, leaving almost archaeological remains of a forgotten past. Such transformations are accepted by the inhabitants who forget the original historic centre, letting their past vanish and, with it, the city's character. Understanding what these spaces were like and becoming aware of the need to preserve them in a few maps kept in an archive is an almost impossible task. This sort of information is usually incomprehensible and lacks the fascination of virtual reconstruction. Therefore local authorities must use attainable tools to raise citizens' awareness, showing them what the city was like and how to appreciate and protect it. Computers are ideal tools for this as they transform all the inaccessible documentation into understandable images, capable of fascinating and touching people, as well as teaching about one's own history in a simple and entertaining manner.

4. CONCLUSIONS

4.1 Historic and virtual information on the Internet

The work carried out is a contribution to the existent documentation about the city of Granada, which is accessible through Granada Council's Rehabilitation Institute web page, along with a great deal of the information that was used to develop the model. The web page is still being tested, but is becoming progressively larger by the incorporation of available information from archives and libraries to make it user-friendly.

Our objective is that all this research actually achieves its main goal, which is to make citizens aware and knowledgeable about their heritage. They are after all the main beneficiaries in knowing and preserving their cities. There is more justification for these kinds of projects if they speak to the public and they enjoy them. Specialists can always consult documents in archives to do their research, but virtual reconstruction can bring together citizens and the historic studies carried out by architects and archaeologists. These studies shouldn't be confined to libraries for the use of specialists only.

4.2 The representation of cities from the past

Currently there are a great deal of initiatives in the field of representation of cities using archive material. The aim is to bring lost architectural works closer to citizens. However, often they represent them in a general way focusing only on making models based on a bird's-eye view.

To make a model that enables us to have a view from a pedestrian's perspective, not only requires a comprehensive knowledge of the represented building, but an in-depth study of the city's atmosphere. We have to be able to represent all those elements that show that a building is alive: plants, clothes hanging up to dry, shutters that open and close, etc. In residential architecture, the interaction of the inhabitants with a building is what gives it its character and, by extension, that of the city.

While software allows us to add all this extra information to the model without hampering its performance, we have opted to
insert it individually with image processors. However, we hope to be able to try out new ideas, in subsequent stages of the project, that would mean including part of this detail in the scale model itself.

5. REFERENCES


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