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MUTATIONS GENERATED BY THE USE OF COMPUTER IN THE HISTORY OF ARCHITECTURE RESEARCH METHODOLOGY

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Abstract: *History generated in the second half of the 20th century, the development of Postmodernism and Contextualism in architecture and urban planning. Research methodology in art history and architecture, is basic tool in the field. The reference work, due to academician Virgil Vătăşianu (illustrated at the University of Cluj-Napoca), supports the idea, that in its basis, art history would be a science, able to reach objective, generally applicable results. The research method has three steps: 1.Documentation, 2.Analysis, 3.Synthesis and it should start from concrete facts developing an exhaustive analysis and generating conclusions. Computer strongly interferes both in research and project design, proving Post-modern contemporary virtualities, beyond the dedicated movement, while recent achievements have affirmatively answered the rhetorical question "WILL COMPUTER CHANGE THE SOUL OF ARCHITECTURE?".* ***Key words:*** *art history, architecture, research methodology, computer, Postmodernism, Contextualism.*

1. INTRODUCTION

History was one of the "tough" sciences of the 20th century, generating, in its second half, the material on which Postmodernism and Contextualism in architecture and urban planning have evolved.

The University of Cluj-Napoca was illustrated in the last century (somehow alike the spirit of Transylvanian School "Şcoala Ardeleană") in the development of the research methodology in art history and architecture, basic tool in the field. Architecture has proven capable for quasi-exhaustive analysis, whereas "the correlation between the functional structure, shape and décor" would be extremely adherent and of an urgent logic.

At this moment, the *synthesis* due to academician Virgil Vătăşianu is the work of reference, and his school irradiates in the field, supporting the idea that in its basis art history would be a science, able to reach objective, generally applicable results. The research method (with its steps: 1. Documentation, 2. Analysis, 3. Synthesis) should start from concrete facts to make an, as well as possible, exhaustive analysis, to generate conclusions.

2. ARCHITECTURE RESEARCH METHODOLOGY

DOCUMENTATION recognized as the basis of research, should contain this (certain and to this end with accuracy scrupulous verified) information (Fig.1., Fig.2., Fig.3., Fig.4.):

A. Monographic presentation of the object or monument:

- Name (if needed be defining elements, the patron of churches, etc.);
- Location (address of the functional ones, ruin's topography, no. of the inventory for those in museums, etc.);
- Description including materials, dimensions, photographic images, *relevé planimétrique* (based upon non-deformable triangulations), sections, construction and decorative details (aspect of churches relevant for their patron), verbal description as accurately as possible;
- Description of monument would ground provisional conclusions on the conservation status of the monument, of its initial aspects or possible additions and even

restoration/reconstruction throughout its entire existence (Fig.5.);

- Collecting and recording written testimony: the inscriptions on the object, reviews, inventories, more recent bibliographic sources and other documents;
- Conclusions drawn from the description of the monument, in conjunction with the elements found in written testimonies, would allow reliable conclusions regarding the object's chronology (genesis, vicissitudes etc.).

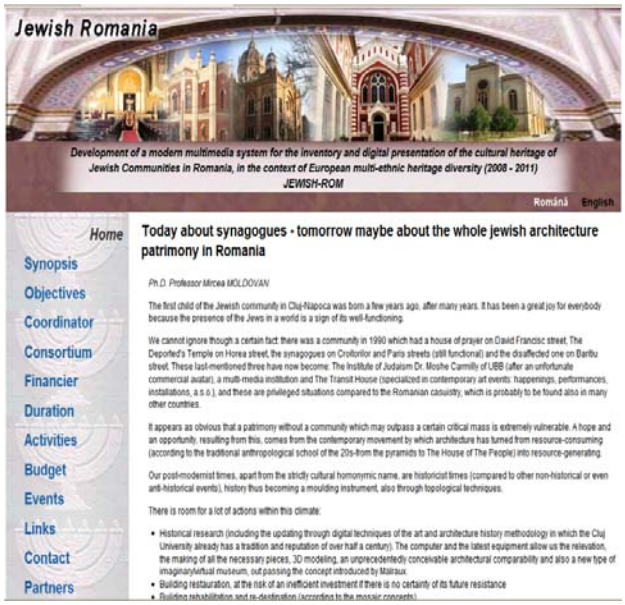

Fig. 1. Web page processing, illustrating the development of a modern multimedia system for the inventory and digital presentation of the cultural heritage of Jewish Communities in Romania.

Fig. 2. Map showing the inventory of synagogues, belonging to Jewish Communities in Romania.

B. Monographic records, responding to the demands/exigencies of monographic presentation, should be the basis for inventories, repertoires or regional/zone artistic/architectural topographies.

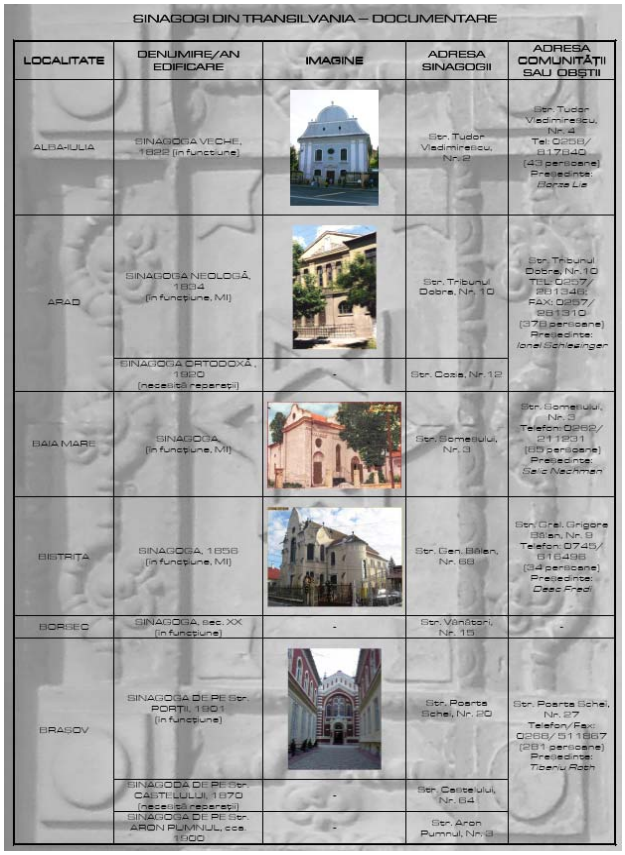

Fig. 3. Digital inventory regarding synagogues from Transylvania, recording name, location, certified years, conservation status and addresses of both monument and belonging Jewish community.

Fig. 4. Interactive web page showing the inventory of the architectural historic heritage of Iaşi County in Romania.

Fig. 5. Plan using layers and images to illustrate initial aspects or possible additions, building stage details and conservation status of a monument (case study – baroque house in Cluj-Napoca, Romania).

Fig. 6. The inner courtyard of the Buonconsiglio castle in Trento (Italy) with the frescoed "Romanino loggia". The wire-frame model after the integration of range and image models and different views of the final textured 3D model of the interior and exterior parts.

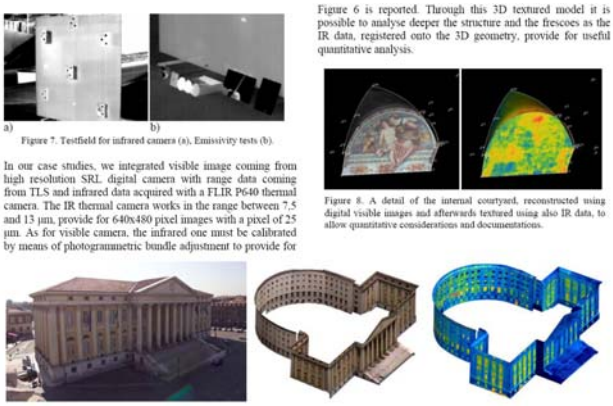

Figure 7. Testfield for infrared camera (a), Emissivity tests (b).

In our case studies, we integrated visible image coming from high resolution SRL digital camera with range data coming from TLS and infrared data acquired with a FLIR P640 thermal camera. The IR thermal camera works in the range between 7,5 and 13 μm, provide for 640x480 pixel images with a pixel of 25 μm. As for visible camera, the infrared one must be calibrated by means of photogrammetric bundle adjustment to provide for

Figure 6 is reported. Through this 3D textured model it is possible to analyse deeper the structure and the frescoes as the IR data, registered onto the 3D geometry, provide for useful quantitative analysis.

Figure 8. A detail of the internal courtyard, reconstructed using digital visible images and afterwards textured using also IR data, to allow quantitative considerations and documentations.

Fig. 7. Palazzo Barbieri in Verona (Italy). Building analysis. Digital reconstruction of a detail from the inner courtyard and the reconstructed 3D model of the exterior walls, visualized with the visible and infrared texture.

Monument methodical ANALYSIS would pursue the use up of all concrete aspects and concern:

- The theme, which would give rise to the work/creation. Historically, the beneficiary originally provided the theme and modernity that has brought about smaller ware-work, would have, in this case, offered a role, also, to the creator. Concerning architecture, the theme should refer to certain types of buildings and at games between tradition, innovation and deviation.
- Material and equipment would involve the creator into a game of possibilities and restrictions. Material can be the expression of ambient determinisms and beneficiary or artist's options, too. Material expresses itself in relation to the state of art techniques. Technical innovation can generate not only new expressions, but also, new materials (the craft – tool relation). Regarding architecture, based upon materials (for example "architectures" of wood, stone, metal, concrete, etc.) configurations, and even scientific ones, were developed.
- Would be the form the creator/artist expresses as a language maker/artisan. Formal analysis would consist of two stages:
    - Primary forms offered by nature, and formal heritage developed by previous periods (concerning orders and styles) artists;
    - Formal work of creators/artists, involving principles and possibilities of expression.
- Would be the content that a work of art transmits to the public (as idea, emotion or message), architecture and urban planning being reputed as action about spirit through atmosphere.

SYNTHESIS would result of particular and general conclusions, drawn from previous analysis, the concrete of artistic evidence (directly, reliable, honest and non-falsable, tangible and visible) considered more reliable than époque influentially written sources.

This vision dates back many decades and was somehow ideal since its beginnings, while only new techniques had opened new opportunities and accessibility.

DOCUMENTATION is in fact onerous because besides the images, a proper survey and measurement is laborious (Fig.6., Fig.7.). Therefore, the only ones who have complied with the methodology of presenting as many detailed parts (plans, sections, façades) of a

monument were Fletcher (who became an institution after his death, with multiple reissues) but only until the Renaissance, and Choisy (having the resources of a Ministry Directorate), that grouped into one axonometric image the plan and interior/exterior views. Even academician Vătăşianu had his department and institution resources available.

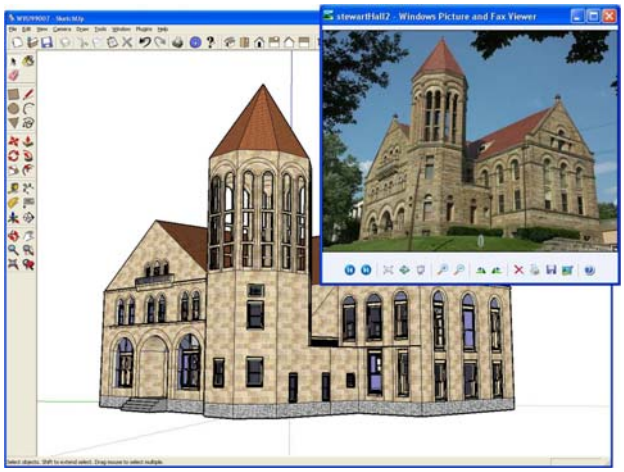

Fig. 8. 3D modeling becomes more and more important in analyzing and studying monuments; images develop into virtual realities.

We should not forget that images have always been "expensive", like in digital era expressed in memory consumption and that the situation from the beginnings, when the full text of a book fitted on a floppy disk, but one could sometimes memorize not even a single "image file", has developed.

Once an image digitized, or a building/ensemble drawn or modelled (Fig.8.), "editing" becomes an extremely accessible "pleasure".

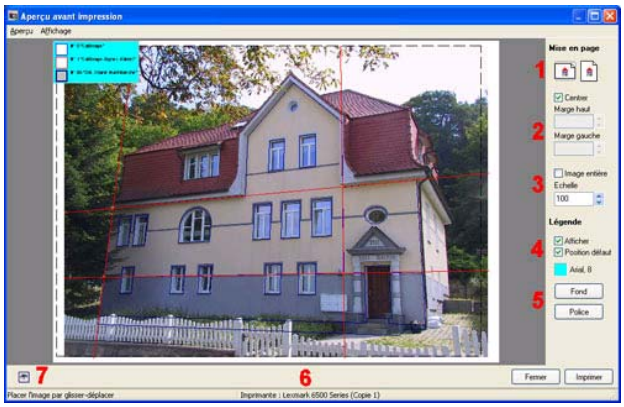

Fig. 9. Automatic *relevé* and photo calibration using special computer applications.

Beyond the initial disappointment of the early applied informatics, while time consuming digital representation is similar to traditional drawing up, currently there are scanners for interior and exterior that give you (at the adequate costs) the digital model of the building observed.

Unlike traditional specialists' scepticism, believing the fact that if they "do not know how to lie", the computer will not be able to adapt to irregularities of the historical monument's *relevé*; current techniques are able to return/render the full (Fig.9.).

ANALYSIS benefits of the fact that computer provides multiple layers, and thereby opens multiple opportunities for architectural comparison, too.

Overlapping buildings/monuments, joining them on the same scale and other methods of processing or editing information are extremely comfortable.

Form analysing and algorithms of variation acquire unsuspected extensions; therefore, this methodology area update seems necessary. Urban analysis has already degenerated into coloration, after certain criteria, widely accepted/not accepted, of the same situation plan and this seems only to highlight the danger of facile abuse in the field.

We should not forget the possibilities offered by the proliferation of GPS: aerial photos, satellite imagery, images combined with overlapping of maps (Fig.10.), the possibilities of further processing and thoroughgoing study, etc.

Fig. 10. Overlay maps illustrate the changes made by modern developments.

The past century, once with the socio-economic changes that have expanded leisure, transformed both architecture and urban

planning from resource consumers into resources, especially touristic and cultural ones.

With the transition from CAD to BIM, SYNTHESIS reveals that the number of plans and sections can indefinitely proliferate; and Gheorghe Curinschi's assertion on the architecture and urban planning history as a way of modelling in the domain, gains consistency.

Already, the processing CorelDraw topological objects reveal Post-modern virtues corresponding to deformation of art works' historical elements, belonging to the architectural movement of the époque.

Computer proves Post-modern contemporary virtualities, beyond the movement of the same name because functions "cut" and "paste" vulgarize (in the sense of unlimited access) urban and architectural collage.

Computer has post-industrial manifest virtues, meaning the flexibility of "the running production belt" and of the product customization offer, all these being visible in architecture and urban planning.

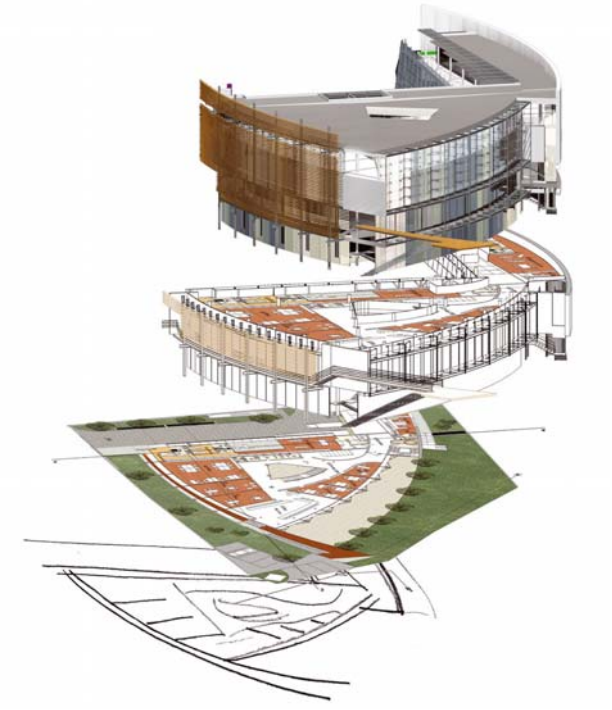

Fig. 11. Collage showing architect's concept starting from 2D sketches and plans, leading to 3D models and images; one should observe the development of the concept, using only computer facilities, the importance of building theme, material use and structure as intelligent (digital) artisan performers of the future creation.

Unlike the 80's messianism and proselytism, when digital computers were promised to solve quantitative problems and the analogic ones qualitative problems, yet there is no guarantee that also with the advanced support of artificial intelligence field, "the black box" of creativity will quickly turn into a transparent one.

Accelerated succession of styles/ architectural trends/movements does not leave any time for developing the appropriate creation algorithms. Contemporary shortening of the research-production-sales cycle quickly trivializes the basic concept, so that even a housewife (not to mention a technician/specialist in any other field) has the firm illusion that she realized in "My House" the perfect home, and the ineffable bird of genuine creation would open its wings to another world.

3. CONCLUSION

Primary reactions, to certain alienation because of CAD were in the last decade, the returning of some prestigious companies at manual drawing or at the use of model studying with endoscope view interior/exterior image capturing, as to subsequent processing.

We do not believe that it is a viable solution, for many issues the rhetorical question "WILL COMPUTER CHANGE THE SOUL OF ARCHITECTURE?" was given an affirmative answer by the recent achievements from Deconstructivism until nowadays and by the history that has shown how various new designing tools have correspondence in new adequate formalizations (Fig.11.).

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Mutaţii generate de utilizarea computerului în metodica cercetării în istoria arhitecturii

Istoria a generat în a doua jumătate a secolului XX, apariţia, în arhitectură şi urbanism a postmodernismului şi contextualismului. Instrument de bază în domeniu, metodica cercetării în istoria artei şi arhitecturii s-a dezvoltat la Universitatea din Cluj-Napoca, în ultimul secol. Arhitectura s-a dovedit aptă unor analize cvasi-exhaustive întrucât „corelările dintre osatura funcţională, formă şi decor" ar fi extrem de aderente şi de o stringentă logică. Lucrarea de referinţă este sinteza academicianului Virgil Vătăşianu, susţinând ideea că istoria artei ar fi o ştiinţă capabilă să ajungă la rezultate obiective, general valabile. Metoda de cercetare cuprinde etapele: 1.Documentare, 2.Analiză, 3.Sinteză, şi ar trebui să pornească de la fapte concrete, realizând o analiză cât mai exhaustivă şi generând concluziile. Calculatorul intervine puternic în cercetare şi în elaborarea proiectelor, dovedind virtualităţi postmoderne contemporane, dincolo de curentul consacrat, iar realizările recente dau un răspuns afirmativ la întrebarea retorică *„WILL COMPUTER CHANGE THE SOUL OF ARCHITECTURE*?".

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