The Historico-cultural Past as Spatial-related Cognition Archives: Computer-assisted Methods in the History of Urban Development, Archeology and History of Art

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Implementation of computer-assisted visualizing methods in studying historico-cultural facts provides archeological and historico-cultural research with a tool adding to consolidation of knowledge resulting from assumptions. The visualizing methods presently available by utilizing of computers have advanced to an extent justifying their implementation in the field of archeological and historico-cultural research. The present contribution covers the above matters by means of a variety of applied examples performed at the Institute for Local Planning at the Vienna University of Technology dealing with history of urban development, archeology and history of art.

**Keywords**: Historico-cultural past, reconstruction, visualizing methods

A: Planning-specific Scope

The historico-cultural past has always been - intentionally or not - the starting point for processes of knowledge and consequently of those of planning and changes. The deliberate confrontation with the past - whether authentically complete, only existing in fragments or even totally lost - is to be regarded as an essential prerequisite for an active configuration of our future.

In assessing visually perceivable phenomenons we principally may assume that spatial development and design work takes place between preservation and modifications. In up-dating understanding in terms of a creative planning process preservation priority or modification priority can be determined for areas or objects with distinct characteristics. This pronounced differentiation makes for allocating differing design potentials to the two defined terms.

The wholistic consideration of a historical city display (e.g. Ephesus) very clearly demonstrates this simple principle of preservation and modification. Thus not only the differing elements of classical architecture but also the changing principles of design work, such as the variations concerning column order, their features and proportions or the changing forms, dimensions and proportions of public buildings and facilities but also the residential quarters and housing buildings become visible. To trace this metamorphosis of a city, a part of an area or an architectural object, to visualize a small segment with sophisticated means finally to be subjected to discussion provides modern planning with a valuable procedure for obtaining spatial-related findings and knowledge.

B: Examples

The following contribution covers the above matters by means of a variety of applied examples performed at the Institute for Local Planning at the Vienna
University of Technology dealing with history of urban development & archeology (Ephesos) and Austrian history of art (reconstruction of Annen-Chapel, Starhemberg-Castle, Lower Austria; Vienna, Former Minorite’s Church, and Imbach, Former Dominican Convent Church).

Subject: Ephesos 1995 Slope House 2 (Turkey)

Description: This photorealistic computer animation of the housing unit 6 in the Slope House 2 demonstrates the effectiveness of using the computer-modeling and animation method as a new tool in archeology. The researcher is provided - at the very difficult stage of allocation and integration of physical findings within the total image - with the possibility of developing variants prior to reconstruction up to a possible anastylosis (re-erection) and of checking their possibilities for realization and spatial impact. The contribution of a photorealistic computer animation on this housing unit is aimed first at representing the archeological findings by means of a digital model as realistically as possible. The present computer animation issued the main frame conditions regarding proportion, dimension and light design for the required protective buildings of the housing units. The digital model was also used for the visualization of the competition findings of protective buildings for Ephesus. This contribution is an integral part of the research complex „Condensed Forms of Housing and Settlements“.

Client: ÖAI (Austrian Institute of Archeology)

Team: Friedrich Moser, Andreas Voigt, Hans Peter Walchhofer, Georg Kleiber, EImar Schmidinger, Philipp Krebs, Ulises Torres Montes.

Duration: 06/1993 - 10/1995

Tools: GDS, Adobe Photoshop, Wavefront TAV, SGI - Mediatools

Subject: Annen-Chapel, Starhemberg-Castle (Lower Austria)

Description: Stonework of an ecclesiastical structure has been preserved in the courtyard of the Starhemberg-Ruin (Dreistetten, Lower Austria) so far not been duly covered for its historico-cultural impact by research. A stylistic analysis of the existing building details resulted in dating the chapel towards the middle of the 13th century. Accordingly, the last Babenberg Duke Frederic II (1230-1246) must not only have provided for the expansion of the 12th-century fortress as “castra, que clare memorie dux Austrie tamquam inexpugnabilia ad tempora longa munivit”, to withstand any attack, but also took pride in adding a second more representative ecclesiastical building to the already existing round chapel. The so-called Annen-chapel devised as a double-story construction made for a novelty in the Dukedom Austria of those days. The ideational orientation at the most famous example of double-story building, the Paris Ste. Chapelle, however, strikes us as a surprise. King Louis IX (+1270) had this impressing chapel built within his palace premises.
as a reliquary for the recently acquired crown of thorns of Christ. The French king gave the Babenberg duke a shaving of the cherished passion relic what apparently induced the duke at the peak of his power to have a palace chapel built as representation building. By means of a profound building-archeological investigation of the preserved wall remnants and true-scale CAD-visualizing the original condition of the remarkable medieval building monument was to be reconstructed (B. Schedl).

Client: FWF
Team: Mario Schwarz, Barbara Schedl, Hans Peter Walchhofer, Andreas Voigt, Karl Haslinger, Georg Kleiber
Duration: 1997 - 1998
Tools: Microstation, ArchiCAD, Photoshop, H+

Subject: Imbach, Former Dominican Convent Church (Lower Austria)
Description: In 1269 Alberro von Feldsberg and his wife Gisela founded a convent in Imbach acquiring a high standing throughout the Middle Ages due to the many donations and royal privileges. In the 18th century Emperor Joseph II dissolved the convent, the convent units being demolished within the following years. Considerable constructional changes both on the inside and the outside of the church have been performed ever since 1884 massively affecting the medieval building substance. Despite the drastic recent changes the medieval building sequence and moreover even lost church furnishings such as the jube were to be reconstructed. By placing slender polygonal piers the simple flat covered aisle-less church had been turned into modern two-span church-hall with cross-springer vault. This modernization might have resulted from the assignment of parish rights to the convent church in 1289 calling for adaptation of the main building for a greater amount of laypersons. The nun's gallery in stone may also be dated to this year, the same applying to the completion of the choir. In line with the medieval liturgy the area for laypersons seems to have been separated from the choir by a huge jube, remainders of a blind arcade impression of which still existing behind the baroque side altar. Lateron, these lost church furnishings also acted as the only access to the two-storey St. Cathrin's Chapel built in the north approx. in 1300. Due to its splendid and decorative appearance the chapel construction contrasts considerably to the simple and rigid architecture of mendicant orders and thus may have been a donation of a high-ranking personality (B. Schedl).

Client: FWF
Team: Mario Schwarz, Barbara Schedl, Barbara Keck, Hans Peter Walchhofer, Andreas Voigt, Georg Kleiber
Duration: 1997 - 1998
Tools: Microstation, Photoshop
Subject: Former Minorite’s Church (Vienna)
Description: Stylistic studies of preserved medieval architectural fragments found on the attic of the present church lead to the assumption that the Minorites had been dealing with the construction of the monastery church in Vienna since the middle of the 13th century. The initial building was a two-span vault hall with extremely steep spatial proportions and an elevated long-structure choir, mistaken in the 19th century, for the former Chapel of St. Louis. The initial church construction also included a jube, arcade impressions, a rib fragment of which as well as its entry portal having been preserved. Queen Elizabeth of Aragon stated in her last will and testament to be buried in the Chapel of St. Louis donated by her. Obviously it was put up at the north side of the two-span main building and was at least a two-bay structure. The minimum spatial dimensions result from the position and the size of the royal sarcophagus. The present north portal perhaps also belongs to the former royal chapel donation. Soon after the Chapel of St. Louis had been built the two-span church was to be expanded by a third aisle thus integrating the chapel into the main building. The extensive building alterations of this construction phase also included the new configuration of the west facade with highly decorated figure-portals otherwise not common to mendicant orders. The medieval church was subjected to drastic changes in the 18th century leading to lasting confusion regarding medieval building sequence and finally to the spectacular demolition of the medieval church in 1902 (B. Schedl).
Client: FWF
Team: Mario Schwarz, Barbara Schedl, Maria Parucki, Hans Peter Walchhofer, Andreas Voigt, Georg Kleiber
Duration: 1997 - 1998
Tools: Microstation, Photoshop

C: Intermediate Results

The briefly specified examples point at the vast application range for implementation of computer-assisted visualizing methods in studying historico-cultural facts. Making no claim of being exhaustive some aspects of a digital reconstructions are as follows:

- visualizing of "spatial phenomenons" in the broadest sense (e.g. urban spatial structures, building-up structures, architectural objects, interior rooms etc.) as contribution for representativeness, and consequently perhaps for more acceptance of the specific research subject (e.g. archeology, art history);
- consolidation of knowledge resulting from assumptions by precise "re-construction", reviewing of spatial-functional plausibility, static reviewing etc.;
- disclosure of building plans and construction principles having been sometimes only made accessible to a very small group of persons concerned with the planning and erection of an objects;
• recovery of already lost spatial phenomena;
• preservation of the personal experience features (at least by the possibility of “virtual walk-throughs”) of particularly protected objects, otherwise no longer accessible to a widespread public;
• creation of a digital-assisted archives of spatial phenomena to be at the disposal as analysis objects for our generation and the ones to come acting as a cognition-archive as well as as a laboratory-archive;
• furthermore, the digital archive of historico-cultural past also lends itself to experimental testing work of construction variants, variants of textures, tinting, lighting, as well as experimenting within light design, the subsequent defining of energy parameters, etc.;
• "digital cities" - acting as models of today’s urban spatial stock also become graspable as digital archives being well-suited as digital working models in order to develop the real city of tomorrow; interlinking these present-day models with those of the past makes for drawing-up of time-space databases providing us with findings regarding the development of structures and travels through time.

D: Present Challenges

From the experience gained so far the challenges for the further development of the set of instruments - again not providing any completeness - may be specified as follows:

• improvement of presentation techniques of reconstruction findings as well as the interaction possibilities with these digital worlds, e.g. by using the simulation environment "CAVE" ("space with three-dimensional image projections": space where a make-belief of a three-dimensional virtual world (virtual reality) by projection of images to floor and walls is produced. The visitors of this space wear so-called stereoscopic glasses, the sensors of which transfer the head movements to highly efficient computers which can adjust the perspectives of the projected images accordingly”. Internet Dictionary, http://www.networds.de/);
• improvement of the worldwide publications and accessibility of research findings by drawing-up digital, interlinked archives putting the world wide web (www) to use; consolidation of adequate standards of exchange for three-dimensional data (e.g. VRML);
• expansion of the reconstruction scope in a factual respect (e.g. temporary, historical architecture: exhibition architecture, spatial productions and installations; simulation of statics, the energy situation etc) and regarding personal experience quality (acoustic simulation);
• optimizing of continuous digital reconstruction processes (e.g. of photogrammetrical initial recording followed by CAD- or GIS-assisted reconstruction resulting in complex simulation and visualizing of reconstructed spatial phenomena);
• integration of GIS-functionalities in the (mainly visual) reconstruction (e.g. administration of place of discovery and specimens found, topological and topographical integration of separate reconstruction in a larger spatial scope), but also facility management functionalities for the administration of (reconstructed) construction displays; interlacing with systems of visitor-guiding.

E: Concluding Remark

What really matters is to avoid viewing the past and the awareness thereof by reconstruction in an isolated manner, but rather to make use of the chance of
acquiring knowledge for a conscious and active configuration of the future, in particularly regarding spatial analysis. The cognitive scope comprises small architectural objects and interior rooms as well as areas of urban construction or spatial total structures. The historico-cultural past thus become a space-related cognition-archive.

References


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