DIGITAL RECONSTRUCTION
Working Group of the Association »Digital Humanities in German-Speaking Region«

Outline for the publication (working title): The Virtue of Models 2.0 - … (Der Modelle Tugend 2.0 – …)

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This publication by the Working Group will consider »digital 3D reconstruction« as a component of interdisciplinary research against the backdrop of a 25-year history and the various challenges on the way to producing scientific 3-D information models.

The overarching aim of the book is to function as a compendium showing the range of current academic discourse relating to digital hypothetical 3-D reconstruction of architecture that has been destroyed or was never built and, through doing so, to demonstrate traditions and lines of development, the current state of research and practice, as well as future challenges and desiderata.

Individual aspects will be discussed, taking account of international research findings as well as the specific demands of the German academic landscape. Furthermore, developments will be presented from a cross-project and trans-technological perspective, with specific technologies and products being briefly outlined in a final glossary. The particular importance of projects for development and trendsetting will be acknowledged in a dedicated chapter entitled »Projects«. As with the treatment of technologies and projects, the controversial theme of the replicable and sustainable documentation of research findings and results of digital hypothetical 3-D reconstruction will run continually through the individual aspects, with particular attention being devoted to the highly topical theme of data processing and digital research infrastructures in a chapter entitled »Knowledge organisation and representation«.

As regards the structure of the book, each chapter will begin with an introductory essay defining the respective theme, delineating the purpose of the chapter in relation to the book as a whole and presenting issues and aspects at the focus of investigation. Individual essays within the chapters will then serve to discuss the various aspects from a trans-technology and cross-project perspective. A summary of each chapter will provide a resumé and point to any hitherto neglected or related aspects, as well as showing links with other chapters.

THE STRUCTURE OF THE BOOK

I.) »Foundations« (Chair: Stephan Hoppe)

This introductory chapter will cast light on the history of computer-aided 3-D reconstruction of works of art and buildings which have been destroyed or never existed; it will structure the terms and typologies and consider model theory in a cultural-historical context.

This chapter will take a primarily historical approach to the theme of digital architecture reconstruction, accompanied by systematic perspectives. Digital reconstruction continues a long tradition of the pictorial representation of lost buildings, which began in the Renaissance period. As interest in the form of ancient buildings reawakened, suitable methods for their theoretical reconstruction were also developed. Around the Fabbrica of St Peter's Basilica and the Papal Court in Rome in the early 16th century, there arose a group of scholars and artists who attempted to reconstruct the appearance of certain buildings in drawings. These 16th-century endeavours were later expanded by institutions devoted to classical studies, and a rich culture of theoretical academic reconstruction developed, primarily through the media of drawing, painting and physical models. This culture will be outlined in this chapter, taking a mainly typological and historical approach.

When digital planning technology was introduced into architecture in the 1980s, it became possible to produce three-dimensional designs and visualisations of historical buildings. Part of this chapter will present the main features of the visual history of this digital medium. Milestones in digital reconstruction, the key protagonists and institutions will be elaborated on and light will be cast on the context of their scientific endeavours.

Other sections will present the main features of the development of the technology, systematically analysing the individual types of digital reconstruction and compiling the terminology used in international discourse. For this purpose, the most important theoretical literature on the topic will be examined and an overview of research on the subject presented. A model theory in cultural-historical discourse and an epistemology of 3-D modelling will round off this excursion.

II.) »Forms of presentation and information« (Chair: Fabrizio Apollonio, Oliver Hauck)

The introduction will lead into the chapter on »Forms of presentation and information« and will discuss the various media representations of 3-D models and the different ways of communicating information. Questions of aesthetics will be posed and the challenges and potentials of an academic publication (presentation of the proportion of hypothesis, etc.) and of knowledge transfer will be considered.

In the field of tension between illusion and immersion, there is a broad spectrum of forms of representation and publication of digital 3-D reconstructions, which differ hugely not only as regards their perception but also as to their technical requirements and the complexity of their production. In the introduction, an overview will be provided of the various forms of presentation available and of their inherent characteristics and requirements. The question will be investigated as to whether and to what extent the method of visualisation influences the production of the model itself and where the limits lie between scientifically sound, replicable decisions and decisions that are of a purely artistic nature. This is a question that has attracted remarkably little attention in the scientific discourse so far, current discussion revolving primarily around questions of the replicability of the modelling (and particularly the question of the correlation of the model and its sources). Finally, the question will be discussed as to whether the standards that are generally regarded as desirable for digital 3-D reconstructions are really needed, or whether the demand for tools for the integration of scientific discourse, including ensuring the citability of the models and their visualisations, especially with regard to the retroactive effect of existing 3-D models and visualisations, is more important since this makes it possible to fall back on existing standards of academic work.

III.) »Methodology« (Chair: Mieke Pfarr-Harfst, Sander Münster)

The third chapter will discuss the operational processes and guidelines which enable the production of structured and well-founded digital 3-D models against the background of controversies in the fields of cultural history and visual culture.

Against the background of research and educational tasks in the field of cultural history and visual culture, this third chapter will discuss the operational processes and methodological principles of digital 3-D reconstruction. This will include (1) the question of the production context of digital 3-D models and the related performance requirements, as well as the composition of the persons and projects involved. Furthermore, attention will be paid to how these framework conditions are reflected in the (2) production of such models and how the development of knowledge, the division of labour and methodological requirements in the practical application of digital 3-D reconstruction can be defined. Considering the fact that a whole series of established standards and procedural models, such as the London Charter, set out guidelines on 3-D reconstruction, the question arises as to whether and how such guidelines are actually applied in practice and how an ideal process should be defined. A further aspect is (3) the integration of digital reconstruction into academic discourse. On the one hand, light is to be cast on the replicability and reproducibility of digital reconstructions and the software and algorithms used, along with their influence on modelling results, and on the other hand consideration will be given to the role of the individual and implicit knowledge of those involved and how this can be incorporated. Furthermore, from the point of view of scientific methodology, numerous questions arise concerning the integration of methods and modelling results into academic discourse: How can modelling results be cited? What should be the object of scientific discourse as regards the mostly visual output of 3-D models? And how can such discourse be integrated into the specialist cultures of the various scientific disciplines involved? Finally, the closely associated question of the (4) incorporation of digital 3-D reconstruction into the training of students in the relevant specialist disciplines will also be discussed in this chapter.

IV.) »The organisation and representation of knowledge« (Chair: Piotr Kuroczyński, Ina Blümel)

Building upon the insights gained in the previous chapter, the chapter entitled »The organisation and representation of knowledge« will investigate the question of structured data modelling against the background of Semantic Web technologies and suitable digital research infrastructures for the knowledge acquired in the reconstruction process and for the 3-D datasets.

The potentials of Linked Open Data, particularly the structuring and linking of knowledge across discipline boundaries to create a global graph for the various domains of expertise, are attracting increasing numbers of research projects.

How might Semantic Web technologies be used to benefit the Digital Humanities? How is knowledge structured and organised in Web 3.0? What ontologies and systems of concepts can be applied? How can contents be semantically enriched through artificial intelligence? Which research infrastructures can provide suitable services for scholarship in this context?

This chapter is intended to provide an insight into these themes within the sphere of digital reconstruction with its 3-D datasets and to discuss the domain-specific potentials, opportunities and also challenges posed by Semantic Web technologies. The complexity of the tasks poses new challenges for humanities-based projects. Among other things, the questions arise as to what must be documented, how and to what extent, the development and application of suitable thesauri and adequate referencing to the ISO standard 21127:2006 (CIDOC-CRM), as well as strategies for ensuring the long-term availability of the information.

Exploring these themes is intended to provide an insight into strategies of knowledge organisation with regard to interoperability and availability, as well as providing information about possible application ontologies. The results will be presented in a sketch outlining the future-oriented virtual research environment with an ideal type of interface, selected features and a back-end for the collection of information and the operational processes.

V.) »Beacon projects«

The final chapter of the publication will present relevant projects from the history of the discipline (milestone projects) and current trendsetters (benchmarks). The projects selected should reflect the full spectrum of projects and cover the individual aspects discussed in the previous chapters. The list of projects will be drawn up on the basis of their having been mentioned in the previous contributions and with regard to their points of focus; this will be done jointly by the chairs. This chapter will therefore create a direct connection between the theoretical approaches discussed in chapters I-IV and practical applications, in order to establish the need for action and the necessity of interdisciplinary debate in this field.

Glossary

A thematically structured glossary at the end of the book will serve not only as an alphabetical list of terms but also, and primarily, to provide a brief description of those terms, technologies and projects, as well as documentation forms and strategies, that are defined. This will be done by means of brief, focused explanatory texts written according to a uniform pattern. In the individual chapters and in the cross-project and trans-technology discussion of individual aspects, reference will be made to the glossary and/or to the description of the project in the chapter entitled »Beacon projects« whenever terms, technologies, projects and documentation strategies are mentioned. The glossary will serve to underline the book's character as a standard work.