

# The Making of the Film “Vienna in the Middle Ages”

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A prominent part of the new Museum of the Middle Ages in St. Virgil's Chapel at St. Stephen's Square in Vienna (Austria) is a 6-minute-long film about the development of the city – “Vienna in the Middle Ages”. Beginning with the abandonment of the legionary fort, it follows the emergence of the city up to the construction of the town wall in the thirteenth century, afterwards examining major parts of the late medieval cityscape including the market district, the castle and the cathedral. The authors prepared the film for Wien Museum and were also members of the team which produced and curated the exhibition at St. Virgil's Chapel. The film combines the very latest archaeological data with thorough knowledge of the written and pictorial sources. It incorporates results based on georeferencing historical maps as well as digitalized data deriving from 3D laser-scanned objects and monuments. The film unites parts of many other films and visualisations from past projects with new reconstructions of the urban topography and of prominent buildings in the story of medieval Vienna. The production of the animated short film is a good example of the collaboration between archaeologists, historians and visualisation specialists.

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## Keywords:

Vienna, Medieval History and Archaeology, 3D modelling, Animation.

## CHNT Reference:

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## INTRODUCTION

The short film “Vienna in the Middle Ages” was produced for the new permanent exhibition – curated by Michaela Kronberger, Wien Museum – in St. Virgil's Chapel. This Chapel lay beneath the former St. Mary Magdalene Chapel on today's Stephansplatz. It was rediscovered in 1973, during construction work for subway line Number 1.<sup>1</sup> Following the excavation, the chapel was conserved. It was integrated into the subway station “Stephansplatz” and became a dependency of the Wien Museum. However, humidity increasingly threatened the wall paintings. As a result, the site had to be shut down in 2008 and was afterwards comprehensively restored. The chapel and a new exhibition “A Museum of the Middle Ages”, carefully using the limited space, was reopened in late 2015 (Fig. 1).<sup>2</sup> The Museum was awarded the “Austrian Museums Mark of Quality” in 2017.<sup>3</sup>

St. Virgil's chapel was built in the early 13th century and was later a subterranean sacred space below Mary Magdalene Chapel, a cemetery chapel, which was begun before the mid-13th century. The planned purpose of the subterranean chapel is unknown. It may have been intended to be used as a mausoleum for St. Koloman, the patron saint of Lower Austria at that time. Instead, in the 14th century it became the family tomb of the burgher family Chrannest, while other parts of the building were used as a charnel house and as the headquarters of the scribes' guild. Mary Magdalene Chapel was demolished following a

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<sup>1</sup> <https://www.geschichtewiki.wien.gv.at/Virgilkapelle> (11.2.2019)

<sup>2</sup> <http://www.wienmuseum.at/en/locations/virgilkapelle.html> (4.1.2018)

<sup>3</sup> <http://www.museumsmarkofquality.at/shop/shop.php?detail=1255467407> (4.1.2018)



*Fig.1. St. Virgil's Chapel as a museum: The new entrance to the museum in the subway station Stephansplatz. (Photo: Heike Krause)*

fire in 1781 and the subterranean chapel was filled with rubble [Kaltenegger and Schicht 2015; Kaltenegger and Schicht 2016].

The film was intended to show the growth of the town and its institutions, from the Roman period to the Late Middle Ages, and also the Mary Magdalene Chapel, including St. Virgil's Chapel, and the surrounding area. The animated short film was to be about 6 minutes long and without spoken narration. Therefore, dates and topographical information were ported though text inlays to communicate the most important milestones in the development of the city. It was to be shown in an endless loop and run alternately in German and English versions. The first tasks were to familiarise ourselves with the most recent research results in different disciplines, to define the most important stages of the city's development on the basis of written, archaeological and pictorial sources and to develop a storyboard.

## CONTENT

Only few medieval buildings are visible in the city today. The earliest pictures, altar pieces showing a comparatively realistic view of the houses and churches, date to the second half of the 15th century. A few historic pictures are included in the film to show the sources available, for example the 'The Visitation of Mary' from the Schotten Altar, c. 1480 [Opll 1999, 127-129]. Previous animations from past projects of the Jewish Museum Vienna, the Academy of Sciences, the Stadtarchäologie Wien and Wien Museum were reused in the film to save time and money. A complete 3D digital reconstruction of the city was not attempted. On one hand this would have been an enormous amount of work. On the other hand the scarcity of sources for large parts of the city would have made it too speculative.

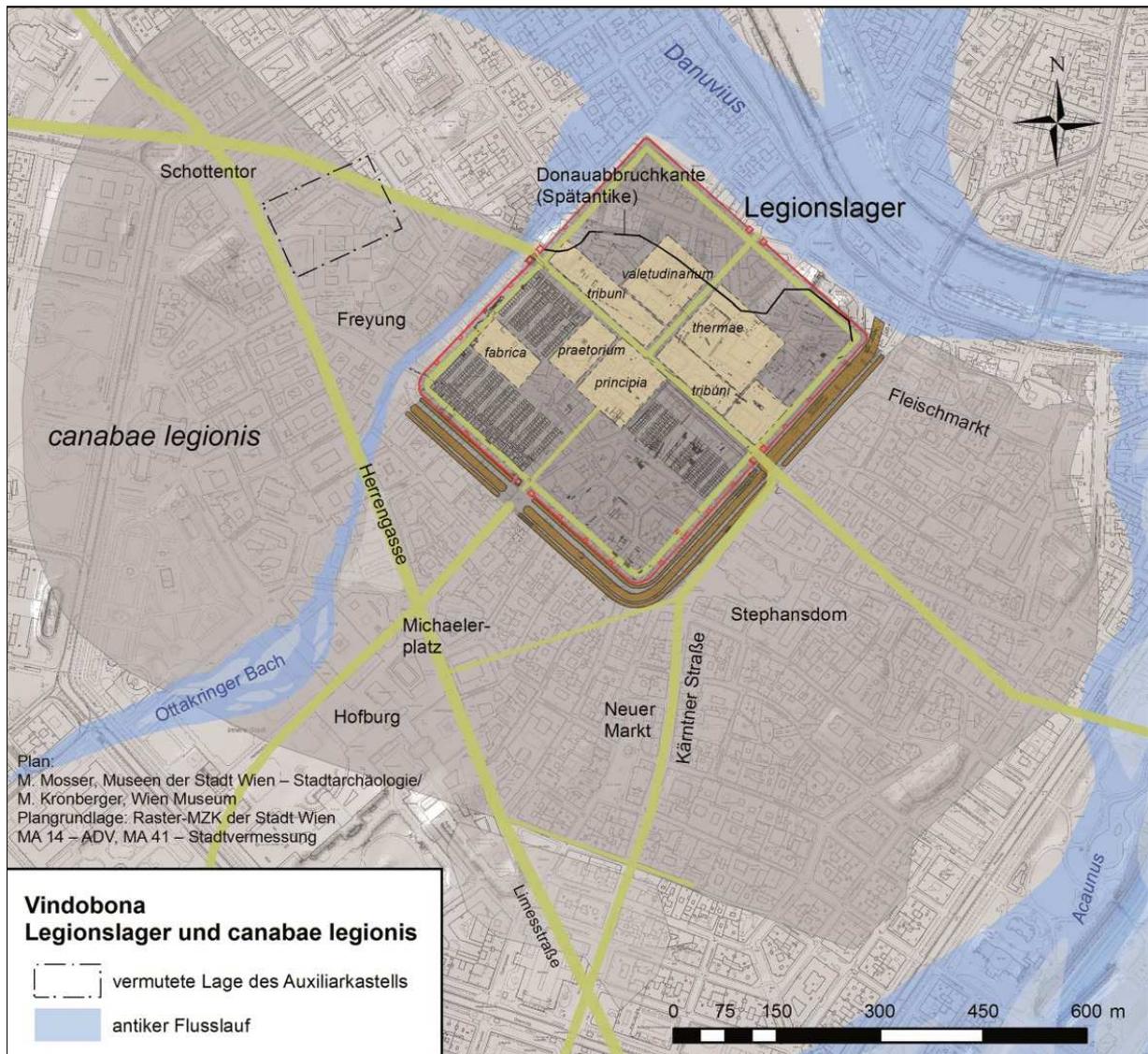


Fig. 2. Vindobona: Reconstruction of the Roman fort.

The film begins with the decline of the Roman legionary fort Vindobona in Late Antiquity (Fig. 2). This was achieved through the use of the reconstruction plan of the fort based on archaeological results and analogies and through the ancient-period terrain model [Gietl et al. 2004; Mosser 2011; Mosser 2016.]. The settled area in the early medieval period is shown only through finds spots and shaded surfaces, as too little is known about the appearance of the settlement at that time (Fig. 3).

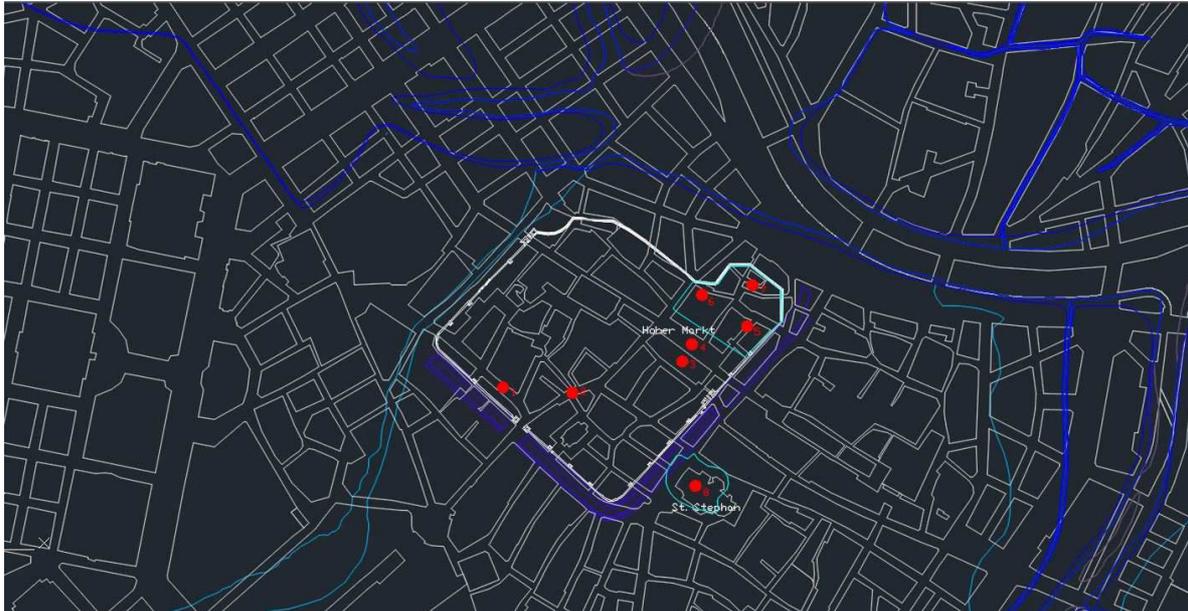


Fig. 3. The finds sites of the 9th and 10th centuries (red dots). (Plan/Mapping: M. Mosser, P. Mitchell)

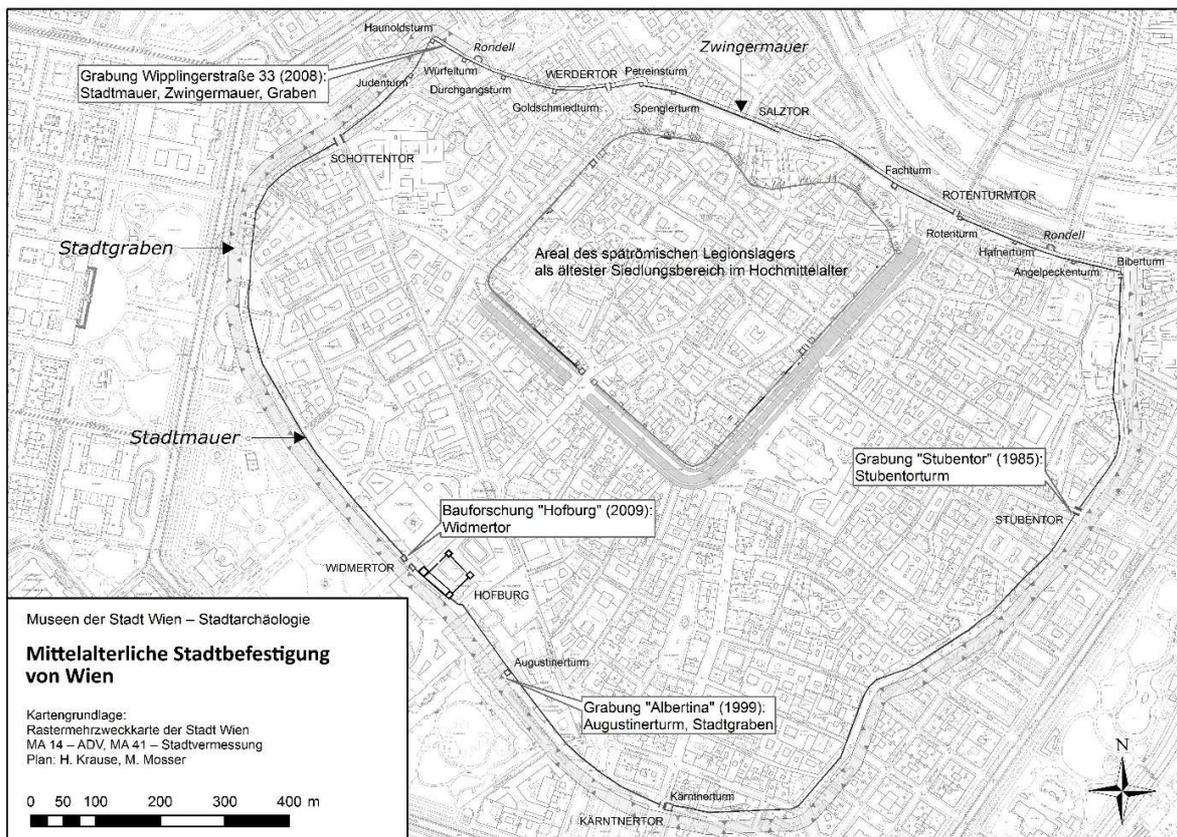


Fig. 4. Reconstruction of the urban fortifications in the late Middle Ages against the background of the modern city plan (Stadtmauer = Town wall).

Vienna was greatly expanded and became a town at around 1200 AD [Krause 2016a]. A new town wall was erected of which nothing now remains above ground. The reconstruction of the town plan and the urban fortifications drew on research results from authors from different fields including archaeology, buildings archaeology, architecture and environmental history. The course of the fortifications is based on archaeological evidence on the one hand and historic plans, views and photos on the other (Fig. 4) [Krause 2013; Krause 2016b]. Historic plans such as the city plan from Bonifaz Wolmuet, 1547, and buildings archaeological data were also the basis of the late medieval street plan, recently reconstructed by Claudiu Silvestru [Silvestru 2014, 71–84]. The historic course of rivers and streams and a medieval-period terrain model were also used. The most important source for the reconstruction of the river landscape was the plan/picture by Niclas Meldemann, 1529 [Hohensinner et al. 2013].<sup>4</sup>

### SOME BUILDINGS AS EXAMPLES

One of the most important past projects reused in the film was the visualisation of the Vienna Hofburg carried out by Herbert Wittine together with the Academy of Sciences Hofburg team as part of a project which has led to a new five-volume, 3000-page history of the castle [Rosenauer 2012-2018]. The medieval team (Mario Schwarz, Günther Buchinger, Paul Mitchell, Doris Schön) had decided to reconstruct only from the known facts, based on buildings archaeology, which took place from 2005 onwards in the castle, the churches of St. Michael and St. Augustine, and surrounding buildings, without attempting to reconstruct the façades of the complex. This meant that in the film some speculative features, such as windows and façade structures, were added in order to ensure that the portrayal of the castle did not jar with the other material.

The film also shows the first transformation of the castle (Fig. 5). The four large and decorative corner towers are architectural elements adopted from French castles during the course of the 14th century. They were an important part of the Vienna cityscape for more than 350 years and became an icon of the House of Austria in general, much imitated at other castles and important buildings. Again the castle was given a minimum of viewer-friendly windows in the film, but the volume model is based on buildings archaeology and later pictures.

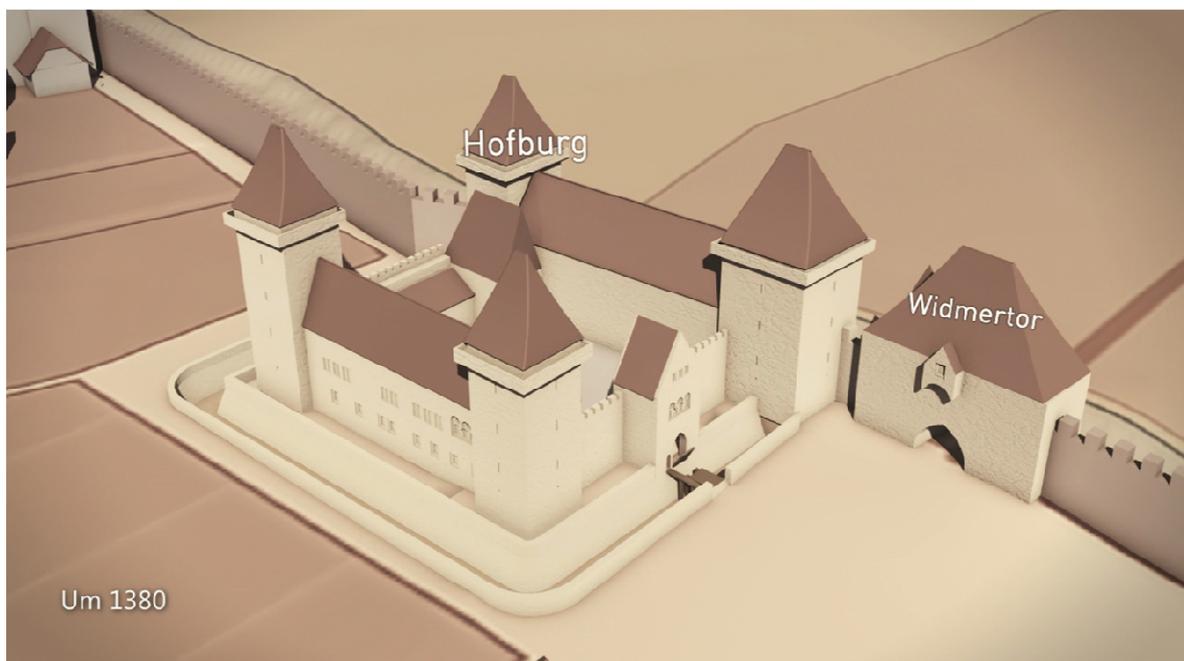


Fig. 5. Film still. The Hofburg c. 1380.

<sup>4</sup> FWF-Project ENVIEDAN P 22265-G18: [http://www.umweltgeschichte.uni-klu.ac.at/index\\_3560\\_ENVIEDAN.html](http://www.umweltgeschichte.uni-klu.ac.at/index_3560_ENVIEDAN.html) (15.2.2018)

However, some buildings were reconstructed from scratch in the film. Vienna University, for example, was founded as an institution in 1365 and emerged as an actual building from 1384 onwards. The medieval university was destroyed by an entirely new university complex in the 1620s and for hundreds of years its layout and appearance were largely forgotten [Mühlberger and Niederkorn-Bruck 2010]. Excavations carried out twenty years ago under the supervision of Johannes Offenberger rediscovered the medieval street on which the old building had stood. This allowed us to use the two portrayals of the building which survive, from 1384 and from 1609, shortly before its destruction. Both pictures show a four-sided building around an internal courtyard and with a large tower.

The medieval picture in particular is rather sketchy, but it includes important and typical details, such as a small external tower, cross windows and dormers. At the end of a process of discussion and experiment, a building was created, which is not only a plausible late medieval structure in Vienna, but also recovers something of the significance and nobility of the long-lost building (Fig. 6).



*Fig. 6. Film still. The University c. 1400.*

Another building built from scratch was the so-called Heiltumstuhl, which is prominent in the reconstruction of St. Stephen's Square towards the end of the film. This was an arch over the street beside the cemetery, surmounted by a gallery studded by Gothic windows. It was built around 1480 as a place from which to display the many holy relics of the cathedral on celebratory days and demolished around 1700 as it was said to be a barrier to traffic. The visualisation of the structure was simple, because of its architecture and thanks also to several high-quality historic drawings. Once again, the Viennese and visitors to the city can now appreciate an important building, which has in fact been completely lost.

## PRODUCTION

The animated short film was produced in 2015 and relied on an experienced team of archaeologists, historians and specialists for virtual archaeology within a production period of approximately five months.

As previously mentioned, a story and shooting board was developed to define the important issues about the areas to be reconstructed. This was followed by data acquisition and research activities of the team.

Firstly, a GIS (Geographical information system) was produced incorporating all relevant topographical information. Various georeferenced cartographic and topographic information was collected and

assembled to construct a database used for the tasks involved in the reconstruction. Topographical data such as the DHM (digital height map) and the DTM (digital terrain map) were needed for the generation of the virtual environment, which was further modified to achieve an approximation of the circumstances in the period desired. To accomplish these tasks specialised terrain simulators and editors were used to calculate the processes of erosion and the flow of water. The results are displayed in a fractal geometry, producing a highly realistic and natural appearance (Fig. 7).

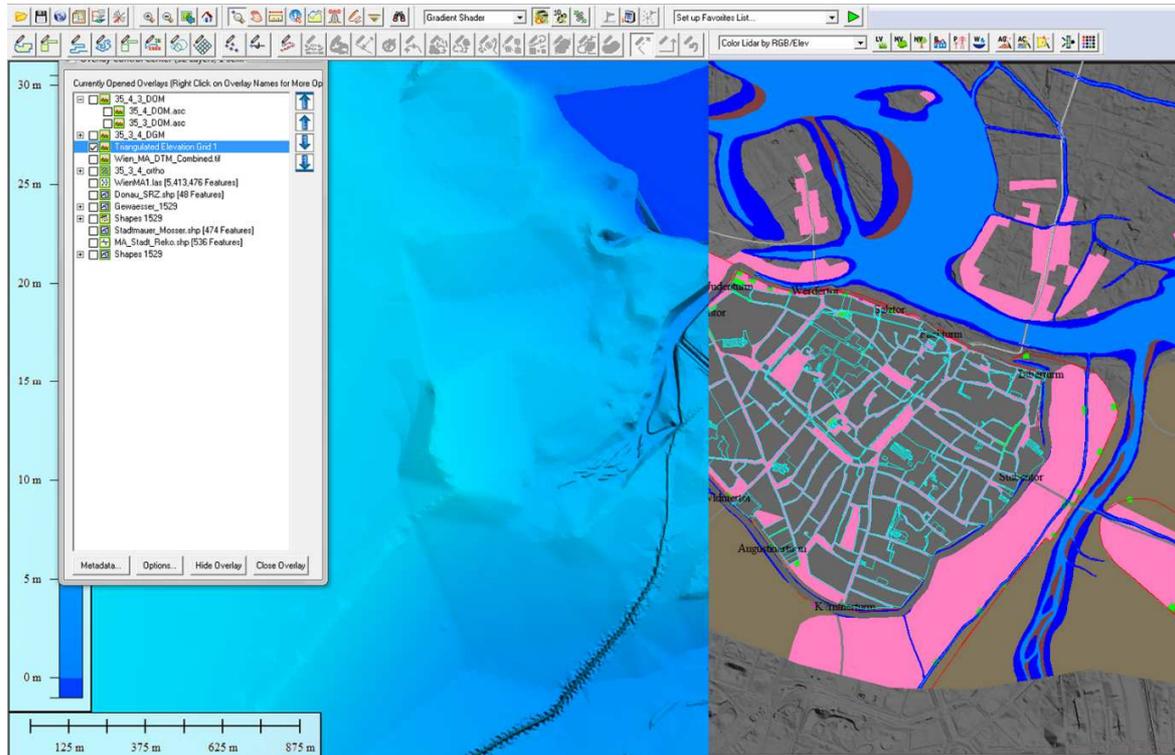
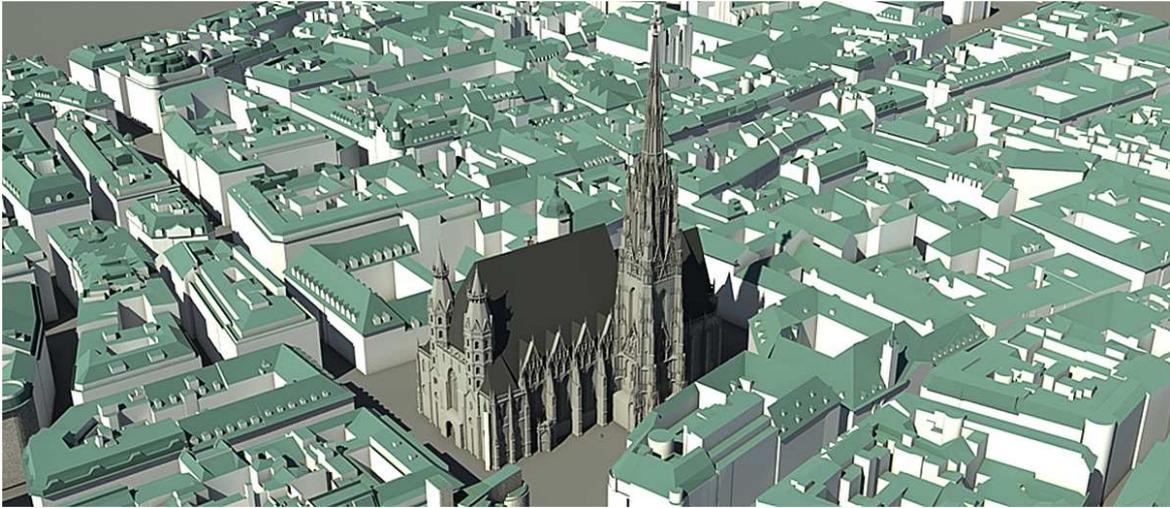


Fig. 7. GIS. Screenshot of the final data.

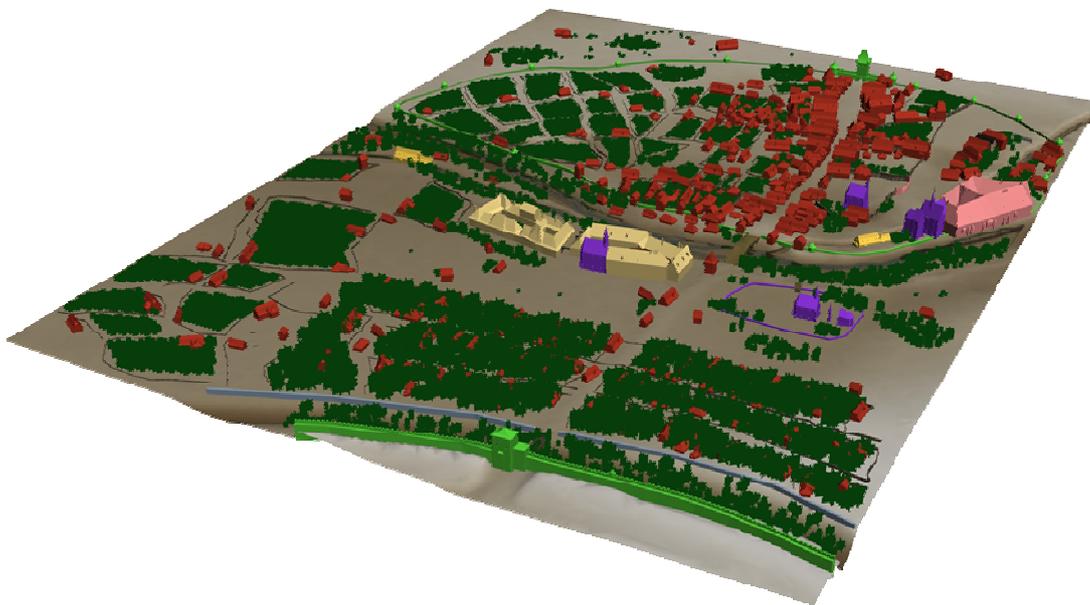
It was decided to use a rather graphical style of presentation in order to avoid the necessity of visualising details which are not known or uncertain. The gaps between the well-known structures and uncertain interpretations were solved by displaying the information through maps, projected on the 3D terrain models. The storytelling also implied the visualisation of the recent building and terrain structures which were extracted from the existing 3D building and terrain models supplied by the survey services of the city of Vienna (Magistratsabteilung 41, Stadtvermessung). Another very important aid was the integration of the existing CAD (computer-aided design) model of the St. Stephens Cathedral, supplied by the “Dombauhütte St. Stephan” (W. Zehetner, Master Builder).



*Fig. 8. 3D City Model of Vienna with the CAD Model of St. Stephens.*

Nevertheless, all of these materials and files had to be adjusted for reuse within a virtual environment with the geometrical and cinematographical framework described above (Fig. 8).

The usual process of historical visualisations takes all the known information and interpretations into account and starts out with a rough sketch of the reconstruction, which is then shared and discussed with the scientists involved. Once the general idea of the appearance of landscapes and settlement structures is agreed, a more detailed model is created and subsequently added to the overall scenery. At the end, textures and lighting are added together with a virtual camera path for the final rendering. In all, 18 such scenes had been produced and were then mastered in the postproduction for the final output (Fig. 9).



*Fig. 9. Volume Model of the suburb of Wieden.*

As already mentioned, we reused some of the already existing models and scenes from former productions. We nevertheless had to convert them to the overall style of the animations. The sceneries used were implemented in the newly-created terrains and adjusted to the state-of-the-art town plans for the appropriate periods.

The reconstruction of the St. Virgil's Chapel was processed by using accurate 3D laser scans which had been made and provided by the surveying service of Lower Austria region (Abteilung Hydrologie und Geoinformation) using a Riegel VZ400 Laser scanner. The outcome of the laser-scanned chapel was a point cloud with a density of approximately 1 mm, but the meshed model did not supply textures. For this reason, an image-based modelling approach was used to gather all surface features and use them for the final texturing of the Chapel. We chose the technique Structure from Motion (SfM) which aims to extract 3D geometry and surface information from 2D images. This technique uses two images which depict the same object from two different perspectives, in order to extract the 3D information, imitating the human vision system by calculating the perspective alignment lines. (Fig. 10).

This process was supported and accompanied by the archaeologists and building researchers Marina Kaltenegger and Patrick Schicht. The results allowed a detailed representation of the chapel, which was also used for light simulations and contributed to the understanding of its architectural functions (Fig. 11).



*Fig. 10. 3D Laser Scan and Photogrammetry (SfM) of St. Virgil's Chapel.*



*Fig. 11. Reconstruction and simulation of St. Virgil's and the Mary Magdalene Chapel.*

## CONCLUSION

Research into different aspects of the development of the town, the urban landscape and the history of prominent buildings has fed into computer-supported visualisations in recent years. Up-to-date results made it possible to produce the animated film “Vienna in the Middle Ages” about the growth and importance of Vienna from Late Antiquity to the Late Middle Ages, with an unprecedented level of precision. Not only humanity was responsible for change and the increased density of settlement. The environment, in particular the dynamic river landscape, was also a factor.

The good collaboration both within the project team and with other specialists ensured a successful presentation of the medieval city of Vienna and its prominent landmarks in the medieval period. Through the reuse and adaption of existing data we were able to fulfil the given deadlines and remain within the predefined budget.

The form of the presentation enabled us to focus on the better known parts of the medieval town and landscape, but still gave a good overview of the settlement’s development and its extensions, while allowing us to fill in further details, based on research, in the future. The result of our shared efforts is an interesting and up-to-date film, which is proving very popular among visitors to the exhibition.

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