Rainer Drewello, Burkhard Freitag, Christoph Schlieder

New Tools for Ancient Ruins

Architectural monuments are perpetual construction sites, and historical plans, drafts and photographs are essential for their restoration. Yet the archives of many churches, castles and palaces are either in poor condition or difficult to access. Cultural researchers and engineering scientists are now adding these sources to a database system in order to increase their usability

Architects are not computer scientists, and computer scientists are not cultural studies researchers. Just as a computer scientist's daily tasks do not normally include drawing, cultural studies researchers are not required to programme computers, and interpreting historical sources is not part of an architect's remit. All these differing skills may, however, be required of someone involved with historical monuments. After all, cathedral, castle or palace complexes are not just converted spaces or Facility Management objects. Instead, their form, function and history have transformed them into living witnesses to the past, to places where architectural, social and cultural history intersect.

In architectural monuments, historical tradition plays an important role. The two main churches in Nuremburg, St Lorenz and St Sebaldus, to name just two examples, have archives containing 3000 papers and documents dating back to 1580. They also contain around 1500 articles published in books and magazines, 2200 black and white photographs, and 6500 slides, not to mention 1500 hand-drawn maps. While these documents are tremendously significant both for historical and practical reasons, they are neither appropriately catalogued nor accessible to either private persons or scientific researchers. And Nuremburg is no isolated example, as the Dombaumeister [master cathedral architects] who manages and restores around 140 major properties in Central Europe – from Vienna to Trondheim, via Cologne – will attest.

One major problem with architectural archives is their incomplete or outdated document filing systems. Written documents, pictures and plans are usually categorised, either chronologically or by source type, using only the most basic of systems. Boxes of photographs or rolls of blueprints do not, however, permit content searches, reducing research to games of chance or patience.

Architectural monuments are not only historical or technical witnesses, however. They are also large-scale construction sites. Each time a renovation is undertaken, the documentation from the previous renovation must be referenced: consequently, these documents are often accessed and used. Architects and art historians are, for example, still using exquisite ink drawings from around 1900 – an anachronism in this digital age of almost unsurpassable surveying techniques. This purposeful usage of older sources, however, has its advantages. These buildings are so complex that even the most accurate digital measurements can be translated into a usable form only through considerable investment of time and effort. This effort is often avoided, not least because it is not possible to ensure the longevity of this valuable data without a long-term archiving solution. Instead, tried and true solutions are employed.

Yet the fascinating opportunities afforded by digital technologies speak for themselves, particularly when these take into account different user requirements and working habits. The digital age and its associated qualitative leap require dual-purpose storage and archiving systems to be established. These

The Cathedral and Old Town in Passau. The Cathedral archive houses numerous documents. These are now being indexed with the help of a database.

systems must serve two functions. Firstly, they must be capable of managing traditional archive objects. Secondly, they must archive next-generation documents, with all their compatibility issues, in such a way as to render them usable and readable in 100 years' time.

Take, for example, the Cathedral in Passau, where the church masons' guild has defined a comprehensive naming key. This key is designed to ensure that every last stone of the building can be catalogued, and to facilitate access to its data. The simplest way to do this would be to "virtually attach" existing documents to their appropriate locations – such as towers, wall frescoes, altars, or even individual stones of the church. It is crucial that the keys to the data storage archive are the spatial references for the objects in the inventory system.

The spatial referencing concept has taken centre stage due to the difficulties involved in describing buildings which are, because of their history and architectural styles, seldom homogenous. Discussions typically centre on naming and counting methods ("What do you call the transition between a church's nave and transept?" Should structural elements be counted from east to west, or by cardinal direction? Should numbers or letters be used?" And so on.). Fortunately, the engineering sciences, architecture and art share similar tools and a common language: that of the pen, the sketch and the plan. Each line and area of crosshatching is a stipulation, while every outline is an abstraction that can be understood with few words. It is the normative properties of the line which enables plans to form an almost perfect basis for archiving building data.

This is where the Digital Monument Archive (DMA) comes in. An organisation which offers specialist databases for historic buildings, the DMA stores documents with the most diverse provenances, whether these are plans, text and image sources, tables or photographs, as well as videos and

Illustration: Fritsch

3D data. What is unique about it is that the DMA uses a freely definable building structure key, which begins with the building as a whole and ends with its individual components. Documents to be archived are attached to "their" locations and furnished with metadata, which are assigned to thematic catalogues. This enables data pertaining to a structural element to be found either by navigating through a data tree or via a plan. Keyword searches and filtering by thematic category are also possible. These enable objects to be found by category or theme, irrespective of their actual position in the building.

Creating a digital archive, however, requires the prior organisation

Illustration: Dombauhütte Passau / Hauck

Left: Restoring the façade of Passau Cathedral is an arduous process. Above: Historical graphical material belonging to the archives of St. Lorenz's Church in Nuremburg is studied before being digitised.

Right: On-screen mapping of historical planning documents. Centre: Every stone of Passau's Cathedral is assigned a number, enabling extremely precise spatial assignments to be made. Below: All the information is added to the Digital Monument Archive, where it can be electronically accessed.

and digitisation of the existing resources. The effort involved in this task is well-invested, as it provides archivists with two standalone solutions. Linking archives via the web would then create a network of distributed servers within which specialist information could be exchanged. Whether and how this could work has been tested using the example of the two Nuremburg churches. Their document archives are to be made accessible via the Internet, enabling them to be viewed via web browsers.

Expanding the information base is crucial to this concept. After all, drawings and maps are more than lines and planes. Instead, they also contain information which can be deciphered by careful reading. One aid in highlighting particular features is the MMS (Mobile Mapping System), which converts the bits and bytes of scanned plans into tangible information, attaches it to the correct position in the drawing and scans it into the Digital Monument Archive. In this way, plans become information databases which can be expanded and used for comparisons.

In his 2003 publication on the western façade of Cologne Cathedral, Marc Steinmann illustrated the usefulness of "semantic maps" in an exemplary way. In this work, he analysed the medieval façade plan "F" using all the rules of art (his-

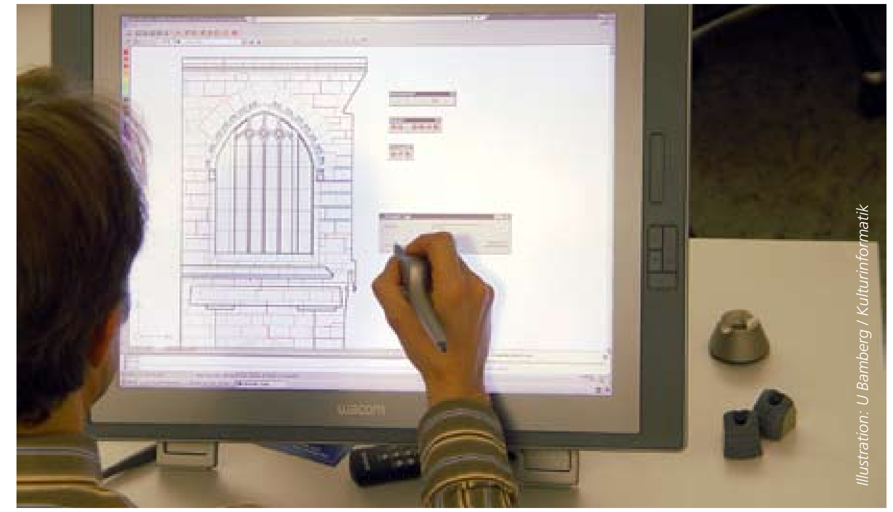
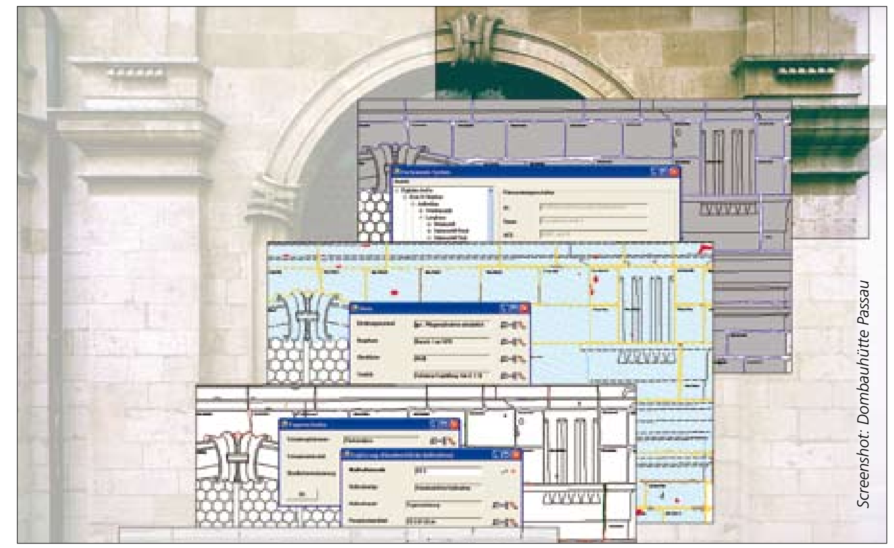
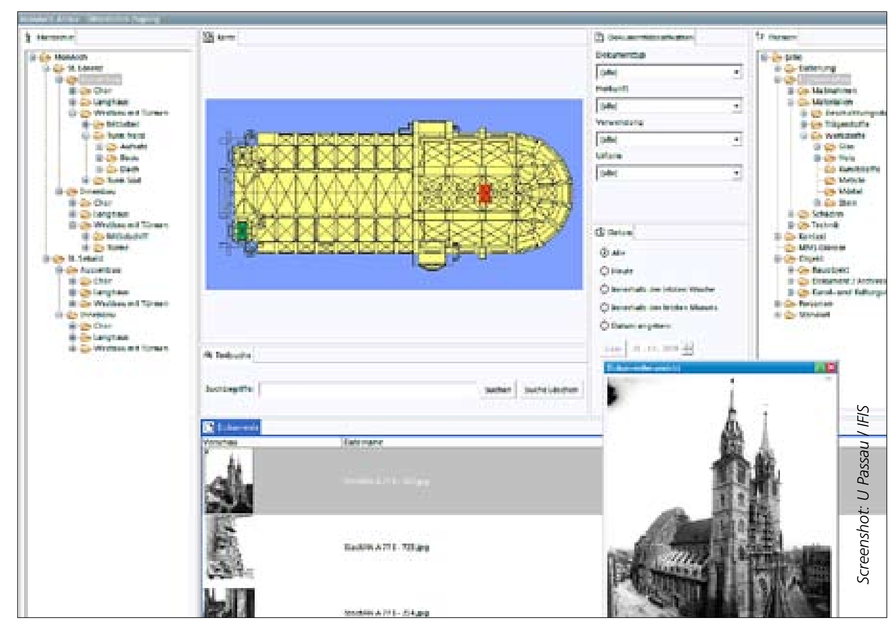


Illustration: U Bamberg / Kulturinformatik



Screenshot: Dombauhütte Passau



Screenshot: U Passau / IFIS

tory). The sketch, which is pieced together from sheets of parchment and rendered in ink, is both a microcosm of the medieval intellectual world and a flawless technical masterpiece. Juxtaposing the decoded knowledge and the drawing would deliver a master plan for High Gothic.

In practice, however, to achieve detailed observations of this type and intensity is almost impossible. The tremendous dimensions of the drawing, which is over four metres tall, make things extremely difficult. A semantic map would, doubtless, be a blessing for every future user of this imposing plan, to say nothing of the experiential value gained by observing the meticulously drawn details, which prove an object of fascination for every visitor.

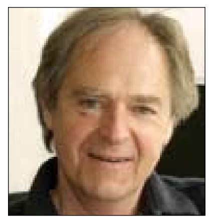
Clearly delineated structures have, however, always had their detractors. Austrian writer Arthur Schnitzler, a representative of the Viennese Modern Age movement in around 1900, coined the dictum that order is unnatural, and that chaos is the natural order of things. Whether, however, human-wrought city structures represent utter chaos or organic time/space constructs, is a matter of perspective. What is certain is that it takes time to get one's bearings in urbanised regions, and the faster these areas grow up, the more confusing they seem. Even in small mazes, people reach their limits very quickly.

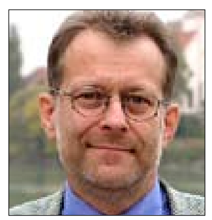
One example to support this assertion is provided by the old town of Bukhara in Uzbekistan, which was built during the 16th century and which is considered, in principle, to be of a readily comprehensible size. It is, in fact so difficult to get one's bearings there that it is impossible to find one of its 144 monuments without a guide. Anyone wishing to carry out an analysis of one of the town's quarters and its Islamic buildings, particularly one involving different scientific disciplines, will quickly realise the advantages and opportunities of a plan-based inventory system.

Such a system becomes indispensable as soon as the researchers involved need to communicate in a mixture of Persian (Islamic context), Uzbek (the local language), Russian (the official language) and German (research interest) terminology.

Whether state-of-the-art technology can go beyond providing technical advantages to generate synergies – and thus, to help create bridges between cultures or define new intersections in research – remains to be seen. It will, in future, be impossible to progress without building such bridges. After all, tools are meant to be used for the benefit of humankind.

Illustration: Dombauhütte Bamberg





Prof. Dr. Rainer Drewello
serves as professor for conservation science at the Institute for Archaeology, Historic Monuments and Art History (IADK) at the University of Bamberg.

Prof. Dr. Burkhard Freitag
is Director of the Information Management Department at the University of Passau.

Prof. Dr Christoph Schlieder
is head of Computing in the Cultural Sciences Department at the University of Bamberg.

Contact: Prof. Dr. Burkhard Freitag, Universität Passau, 94030 Passau, Germany

www.monarch-project.eu
www.uni-bamberg.de/buchara-projekt

Rembert Unterstell

Illustration: Unterstell

"I still have a suitcase in Dresden …"

An opportunity to make new contacts in the international research community – following the 60th Nobel Laureate Meeting at Lake Constance, twenty young Indian researchers embarked on a tour of Germany's research landscape, visiting universities and institutes around the country. We spoke with two of the participants about their experiences

Dresden tastes of the future – at least according to Srivarsha Rajshekar from Rajasthan in northern India. Rajshekar was so impressed that she elected to leave her suitcase at the Max Planck Institute of Molecular Cell Biology and Genetics (CBG) at 108 Pfotenhauerstraße, Dresden. "People are so helpful here", says the 21-year-old student with a winning smile. Currently studying at the Birla Institute of Technology and Science in Pilani, Rajshekar returned to the CBG last autumn to study zebra fish and learn laboratory techniques for six months as part of her undergraduate studies. Could this be the beginning of a successful career in science and research?

Following a gruelling selection process, Srivarsha Rajshekar was one of 20 "high potentials" from across India to be awarded a DFG scholarship to attend July's Nobel Laureate Meeting in Lindau and participate in an extended tour of Germany's research landscape. Of the 40,000 young researchers nominated to attend the meeting, just 675 researchers from 68 countries were invited to convene at the small island town on Lake