

The Use of Virtual Models of Historic Churches

Historic Churches, 2010

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Digital reconstruction of the Guild Chapel, Stratford-upon-Avon looking east. The image shows 'The Last Judgement' over the chancel arch, and 'The Dance of Death' on the north wall of the nave. (Image: Geoff Arnott/Heritage Technology)

pervades church buildings, offering an opportunity for prayer and reflection in a space removed from the hustle and bustle of modern, technologically saturated life. Moreover, although many of the major cathedrals are now beginning to explore the potential of such technologies, the cost and technical expertise required to produce and maintain these resources places them beyond the reach of most smaller parish churches. Here, the major source of information continues to be printed guidebooks and local history displays. Understandably, parish efforts to bring visitors into churches have tended to focus more on outreach and mission-related activities, rather than scholarly displays about the history and meaning of church buildings.

So what role is there for technology to inform and enhance our understanding and experience of church buildings? Recent initiatives, such as the DVD-ROM *The English Parish Church Through the Centuries* produced by the Centre for Christianity and Culture at York, have sought to create accessible scholarly resources which can be used to help parishes explain the significance and meaning of church buildings to the wider public, partly through the use of VR models.

Two recent projects, both discussed below, have also sought to develop digital models of ecclesiastical sites: Holy Trinity parish church, Micklegate, York and the Guild Chapel at Stratford-upon-Avon. Both projects are the result of collaboration between the parishes and charities maintaining the buildings, academics working within the Department of Archaeology at the University of York, and Heritage Technology Limited, a company specialising in the archaeologically-informed reconstruction of historic buildings and landscapes.

HOLY TRINITY, MICKLEGATE, YORK (ANTHONY MASINTON AND GEOFF ARNOTT)

Of the 19 surviving medieval parish churches in the city of York, one of the most surprising is Holy Trinity, Micklegate. This unassuming church is set back from a busy street in the shade of its churchyard trees. The most notable feature of its exterior is the parish stocks beside the churchyard gate. Once inside, however, one has the strong impression that its remarkable interior is far larger than the exterior. It is immediately apparent that this church has a fascinating story to tell.

The Holy Trinity PCC has been engaged in a long-term mission of neighbourhood renewal with its church building at the centre. The programme includes an exhibition, 'The Monks of Micklegate', which is free and open daily. The exhibition tells the story of Holy Trinity's past. In 2009 the PCC approached Heritage Technology and the University of York's Centre for Christianity and Culture with a project centred on a digital reconstruction of the church's development from the late Middle Ages to the present. In September 2010 the first part of the digital Holy Trinity project was launched.

One of the early anchors of the medieval city of York was the Priory of the Holy Trinity founded before the Conquest and standing atop Bishop Hill beside Micklegate Bar, the principal entry to the city. After the Conquest it was re-founded and given to the Benedictine Abbey of Marmoutier in France, thereby making it an 'alien' house. The church is listed among the churches that suffered during the great fire of 1137 and sometime in the later 12th century it seems to have undergone a long campaign of rebuilding. During this period its importance in the region was eclipsed by York's other Benedictine house, St Mary's Abbey, near the Minster, and it had a precarious and colourful existence until the early 16th century.



In recent years, heritage organisations have begun to explore new ways of engaging with visitors to historic buildings and enhancing the visitor experience. This has included the use of costumed guides, live displays and re-enactments and, increasingly, the use of audio-visual technology in guided head-set tours, displays and virtual reality (VR) models. The increasing use of 'e-heritage' is, of course, not without its critics. It will engage some audiences but it can alienate others. The use of technology also brings with it a host of issues relating to the authority and reliability of digital data, which have been debated extensively by academics and professionals working in these fields.

How relevant are these developments and debates for historic churches? It could be argued that the use of technology detracts from the very particular and much-loved essence of the church-visiting experience: the sense of stillness and calm which

As an institution it was a survivor, evading two attempts at dissolution during its final century. The first attempt was during the suppression of the alien priories under Henry V in 1414. The monastery avoided dissolution by petitioning the King, claiming the undivided English loyalty of its inmates. In 1536 Henry VIII dissolved all monasteries with an income of less than £200 per annum. Holy Trinity was closed, but the monks were soon restored to their stalls during the Pilgrimage of Grace. This popular re-establishment appears to have gone unnoticed by the Crown after the collapse of the Pilgrimage and Holy Trinity continued to function as a priory until it was finally dissolved in 1538 along with a number of other houses in the city.

The Church of the Holy Trinity, Micklegate, York. In 2009 the PCC approached Heritage Technology and the University of York's Centre for Christianity and Culture with a project centred on a digital reconstruction of the church's development from the late Middle Ages to the present.

After the Dissolution the priory buildings rapidly vanished, leaving the precinct site virtually empty by 1610. But the priory church itself remained, largely because it had served as both monastic and parish church. In 1551, however, the central tower collapsed in a storm. Unable to afford repairs, the parishioners abandoned the choir and transepts and retreated into the nave where the aisle arcades were blocked, the clerestory removed and the west bay demolished reducing the church to less than one third its original size. This building, however, survives to the present day and is still in use for parochial worship.

CREATING THE MODEL

While the touchscreen installation is an important part of the exhibition, allowing visitors to intuitively understand over a century of scholarship on the history and fabric of the priory, the process of creating the virtual reconstruction is equally valuable. More than an opportunity to create a church 'guidebook' for the 21st century, the development of a digital resource such as Holy Trinity's is an opportunity to bring together all of the previous research pertaining to the site in order to push understanding further through research driven by the computer modelling process itself.

Computer modelling requires an attention to detail unthinkable in other forms of presentation. The modeller must understand not only the basic shape of the site in the past, but also the materials used, colour and decoration, effects of light and shadow, patterns of usage and wear. What is presented in the best three-dimensional reconstructions is not simply a snapshot of a building, but a comprehensive vision of the current state of research on the site and the period depicted. Equally important, a virtual reconstruction is as valuable for the gaps in knowledge it reveals as for the existing knowledge it presents.



Digital reconstruction of the Priory of the Holy Trinity. The priory was one of the anchors of medieval York but had virtually disappeared by 1610. Elements of the priory church survive as part of the Church of the Holy Trinity, which remains in use for parochial worship. (Image: Geoff Arnott/Heritage Technology)

Holy Trinity church itself remains standing and, while shorn of every original outer wall, the core of the nave and key exterior details are preserved. The 15th century parishioners built their own bell tower atop the northwest bay of the church thereby 'fossilising' the details of that portion of the building and providing adequate hints to later restorers to reconstruct the appearance of the pre-Dissolution monastic nave. Here, then, knowledge was most complete and modelling was relatively simple.

Modelling became more problematic for the remaining portions of the original church. Thankfully, the site is littered with fragments from the monastic choir and transepts from which archaeologist David Stocker was able to build a detailed architectural history. This combined with the survey records of the early 20th century restorers allowed a reconstruction of how the church east of the crossing may have appeared in the mid 15th century when the priory was in its heyday. Modelling the cloister buildings was much more difficult. Only one stone fragment from the cloister itself survives: a double capital of the early 13th century. It is a distinctive type and provided enough of a hint to allow a full reconstruction of the cloister

arcades. The cloister buildings themselves were even more challenging as very little physical or historical evidence survives. Based on clues provided by property boundaries, old maps, one surviving Romanesque doorway that had been moved to a different site, and much comparative research the cloister buildings were reconstructed displaying a Transitional architectural style and retaining earlier features.

With the church and cloister complete, the rest of the site remained to reconstruct. The church stands in the northwest corner of the seven acre precinct, occupying only a small proportion of the available space. The only non-cloister building for which any evidence survives was the gatehouse which stood on Micklegate until 1855, long enough for drawings and photographs of it to be made. When it was demolished to make way for site redevelopment it was surveyed, leaving an unprecedented record of this 14th century fragment of the monastic site. Based on this evidence it was apparent that the gatehouse had been heavily altered and reduced in size. Comparative evidence from other urban monastic sites was sought in order to complete the reconstruction. A few tantalising hints from antiquarian maps and images survive which suggest what the remaining five to six acres of the monastic site contained. This included large areas for small-scale farming, space for works yards, and the boundaries of the outer court. However, the details of these areas and the buildings therein were wholly unknown. Comparative evidence at other houses of similar size was sought. The resulting model draws from sites across the country. During this phase of virtual reconstruction it became clear that, while the layout and function of monastic precincts in general are well understood, there is no specific understanding of the layout and function of urban monastic sites. This is despite their abundant though fragmentary survival and continuing impact on the development of every urban centre in England. The gap in knowledge has prompted renewed and ongoing archaeological reinvestigation of the site using ground penetrating radar to locate buried medieval wall foundations and further traces of the layout and function of the monastic precinct.

Finally, the digital reconstruction process brought into focus one key event in the site's development: the collapse of the church's central tower in 1551. It is this event which guided that development of the church building far more than the whims of Henry VIII and profiteering property developers. While the fact of the tower's collapse is known, the extent of the damage and the related subject of the size and form of the Romanesque tower itself are completely unknown. Here, computer modelling has come to the aid of historical and archaeological research. A stone-by-stone virtual model of the tower and surrounding church fabric was created. This was then subjected to a 'physics simulation' which modelled the extent of the damage from the tower's collapse. The result is a sequence of animations re-envisaging the collapse of the tower and the devastation it wrought. Witnessing the ruin, it is easy to understand why the parish did not choose to rebuild, but to retreat into the surviving building and turn the remains over to stone quarrying thus triggering 70 years of systematic erasure of

centuries of monastic heritage.

THE GUILD CHAPEL, STRATFORD-UPON-AVON (KATE GILES AND GEOFF ARNOTT)

The Stratford Guild Chapel project emerged as a consequence of another project being carried out on the 'guild buildings' of Stratford-upon-Avon, in conjunction with King Edward VI Grammar School. This work had highlighted the significance of the Guild Chapel, which is used by the school but maintained by The Friends of the Guild Chapel charitable trust. During the 19th and 20th centuries, restoration works had uncovered a series of wall paintings in the chapel, which were described and drawn by antiquarians, before being whitewashed and destroyed. The original aim of the Stratford project was therefore simple; to create a digital reconstruction of the chapel interior which could provide the backdrop or canvas onto which the antiquarian drawings could be 'projected', so that the extent of the painted scheme could be appreciated for the first time since the 16th century. The initial phase of the project was carried out as part of an MSc dissertation by Geoff Arnott in the Department of Archaeology, University of York, but more recent work has been funded by the Department of Archaeology's research-priming fund.

The guild of the Holy Cross, Stratford-upon-Avon was licensed in 1269 to establish a hospital for the maintenance of poor priests in the diocese of Worcester. A century later it had become the dominant guild within the town, amalgamating with the guilds of the Blessed Virgin and St John the Baptist, and playing an important role in the social and political, as well as the religious life, of the town. The chapel is located on the corner of Chapel Lane, adjacent to the Guildhall complex on Church Street. It is built of squared sandstone and consists of a four-bay nave with a western tower, a low, two-bay chancel and a north porch. Surviving documentary sources of the guild reveal that the present chancel is the result of a rebuilding which commenced in 1449-50, while the nave was rebuilt in 1496 by the wealthy Stratford and London merchant and alderman Sir Hugh Clopton, who also rebuilt New Place, later occupied by Stratford's most famous son, William Shakespeare.

In 1804, a series of wall paintings was discovered during restoration works in the chapel. They were described by the antiquarian Robert Wheler, and drawn by his contemporary Thomas Fisher, although the drawings were only published in 1838. The chancel contained a narrative sequence of the Legend of the Discovery of the True Cross, in two tiers of images, spread across the north and south walls. The south wall also contained an image of a bishop and a crucifix, while dragons inhabited the spandrels over the priests' door. Over the chancel arch was a 'Doom', or Last Judgement, with Christ seated on a rainbow, located just above the rood, whose outline, including the crucifix and flanking images of St John and Mary, can still be seen above the chancel arch today. In the nave, the restorations exposed figures of St Modwena and St Ursula. On the west wall, flanking the tower arch, were again two tier-images images of the martyrdom of St Thomas Becket above an allegorical *memento mori* painting of the poem 'erthe out of erthe', and an image of St George and the Dragon over an image of the Whore of Babylon. Sadly, despite the significance of the paintings, they were subsequently destroyed or whitewashed. It was not until 1928 that the Last Judgement, over the chancel arch, was re-exposed and 'restored' by the famous wall paintings expert, EW Tristram.

No paintings were discovered on the nave walls in 1804. However, in 1576, the antiquarian John Stow had annotated his edition of *Leland's Itinerary*, with the following reference:

Around the nave of this chapel there was carefully painted the Dance of Death, popularly known as the Dance of Paul's, because there was a similar painting at St Paul's around the cloisters on its north west side, which were destroyed by the Duke of Somerset during Edward VI's reign.

In 1955, fragmentary traces of these paintings were discovered on the north wall of the nave by the painstaking photographic recording and transcription work of the art master of King Edward VI Grammar School, Wilfrid Puddephat. Puddephat carried out careful comparative analysis of the Stratford scheme with surviving manuscript sources and descriptions of similar schemes, such as that in the Cemetery of the Innocents in Paris, painted between 1424-5. He used these as the basis for an exquisitely detailed reconstruction drawing. On the south wall, Puddephat also discovered fragmentary traces of scenes from the 'Lyf of Adam', but he never attempted to reconstruct the original appearance of these scenes.

CREATING THE MODEL

The first stage in the creation of the model was the recording of over 3,500 points of digital data in a 'reflectorless electronic distance measurement' survey. Over 200 scaled photographs were also taken and these sources were combined to create a wireframe computer aided design model. The model was textured and lit using a range of software programmes. Digital photographs were taken of Fisher and Puddephat's drawings, held by the Shakespeare Centre Library and Archives. These were then applied to the walls as part of the textured surface. Throughout, close attention was paid to aspects such as the appearance of the limewashed plaster and the colours of pigments known to have been used in late 15th-century painting. However, the model was not intended to be 'photorealistic'. Rather, it was deliberately designed to display the antiquarian records of the paintings 'in context', by supporting the model with a website in which the historic sources and details (what computer specialists would term the 'paradata') behind the model could be discussed.

The first version of the model has now been completed. It had not, however, been anticipated that the model would itself become a research tool, raising a series of further questions about the ways in which previous antiquarians recorded and interpreted the evidence of Stratford's painted scheme. Research carried out in 2010 has revealed important differences between Fisher's drawings and Puddephat's more accurate photographic records of the paintings, taken in 1955. Although some of these differences are minor, others change the possible interpretation of the paintings in subtle ways. We hope to be



Reconstruction of the Guild Chapel, Stratford-upon-Avon showing the north wall of the chancel decorated with scenes from the Legend of the Holy Cross (Image: Geoff Arnott/ Heritage Technology)



Reconstruction of the Guild Chapel looking west. The left side of the tower arch is decorated with images of the martyrdom of St Thomas Becket and a *memento mori* scene, to the right of the arch are images showing St George and the dragon, and The Whore of Babylon. (Image: Geoff Arnott/Heritage Technology)

able to build these findings into new 'layers' and textures within the model, allowing future scholars and visitors to explore these differences for themselves. Similarly, a comparison of Fisher's 1804 drawing of the Last Judgement with that of EW Tristram, made in 1928 and now in the Victoria and Albert Museum (London), has revealed important differences, not only in the details of the painting, much of which had been destroyed in the intervening century, but also in Tristram's minute attention to the methods of painting, and the relationship between the image and the underlying wall surface. These differences reflect Tristram's scholarly interests as a wall painting expert and as a conservator. Sadly, they also reveal the devastating impact of his conservation methods on the painting. Once again, we hope to build these findings into the model as a series of layers of record which can be compared and contrasted by visitors and scholars with the surviving scheme.

Finally, we hope to use the model to raise questions about the extent to which the chapel paintings survived the early stages of the Reformation. Stratford and its inhabitants appear to have adopted an equivocal but pragmatic attitude to the religious changes of the 16th

century. The Guild Chapel is perhaps most famous today for the fact that in 1563-4, the accounts of the corporation chamberlain, John Shakespeare (father of the famous William), record the payment of 2d for 'defasyng ymages in ye chapel'. However, it is far from clear which images were destroyed at this time. Stow's reference and new research within the archives suggest that the Dance of Death, and possibly the Holy Cross sequence, may have survived into the 17th century at least.

CONNECTING PEOPLE WITH HERITAGE

For most parishes, financial priorities continue to be the payment of parish share and the maintenance of church buildings, rather than the commissioning of new e-heritage resources. However, for some, enhancing the quality of the visitor experience may be one way of maximising income from tourism. It can also be a useful way of explaining the meaning and significance of church buildings for the increasing numbers of visitors who have no background in church worship or history. Collaboration between parishes, professionals and academics can result in the production of e-heritage resources which, rather than removing visitors from the church experience, encourage them to dwell longer, look harder, and ultimately, understand more about this important aspect of our cultural heritage.

Recommended Reading

- Christianity and Culture DVD-ROM: www.christianityandculture.org.uk
- C Davidson, *The Guild Chapel Wall Paintings at Stratford-upon-Avon*, AMS Press, New York, 1988
- Heritage Technology website: www.heritagetechnology.co.uk
- JG Nichols, Ancient Allegorical, *Historical and Legendary Paintings on the Walls of the Chapel of the Trinity, belonging to the Gilde of the Holy Cross at Stratford-upon-Avon in Warwickshire, from drawings made at the time of their discovery by Thomas Fisher*, London, 1838
- W Puddephat, 'The mural paintings of the Dance of Death in the Guild Chapel of Stratford-upon-Avon', *Transactions of the Birmingham Archaeological Society*, 76, 1960
- J Solloway, *The Alien Benedictines of York*, Leeds, 1910
- D Stocker, 'The priory of the Holy Trinity, York: antiquarians and architectural history', in L Hoey (ed), *Yorkshire Monasticism: Archaeology, Art and Architecture from the 7th to the 16th Centuries*, British Archaeological Association conference Transactions 16, Leeds, 1995
- RB Wheler, *The History and Antiquities of Stratford-upon-Avon*, J Ward, London, 1806