LIBERATING DIGITAL PROCESSES IN HERITAGE

Networks and Democracy

Digital heritage is a fast-moving field, with the nature of the technologies themselves dictating the culture of their usage and the type of people that can use them. These technologies were previously the preserve of specialists and geeks, but now, with simpler interfaces, many more ordinary heritage workers can use them. A key factor is that digital data does not respect origins and can be moved, transformed and exchanged at will. Indeed, digital data has to move to survive, and the more it is exchanged the more it is likely to do so.

Digital archaeology workshops organised in February 2009 by the authors at Truro College, University of Plymouth Colleges, in Cornwall, UK, attracted a range of speakers from the UK, USA, Germany, Portugal and the Republic of Georgia. The workshops covered a wide range of new user-friendly digital techniques, including mid-range laser scanning, hyperspectral imaging, polynomial texture mapping (PTM), reflectance transformation imaging (RTI), digital photogrammetry, 3D immersive environments, audio-visual and data archiving and the orchestration of coordinate data into music. We discuss the emerging impacts of these technologies as revealed by the workshops.

Digital Past

Until recently, digital processes were very rigid and technical. Digital heritage processes include data capture, processing and archiving. These were traditionally illustrated in the form of workflows. Whether we consider the optical workflow from the taking of a picture, through production of negatives and then diapositives in a darkroom, or the workflow of a surveyor from logbook to draft produced in a studio and finally a print, workflows are highly regimented, fixed processes. Such processes have been seen as a series of discrete activities arranged in sequence. Equally, the archiving of digital data was not thought to be much different from that of fine art or books and manuscripts, i.e. as if they were discrete (and static) storage spaces.

It is therefore not surprising that the concept of workflows became a one-way trajectory following prescribed paths controlled by the 'expert' engineer. This expert required specialist training to ensure quality; the training was not so much a toolkit as a career option. The archive was also assigned its own mystique, particularly as institutional networks and computer systems had a habit of breaking down. The precious records therefore needed a wise and cautious gatekeeper.

Digital Present

The 'expert' model is currently failing heritage. Anecdotal stories abound of poorly understood equipment languishing in its box for months before the archaeologist can figure out a use for it, while others never get past the price and apparent complexity of the equipment to even contemplate a purchase. No-one, it seems, understands why it is necessary or helpful, let alone whether a demonstration by an expert should be requested.

On the other hand, communities of enthusiasts have broken ranks to offer free software, and even instructions, for cheap, do-it-yourself equipment. It is noteworthy that even the ITC giant Microsoft has hosted Photosynth, an online programme for members of the public to

upload their holiday photographs and turn them into 3D digital photogrammetry models. In other words, anyone can be a 3D photogrammetrist! The only barrier between the archaeologist/heritage worker and the future of digital archaeology is awareness ? the awareness of what can be done and what is out there to help realise these ambitions.

Digital Future

Part of the key to bridging the gap between specialist and non-specialist is the nature of the data itself. The digital heritage processes mentioned above (capturing, processing and archiving) are not actually separable, given the role of computing at all stages. Indeed, in digital photogrammetry the computer programme is everything, as evidenced by Microsoft's Photosynth programme. Little in the way of photographic skill or professional equipment is needed to gain a good result. For example, David Southam of FARO (Figure 1) demonstrated how his latest laser scanner could be operated remotely from an i-Pod or a 3G phone (Figure 2). This means that free or pre-existing software can be co-opted to achieve the same results as more expensive or complicated technologies.
The other component of bridging this expertise gap is the invasion of the material world by digital media. It is increasingly difficult to separate reality and authenticity from cultural heritage when accuracy pushes at and goes beyond the millimetre boundary with surface, rather than single-point capture. It is again difficult when hyper-reality transcends human capability with sound and spectral imaging, e.g. when an accurate acoustic model can be used to describe monuments and spectral analysis can determine the materials of which an item is made.

Emerging Impacts

Technologies have long been recognised (e.g. by Karl Marx and Marshall McLuhan) to have unforeseen impacts on society. In these workshops, Michael Ashley (Figure 3) of the University of California, Berkeley, focused on the potential threat to digital archives. He discussed not just those of museums and universities, but also of ordinary people and their digital albums of family photos. The lifetime of a CD or DVD is only about five years, after which data starts to degrade. In order to preserve data it must be copied, used or exchanged. Unlike the analogue photos of the past, these will not be rediscovered in someone's attic.
Another impact explored by João Barbosa (Figure 4) of the University of Minho in Portugal was the ease with which technology of millimetre accuracy could be learnt. A short exercise with some students on one afternoon showed how, with simple, readily available camera equipment, the students could make RTI images of worn, degraded architecture and detect features that would be hard to see with the naked eye (Figure 5). Amazingly vivid 3D laser images, shown by Erwin Christofori from Germany and Malkhaz Datukisvili from Georgia, demonstrated how vital information for conservators could emerge from such scans in a way not previously possible (Figure 6).

Concluding Remarks

The tone of the workshops was best exemplified by the attitude of community archaeologist and BBC archaeology presenter Julian Richards. Taking a sceptic?s view during the plenary session, he pondered how the average archaeologist would cope with the plethora of digitisation envisaged by the workshop programme. He was, however, won over when he saw the simplicity and effectiveness of the technologies, and could see how he himself might use such things in his own community projects.
Indeed, openness and accessibility is the only future imaginable for digital data, and the heritage community must embrace the technology, with all its implications for engagement and freedom. Instead of trying to control and specialise such knowledge, educating the public and each other in the production and responsible use of data is the way to maintain quality.

Acknowledgements

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Further reading

Mudge, M., Ashley, M., Schroer, C., 2007. A Digital Future for Cultural Heritage; 2007 Proceedings CIPA UNESCO Symposium pp521-527.

Guo-Qing Zhang 2007. Evolution of the Internet and its Cores. New Journal of Physics 10: 123027.