

Managing Change: Introducing innovation into well-established systems

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Abstract

This paper describes recent trials of hand-held digital recording equipment including digital pens and digital clipboards as part of the VERA (virtual Environments for research in Archaeology) project. It examines the key issues involved in introducing such new technologies into well established excavation management and recording systems.

Key words: *Silchester, IADB, Recording Systems, VERA, OGHAM*

In 1997 a major new British excavation project was launched. Run by the Department of Archaeology at the University of Reading, the excavation was located within a single *insula* or block of the Late Iron Age and Roman town of Silchester in Hampshire.

The project was major in two senses; firstly, at 3025 square metres, the excavation area was large in any urban context, and secondly, the expectation was that this was a project which could last at least ten seasons in the field.

It was clear from the outset that managing the volume and variety of archaeological data generated by such a large site would require engagement with digital technologies, and, twelve years on, the project acknowledges that one of the keys to its success has been the core use of the Integrated Archaeological Database (IADB)¹. During excavation, the IADB is a data gathering, storing and recording tool, and during post excavation it allows integrated access to all aspects of the growing excavation record. The

IADB can be accessed from anywhere with an Internet connection, allowing the geographically dispersed research team to interact with the core project team throughout the year.

Traditionally Silchester's excavation data - be it drawn records, written records or photographs - has been entered on to the IADB through manual digitisation, usually once the excavation season is over. Ever since its inception the project has looked to find ways to enhance the collection of site data, with the intention of speeding up the transfer of information from trowel to database. Since 2005 field trials have been held using a variety of digital recording methods including digital pens and notebooks, and handheld Internet browsers. The objective was to have less paper records to digitise during post excavation. In 2008 this aim was achieved, with 43% of the written site record being digitised before the season was finished.

Key to the use of these new technologies was the requirement that they should not cause an unacceptable level of interruption to the traditional site recording processes. It was also important that there should be no lapse in the quality of the recorded data.

¹ Integrated Archaeological Database,
<http://www.iadb.org.uk/index.htm>

This paper will discuss the steps that were taken to trial new recording methods on a long-running project with a proven track record of recording and publishing its archaeological data. What are the main obstacles to challenging traditional and embedded archaeological recording systems? The effect of introducing new working methods into a long-running archaeological research and training project will be discussed. This paper will look at the challenge of managing such a project through times of change, whilst maintaining the integrity of the research and training outputs.

The current excavations at Silchester are part of the *Town Life Project*², a seasonal research and training excavation. Key to understanding the challenges facing a project such as this is the recognition that the dual aims of teaching and research have their own unique set of requirements. As a research excavation, the on-site aims are to trace the development of the town from its Iron Age origins through to its abandonment in the fifth or sixth centuries AD. The project intends to produce a fine-grained understanding of the change in urban conditions through the life span of the settlement. As a field school which trains over 100 people a week, the obligation is also to teach archaeological fieldwork techniques — both old and new — to a diverse group of participants, whilst maintaining the integrity of the archaeological record.

A site like Silchester will produce a great deal of data of all types. There is currently an accumulated record of over 30,000 finds, 5,000 of which are small finds, nearly 8,000 contexts, over 10,000 drawn records and nearly 13,000 photographs. This data has been accumulated over twelve field seasons, amounting to approximately seventy-two weeks of fieldwork. A system has evolved for the recording and interpretation of all this data, both written and drawn.

2 Silchester Insula IX,
<http://www.silchester.rdg.ac.uk/index.html>

Using single context planning, a methodology widely practised in urban archaeology in the United Kingdom, the Silchester excavation has developed a well-embedded recording system which has interacted with — and developed in tandem with — the IADB.

At the start of the Silchester *Insula IX* project in 1997, there was no tradition of using databases with the kind of functionality associated with the IADB in either academic or professional archaeology. Bespoke solutions were adopted for individual projects, and there was no track record of the continuous development of one system.

In a survey carried out of user needs and digital data in archaeology in 1998 only seventy five per cent of United Kingdom field archaeologists had access to a computer. The figure for academics in a better resourced environment of Higher Education was somewhat higher at ninety per cent. Electronic publishing was in its infancy with the refereed journal *Internet Archaeology*³ only being established in 1995. Indeed, the York-based *Archaeology Data Service (ADS)*⁴, the main repository for digital archaeology data in the UK, was only established in 1997.

In the first years of the Silchester project there were no computers on site and all data digitisation was done off site during post excavation. By 2000 there was a database manager on site, 3 networked computers and some daily data entry during the excavation season. In 2005, the UK JISC (Joint Information Systems Committee) funded OGHAM (On-line Group Historical and Archaeological Matrix)⁵ project provided the site with broadband internet access. Internet connectivity provided on-site

3 Internet Archaeology, <http://intarch.ac.uk/index.html>

4 Archaeology Data Service,
<http://ads.ahds.ac.uk/index.html>

5 OGHAM: Silchester Roman Town: A Virtual Research Community,
<http://www.jisc.ac.uk/whatwedo/programmes/vre1/solutions/ogham.aspx>

access to the main IADB database server, resolving the issue of ensuring data integrity between servers on site and at Reading University. The internet access infrastructure also provided a platform for testing and experimenting with other digital approaches to site recording, such as wireless technologies.

One of the fundamental issues of archaeological site and finds recording is the double-handling of data, with a tendency for all records to be written or drawn in the first instance, and then subsequently digitised either during or after the excavation season. Such an approach has obvious resource implications. Would it be possible to enter all the field and finds data without first hand-writing or drawing them? With the provision of wireless internet access from within the excavation trench, it was possible during the 2005 season to trial hand-held devices (PDAs) in the trench to record accessioned finds. It also provided access to the records of previous seasons stored in the IADB. A ruggedised tablet PC was also deployed to record context plans, with the aim of replacing the use of pencil plans on permatrace, which subsequently require digitisation.

While issues emerged over the reliability of the wireless infrastructure in the trench, the problem of using the tablet PC in bright daylight, and the general usefulness of the small PDAs, having direct access to the network proved invaluable. The benefit was not just in terms of data entry, but with the day-to-day management of the ever-growing field project, involving a staff of forty and over one hundred trainee archaeologists, email and access to the internet proved invaluable.

The UK JISC continued to invest in the development of a generic VRE (Virtual Research Environment) for Archaeology with a second project (VERA - *Virtual Environments for*

Research in Archaeology)⁶, which was funded between 2007 and 2009. Improvements were made to the reliability and capacity of the site internet connection. Further trials were undertaken with devices used in the trench to capture the field data digitally directly into the IADB and so reduce post-excavation digitisation. These have concentrated on the use of digital pens and notebooks, and digital clipboards, which do not depend on a wireless network within the trench.

Following preliminary testing in 2007 extensive trials were undertaken in 2008 using the digital pens and notebooks. It was intended that the pens would stand alone and have no traditional counterpart. They would be in use in each of the five supervisor areas in the trench. Students would record the contexts, while supervisors would check them and the VERA-funded research assistant would upload them to the database on site. Altogether, some 43 per cent of the 2008 season's 1,652 recorded contexts were captured digitally and uploaded onto the IADB. The volume of recording varied through the season, but with a significant increase in the last two weeks. The pens were robust and functioned in wet weather conditions and the system as a whole was shown to work, although the ideal of capturing the whole of the season's data into the IADB by the end of the season was not achieved.

While the emphasis in 2008 was on trying to speed the flow of written, mostly context information into the IADB, some initial work was also done on using tracking GPS as an alternative to conventional planning using measured grids. Web cams were also used on site to give an overview of the excavation throughout the season. Used in conjunction with digital camcorders these do offer the possibility of transferring information about the progress of the season via the website into the public domain more rapidly. However, as with the digital pens,

⁶ VERA: Virtual Environments for Research in Archaeology, <http://www.vera.rdg.ac.uk/index.php>

the management and editing of moving images of the excavation requires dedicated time which would introduce a further cost to the project.

What then were the main obstacles to introducing the new technology? At the start of the 2008 season it was assumed that the main challenge would be ensuring that the equipment continued to work in the field. As it turned out, the main obstacle was in fact the acceptance of the technology.

To address user reluctance, training was given to all staff in the form of a briefing before the season began; and handouts, manuals and one-to-one demonstrations were given to supervisors once on site. Throughout the season, a VERA Research Assistant was on site to give advice and guidance to both staff and students. There were also scheduled talks every week which explained the use of technology on site and its contribution towards the final publication of the excavation. Introducing any new system requires communication and explanation.

A common — and understandable — attitude on site was, "if it's not broken, why fix it?" So the challenge was to show that new technologies could both speed up workflow and become as familiar and well integrated as pencil and paper. To complement this, extensive user needs analysis was undertaken as part of the VERA project throughout the 2008 season. The results of this are described by Fisher *et al*⁷ elsewhere in these proceedings.

It was inevitable that the introduction of new technology would also lead to changes in the established working methods on site; for example the existing context recording system was effectively split into two strands for some aspects

of the process, allowing the VERA Research Assistant to upload the site context data recorded by the digital pen on to the IADB. Uploading the digital pen data also had the advantage of introducing an extra opportunity to check the integrity of the archaeological data. The integration of the new tools generally worked well, but the on-site team quickly learned the importance of flexibility of mind and action when engaging with the new technologies, and amendments to working practices had to be occasionally introduced during the course of the season.

Since the award of the JISC grant in 2005, the challenge of improving the flow of information from the eight-week field season into the IADB (and thereby saving both time and money) has become an integral part of the Silchester Town Life Project. The investment in terms of time and effort trialling the new protocols and workflows during 2008 meant that nearly half of the context record was digitised during the season, thus saving, it is estimated, nearly 20 full days of post excavation time. However, as it is also estimated that the VERA Research Assistant spent about this amount of time on site working with the context data from the digital pens, it could be argued that the increase in the amount of on-site digitisation achieved arose from simply having an extra full-time person on site (the Research Assistant), rather than from any specific benefit of using the digital pens and notepads.

As well as integrating new recording methodologies, other valuable lessons were learnt during the duration of the VERA project. Perhaps the most practically useful was how to set up and maintain a more stable and reliable Internet connection than had been available before, in what would be regarded in networking terms as a hostile and fragile environment. This network was able to be managed on site by a member of the team and integrated into the daily work practices, rather than relying on calling out IT support from the University.

7 Claire Fisher, Melissa Terras and Claire Warwick, "Integrating New Technologies into Established Systems: a case study from Roman Silchester" (paper presented at the annual Computer Applications in Archaeology conference at Williamsburg, Virginia, USA, March 22-26, 2009)

On a more theoretical level, the team learnt to question the traditional ways of working and this stimulated wide-ranging discussion on new ways to gather data. Discussion on new ways to reach out to the public and other interested parties also ensued. The Silchester website was revamped for the 2009 season and had a large public audience. The website includes on-site blogs (posted daily by the Field School Director and the Research Assistant), photographs and videos from site, information on the Field School, background material on the town and links to the Victorian and Late Roman on line publications.

This paper has looked briefly at the challenge of managing a large project through times of

change, whilst maintaining the integrity of the research and training outputs. The conclusions drawn so far from the last few seasons are broad. They include the view that digital pens have a place on site not limited to context recording, in fact, the digital pen trials made such an impact that it is proposed that they will be used to record finds and samples in the forthcoming 2009 excavation season. The lesson we take with us is that in a constantly changing and evolving archaeological world there is great advantage to continuous evaluation and re-evaluation of all work practices in relation to new technology.

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