



HEIRNET

FISH-HEIRNET

Minutes of the Spring Meeting, Waterhouse Square, London

8th June 2015, 11.00 – 15:00

Present: Gillian Grayson, EH (FISH Convenor), Dan Miles, EH (FISH Co-ordinator), Phil Carlisle, EH, Keith May, EH, Graham Tait, Devon CC, Louisa Matthews, ADS, Sally Carter, NMW, Peter McKeague, RCAHMS, Paul Cripps, USW, Ceri Binding, USW, David Thomas, RCAHMW, Marion Page (DAT), Dominic Oldman (BM)

1. Welcome and Apologies

Apologies were received from Dan Pett, Suzy Blake, Victoria Bryant

2. Minutes and Actions of the last meeting

The minutes of the last meeting were approved.

9.2 Action to confirm backup copies of heritagedata.org (KM)

A discussion was held by all on the requirements for backing up the linked data on heritagedata.org and the website itself. There are different options, for example to pay the web host Fasthost to do it, CB could write a back up script and each national agency who provides the Linked Data to maintain their own data. GT spoke about the need to provide confidence to the sector that the Linked Data terminologies were secure in the hosting and archiving of the site and proposed that an organisation like the ADS could host the Linked Data. KM assured the group that the PURLS were secure. GT also questioned the risk of the lack of legal representation to keep the Linked Data online. GG assured that HE could guarantee its existence and that each national agency was responsible for the actual terminologies uploaded.

All discussed how this should be taken forward and it was decided that a representative group of the national organisations and Linked Data people need to take this forward – to produce an overarching strategy and also to look at different options – for example the ADS hosting/backing up/archiving heritagedata.org.

2.1 Action on PM, DT, PC & CB to develop a strategy.

2.2 Action on LM to find out whether the ADS might be able to host/back up/archive heritagedata.org .

3. Matters Arising

No matters arising

4. MIDAS Heritage – future direction

Where do we go next?

There was a long discussion on the future of MIDAS Heritage.

PC introduced the discussion based on last year's meeting and his proposals for changing the existing standard and its associated xml schema. He began saying that further thinking into this based on the known issues with the current standard and schema (there are various inconsistencies in the standard and between the standard and its xml schema and that attempts to get AMIE data out using the MIDAS xml schema shows there are problems) and the development of recent systems based on the CIDOC CRM (eg the Getty ARCHES) have led to the need for a major rethink on whether the current standard is fit for purpose, whether it is still required and that maybe a different approach is required.

There was a general discussion on the requirements for a standard for managing heritage data – eg to benchmark datasets, on the need for an xml schema to enable data exchange and interoperability (but in the new world of Linked Data do we need to look to the future and not in data exchange between different systems?). Because of the issues with the xml schema and the FISH Toolkit, neither have been really used, meaning that if they did work, would they be used?

Discussion included an option to look at MIDAS Heritage, see what needs to be done, strip it back and create an xml schema directly from the new standard. Or build up the original MIDAS rather than trying to strip back MIDAS Heritage. Another option is that a standard wasn't required and that everyone should directly relate/map their databases to the CIDOC CRM (tools are being developed to enable this). Using the CIDOC Core Data Standard for Archaeological and Architectural Sites was suggested, but this is believed to be too stripped back. Using the CIDOC CRM could provide real interoperability and MIDAS Heritage could become either an interface (or a gateway) for this or a guiding document/ standard or practice notes for how this is to be done.

DO spoke about the researchspace.org project which was using the CRM to aid interoperability and the relationship between the CRM and the museum standard SPECTRUM (SPECTRUM will come into the CRM and has been mapped to it). He also spoke about the strengths and weaknesses of directly basing databases on the CRM rather than using an interim – eg SPECTRUM and MIDAS. DO stressed that the CRM was a “knowledge map” and was a standard that is not technology led, which is important for interoperability. He also spoke about the need to move away from technical mapping to non-technical mapping and this was part of the Synergy reference model of data provision

PC and DO said that there is a need to get buy in and to show systems working based on the CRM, one example is DO's project which includes a public search system based on the CRM.

All agreed that something needs to be done and to achieve this, representatives from the sector need to get together, work out the requirements and then organise a project to achieve this – but at all times being transparent and communicating with the sector.

- 4.1 Action on all around the table to develop their functional requirements and begin to think about how MIDAS can be redeveloped.
- 4.2 Action on DM to set up a wiki to be used to capture requirements and ideas of moving forwards
- 4.3 Action on DM to set up a specific meeting in September on scoping the work that needs to be done.

5. FISH Terminology Working Group – update and the Thesaurus of Cultural Heritage

PC gave the group an update on where we are with the Thesaurus of Cultural Heritage, and that it was now part of the Historic England corporate action plan. There was also buy in with Northern Ireland and the

Republic of Ireland through the MEDIN project. He discussed that he is looking into different tools, eg the open source tool Tematres for developing SKOS vocabularies. This would create basic SKOS files that can be exported into other tools. The idea being to import the thesauri into a system such as the Arches software Reference Data Manager which would allow us to add images and documents to a concept as well as provide multilingual capability. PC is preparing a scoping document for the next FISHWTWG in July and then looking to develop a project through the HE corporate action plan to develop a new system within the next 3 years. In the meantime the controlled linked data in heritagedata.org will be maintained to be eventually being replaced by the Thesaurus of Cultural Heritage.

A discussion was held on the implications of developing this new thesaurus including issues of implementation into systems (eg with SWISH and HERs). PC said that the project will publish the Linked Data terminologies but that the different software owners will have to work out its implementation.

GT said that as well as a scoping document, a communication plan should be created.

PM said that thought was required into how it was to be governed and maintained in the future – eg what to do with candidate terms. He also added that Northern Ireland are keen to share their vocabularies but have no resources for implementing things.

PC replied that HE would help

DO asked about some of the concepts and issues of creating this new thesaurus, eg different institutional views of the terminologies.

All agreed that as part of any project to take this forward a communication and clear governance for this resources is required.

PC also said that the minutes from FISHTWG are now on the FISH website and that the results of the online conference on Prehistoric terminologies – led by Gill Campbell will be looked at at the next FISHTWG meeting in July.

5.1 Action on PC to circulate the Thesaurus of Cultural Heritage scoping document to FISH-HEIRNET after the FISHTWG meeting

6. Websites – FISH, INSCRIPTION AND HERITAGEDATA.ORG

DM gave an update on the website issues and that little progress had been made since the last meeting eg – the old FISHFORUM and INSCRIPTION websites were still live and decisions were required so that progress could be made.

The meeting discussed the issue of the websites and the decision was taken that <http://heritagedata.org/> would be the site for all terminologies – whether in linked data or csv/pdf format – it would be the definitive place for people go to get the information to download or use. The <http://fishforum.weebly.com/> website would be the main administrative site of the FISH FORUM, posting news and events details as well as meeting presentations, minutes etc. It would link directly to heritagedata.org. The FISH Weebly site is to be migrated to WordPress and accessed via the URL <http://www.fish-forum.info/>. Moving to WordPress would allow both the FISH and heritagedata.org websites to be managed through the same content management system. The work will be completed by November and the next FISHHEIRNET meeting. Disclaimers should be put on the old sites and when the new sites are up and running a communication plan is required to let everyone in the sector know of the changes.

6.1 Action on DM to sort out disclaimers

6.2 Action on DM and TW to organise the website work to be undertaken

6.3 Action on DM and TW to communicate the changes when they have been completed

7. TACOS next steps for FISH

GG spoke about where FISH can take on some of the next steps highlighted in the TACOS report. She worked through each of the areas and asked the group to consider implications for FISH (see appendix 2). In particular, she focused on the suggestions for potential ways forward. Although the group felt that it was being active in pursuing some of these, there were key areas that required further work, with the major one being communication. It was agreed that FISH needs to be more transparent and visible to the sector – eg in communicating to HER Forum. FISH also needs to learn from outside initiatives – learning from other sectors. FISH needs to build communication into the work it does, e.g. the potential new MIDAS project and the Thesaurus of Cultural Heritage – communication before project start, during and the results. There was also more work to be done on FISH’s web presence to ensure easy, clear access to its resources (see agenda item 6).

Another area considered was representation and liaison with other relevant groups. FISH had reviewed membership at the previous meeting and focused on ensuring links with other groups so it was felt that this had improved but needed to be kept under review.

The group also discussed the issues arising from data quality – there is one school of thought the get it out there and sort it out, but this doesn't always work and requires more structuring. DO said that we shouldn't be posting any Linked Data, but we need quality well thought through data, there have been issues with this in some recent large aggregation projects.

7.1 Action on DM to establish a communication strategy.

8. Data supply and reconciliation Project – Graham Tait

GT gave an update on the recently completed EH/HE funded Data Supply and Reconciliation Project. Historic Environment Information is currently held by local Historic Environment Records (HERs) as well as by Historic England within the National Record of the Historic Environment (NRHE). This project researched and discussed the issues that would be involved in supplying NRHE data to HERs and the reconciliation necessary to achieve this. Wide consultation with HER Officers and other interested parties took place. There was overwhelming support to undertake this process in principle, and a broad consensus on how best to do this (manual accessioning assisted by web-based resources). Concerns were however raised about the resources necessary to undertake this process. A costed Project Design has been written for a potential second phase of work to develop a working prototype and identify the resources and criteria required to carry out this process.

9. BIAB update

LM gave an update on BIAB. BIAB will come to the ADS from 1st April 2016. The CBA will maintain BIAB until this point. There is an HE funded project to look at migrating BIAB to the ADS, as well as the interface, data collection, etc. BIAB is to be taken on as part of the HERALD project and the BIAB advisory board has now merged with the OASIS management board.

10. Reports from Contributing Organisations

DT gave a quick update on the change of name of the joint welsh working group to the Historic Environment Data Standards Working Group for Wales

PM said that the SHED (Scotland's Historic Environment Data Strategy) programme had been running for a year and projects were now starting.

11. Potential future agenda items

PM asked if web stats could be discussed at the next meeting. He is interested in knowing what people are doing with their web stats, what open data is being published and what are the outside drivers for what stats to collect.

GT asked if HIAS could be on the next HEIRNET meeting with a chance to discuss where it is going and to capture ideas and information on the different projects as part of the programme.

It was agreed that it would be useful to have a format similar to the last meeting with a more strategic session followed by an open session with the opportunity for contributions from colleagues local to the area in which the meeting was being held. Cambridge was suggested as a possible venue.

Action on GG and DM to follow up Cambridge as a venue for the next HEIRNET meeting.

12. AOB

GG thanked Suzy Blake who has stood down from FISH for her hard work and enthusiasm over the last few years as the HER ALGAO committee representative.

GT announced that he has just moved from Devon to become the Coventry HER officer.

DM asked if everyone could be more proactive in posting to the FISH Forum email list eg publicising events, highlighting interesting and relevant articles, video presentations etc...

Appendix 1 Open Actions

No	Joint FISH/HEIRNET Meeting: 01 st November 2011	Owner	Notes
11.5.1	Action to look at previous discussion on this matter relating to licensing	KN	Open – CH has taken over this action.
No	Joint FISH/HEIRNET Technical meeting: 26 th April 2013	Owner	Notes
7.2.1	Action to look into accessing EH investigation reports.	DM / KM	Open – GG to check that the agreement in HE is being taking forward
No	Joint FISH/HEIRNET Technical meeting: 10 th June 2014	Owner	Notes
10.1	Action to invite Claire Foley and Manx Heritage	GG	Claire Foley invited, action transferred to SC for Manx Heritage
10.2	Action to clarify BM involvement	GG	DP was representative but now has changed position – awaiting confirmation from DP
10.4	Action to identify potential software providers from the historic environment and cultural heritage sector for future agenda items.	All	
12.1	Action to enquire about peat recording in EH	PC	PC talk to GC about what is being recorded?
No	Joint FISH/HEIRNET Spring meeting: 8 th June 2015	Owner	Notes
2.1	Action to develop a strategy for the archiving/backup of hertiagedata.org	PM, DT, PC & CB	
2.2	Action to talk to Michael Charno at ADS to get and get an idea of whether gedata.org can be hosted/archived by the ADS	LM	
4.1	Action to develop their functional requirements and begin to think about how MIDAS Heritage can be redeveloped.	all	
4.2	Action to set up a wiki to be used for all to capture requirements and ideas of moving forwards with MIDAS Heritage prior to a meeting	DM	
4.3	Action to set up a specific meeting in September on developing MIDAS Heritage.	DM	

5.1	Action to circulate the Thesaurus of Cultural Heritage scoping document to FISH-HEIRNET after the FISHTWG meeting	PC	
6.1	Action to sort out disclaimers on the old FISHFORUM and INSCRIPTION websites	DM	
6.2	Action to organise the website work to be undertaken by November 2015	DM & TW	
6.3	Action to communicate website changes to the sector when they have been made	DM & TW	
7.1	Action to establish a FISH communication strategy.	DM	
11.1	Action to follow up Cambridge as a venue for the next HEIRNET meeting	GG & DM	

Next Steps

It was clear from a number of TACOS discussions and feedback comments that delegates felt that a more strategic direction for the historic environment information management sector was timely. The following section comprises suggested 'Next Steps' to further investigate potential avenues of enquiry highlighted in the report to address some of the issues that currently impede a collaborative strategy to information management across the historic environment sector.

1 ENHANCING COMMUNICATIONS

The issue of poor communication within the historic environment information sector was highlighted in both TACOS seminar discussions and feedback comments. Communication was seen as a major barrier to improving cross-sector collaboration in historic environment information management with the need to overcome the perception that the sector is fragmented with different groups operating in isolation. This is clearly not a recent observation and an [HEIRNET](#) user survey undertaken by the ADS and published in 2006 recommended that “*HEIRs*¹⁶ will only achieve their full potential with more attention [paid] to communication” and that “*HEIRs should consider longer term communications as part of any HEIR development programme*”¹⁷. Edmund Lee reiterated this sentiment by emphasising that information management was about more than just technical skills and that it also relied on the ability to communicate the value of information resources effectively, manage processes and disseminate information based on a sound understanding of user needs to make sure that information was decision-ready¹⁸.

Communicating with users: raising awareness and improving access

Discussions and feedback comments remarked that there was a lack of clear channels for obtaining information, with users either feeling that they didn't know where to go for information or were overwhelmed due to improved online accessibility and overlapping resources. Information portals such as [Heritage Gateway](#), [PastMap](#) and [Archwilio](#) have proved to be useful by providing a single point of access to multiple datasets, which removes some of the issues associated with dispersed datasets, but the discovery and use of these resources still relies on raising awareness to potential user groups. To improve the way we encourage use of historic environment information resources we need to understand the needs and wants of different user groups. Several TACOS presenters and delegates particularly emphasised the need for better audience research to inform actions to address accessibility issues and the implementation of new technology with ongoing evaluation of outcomes to inform future decisions. Marketing and communication skills are not traditionally taught as part of the historic environment subject curriculum and there are few sector-specific training and skills development opportunities in this area for early career professionals or those undertaking CPD.

Communication within the sector

There are a number of specialist historic environment information forums and groups (e.g. HEIRNET/FISH, HER Forum, SMR Forum Scotland, IMSIG, ALGAO HER Subject Committee, Antiquist) often with a degree of overlap in membership across the historic environment information sector. *So why is there still a perception (as indicated in TACOS discussions and feedback) that as a sector we*

are not communicating effectively with each other? There is also the potential for information managers to be overwhelmed by the sheer volume of information generated by forums and ad-hoc updates through mailing lists and online groups. This, coupled with resource limitations, means that there is less time to spend fully digesting the proceeds of forums, with the cost of travel also potentially prohibiting participation. TACOS feedback suggested that existing forums and facilities for information sharing needed to be improved and that cross-sector information sharing could be facilitated by bringing together forums that would traditionally appeal to different interest groups and areas of the sector. A number of TACOS seminar attendees commented on the low representation of the commercial sector, with 6/45 (13.3%) of the York seminar delegates identifying themselves as commercial and 2/18 (11.1%) of virtual delegates. This is certainly an issue that needs addressing, and is potentially part of a wider concern regarding the tension between commercial uses of publicly funded (historic environment) datasets.

Positive feedback on the TACOS ‘World Café’ style seminar suggests this format might be a useful way of discussing specific issues in an informal setting with a range of representatives from across the sector. Feedback received on the virtual seminar format suggested that this effort to improve access was welcomed but that more experimentation and research into the pros and cons of using different media was required.

Intra-sector communication

Many of the cutting-edge developments in information management and development of new information systems and technology are happening outside of the historic environment sector, with recent intra-sector partnerships demonstrating that historic environment data can be of particular interest to developers. There are also funding incentives encouraging external sectors to engage more with the heritage sector and visa-versa. Digital systems and technology research plays such an important role in the digital humanities¹⁹ that it is no longer limited to EPSRC²⁰ and ESRC²¹ for research funding, with recent examples of cross-sector collaborative projects funded by the AHRC including the [Semantic Technologies for Archaeological Resources](#) (STAR) and [Semantic Technologies Enhancing Links and Linked data for Archaeological Resources](#) (STELLAR) projects. A few historic environment information managers have ventured out into this brave new world of information science and technology and have reaped the benefits that come from these new technology partnerships. For example, Dan Pett’s collaboration with Trace Media who wanted to use the PAS dataset to showcase the potential of their visualisation platform, and the semantic web research of the University of South Wales in collaboration with the Archaeology Data Service and project partners²². Both projects are demonstrating the positive and measurable impact that information science research can have on the arts and this notion of ‘impact’ is a major factor for the major funding bodies²³.

At present technology partnerships involving the historic environment sector are often forged on an ad-hoc basis by those amongst us who are most comfortable with these technologies. But if these sorts of partnerships are to be encouraged across the sector in the future, it will be necessary to improve opportunities for intra-sector communication between historic environment information managers across the sector. Edmund Lee suggested we needed a common language for articulating our sector’s training needs as part of wider learning frameworks, and there is also a need for us to get better at communicating the sectors technological and information management needs to information scientists who are actively researching and developing innovative solutions to common data issues. The Cultural Hub introduced the idea of ‘brokers’ to facilitate the development of partnerships across different sectors and this model could be investigated further to determine if this would be a useful facility to provide for historic environment information managers so they can make informed decisions regarding future technology partnerships.

Potential ways forward to improve inter- and intra-sector communication:

- Encourage partnership working as standard practice through promotion at information exchange events (such as the TACOS seminar) and through existing groups (e.g. HER Forum, FISH/HEIRNET, ALGAO, Heritage Data, IfA IMSIG)
- Review of existing groups and networks to identify overlaps, gaps and opportunities for greater collaboration
- Better communication and engagement with the wider historic environment sector to enable the value and benefit of new schemes to be understood and acted upon
- Create opportunities for engagement with potential partners outside of the sector

MAXIMISING RESOURCES

One TACOS delegate remarked that “*austerity might be the driver for change*”. Naturally any discussion of barriers to a collaborative strategy for sector information management will inevitably focus on how such a strategy would be supported across different areas of the sector through resourcing in terms of finances and person time. The recession over the last few years has seen many cuts to the budgets that support historic environment information management at both the local and national government level²⁴. As such, there is now much more emphasis on inter- and intra-sector partnerships to share the cost of developing and implementing new systems and technologies as well as greater use of Open Source technologies, with some of the popular platforms highlighted by TACOS seminar speakers, as well as improving accessibility and reuse through Open Data initiatives and Creative Commons licensing. Crowdsourcing and citizen science projects are also providing novel ways of sourcing labour, with crowdfunding models starting to be seen in the sector.

Duplication of effort is considered to be one of the major drains on historic environment information management resources. Seminar presenters suggested various potential ways to improve efficiency in the use of resources including clearer guidelines and standards for data creation, improved channels for communicating, more effective partnership working and greater use of technology. For most historic environment information managers the notion of working in partnership is well entrenched. Victoria Bryant explained that although partnership working was desirable, getting access to the right partners and discovering opportunities for collaboration still requires time, financial resources and access to information to assess the feasibility of partnership projects. The ‘Triple Helix’ concept trialled by the University of Birmingham Cultural Hub brought together academics, public bodies and business to facilitate project initiation by providing a forum to source partners and access new funding streams within and outside the sector. Working in partnership can also help not only to share the financial costs of projects and the person resources required to undertake the work, but also to minimise risk to individual organisations. Some TACOS discussants thought that **collaboration needed to be guided at the strategic level** to encourage inter- and intra- sector partnership working wherever practicable as part of sector best practice.

The recently launched project Micropasts is demonstrating how crowdsourcing might be put to use in the enhancement of historic environment datasets and is starting to collect information that will be vital in assessing the feasibility of partially resourcing historic environment information projects this way. For example, progress reports indicate that there is greater enthusiasm for some tasks than some others; photomasking is by far the most popular being 81% complete after just over three months. It is also important to stress that by increasing the number of data creators in such tasks it can also increase error margins and it will always be necessary for such projects to be closely monitored by an experienced data manager. It is also possible that common data issues could be mitigated through the design of crowdsourcing platforms (e.g. using embedded spell-checkers for common typos, using Linked Data vocabularies etc).

Potential ways forward to maximise use of resources:

- **Linking more datasets to minimise duplication of effort**
- **Improving the availability and accessibility of information on new and existing projects**
- **Encouraging re-use of data wherever practicable through Open Data initiatives and Creative Commons licensing (see below) Making the most of Open Source technologies**

INNOVATIVE FUNDING MODELS

Traditional sources of funding are becoming increasingly limited leading to more competition between different areas of the sector. Not only does this highlight the necessity to work in partnership instead of similar projects competing, it has also encouraged new and innovative approaches to funding and supporting historic environment projects. Over the last five years crowdfunding has been increasingly utilised to raise money for self-contained projects and from 2012 this was applied to archaeology through the ‘social business’²⁵ DigVentures to crowdfund and crowdsource an archaeological excavation on Flag Fen in Cambridgeshire and again in 2013 for Leiston Abbey, Suffolk. This model seems to work well for excavation-based projects, which are traditionally popular activities, with projects exceeding their original funding goal and participation targets²⁶. Building on the recent success of crowdsourcing to enhance historic environment datasets, Micropasts has developed a platform to investigate the potential of crowdfunding for historic environment digital projects that require small amounts of start-up money.

Potential ways forward to make the most of new funding models:

- **Further information is required to appraise alternative funding models such as crowdfunding and intra-sector public/private partnerships to support projects and facilitate knowledge transfer.**
- **Further information on the potential of crowdsourcing to gather and enhance historic environment datasets.**

CONSISTENT APPLICATION OF EXISTING STANDARDS

The TACOS seminar discussion topics were arranged to avoid explicitly discussing standards in isolation and instead to discuss them in terms of practical applications of existing standards and how these might be better utilised and promoted to historic environment data creators and managers. The TACOS presentation by Ceri Binding (see Appendix) demonstrated the value of online Linked Open Data technologies and how these were improving interoperability through the sharing and aligning of existing standardised terminologies and vocabularies. Peter McKeague urged TACOS delegates to work with existing industry standards but also to seize opportunities to provide feedback on the development of new standards and actively participate in consultation processes to ensure that our sector’s needs are accommodated.

Potential ways forward to ensure existing standards are utilised consistently:

- **Better promotion of existing standards tailored to the needs of different data and information producer and user groups**
- **Explore opportunities for greater collaboration on sharing standardised terminology/vocabularies via Linked Data**
- **Promote the potential benefits of applying Linked Data to the wider sector**

IMPROVING ACCESS TO DATA AND INFORMATION

Seminar discussions and feedback suggested that better audience research as well as monitoring and evaluation of existing information would help to inform future access strategies and enable a more proactive approach to marketing historic environment information resources.

A number of TACOS seminar presentations demonstrated the potential of Open Access historic environment information to encourage greater use and reuse of data. The SHED strategy in Scotland is helping to change attitudes towards open data with the ambition that eventually all Scottish historic environment data will be made available through open licensing to enable and actively encourage reuse of data – even for commercial use. The latter point is still a highly contested area within historic environment data provision with numerous debates on charging and licensing on the HER Forum. The benefits of making data Open Access was demonstrated through Dan Pett’s report of increased usage of PAS data since the removal of their commercial clause.

The TACOS seminar facilitated a discussion amongst one group regarding the difference between data that is *freely accessible* and that which is *free to use*. Open Data and licensing is still a major issue for many information managers as their organisations see the information and data they hold as an economic resource and a potential source of revenue. Whilst many TACOS delegates acknowledged that ‘data hugging’ was a bad thing, there were still reservations regarding the regulation of commercial use of publicly funded datasets. One way that this might be overcome is by using different levels of Creative Commons Licensing (see below) with plenty of examples worldwide where publicly funded information and data have been made accessible to commercial reuse²⁷. As with Open Source platforms these government initiatives have the potential to provide information managers with the information necessary to make a clear business case for Open Data.

Potential ways forward to improve data and information access include:

- **Carrying out audience research to inform future access strategies**
- **Monitoring and evaluating existing information**
- **Marketing and promoting our resources in a proactive way.**
- **Learning from successful projects (see appendix):**
 - **To provide clearer guidance for projects on standards and best practice**
 - **Engage with academic and commercial archaeological sectors.**

DEVELOPING SKILLS

The seminar discussion session and feedback from delegates identified that the majority of historic environment information managers acquired their technical skills on an ad-hoc basis mainly through their own personal interest in the field of ICT. This was highlighted as a potential issue as there was no consensus regarding the skills and knowledge that were essential to the role of an historic environment information manager. It was suggested by a number of discussion groups that it was important to understand better the conceptual skills required to enable information managers to adapt to changing technology with particular focus on analytical skills and epistemology²⁸ rather than focus training solely on particular software and systems. A number of groups also emphasised that we should not lose sight of the importance of historic environment subject-specific knowledge and skills which are required to check the quality of data and would help inform how best to utilise different datasets.

Potential ways forward improve skills provision for the sector:

- **A more structured approach to defining and recording core skills necessary for the effective management of historic environment information. Existing models that could be utilised include:**
 - **National Occupational Standards**
 - **CILIP Framework of Professional Development**
- **Using and developing knowledge transfer tools, online training support and CPD opportunities for historic environment information management as well as the historic environment sector in general**
 - **Particularly supporting learning and CPD on the creation, management and use of Open Source, Open Data and enabling Open Access**
- **Encouraging collaboration and responsibility across all areas of the sector for maintaining and improving historic environment information management skills for professionals, students and the 3rd sector**

DELIVERING CULTURE CHANGE

Feedback from the TACOS seminar indicated that a ‘culture of resistance’ was a major barrier to the potential implementation of new approaches and technologies stemming from uncertainty regarding the ever-changing information technology environment and the pace at which digital technologies continue to develop. Many respondents felt that as a sector we are often ‘playing catch-up’ and are left languishing behind due to lack of resources to participate in the initial development of new technologies, struggling to then implement a ‘finished product’ into existing workflows and frameworks. An issue raised by a number of TACOS delegates was that some new historic environment data projects did not adhere to historic environment information sector best practice and existing standards, and whether this could be addressed at the point of application for funding to ensure that datasets generated by new research were accessible and interoperable.

Potential ways forward in delivering culture change:

- **Skills training and development need to focus on new approaches and technologies**
- **Developing a common language that spans disciplines**
- **More information on Open Source, Open Data and Open Access initiatives to enable information managers to make an informed choice and put forward business cases for their use**