Impact case study (REF3)

Institution: University of York

Unit of Assessment: 15 - Archaeology

Title of case study: The impact of the Archaeology Data Service (ADS) on archaeological archiving and publishing

Period when the underpinning research was undertaken: Jan 2000 – Dec 2019

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Professor Julian Richards	Professor; Director ADS	01/10/1986 – present
Dr Tim Evans	ADS Deputy Director	01/08/2006 – present
Dr Ray Moore	ADS Archives Manager	11/08/2008 – 17/12/2020
Dr Holly Wright	ADS International Projects Manager	03/10/2005 – 29/09/2006; and 01/02/2007 – present

Period when the claimed impact occurred: 1/8/2013 – 31/12/2020

Is this case study continued from a case study submitted in 2014? N

1. Summary of the impact (indicative maximum 100 words)

In 1996, two years before Google was launched, Richards and his team established the **Archaeology Data Service**, an internationally recognised digital archive which preserves data, and makes it freely available online. Since 2014, our research into digital preservation and access has put the UK at the forefront of archiving developments throughout the world, and our impact now extends across national heritage agencies, local government, commercial contract archaeology, and the general public. We have developed new metadata standards and good practice, transformed access to grey literature, allowed non-academic users unprecedented access to information, and changed publication models for major government-funded infrastructure programmes. Our example has led to the establishment of at least six digital archaeological archives overseas since 2014.

2. Underpinning research (indicative maximum 500 words)

In 1996 the use of the Internet was in its infancy. The challenge of digital preservation was only just being recognised. The research team at York, led by Julian Richards, pioneered methods of exploiting the new technology to address the problem of preservation and accessibility of archaeological data (**3.1**). Their research underpinned the Archaeology Data Service (ADS). Since its inception the ADS has secured over GBP10,000,000 of external funding (GBP3,500,000 received since 1 August 2013) demonstrating its commitment to an ongoing programme of research into all areas of digital preservation, resource discovery and data sharing.

A key research project undertaken by the ADS was the creation of the so-called 'Grey Literature Library'. Before 2000 it had been extremely difficult for archaeologists to gain access to these unpublished fieldwork reports. With initial funding from JISC's Research Support Libraries Programme (RSLP) and support from English Heritage, Richards led research into the capture, flow and usability of data from producers, such as contracting units and community groups, to users, such as local and national data managers (**3.2**). This led to the development of the OASIS online reporting service by ADS. Indexing reports had also been too costly and time-consuming but research by ADS, including the use of Natural Language Processing for metadata enhancement, is adding new innovations to OASIS, including automated creation of metadata terms (**3.3**). Data loss was a major challenge and, in 2012, our research into the application of how the Open Archival Information System could be applied in Archaeology led to the Digital Preservation Coalition's Prize for the most outstanding contribution to digital preservation of the previous decade. Since 2013 this recognition enabled an expansion of the ADS's remit to facilitate preservation of, and access to, the results of commercial and community archaeology and, in April 2020, ADS was awarded the Core Trust Seal. Our work on preserving and publishing grey literature has been further underpinned by research on preservation formats which highlighted the risks of information loss in PDF files (**3.4**).

As use of the Internet expanded, Richards looked at ways to link data electronically across Europe and the world. In 2001–04 the ARENA project, funded by the EC Culture 2000 programme, allowed the ADS to broaden its horizons to work with European partners in developing technologies that enabled key European archaeological archives to be available online, to create

a portal allowing access to sites and monuments data from the partners and to work towards a wider European network for archaeological archives (**3.5**). This research into interoperability and archive standards was developed in the ARIADNE (2012–16) and in the ARIADNEplus (2019–23) projects, for which ADS was the Deputy Coordinator, and which were named in the European Strategy Forum for Research Infrastructures roadmap (**3.6**). This led to our participation in E-RIHS (European Research Infrastructure for Heritage Science) where we researched how best to archive heritage science data (2017–19). ADS is also the only archaeological archive (and one of only 3 UK partners) in SSHOC (the Social Sciences and Humanities Open Cloud) a major EU initiative which brings together all the legally recognised research infrastructures across these domains (2019–23). Our role is to research data standards and policies to allow archaeology to participate fully within EOSC (the European Open Science Cloud), with research into the special issues facing heritage science completed by 2020. Finally, in 2018 Richards was awarded a COST Action, leading 31 countries in *Saving European Archaeology from a Digital Dark Age,* where our research focuses on barriers to data re-use.

3. References to the research (indicative maximum of six references)

3.1 Richards, J.D. 2017. Twenty Years Preserving Data: A View From the UK. *Advances in Archaeological Practice* 5.3, 227-37. https://doi.org/10.1017/aap.2017.11

3.2 Hardman, C. & **Richards, J.D.** 2003. OASIS: dealing with the digital revolution, in M. Doerr and A. Sarris (eds.) *CAA2002: The Digital Heritage of Archaeology. Computer Applications and Quantitative Methods in Archaeology 2002*, Archive of Monuments and Publications Hellenic Ministry of Culture, 325–8. Available upon request.

3.3 Richards, J.D., D.Tudhope & Vlachidis, A. 2015. Text Mining in Archaeology: Extracting Information from Archaeological Reports, in J.A. Barceló & I. Bogdanovic (eds.) *Mathematics in Archaeology.* Science Publishers, Boca Raton, Florida, 240–54. Available upon request.

3.4 Evans, T.N.L. & **Moore, R.H.** 2014. The Use of PDF/A in Digital Archives: A Case Study from Archaeology. *International Journal of Digital Curation* 9(2), 123–38. https://doi.org/10.2218/ijdc.v9i2.267

3.5 Aloia, N., Binding, C., Cuy, S., Doerr, M., Fanini, B., Felicetti, A., Fihn, J., Gavrilis, D., Geser, G., Hollander, H., Meghini, C., Niccolucci, F., Nurra, F., Papatheodorou, C., **Richards, J.**, Ronzino, P., Scopigno, R., Theodoridou, M., Tudhope, D., Vlachidis, A. & **Wright, H.** 2017. ARIADNE: A European Research E-Infrastructure for Archaeology. *Journal of Computing and Cultural Heritage* 10.3. https://doi.org/10.1145/3064527

3.6 Wright, H. & **Richards, J.D.** 2018. Reflections on Collaborative Archaeology and Large-Scale Online Research Infrastructures. *Journal of Field Archaeology* 43:sup1, S60–67. https://doi.org/10.1080/00934690.2018.1511960

Evidence of the quality of the research: Outputs (3.1) and (3.4-3.6) were published in peer-reviewed journals; output (3.2) was published in peer-reviewed conference proceedings; and output (3.3) was also peer-reviewed. Much of the ADS research into interoperability and archive standards described in Section 2 was the outcome of competitive EU funding, including four major awards for which **Richards** was the York lead. ARIADNE (Grant no.313193), ARIADNEplus (Grant no.823914) and SSHOC (Grant no.823782) were funded under various INFRA programmes. SEADDA (Action 18128) for which **Richards** is Action Chair was funded under the COST programme.

4. Details of the impact (indicative maximum 750 words)

The 2019 UKRI report on *The UK's Research and Innovation Infrastructure* concludes that "The Archaeology Data Service (ADS) is a world-leading digital heritage data archive that has been leading the development of digital preservation since 1996" (**5.1**). From 2014–20 new developments in OASIS have led information access policies in the UK, allowing non-academic users unprecedented access to information. Our research into preservation and access has transformed how the results of archaeological fieldwork are archived and disseminated, influencing the strategies of major UK transport infrastructure projects from 2016–19, whilst the reach of ADS has inspired the creation of repositories in at least six other countries since 2014 and put us at the heart of European digital infrastructure initiatives.

(1) Changing national policy and practice for archaeological reporting

Since 1 August 2013 the ADS Library of unpublished fieldwork reports has grown by at least 4,000 reports per year, as shown by our in-system monitoring (18,000 reports in 2013 – now over 60,000, being downloaded over 40,000 times a year), with 565 new archaeological contractors registering to use OASIS, and over 55,000 new OASIS records created. OASIS is used by 137 local authorities (to sign-off planning conditions), 4 national heritage agencies (to update national lists), and 8 other agencies (including the Ministry of Defence, Historic Royal Palaces and the National Trust, for notifications about archaeological work) (**5.2a**). The publication of grey literature by ADS has also led to a verifiable improvement in its quality. The Heritage Information Strategy Adviser for Historic England (HE) writes that: "Since the introduction of OASIS the digital publication and archiving of archaeological investigation reports, along with online availability of those reports with DOIs via ADS, has led to a clear and widespread improvement in the quality of commercially funded archaeological reports and the availability for re-use of the archaeological information contained within those records and associated digital archives". OASIS now sits at the centre of HE's Heritage Information Access Strategy (HIAS) and the Strategy Advisor writes that "HE sees OASIS as having a crucial role in enabling the timely delivery of information gathered through investigations of the historic environment and as such in best increasing and sharing the value that such work has, whether undertaken through the planning system or research funding, for public benefit" (**5.2b**). From 2015 to 2020 OASIS has been redeveloped to embrace standing buildings archaeology, museums and community groups, with over GBP350,000 further funding from HE and over GBP130,000 from Historic Environment Scotland (HES) (**5.2c**). The HIAS programme is recognised in the Government's 2016 Culture White Paper and includes the work undertaken by the ADS on upgrading the current OASIS system. Most county councils now mandate OASIS usage and the 2018 Chartered Institute for Archaeologists (CiFA) report on *21st century challenges for archaeology* concluded that "The use of OASIS should be compulsory" (**5.3**, p.40). OASIS reporting is being used to directly inform archaeological research agendas and the system developed by ADS will be used to update the next generation of national and regional Research Frameworks being developed by HE and HES (**5.4**).

(2) Transforming professional policy and practice for digital archiving

In 2017 the PUBLICAN report (**5.5**), a survey of over 75 public and commercial sector archaeologists, found that the ADS is having a positive impact on practice in (a) improving the design of development projects; (b) saving time when researching using existing resources; (c) filling gaps for Historic Environment Records (HERs); (d) changing policies to digital archiving in local government through providing best practice examples; (e) contributing to profile building for freelance specialists and commercial units; (f) highlighting gaps in service provision for digital dissemination outside archaeology; (g) improving workflows for local government; (h) providing continuing professional development (CPD) for the profession via the Guides to Good Practice; and (i) challenging perceptions about forms of publication. Nonetheless, the 2017 Mendoza review identified a crisis in archaeological archiving. The 2018 CiFA report addressed the challenge by recommending (p.39): "support for the nomination of accredited providers such as ADS". An action plan from HE, endorsed by the then Minister for the Arts, Heritage and Tourism, Michael Ellis, recommended (p.7) that: "DCMS should welcome and endorse guidance from key archaeological organisations that, as soon as practicable, relieves museums of the expectation that they should attempt to curate digital archive material from archaeological projects, in favour of their deposition in a Trusted Digital Repository that will guarantee the preservation and accessibility of digital material, such as the Archaeology Data Service" (**5.3**). In practice, ADS is the only trusted digital repository for archaeology in the UK. ADS archiving has now been included as mandatory in specifications for archaeological works by over 25 county and city councils, and museums including: Birmingham, Buckinghamshire, Cambridgeshire, Crawley, Co.Durham, Derbyshire, Devon, East Sussex, Gloucestershire, Hampshire, Hertfordshire, Lancashire, Leicestershire, Lincolnshire, Liverpool, Norfolk, Northamptonshire, Oxfordshire, Salisbury, Staffordshire, Somerset, Suffolk, Tyne & Wear, Wiltshire, Worcestershire and City of York (**5.6**).

The ADS has also had a transformative impact on the ways in which the results of archaeological fieldwork, undertaken in advance of major government-funded transport infrastructure projects, are archived and disseminated. The research into detailed metadata and data standards that we

undertook in 2004 as part of providing easy navigation to the massive digital archive of the Channel Tunnel Rail Link (CTRL) (https://doi.org/10.5284/1000230) has underpinned further impact since 2014. In 2017 the success of CTRL archive led the engineering consortium in charge of the GBP18 billion Crossrail project to use ADS to enhance publication of their major excavations (https://doi.org/10.5284/1055125). The lead archaeologist for Crossrail noted that the CTRL archive has come to be seen as an exemplar by the field profession, and led them to turn to ADS "as a highly economic vehicle for sharing detailed datasets" (**5.7**). A similar approach has been adopted for HighSpeed2 (HS2), who note that their ADS digital archive will be "the largest historic environment digital archive ever compiled in the UK" and that ADS will allow them to safeguard their "digital legacy for future generations and deliver HS2 Ltd's commitment to making data easily available under the Government's Transparency agenda" (**5.8**). We have also been chosen by the Headland Archaeology / MOLA (Museum of London Archaeology) consortium, working on the GBP1.5 billion Highways Agency A14 bypass as the optimum means of providing full access to their discoveries, leading to a major financial saving on conventional publication (**5.7**). The A14 project director notes: "the ADS has had a major influence on our publication methodology for the A14 project, helping us to move away from a 'one big book' approach, to a varied, interesting and far more accessible strategy of dissemination, that is also very cost-effective." He adds that: "this will create a far longer-lasting legacy...than traditional approaches". Beyond the UK, the Head of Archaeology and Heritage at Transport Infrastructure Ireland says that the example of ADS has had a major impact on their own strategy, leading them to try to make their reports and data available online via the Digital Repository for Ireland (**5.7**).

(3) Adoption of ADS as a model by overseas state archaeological archives
In 2012 ADS had already provided a model for public archives in the US, Sweden and the Netherlands, all now self-sustaining repositories, and all used widely by non-academic audiences. Since 2014 that reach has extended to Austria, Germany, France, Turkey, Argentina, and Japan (**5.9**), in each case providing repositories with broad public or private sector audiences. The ADS role in ARIADNE, and a workshop we provided in 2014, led to the establishment of an archaeological repository by the Austrian Academy of Sciences (ÖAW). Their Director comments that ADS "served as a model for establishing a repository for humanities research data at the ÖAW". In November 2015 staff from the German Archaeological Institute visited ADS, and wrote: "The staff at the ADS can look back on almost 20 years of archiving digital archaeological data. What better place is there to learn about how it is actually done?" (**5.9**). In a 2019 publication (**5.10**), the European Projects Manager and colleagues from Inrap, the French state heritage service, wrote that: "It is worth mentioning here the digital repositories (ADS, DANS, SND) which directly influenced our institution by being good examples of concrete implementations of data sharing. With their specificities, successes and failures these top-level organisations have a very strong influence on many institutions and specifically ours." In 2017 ADS hosted a visit from staff of the British Institute in Ankara (BIAA) which led to the Institute establishing their own ADS-like repository, and to making a follow-up extended training visit in 2019. After a visit to ADS in 2016 by a representative of CONICET, the Argentinian national research council, Richards was asked to visit Argentina in 2017 and give a presentation to CONICET and Argentinian archaeologists. In 2018 this led to CONICET establishing a federated network of museum-based repositories, funded by the Fundacion Williams. These aim to provide Open Access to data for archaeologists and the wider public (**5.9**). After visiting ADS in 2017 the Japanese Nara Research Institute were "inspired" to put their grey literature online, leading to a policy change in Japan's National Heritage Agency, with whom they work. In a paper published in 2019 they wrote that their database was "entirely a domestic project built to satisfy the needs of Japanese researchers and excavators. However, after the authors met with Julian Richards from the ADS in February 2017, and again in February 2018, things have changed drastically." The reports (previously never consulted by non-archaeologists) have had over 1,400,000 downloads, mainly by members of the public. Now over 1,400 Japanese municipalities require Japanese contractors to put their reports online via Nabunken (**5.10**). The ADS connection led to the US, Argentina and Japan joining the European ARIADNE infrastructure in 2019. ADS also leads the development of international standards for digital curation. Nara have translated the ADS Guides to Good Practice (G2GP) to provide data standards for contractors, and the Guides have also provided the basis for those published by the Swedish National Data Service (SND). The ÖAW report that ADS "policy documents served as

best practice examples for our own". The Director of the BIAA, comments that the G2GP and ADS web pages are "essential utensils to gather the know-how to create a new digital repository" (**5.9**).

5. Sources to corroborate the impact (indicative maximum of 10 references)

5.1 *The UK's research and innovation infrastructure: opportunities to grow our capability*. UKRI 2019, p.152, and UKRI research infrastructure booklet.

5.2a OASIS statistics from in-system monitoring together with statistical information in *British Archaeology* May-June 2020, pp. 54-7 and https://archaeologydataservice.ac.uk/library/statistics. xhtml; **5.2b**, Historic England Heritage Information Access Strategy presentation and letter from their Heritage Information Strategy Adviser https://historicengland.org.uk/research/support-and -collaboration/heritage-information-access-strategy/; **5.2c**, commission for Historic Environment Scotland.

5.3 *The world after PPG16: 21st-century challenges for archaeology.* CIfA/ Historic England report; and *Work Digital / Think Archive: A guide to managing digital data generated from archaeological investigations,* report prepared by DigVentures for the Archaeological Archives Forum, on behalf of Historic England.
https://www.archaeologists.net/21st-century-challenges-archaeology
https://digventures-thepixelparlour.netdna-ssl.com/wp-content/uploads/2019/12/WDTA-Guide-FINAL.pdf

5.4 Research Frameworks project design and presentation, Historic England; Historic England website.
https://historicengland.org.uk/research/support-and-collaboration/research-frameworks-typologies/research-frameworks/
Connecting OASIS and DES with Regional Research Frameworks in Scotland. Historic Environment Scotland, Sept 2019.
https://archaeologydataservice.ac.uk/blog/oasis/?p=697

5.5 *PUBLICAN: Developing New Models of Publication in Archaeology.* ADS and Internet Archaeology Impact Evidence Report, 2017.

5.6 Statements from city and county councils and museums on mandating archiving with ADS.

5.7 Statements from the lead archaeologist, Crossrail; Managing Director, Headland Archaeology and A14 Project Director; and Head of Archaeology and Heritage, Transport Infrastructure Ireland.

5.8 *HS2 Phase One Historic Environment Research and Delivery Strategy. HERDS.* https://www.hs2.org.uk/documents/1684/ Section 7.15, p.117 and *HS2 Phase One Historic Environment Archive Strategy* Section 3.3, p.16.

5.9 Statements noting influence of ADS in leading to the establishment of their national repositories from Austrian Academy of Sciences, British School in Ankara (Turkey), CONICET (Argentina), and Nara Research Institute, Japan. Link to version of ADS guides in Sweden (https://snd.gu.se/sv/hantera-data/guider). Blog by DAI (German Archaeological Institute) staff reporting their visit to ADS: https://archaeologydataservice.ac.uk/blog/2015/12/ianus-visit/.

5.10 Published papers by Rossenbach, Marx & Bryas (pp.41–50), and Takata, Kaneda & Veltcheva (pp.175–85) in Richards, J.D. & Niccolucci. F. (eds.) *The ARIADNE Impact*. Archaeolingua, Budapest, 2019. https://doi:10.5281/zenodo.3476711