

<b>Institution:</b> University of York
<b>Unit of Assessment:</b> 17, Geography, Environmental Studies and Archaeology
<b>Title of case study:</b> ADS: Impact on preserving and presenting archaeological information
<b>1. Summary of the impact</b> (indicative maximum 100 words)

Founded in York in 1996, the Archaeology Data Service (ADS) has transformed how archaeological research is communicated in the UK, and impacted digital archiving throughout the world. Without the ADS, much of the fragile digital data (often the primary record of sites now destroyed) would have been lost. Instead, they are freely available to all. This impact extends across national heritage agencies, local government, commercial archaeology, and the public. Our resources are widely used with over two million page requests per month; almost half from beyond the HE sector. A recent study has concluded that the ADS is worth £5m per annum to the UK economy (Beagrie & Houghton 2013). The ADS has helped shape the digital preservation policy of English Heritage and informed practice in the United States, Australia, Canada, the Netherlands, Sweden, and Germany.

<b>2. Underpinning research</b> (indicative maximum 500 words)
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In 1996 (two years before the foundation of Google) the Department pioneered methods of using computing in archaeology. It founded the first internet journal in any discipline, *Internet Archaeology*, promoting **open access** 15 years before the Finch Report, and one year later established the *Archaeology Data Service*, the world's first digital archive for archaeology. A key question alongside the importance of accessibility was the problem of **preserving archaeological data**. What matters here is more than just making sure data are migrated from obsolete formats. Archaeological data are unique. In the case of excavation, the process destroys the resource and the data become the only way future archaeologists can ask new questions of that resource. The solution has been provided by the fundamental research that underpins the *Archaeology Data Service* [1].

Initial research focused on establishing **procedures** and **standards** for the documentation and preservation of data files, using metadata and migration to preserve their significant properties, for example by developing the first application of Dublin Core metadata to archaeology [2]. Research into standards led to a series of *Guides to Good Practice*, first published in 1997, and now continually updated through international collaboration. The Guides are now co-published with Digital Antiquity in America, with input from multiple EU project partners.

With funding from the Research Support Libraries Programme and support from English Heritage, Richards established the OASIS project (*Online Access to the Index of archaeological investigations*) in 1999, which 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]. Collaborative research with Computer Science, Sheffield, into natural language processing (AHRC-EPSRC-JISC eScience *Archaeotools* project [4]) in order to extract automated data and metadata from grey and legacy literature, enabled the ADS to rapidly expand this provision and underpinned the **Grey Literature Library**, launched in 2008.

As demand for online resources increased, the ADS considered how Europe (and European identity) could best be served by a digital infrastructure for cultural heritage. The ADS led the EU-funded ARENA project, to research a **shared, interoperable information infrastructure**, and is now the co-leader (with PIN, Italy) of implementing this infrastructure within the ARIADNE project (2013). *Internet Archaeology* has provided another platform for research into new models for data access. As an example *Making the LEAP* pioneered links between the journal publication and supporting data, enabling readers to drill down seamlessly into online archives, to test interpretations, and develop new conclusions [5].

Further research has been undertaken into **digital preservation costs** [6] by establishing the Digital Archiving Pilot Project for Excavation Records (DAPPER). This research formed the basis of the ADS cost model and charging policy and was taken up in the cross-disciplinary Making Research Data Safe project.

Impact case study (REF3b)

The research has all been conducted at York under the leadership of the ADS Director Julian Richards (1996 to present). Key personnel: Alicia Wise (Data Coordinator, 1997–8); Paul Miller (Collections Manager, 1997–8); Catherine Hardman (Deputy Director, 2001 to present); Alan Vince (Editor, *Internet Archaeology*, 1996–98); Stuart Jeffrey (Deputy Director, 2006–12); Tony Austin (Systems Manager, 1998–2013); Judith Winters (Editor, *Internet Archaeology*, 1998 to present); Michael Charno (Applications Developer, 2006 to present).

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

- [1] Richards, J.D. 'Preservation and re-use of digital data: the role of the Archaeology Data Service', *Antiquity* 71, 1057–9, 1997.  
– *International peer-reviewed journal, downloaded 83 times since digitisation in 2005 (source: Antiquity 23.9.13); Available at: <http://antiquity.ac.uk/ant/071/Ant0711057.htm>; cited by 17.*
- [2] Wise, A & Miller, P. 'Why metadata matters in archaeology', *Internet Archaeology* 2. <http://dx.doi.org/10.11141/ia.2.5> (open access), 1997.  
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- [3] Hardman, C. & Richards, J.D. 'OASIS: dealing with the digital revolution' in Doerr & Sarris (eds.) CAA2002: The Digital Heritage of Archaeology. Hellenic Ministry of Culture, 325–8, 2003.  
– *Available on request. Peer-reviewed international conference paper; cited by 10.*
- [4] Jeffrey, S., Richards, J.D., Ciravegna, F., Waller, S., Chapman, S., and Zhang, Z. 'The Archaeotools project: faceted classification and natural language processing in an archaeological context' *Phil Trans Royal Soc A*, 367, 2507–19, 2009.  
– *Available at: <http://rsta.royalsocietypublishing.org/content/367/1897/2507.full.pdf>, cited by 17; describes results of AHRC peer-reviewed research grant.*
- [5] Richards, J.D., Winters, J., & Charno, M. 'Making the LEAP: Linking Electronic Archives and Publications', in Jerem, E., et al. (eds.) *On the Road to Reconstructing the Past*, 141–6, 2011.  
– *Available on request. Output of an AHRC-funded ICT strategy peer-reviewed research grant; underpinning research won British Archaeological Award for Best Archaeological Innovation in 2008. Highly Commended in The Association of Learned and Professional Society Publishers Awards - Publishing Innovation 2009.*
- [6] Richards, J.D., Austin, A.F. & Hardman, C. 'Covering the costs of Digital Curation', *Heritage Management* 3(2), 255–63, 2010.  
– *Available on request. International peer-reviewed journal; as a result of this publication Richards was invited to give keynote address at European Space Agency conference (2012).*

(Citation data: SCOPUS unless journal not indexed, then Google Scholar 17.10.2013)

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Richards 'OASIS: Online Access to the Index of Archaeological Investigations', Research Support Libraries Programme (HEFCE), 1999, £65,700.

Richards & Ciravegna, 'Archaeotools: Data mining, faceted classification and E-archaeology', AHRC-EPSRC-JISC eScience programme, 2007–9; £321,817; *end of grant report "outstanding"*.

Richards, 'ARENA: Archaeological Records of Europe Networked Access'; ARENA 1: 2000–04 598,730 euros, EU Culture 2000 programme; ARENA 2: 2008–10 59,000 euros, EU ESFRI programme.

Richards & Kintigh, 'TAG: Transatlantic Archaeology Gateway', JISC-NEH 2009–10, £81,778.

Richards, 'Making the LEAP Linking Electronic Archives and Publications', AHRC ICT Strategy programme, 2005–07, £73,196 – *End of grant report "outstanding"*; follow-on funding to Richards, "LEAP2: A Transatlantic LEAP", Andrew W Mellon Foundation 2008–9, \$124,595. *The LEAP project was awarded the British Archaeological Award for Best Archaeological Innovation in 2008.*

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

The ADS has transformed how archaeological research is communicated in the UK, and impacted digital publication and archiving throughout the world. The ADS leads the world in setting **standards** for the preservation and accessibility of archaeological data by and for the commercial, community and higher education sectors. As a result of the *Guides to Good Practice*, in 2008 the ADS was asked to lead on digital information standards within the EU-funded *Archaeology in Contemporary Europe* project. The Guides were updated in 2009–10 with funding from the Mellon Foundation and continue to be endorsed in the UK by the Council for British Archaeology, English Heritage and the Institute for Field Archaeologists. The Guides are also embedded in the UK's teaching curriculum as standard textbooks for digital archiving courses. The ADS's implementation of Dublin Core metadata to archaeology has been widely adopted across the world, having been taken up both by Digital Antiquity in the United States and DANS in the Netherlands. In recognition of its excellence in data standards in 2010 the ADS was awarded the Data Seal of Approval (only the second UK archive ever to receive this accreditation, after the UK Data Archive) [1] and it is the only accredited heritage digital archive for the Marine Environment Data Information Network [2].

The findings of research into the capture, flow and usability of commercial and community data helped solve the grey literature problem (e.g. Bradley 2006, *Antiq. J.* 86, 1–13). In 2003 the OASIS project and work of the ADS was commended by an All Party Parliamentary Group of MPs [3]. The success of the OASIS project led Historic Scotland to adopt the system for recording archaeological reports and in 2010 English Heritage built OASIS into their Planning Policy Guidance (PPS5). ADS now sets the **standard** for recording **archaeological data** produced by the **commercial** and **community** sectors; over 400 commercial contractors now use the ADS to archive their reports on open access. In 2011–12 there were 110,000 individual downloads with almost half of this usage from the non-HE sector. Developments from the *Archaeotools* project increased the rate of indexing, and there are now over 21,000 reports online (compared with 1,722 in OASIS in 2008). In 2012 the Grey Literature Library won the British Archaeological Award for Best Archaeological Innovation [4].

Groundbreaking research delivered by the ADS has extended **interoperability across national borders**—influencing the EC's INFRASTRUCTURE programme to facilitate cross-border access to databases of cultural heritage institutions. In 2013, 16 countries each agreed to make archaeological data publicly accessible through common interfaces (European ARIADNE project) [5].

The ADS has worldwide reach. It has supported the Netherlands, Sweden, Germany, the US, Canada and Australia to establish equivalent facilities (e.g. DANS, Netherlands; Digital Antiquity, US; FAIMS, Australia). Digital Antiquity built upon the ARENA infrastructure to work with ADS to develop the Transatlantic Archaeology Gateway, as well as a US equivalent of the LEAP project. Initiatives in **digital preservation costs** such as the ADS charging model, which has been applauded [6], has been emulated most recently by DANS and Digital Antiquity.

Keith Kintigh, past President of SAA sums up the **significance and international reach of the ADS**: “The ADS is an enormous asset to the UK's archaeological community—within and outside academic settings.... ADS has been a key player internationally in advancing initiatives concerned with the preservation and dissemination of cultural heritage information and has... been a model of a sustainable and productive digital archive... In our own multi-institutional effort to develop a digital archive for archaeological data in the US...ADS has not only served as a valuable model, its staff have provided critical advice and assistance. Further, ADS has been a major driver of international efforts to establish interoperability of digital repositories facilitating the sharing of archaeological information. Looking beyond archaeology, with its long (for a digital repository) history of success, ADS has also been a widely cited exemplar of a successful disciplinary repository” [7].

Impact case study (REF3b)

The ADS has continuously sought to **evaluate** its **impact**. A survey conducted in 2009–10 demonstrated that almost half of all users are outside the HE sector: 10% central/local government; 8% private consultants; 4% private research organisation; 5% business; 11% community /charity organisation; 8% other; 86% of users are maintaining or increasing their use resulting in continued access levels year on year (Figure 1); 97% of users agree that the ADS has reduced the cost of data acquisition and processing [8]. According to English Heritage, the ADS “has become the primary digital archive for a large part of [its] own research” [9] and it has had a “very significant impact in the wider archaeological community” [10].

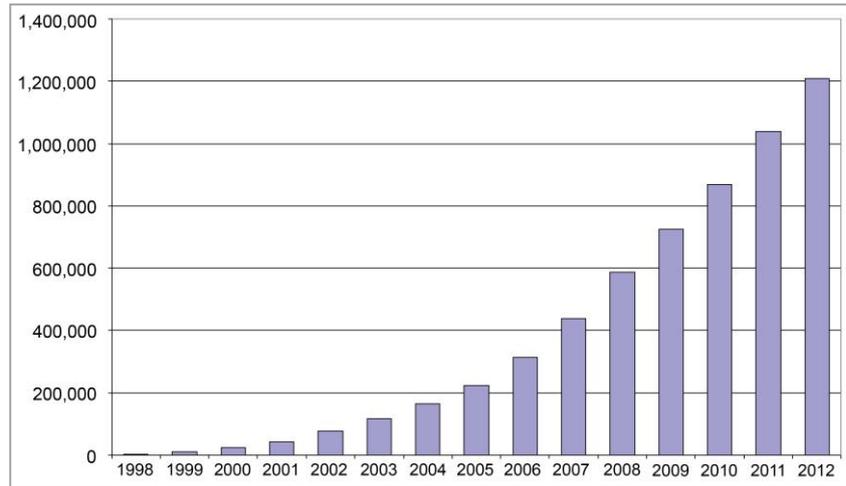


Figure 1. Cumulative accesses to the ADS, 1998–2012.

A study conducted in 2012 showed that the work of 53% of UK archaeologists would be severely impacted if the ADS did not exist; every £1 invested in the ADS yields a return to the UK economy of up to £8.30 over 30 years and ADS is worth £5m per annum to the UK economy [11].

In recognition of its work, the ADS was awarded the Digital Preservation Coalition’s decennial award for the “most outstanding contribution to digital preservation in the last decade” (2012) [12].

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

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 [2] MEDIN web site: [http://www.oceannet.org/data\\_submission/ads/](http://www.oceannet.org/data_submission/ads/) (accessed 23.9.2013).  
 [3] APPAG 2003 “The Current State of Archaeology in the United Kingdom”.  
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 [4] British Archaeological Awards winners 2012:  
<http://www.archaeologyuk.org/awards/baa2012.html#inno> (accessed 23.9.2013)  
 [5] ARIADNE project, see p. 2 for full partner listing:  
[http://ec.europa.eu/research/infrastructures/pdf/fp7\\_factsht\\_ariadne\\_60313.pdf](http://ec.europa.eu/research/infrastructures/pdf/fp7_factsht_ariadne_60313.pdf) (accessed 23.9.2013)  
 [6] Charles Beagrie on the ADS charging model: <http://blog.beagrie.com/?m=200801> (accessed 23.9.2013); JISC report on ADS charging model:  
<http://www.jisc.ac.uk/publications/reports/2008/keepingresearchdatasafe.aspx> (accessed 23.9.2013)  
 [7] Society for American Archaeology, Past President.  
 [8] RIN/JISC survey by Technopolis (published 2.9.2011)  
<http://www.jisc.ac.uk/publications/generalpublications/2011/09/datacentres.aspx> (accessed 23.9.2013).  
 [9] Chief Executive, English Heritage.  
 [10] Head of National Heritage Protection Commissions, English Heritage.  
 [11] Neil Beagrie (Charles Beagrie Ltd) & John Houghton (Centre for Strategic Economic Studies, Victoria University), 2013 ‘The Value of ADS’  
<http://archaeologydataservice.ac.uk/research/impact> (accessed 23.9.2013)  
 [12] Digital Preservation Coalition 2012 <http://www.dpconline.org/newsroom/latest-news/945-saving-the-digital-decade-dpc-recognizes-major-accomplishments-to-safeguard-our-digital-memory> (accessed 23.9.2013).