

<p>Institution: University of Bradford</p>
<p>Unit of Assessment: C17 Geography, Environmental Studies and Archaeology</p>
<p>a. Context Archaeological research at Bradford is aligned with a university ethos grounded in fundamental and applied science and technology. As a result our distinctive approach to the archaeological agenda creates outcomes beyond academia and increasingly outside of what is traditionally regarded as archaeology. Regular users of our research include commercial units and government bodies, particularly in relation to the increasing importance of archaeological science and the treatment of legacy data. Our research is highly valued in guidance and policy-making spheres as evidenced by the involvement of many staff in professional and government/society committees. We have active links with many local community groups and museums both as a vehicle for engaging with those outside our sector as well as for delivering cutting edge research within suitable timescales and at an appropriate level for public understanding. Our unique one-year professional placement for degree students, pioneered nearly 40 years ago, ensures that we interact with numerous non-academic organisations in the UK and internationally.</p> <p>Our university has a core mission of <i>Making Knowledge Work</i> and this aspiration drives strategies that create sustainable impact at a local, national and international level. Since 2008, all areas of our research have led to discernible impact. Research in Social and Biological Identities has delivered <i>educational</i> (museum/workshop), <i>practical</i> (contracts) and <i>forensic/humanitarian</i> (locating recent murder victims) impacts as well as providing significant long-term impact for regional <i>economic development</i> (e.g., Old Scatness, Shetland), while the Archaeological Sciences group has additionally provided new approaches to <i>professional</i> (guidance) and <i>industrial practice</i> (hardware and software). While overall there has been a focus on economically-inspired knowledge transfer within this period of assessment, members of the unit have also maximised the reach of their research towards social impact and policy.</p> <p>b. Approach to impact Our approach to impact is to foster and to sustain interactions with diverse non-academic groups regionally, nationally and internationally. The nature of the engagement is shaped by the career background of staff and their research interests. The current staff group includes individuals who have held non-academic positions. Our Impact Co-ordinator (Gaffney) worked for 20 years in commercial geophysics before taking up an academic post. Two staff held positions in national bodies, namely Historic Scotland (Armit, Inspector of Ancient Monuments) and English Heritage (Gibson, Archaeologist responsible for Prehistory). One member of staff (Batt) was employed in continuing education before taking up an academic post. As a result the ethos is to engage with non-academic partners to develop new ways of collaboration and dissemination. Impact is co-ordinated, facilitated and monitored by the Research and Knowledge Transfer Group and through annual meetings between individual staff and the Director of Research. Our approach to impact is exemplified below in the different types of activity undertaken by staff in association with key users and beneficiaries.</p> <p>Forensic archaeology. The University of Bradford pioneered forensic archaeology in the UK in the 1980s. Throughout this period we have supported staff to develop forensic casework experience in northern England (North-, South-, West Yorkshire and Northumbria Police) which has led to convictions following expert evidence presented by staff in court. We were asked in 2007, by the Independent Commission for the Location of Victims Remains, to lead forensic search teams in Ireland to assist in detection and recovery of 'The Disappeared' – those killed and buried in secret by illegal organisations during the Northern Ireland conflict. The largest search was in County Wicklow, where the remains of one individual were recovered in 2008. Continuing work on other sites has led to the recovery of three other individuals providing closure for the families involved. The impact of our work has been showcased at the highest levels via presentations to the UNHCR in Geneva and the International Red Cross.</p> <p>Commercial interactions. In 2009, we cemented a long-term working relationship with a commercial company and a survey instrument manufacturer into a cluster for the application of</p>

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near surface geophysics (*Bradford Centre for Archaeological Propection, B-CAP*). B-CAP combines academic and commercial expertise to advance development and application of geophysical techniques. The group has also developed applications beyond the archaeological sphere. For example, in collaboration with the London School of Hygiene and Tropical Medicine with funding from The Gates Foundation, the investigation of fill-models for modern latrines in Africa has been used to monitor current latrine designs and to explore those where the risk of infection can be reduced. The consequences of unsafe sanitation are devastating; every year, food and water tainted with faecal matter result in illness and death. The Bradford research contributed to designing improved assessment of fill rates and longer lasting latrines.

Legacy projects. Since 2008 we have worked closely with government bodies to provide mechanisms for upgrading and publishing Legacy Data (e.g., with Historic Scotland on the Broxmouth Hillfort Project, English Heritage on the Wetwang/Garton Slack Project and British Academy-funded analysis of legacy radiocarbon data). We have been proactive in defining metadata and schema for streamlining re-use of data (particularly geophysical). The National Roads Authority Research Fellowship Programme funded the investigation of the outcomes of 10 years of commercial geophysical survey work in Ireland. An AHRC/EPSRC Science in Heritage award (*Cultural Objects Worked in Skeletal Hard Tissues, 2010-13*) interacted with a number of museums including Leeds, Hull and The Horniman, which hold collections rich in hard tissue objects. By allowing the researcher to spend time working alongside curators and conservators, the project ensured an effective and direct exchange of information and ideas between researchers and practitioners. This information enhanced the presentation of these materials to the public through workshops and permanent exhibitions.

Public engagement and wider understanding. A significant number of our projects are framed around public engagement. A typical example is the Wellcome Trust Society Award project (2010-13) *You Are What You Ate*, which in collaboration with the University of Leeds and Wakefield Council, presents archaeological, visual and textual evidence from the medieval and early-modern periods to initiate debate and reflection on eating behaviours. More than 40,000 people have interacted with the outputs, including several exhibitions in regional museums, school visits and Bradford-based osteology workshops. The project has recently been awarded further funding from the Wellcome Trust to continue for another year. One strand of a British Academy Mid-Career Fellowship (2012-13) focused on primary schools in Bradford, Orkney and Iceland to develop and test activities using evidence from the Viking expansion to promote understanding of migration in modern societies. Outcomes include activity plans for teachers, made available through the Council for British Archaeology (CBA). A series of workshops demonstrating the role of science in understanding the past have taken place at high profile events with significant public footfall, including the British Science Festival, the York Viking Festival, the CBA Festival of Archaeology and the Orkney International Science Festival.

Community archaeology and heritage. We have developed many successful relationships with community groups at a number of levels hosting day schools and conferences, training events and laboratory workshops as well as sharing expertise in fieldwork. These relationships have in turn provided opportunities for student training and have even stimulated new research avenues. The *Stanbury Hill Project* (2009-2012) was a joint venture between the Bingley & District Local History Society and the University of Bradford and supported by the Heritage Lottery Fund (HLF). Fiona Spiers, Head of the HLF in Yorkshire and the Humber reported that the project will “enable members of the local community to learn new skills and enhance their knowledge and sense of their local heritage.”

Institutional support for impact has provided expertise and funding, for example, a skills review of staff expertise for commercial enabling, as well as providing a HEIF-funded Business Manager for the REF period. HEIF investment has also been used to enhance long-term business relationships including commercial software development for local stakeholders. The university facilitated the cross fertilisation of ideas between academic areas resulting in enhanced impact; we have derived benefit from collaboration with the Centre for Visual Computing which has resulted in projects with museum partners especially those related to 3D visualisation. The School of Life Sciences has

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facilitated impact by providing funds for travel that has helped build relationships with non-academic partners which have subsequently been funded, for example, the National Physical Laboratory, the British Museum and the Natural History Museum.

c. Strategy and plans

The University has an Impact Coordinators Group which promotes awareness of external collaboration with the aim of disseminating the awareness of impact into all areas of research. As we have a long tradition of applied archaeological science we anticipate that our research will continue to have high impact. As part of our strategy we have identified the development of projects with outside groups as a key factor in the visibility, relevance and use of our research. This will result from the strengthening of existing links and the establishment of new networks. We highlight our use of industrial partners for doctoral research where the topics are substantive, focused to needs and timely. This creates better impact and engages the next generation of researchers. This strategic engagement furthers our impact goals and extends and diversifies our opportunities for their successful implementation.

We have recently been awarded significant HEIF investment (£180K, 2013-14) by the University to develop a Hub (Bradford Visualisation) which will be a conduit for knowledge generated in recent (*Digitised Diseases/From Cemetery to Clinic*, both JISC-funded) and new (*Fragmented Heritage*, AHRC) research projects. This includes new approaches to the authentication of ivory (*Visualising Animal Hard Tissues*, AHRC). The new investment will enable us to progress the commercialisation of our work in the field of visualisation (particularly landscapes via *Fragmented Heritage* and confined space studies such as *Sculptor's Cave*, Scotland) and will enable us to broaden our expertise to new materials such as prehistoric sheet metalwork (e.g. through existing EU-funded collaborations with the Archaeological Museum in Zagreb and the Novo Mesto Museum, Slovenia).

New early career appointments in 2013 are expanding our capability for achieving impact. We will forge new collaborations with healthcare professionals on the ways in which archaeological approaches can inform contemporary attitudes to death and end of life care. We are exploring contemporary, early life diet and physiology using exfoliated deciduous teeth from the *Born in Bradford* project. Stable isotope analysis will be conducted on this material as well as on deciduous teeth from Sudanese children, providing greater understanding for the study of the perinatal period.

We will develop new community projects of major contemporary relevance and interest. A 2013-16 HLF-funded (£100K) community archaeology project (*World War I: The Leeds Pals & Nidderdale*), led by Nidderdale Area of Natural Beauty, will investigate the World War I training camp at Colsterdale, North Yorkshire and will benefit from the expertise of our survey and excavation team.

With institutional support for training, we will test social media for engaging with non-academic audiences. A 2012 publication by Bradford researchers, on analysis of preserved soft tissues of human remains dating to the Inca period, was picked up by a *Facebook* science group and received over 50,000 *likes* and over 12,000 *shares* within a week of publication. The blog statistics for *Digitised Diseases*, a project led by Bradford, record over 22,000 hits. This JISC-funded project is launching a virtual training zone and investigative tool for clinicians, human osteologists, archaeologists and the wider public. The accompanying *Facebook* page and *Twitter* account have over 1,000 followers. This demonstrates that social media is an important vehicle for engagement and we will develop these tools for achieving impact.

d. Relationship to case studies

The two case studies illustrate our long-term approach to multi-user engagement. They are chosen to represent impact arising from each of our two research themes and to demonstrate the achievement of different types of impact. They provide evidence the broad nature of our impact within both cultural and scientific spheres while demonstrating the use of our research by a variety of users. The Shetland study provides evidence for improvements and change in heritage presentation that have wide economic benefits to island communities. Our geophysical based study highlights the technical strength of our unit and illustrates the significance of research as it is taken up by commercial and other non-HEI user groups.