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Brendon Wilkins*

A theory of change and evaluative framework for measuring the social impact of public participation in archaeology

Drawing on the language of social impact investing, this paper outlines the results of an audience and participant evaluation conducted during the world's first successfully crowdfunded and crowdsourced excavation, which took place in 2012 at Flag Fen, a Bronze Age site near Peterborough in the UK. It introduces a 'theory of change' to account for the impact of participatory archaeology programmes, with a 'standards of evidence' framework designed to elucidate the causal links between activity and change. Assessing the merits of this strategy with recommendations for future implementation, this paper posits an evaluative framework designed to ensure that claims made regarding social impact of public participation in archaeology are as substantively evidenced as conclusions about the past drawn from the excavation itself.
Keywords: crowdfunding, crowdsourcing, social impact, community involvement, UK

Attingendo al linguaggio degli investimenti a impatto sociale, questo articolo delinea i risultati di una valutazione del pubblico e dei partecipanti condotta durante i primi scavi al mondo che hanno utilizzato con successo crowdfunding *e* crowdsourcing*, avvenuti nel 2012 a Flag Fen, un sito dell'età del Bronzo vicino a Peterborough nel Regno Unito. Si presenta una "teoria del cambiamento" per spiegare l'impatto dei programmi di archeologia partecipativa, con un quadro di "standard di evidenze" progettato per chiarire i nessi causali tra attività e cambiamento. Sulla base dei meriti di questa strategia e le raccomandazioni per la futura implementazione, l'articolo propone un quadro di valutazione progettato per garantire che le affermazioni riguardo all'impatto sociale della partecipazione pubblica in archeologia siano dimostrate nella sostanza così come lo sono le conclusioni sul passato tratte a partire dallo scavo.*
Parole chiave: crowdfunding, crowdsourcing, *impatto sociale, coinvolgimento della comunità, Regno Unito*

1. Introduction

In the boom years following the millennium, with more archaeologists employed doing more archaeology than ever before, concerns were raised that despite the great deluge of work taking place, the profession was still failing to deliver a wider public benefit (Bradley 2006; UCD

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2006). Archaeology is instituted in the public interest, so demonstrating value for money to the tax payer, grant funders, or private individuals and organisations who ultimately pay for the work was of paramount concern. Questions of 'fitness for purpose' were directed towards the capacity of a state-backed 'conservation sector' to protect and maintain natural and built heritage through a legal and planning framework, and the largely private 'mitigation sector' constituted to respond to the former's demands (Willems, van den Dries 2007). Solutions focussed on cost-effective strategies for converting technical data, such as excavation archives and reports, into published and easily accessible research outputs including journal or monograph publications. Mirroring similar adjustments in charitable and philanthropic funding, these concerns shifted subtly once again following the Great Recession, moving away from a concern with research outputs to consider the actual difference that organisations make to individuals and communities (Rotheroe *et al.* 2014; Bagwell *et al.* 2015). This change can be discerned most clearly in grant and philanthropically funded university-based archaeology projects, where demonstrating the wider impact of research is becoming a condition of funding (Research Excellence Framework 2014).

Co-production (the process of producing research with, rather than for, communities) has been presented as a timely response to the discipline's need to demonstrate impact, bridging the 'relevance gap' perceived to undermine traditional methods that focus exclusively on research outputs (Durose *et al.* 2011). Researchers benefit from this arrangement by ensuring that questions remain relevant to needs they may otherwise neglect or be unaware of, and communities become empowered through equal involvement in research and policy decisions that may directly affect them (Ostrom 1996). The increasing emphasis on achieving a wider public benefit is part of this trend, as archaeological organisations seek to broaden their relevance and redefine the legitimacy of their work. Precisely defining these impacts, however, continues to present a considerable challenge to archaeology-related programmes and activities, where the benefits are often abstract, intangible and difficult to attribute.

The absence of both an agreed methodology or a firm evidence base is part of a wider problem in public archaeology, demonstrated in a recent meta-analysis of the total number of articles published in the journal "Public Archaeology" since its inception (Gould 2016). A total of 191 papers were assessed (vol. 1(1) in 2000 through till vol. 14(1) in 2015) across a range of evaluative criteria, including 'whether data was supplied to demonstrate achievement of goals or consistency with the-

oretical expectations' (Gould 2016, p. 5). An 'ethnographic' methodology of participant observation and interaction has become the preferred approach, with the underlying assumption that evaluation should seek first and foremost to assess a project's 'bottom-up' credentials (Simpson, Williams 2008; and see Thomas 2011, pp. 59-62 for a critical review of the published results of this approach). Stemming from the post-colonial concerns of Western archaeologists working within multicultural societies, this position seeks to explicitly situate the nature of knowledge production, mitigating the bias of expert privilege through a critical self-reflexive awareness and a multivocal acceptance of diverse and potentially conflicting interests concerning the past (Bergrren, Hodder 2003). In consequence, the self-evaluated case-study has become the default mode of publication (see also Carman, Sørensen 2009) eschewing evaluative methodologies based on quantitative data collection with 'results presented predominantly in an impressionistic form unanchored to hypothesised outcomes, theoretical models, or detailed data' (Gould 2016, p. 6).

The shortcomings of the current dominant mode of evaluation in community and public archaeology relate to a failure to capture whether the project had any negative effects, or what would have happened anyway in the absence of the initiative. This not only reduces the capacity of practitioners to make substantive claims regarding their own efficacy, it makes the comparative evaluation of projects extremely difficult to assess. These issues have been accentuated with the adoption of new, digitally enabled modes of collaboration, where little is known about which individuals and communities participate, how they participate and what the potential negative and positive impacts of adopting emergent technologies could be. The evolution of technology is far outpacing the development of the ethical practice or professional infrastructural that underlies it, and in this context, a question remains over whether technologically enabled models of participation encourage a more equitable democratic framework. The adoption of crowdfunding and crowdsourcing in archaeology has been dismissed on this basis, criticised as imposing an inherently exclusionary digital and financial divide that perpetuates inequalities at odds with archaeology's broader social mission (Perry 2015, p. 384; Richardson 2017, p. 7). Despite the forcefulness of these arguments, however, there is little research, evidence or an established methodology with which to assess the relative advantages and disadvantages of this new method of working.

Good intentions do not necessarily guarantee good outcomes, particularly with regard to the adoption of new technology and disruptive busi-

ness models. A vibrant archaeological and cultural heritage sector needs to support the most promising, safe and efficient innovations, and it is vitally important that decisions are made on the basis of high-quality impact evidence. This paper will focus on the steps taken to measure the impact of community-based archaeological research undertaken by an organisation which consistently experiments with previously untested crowd and digitally enabled modes of participation. Launched in 2012, DigVentures uses crowdfunding, crowdsourcing and digital technology to provide opportunities for the public to participate in archaeological research (Wilkins 2013, p. 46). Projects are delivered in partnership with academic and heritage custodians, a collaborative methodology first formulated through DigVentures' *Flag Fen Lives* project – the world's first successfully crowdfunded and crowdsourced archaeological excavation (Palmer 2012; Stannage 2013; Piscitelli 2013).

Though crowdfunding and crowdsourcing are similar propositions, opening up functions that were previously performed within or between organisations 'to a large undefined group of people generally using the internet' (Howe 2006), mainstream crowdfunding platforms focus primarily on sourcing financial contributions from backers in order to 'kickstart' projects. DigVentures has taken a more holistic approach, combining both crowdfunding and crowdsourcing to attract financial and non-financial contributions from backers. The organisation has replicated this model of crowdfunded and crowdsourced archaeology at numerous sites in the UK, Europe and the US, raising approximately £1.1M for excavation through crowdfunding and matched grant funding, supported annually by over 1,000 participants. Though these are financially substantial figures, they reveal little in regard to the social impact of the DigVentures intervention. The following section will consider what the impact of public participation could be, before going on to consider how an archaeological intervention can be evaluated, assessed against the *Flag Fen Lives* project case study.

2. Social impact methodology

Any consideration of project evaluation must begin by defining what exactly constitutes social impact, which is an issue not just for archaeological projects, but an equally difficult and pressing challenge across a range of disparate arts, cultural and sporting activities that rely on public participation. Comprehensive evaluation is a fixture of public policy, where government agencies remain accountable to elected bodies

who must ultimately demonstrate value for money and effectiveness to the electorate. Unlike in financial accounting, there is no standardised framework or methodology for measuring the social value of cultural heritage programmes, so the sector has gravitated toward SROI (Social Return on Investment) models to develop a language of advocacy sensitive to the target-driven demands of government funders (see Historic England 2018). By measuring organisational inputs and outputs such as the number of jobs created, programmes delivered or reports produced, this methodology aims to capture the wider social and environmental value created, calculating a return by converting these into a financial proxy.

The shortcoming with this approach is that it focuses on government funder-driven values, often at the expense of achieving a broader stakeholder accountability, where positive impact may not be as readily reducible to econometrics. Reasserting the non-monetary values of heritage programmes has been argued as a necessary measure to correct the 'potentially counter-productive effect of trying to put a price on the priceless: in purely monetary terms governments will always find areas with stronger claims than culture on their budgets' (Hewison, Holden 2014, p. 9). The notion of Cultural Value (Holden 2006), building on the theory of Public Value (Moore 1995), has been influential in providing the conceptual tools necessary for organisations to ethically express the way they interact with the public as a basis for performance measurement and decision-taking (Holden 2006). This broader framing to consider the actual difference that organisations make to individuals and communities mirrors similar developments in social impact investing, where it is fundamental to establish whether funding has achieved a positive impact on social outcomes and goals.

The DigVentures framework for measuring social impact has been informed by the work of two funding organisations in particular, combining the deep sector knowledge of the National Lottery Heritage Fund (NLHF) to provide guidelines on heritage programme outcomes (or the 'what' to measure), and the standards of evidence devised by Nesta, the UK Innovation Foundation (or the 'how' to measure). In response to a commission by the NLHF to assess the efficacy of their approach to evaluation, Holden and Hewison refined the notion of Public Value to encompass three interlocking kinds of Cultural Value: intrinsic, instrumental and institutional (Hewison, Holden 2004). These three concepts were then refined into an operational outcomes framework designed to encompass the range of intrinsic (outcomes for heritage) instrumental (outcomes for people) and institutional values (outcomes for communities and society) that charac-

terise NLHF grant-aided projects (Clark, Maeer 2008). These themes have informed the last three NLHF five-year Strategic Plans (2008-2013, 2013-2018 and a streamlined version in the most recent issue 2019-2024). In consequence, NLHF applicants are expected to meet (and evaluate their success against) a number of different outcomes as a condition of funding (Bewley, Maeer 2014). In the specific instance of an NLHF supported community excavation, this would range from intrinsic 'heritage' outcomes (the research outputs and management plans derived from the excavation) to more instrumental outcomes for people and society (upskilling participants and creating a more relevant visitor attraction).

If the first hurdle is successfully defining the 'what' to evaluate, the next challenge is to implement a robust methodology managing the practicalities of 'how' to measure. Methodological uncertainly is perhaps the principle reason why NLHF evaluation reports remain of variable quality, a feature highlighted by Gould who noted that the organisation's own audit of 100 evaluation reports found that only '16%… were rated… to be 'very good' and 22% good, while 40% were rated only 'fair' and 22% 'poor' (Gould 2016, p. 8; Boyd, Stafford 2013). Nesta, the UK innovation foundation, have addressed a similar challenge by developing an evaluation methodology that can be implemented by a wide range of organisations within their funding portfolio. This is designed to assist decision making at their impact investment fund to 'establish whether a product or service is benefitting those it sets out to serve, and then to focus investment on products and services that can make the most difference' (Puttick, Ludlow 2012, p. 3).

Nesta's approach to assessing social impact requires recipient organisations to clearly articulate their social mission – why they exist, what change they are making, and who they are making it for. Social impact 'can be conceived as the difference that ventures make to people's lives over and above what would have happened in the absence of that venture' (Nesta 2017, p. 7). Exactly how a specific set of activities result in the achievement of desired goals can be pictured as a 'Theory of Change': a logic model detailing outputs, outcomes and impacts. In this scheme, outputs are a measurable unit of product or service, such as a community excavation; outcomes are an observable change for individuals or communities, such as acquiring skills or knowledge; and impact is the effect on outcomes attributable to the output, measured against two metrics: scale, or breadth of people reached; and depth, or the importance of this impact on their lives.

The credibility of a theory of change rests on the level of certainty that organisational activities are the cause of this change, ensuring that

the correct data is collected to isolate the impact to the intervention. By progressing through five steps of ascending surety, Nesta's 'standards of evidence' framework has been designed to provide a structure around measuring impact, ensuring that evaluation strategies are appropriate to the stage of development of a variety of different products, services and programmes (Puttick, Ludlow 2012). This approach is similar to that taken in the issuance of clinical guidelines in health sciences, where the GRADE system has been established to encompass research ranging from highly reliable evidence derived through randomised controlled trials, to less reliable expert opinion on the basis of individual case reports (Kavanagh 2009). Nesta's framework was informed by the evaluative work undertaken by the Greater London Authority's 'Project Oracle' programme, which sought to establish the evidence base for the efficacy of youth programmes in London (Ilic, Bediako 2011). Nesta further refined this approach, ensuring that evidential standards are academically rigorous as well as properly matched to the developmental stage of a venture, guarding against the potential hindrance an overbearing audit could pose to early-stage ventures and innovation.

DigVentures has combined the Nesta and HLF models into a theory of change that aligns with its organisational mission and values (fig. 1), following which a series of testable steps have been refined into a standards of evidence framework to elucidate the causal links between activity and change (fig. 2). A typical DigVentures community-based research excavation can be seen to inhabit an impact spectrum resulting in both intrinsic outcomes (pure heritage and research goals) and instrumental outcomes (creating social value for people and communities). In this scheme, inputs are internally deployed resources or staff, such as a team of community archaeologists or digital recording system, organised into their equivalent value category (fig. 1, beginning from left to right, column a). Activities are tasks or events undertaken by the organisation, such as a crowdfunding campaign or community excavation (fig. 1, column b). Outputs are a measurable unit of product or service, such as numbers of attendees or an assessment report (fig. 1, column c). Outcomes are an observable change for individuals or communities, such as acquiring skills or knowledge (fig. 1, column d), which are finally aligned with the organisation's guiding mission and long term aspirations (fig. 1, column e).

Working logically through this framework, hypotheses can be formed elucidating what takes place within the 'black box' of a public programme, modelling the linkages between the social outcome of the intervention (what the organisation says it does) with inputs, activities and outputs

OUR THEORY of CHANGE

Measuring impact for both intrinsic outcomes for archaeology and instrumental benefits for people and communities

	INPUTS *internally or externally deployed staff and resources*	ACTIVITIES *the processes and tasks undertaken by the organisation*	OUTPUTS *a quantifiable unit of 'product' or 'service' measurable once completed*	OUTCOMES *Observable change for heritage, individuals or communities*	MISSION AND VISION *The organisation's guiding mission and long term aspirations*
For Archaeology and Heritage	Excavation team Wider specialist team Venturers (public participants)	1. Desk-based assessments 2. Remote Sensing 3. 3D landscape and building survey 4. Excavation 5. Post-ex assessment and analysis 6. Accessible digital archive	• Project Designs • Survey reports • Assessment and Final Reports • Management Plans • Archaeological Publications • Site Interpretations	Through our work, heritage will be: • identified, interpreted and better explained • better managed and in an improved condition	By collaborating with citizens, businesses, organisations and government, we aim to create a firm evidence-base for the past through accessible, peer-reviewed research, ultimately enabling places to thrive, prosper and sustain distinct local identities
For Individuals	Community management, educational and editorial teams DigVentures' collaborative platform: • collaborative resources *DigVentures.com* • collaborative finance *Crowdfunding app* • collaborative labour *Digital Dig Team web app* • collaborative knowledge *MOOC learning management system*	1. Crowdfunding campaigns and matched crowd/grant funded applications 2. Accessible training programme comprising Dig for a Day/ Dirty Weekend/ Field Venturer 3. Digital learning resources including site-specific and skills-based learning available in person or online 4. DigCamp and CyberDig family sessions	Funded/Match-funded Project • Number and diversity of Dig participants • Number and diversity of Digital participants • Number and diversity of DigCamp participants • Co-created digital archives and interactive, open-access, online resource measurable through digital analytics	By taking part in our work: • a wider range of people will be involved in archaeology and heritage • people will have learnt about heritage, leading to changes in ideas and actions • people will have greater wellbeing	By creating a spectrum of digital and physical opportunities to participate together, we aim to equip citizens with the skills needed to use, produce, manage and co-commission heritage resources, fostering civic awareness and a deeper sense of place and belonging
For Communities / Society	Community management educational and editorial teams Site Hut Dig Timeline Social Channels	1. School visits 2. Site open days 3. Pop-up and virtual museums 4. Published web content and native social posts 5. Recorded video and live 6. Traditional broadcast and print media	• Number of web/social engagements, and community growth • Number and diversity of site and pop-up visitors • Site and museum visitors increased and lasting audience for sites	As a consequence of our work: • The local area will be a better place to live, work or visit • Partner organisations will be more resilient	By challenging the perceived barriers to archaeological participation, we will create an accessible 'broad tent' incorporating multi-cultural and diverse perspectives; we aim to increasing the awareness and amenity of sites and visitor attractions, stimulate leisure and tourism, and help to make distinctive heritage the unique selling point of a place

(what actually happens). Used in conjunction with a standards of evidence framework, DigVentures has been able to determine the degree of causality that can be attributed to their interventions, progressing through five steps of ascending surety that observable changes are a consequence of their work.

This framework begins with Level 1 (fig. 2, row 1), where practitioners are able to give an account of hypothesised impact, providing a logical reason why project activities could have an impact on outcomes, and how that would be an improvement on alternative provision. For a project to achieve Level 2 (fig. 2, row 2) practitioners will be gathering data that shows some change amongst participants, but this may not be sufficient to provide evidence of direct causality. At Level 3 (fig. 2, row 3) practitioners will be able to demonstrate that they are causing the hypothesised impact, by showing less impact amongst those who don't participate in the project or receive the product/service. Progressing to Level 4 (fig. 2, row 4), and practitioners can explain why and how the project is having the impact observed, with results potentially independently verified. Rather than a 'gold-plated case study', the project delivers impact at a reasonable cost, meaning that it can be replicated and implemented in multiple locations. Finally, at Level 5 (fig. 2, row 5), the project methodology is robust and well-evidenced enough to be scaled up and operated by other teams or organisations, whilst continuing to have positive and direct impact on the outcome and remaining a financially viable proposition.

In the remaining part of this paper, this evaluation framework will be applied to a real-world context: the crowdfunded and crowdsourced excavation at Flag Fen, near Peterborough in eastern England. Though this was DigVentures' first community-based research project and the evaluative methodology had not yet been comprehensively designed, it is a useful example of how the organisational learning derived through evaluation can be applied to improve impact-generating activities.

Fig. 1. DigVentures 'Theory of Change' – a logic model detailing inputs, activities, outputs, outcomes and impacts, drawing on outcomes devised by NLHF (outcomes for heritage, people and communities). In the DigVentures model, outputs are classed as a measurable unit of product or service (such as a community excavation); outcomes are an observable change for individuals or communities (such as acquiring skills or knowledge); and impact is the effect on outcomes attributable to the output (measured against two metrics: scale, or breadth of people reached; and depth, or the importance of this impact on their lives).

STANDARDS OF EVIDENCE

	EXPECTATION	SUGGESTED METHOD	OUTCOMES FOR HERITAGE	OUTCOMES FOR PEOPLE	OUTCOMES FOR COMMUNITIES
	Providing an academically rigorous framework, whilst ensuring that impact measurement is appropriate to the stage of development of a variety of different products, services and programmes.	*Steps needed to ensure correct evidence is collected to determine whether or not a venture is making a positive difference*	*Intrinsic benefits relating to the research dividend and evidence baseline required for successful management of archaeological sites and landscapes*	*Instrumental benefits for participants and platform users, enabling the voluntary sector to scale in a sustainable and ethically responsible fashion*	*Wider social impacts received by those who may not be direct participants, but benefit through increased amenity value, tourism and local distinctiveness.*
Level One	A low threshold, appropriate to very early stage innovations, which may still be at the idea stage. Involving little more than a clear articulation of why the intervention is needed, what it will aim to achieve why this is better than what currently happens. Project owners will be able to give an account of impact, providing a logical reason why their intervention could have an impact and why that would be an improvement on the current situation.	A clear rationale to show why the product/service could have an impact, and why that would be an improvement on the current situation. Articulated as a theory of change and logic model, linking activities, outputs, outcomes to hypothesized impact.	A fully illustrated Project Design, signed off by statutory stakeholder, outlining key archaeological research questions, roles, procedures, stages and outputs.	A training or activity plan, linking activities to outputs, outcomes and impact, and an explanation of how the outcome could be measured.	A training, activity, audience development and/or heritage resource management plan, linking activities to outputs, outcomes and impact, and an explanation of how the outcome could be measured.
Level Two	At Level 2 projects will be gathering data that shows some change amongst those receiving or using the intervention. At this stage, data can begin to show that there is a change in the measure of the outcome among the recipients of the product or service, but this may not be sufficient to provide evidence of direct causality.	Pre and post–survey evaluation; cohort/panel study; and regular interval surveying.	Assessment Report; Management Report, base-lined against previous investigations	Evaluation survey for participants to quantify demographics, socio-economic characteristics and spatial data, followed up with a pre and post-survey qualitative evaluation using a separate questionnaire methodology to determine any changes as a consequence of taking part	Evaluation survey for site visitors to quantify audience demographics, socio-economic characteristics and spatial data, followed up with a qualitative study using a separate questionnaire methodology to determine any changes that took place as a consequence of the visit
Level Three	At Level 3 projects will be able to demonstrate that they are causing the hypothesized impact, by showing less impact amongst those who don't receive the product/service.	Robust methods using a control group, or evaluating a random selection of participants, begin to isolate the impact of the product/service. All products/services at Level 3 will be well documented, with necessary skills, training (and other delivery requirements) outlined clearly, to enable effective replication in alternative places, situation, contexts etc.	Analytical report, synthesizing specialist reports with previous work locally, regionally and nationally, to determine significance, importance and potential of the site.	Meta-analysis of evaluation results with those derived from projects delivering similar community-based activities, including archaeological/heritage and other unrelated arts/citizen science projects.	Meta-analysis of evaluation results with those derived from projects delivering similar community-based activities - including both archaeological/heritage and other unrelated arts/citizen science projects.
Level Four	At Level 4 projects can explain why and how the intervention is having the impact observed and evidenced so far, supported by an independent evaluation to validate the findings. This will also assess the extent to which the intervention can deliver impact at a reasonable cost, and whether it can be replicated and purchased in multiple locations.	Robust independent evaluation that investigates and validates the nature of the impact; this might include endorsement via commercial standards or industry kitemarks, underpinned by a documented standardisation of delivery and processes, data on costs of production and acceptable price point for customers.	Quality assured by the Chartered Institute for Archaeologists (CIfA) under the Registered Organisation scheme, and involving independent site inspections and documentary audit.	External audit of quality of training programmes and activities by CIfA, The Archaeological Training Forum, Register of Professional Archaeologists, Skills Passport and National Occupational Standards.	External audit of community programming and impact by specialist consultancy, undertaken independently of project team.
Level Five	At Level 5, projects will be able to demonstrate that the intervention could be operated up by someone else, somewhere else and scaled up, whilst continuing to have positive and direct impact on the outcome, and whilst remaining a financially viable proposition. For a service, this will establish whether it can be delivered by different staff in different locations.	Evidence will be derived from multiple evaluations of the product/service in different settings (at least two evaluations; one of which will be independent) to demonstrate that the product/service can be used in different settings (which could be in different settings geographically and/or with different types of product/service users). Appropriate methods at this level will include multiple replication evaluations; future scenario analysis; or fidelity evaluation.	An excavation manual, underpinned by a broader operations manual and 'culture deck', detailing how the DigVentures project model should be applied in differing contexts.	A syllabus and training manual, underpinned by a broader operations manual and outline spectrum of engagement, detailing the participant's journey from digital supporter to experienced field digger.	An audience engagement and communications plan, underpinned by a broader operations manual and tailored 'culture deck', detailing how the intervention should be applied with clear and measurable benchmarks.

3. Flag Fen Lives – The Experiment

Protruding from the edge of a freshly re-cut drainage dyke, the chance discovery in November 1982 of Flag Fen's waterlogged timbers set in train one of the iconic 'Great Excavations' of British Archaeology (see Schofield 2011 for other examples). Seasonal excavations led by Francis Pryor and The Fenland Archaeological Trust continued until 1995, funded principally by English Heritage. The work generated major public interest and media attention, resulting in the development of a visitor attraction (the Flag Fen Archaeology Park) based around the excavated finds and archive, comprising a visitor centre, museum, preservation hall (where a section of the causeway is exposed for viewing) and reconstructed prehistoric dwellings.

The monument itself was found to consist of five parallel lines of vertically set wooden posts running for approximately 1 km across the neck of the Flag Fen basin, from the high ground of Fengate in the west to Northey in the east. A large artificial timber platform, approximately two hectares in diameter, was identified some 200 m west of the Northey landfall. This work has been published in numerous books and journals, with a comprehensive statement on the geological, topographic, archaeological and historical background published in 'The Flag Fen Basin: Archaeology and environment of a Fenland landscape' (Pryor 2001).

The Flag Fen basin lies at the western edge of the East Anglian fens in an area of deep Holocene sediments that accumulated in response to a progressive rise in relative sea level. This was the 'high water mark' of a process that had led to the flooding of Doggerland and the southern North Sea basin (Gaffney *et al.* 2007). It produced what Rob Scaife has called a 'negative hydrosere', reversing the typical Holocene succession of underwater environment giving way to terrestrial landform and turning it on its head. The principal phase of archaeological activity at Flag Fen – the Bronze Age post alignment and platform – was constructed in this increasingly wet environment, with dendrochronological determinations indicating that it was actively maintained between 1300 and 900 BC.

Since the discovery of waterlogged timbers in 1982, the integrity of the preservation environment has been of major concern, with reduc-

Fig. 2. DigVentures 'Standards of Evidence' drawing on evidential standards devised by Nesta, to determine levels of certainty that project activities will have a positive impact on the intended outcome, ensure that the correct data is collected to isolate the impact to the intervention, and that findings are validated externally.

tions in water levels hypothesised as seriously impacting Flag Fen's archaeological sustainability. Drainage, farming and development impacts have been exacerbated by an annual trend of exceptionally low rainfall in the eastern counties, reduced saturation within the peat, resulting in oxidisation, fluctuating acidity, and degradation of organic archaeological materials. These concerns led the Department of Culture, Media and Sport (DCMS) to schedule Flag Fen as an 'Ancient Site and Monument' in March 2012, stating the international significance as follows:

> 'The source of Flag Fen's unique and outstanding significance lies in its ability to provide a tangible link to an era of northern European prehistory, which is still shrouded in mystery. As the best- preserved and most accessible site of its kind in Britain, the Flag Fen basin has been and will remain, instrumental in shaping our understanding of life 3,000 years ago. In addition, Flag Fen has been one of the leading sites driving the development of the archaeological profession in the late 20th century – a profession which enjoys much support and interest from the general public. If it is possible to communicate the extraordinary values and potential of the site effectively and in a sustainable way to the public, Flag Fen has the potential to develop into one of Britain's most important heritage attractions'.

The site custodians approached DigVentures to help design and deliver a community-based archaeology project, with the principle research driver being the need to provide baseline data to facilitate the site's future management. The archaeology was deteriorating at an unknown rate, but equally pertinent to the site custodians was the fact that visitor numbers to the park were in a similar state of decline, down from an annual average of 20,000 in the final year of excavation, to less than 11,000 in 2011. The 'Flag Fen Lives' project represented an opportunity to kick-start the regeneration of Flag Fen by positioning research-led excavations in the context of an evolving archaeology park. This was implemented by three objectives, spanning the intrinsic to instrumental outcomes described above:

- To provide detailed scientific information on the preservation environment at the internationally significant Bronze Age site of Flag Fen and assess the long-term sustainability of the monument in the face of drainage, farming and development impacts (Intrinsic values - outcomes for heritage);

- To provide comprehensive archaeological field skills training to on-site volunteers along with a robust interactive digital platform directed at an online audience (Instrumental values – outcomes for people).
- To reverse a decade of decline and bring the Flag Fen Archaeology back to life by making live excavation the beating pulse of the visitor experience, whilst building a new global online audience (Instrumental and Institutional values – outcomes for communities);

The research design was developed in partnership with English Heritage (as was) and a consortium of specialists, and was delivered within the required statutory framework for Scheduled Ancient Monuments in the United Kingdom. To ensure industry standards of best practice were incorporated into the archaeological project a standard joint collaborative research methodology was adopted where a Principle Investigator (DigVentures) would become lead coordinator under the terms of a multi-partner research collaboration agreement. English Heritage was also able to provide advice on relevant specialists, academics and curators that could help develop a conservation management plan based on research-led excavations at Flag Fen including Birmingham University, Durham University, York Archaeological Trust, and The British Museum. Additionally, an academic advisory board of specialists and stakeholders was also formed, including representatives from Peterborough City Council, subject area specialists, and the site's original excavators.

A pre-agreed budget, managed on an open book basis between all parties, was drafted in consultation with English Heritage to cover the costs of an archaeological evaluation and submitted as part of the application for Scheduled Monument Consent. With no recourse to public funds, the starting assumption was that the Principle Investigator (DigVentures) would meet the full economic costs of carrying out the archaeological excavations including all associated post-excavation activity involving the care and conservation of any artefacts discovered. The budget was set at £25,000, and a decision was made to launch an experimental crowdfunding campaign, enabling a range of participatory opportunities in line with the project's three objectives, and ensuring that all activities were designed within those strict financial parameters. In the event that the full funding was not achieved the project would not have gone ahead, and any money raised would have been returned to the community of financial backers, and any financial risk to the project partners was mitigated by DigVentures assuming Principle Investigator status.

	ACTIVITIES *the processes and tasks undertaken by the organisation*	OUTPUTS *a quantifiable unit of 'product' or 'service' measurable once completed*	OUTCOMES *Observable change for heritage, individuals or communities*	STANDARDS OF EVIDENCE *Data collection and confidence rating demonstrating the positive difference made by an intervention*
For Archaeology and Heritage	Desk-based assessments, stakeholder consultation and project design GIS (Geographical Information System) modelling and archive consolidation Auger survey, archaeological investigation (test pits and trenches), palaeoenvironmental assessment (pollen, plant macrofossils and insect remains), archaeological wood assessment, condition assessment of timber, faunal assessment, and finds assessment (pottery and struck flint)	MoRPHE compliant Project Design Scheduled Monument Consent Flag Fen Lives Assessment Reports Multi-Partner and stakeholder meeting to devise future steps	Through our work, heritage will be: identified, interpreted and better explained better managed and in an improved condition	Level 3 – validated through a peer-reviewed analytical report synthesizing specialist reports, comparing and contrasting the results from Flag Fen with previous work locally, regionally and nationally to confirm efficacy, and including a detailed methodology to enable effective replication at alternative sites.
For Individuals	Crowdfunding campaign and matched crowd/grant fund Accessible training programme – Dig for a Day; Dirty Weekend; Field Venturer. Digital learning resources – site-specific and skills based learning DigCamp and CyberDig family sessions	Successful crowdfund raise of £27,000 from 250 contributors, and £5,000 from institutional/grant funders Three-week dig and field school hosted for 130 participants, from a day, weekend, week or full experience, and 120 digital participants. 100 participants on the 'Kids Summer School' Co-created digital archive	By taking part in our work: a wider range of people will be involved in archaeology and heritage people will have learnt about heritage, leading to changes in ideas and actions	Level 2 – collecting evaluation data through pre and post-experience survey of dig participants to determine any changes for individuals as a consequence of taking part, though this may not be sufficient to provide evidence of direct causality.
For Communities / Society	Daily site open days and evening DVIP lectures Daily published web content and native social posts Daily recorded video and live broadcast Traditional broadcast and print media	Increased visitor numbers (up 29% on previous year) amounting to 2,000 people; Volunteer numbers up 40% year on year; Income up 60% above business plan projections; Average visitor dwell time increased from 1.5 hours to 3.2 hours per visit, representing a 78% improvement on perceived value for money on entry fee National media coverage: 4-minute interview on Radio Four's today programme; TV news broadcast on BBC, ITV and local print.	As a consequence of our work: The local area will be a better place to live, work or visit Partner organisations will be more resilient	Level 2 – collecting evaluation survey data of site visitors, identifying demographics, distance travelled and any changes as a consequence of visiting, though this may not be sufficient to provide evidence of direct causality.

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4. *Flag Fen Lives* – outcomes and impact

The 'Flag Fen Lives' campaign was launched on 29th February 2012, comprising a 90-day crowdfunding window followed by a three-week archaeological excavation. Project supporters were able to take part in the project by purchasing benefits from £10 to £2,000, with higher level contributions enabling participants to join the excavation team for a day, weekend, week or longer. The campaign raised £27,000, reaching 108% of the funding target, contributed by a national and international audience of 250 people originating from 11 countries, with a further £5,000 contributed by institutional funders. Following the successful funding campaign, a three-week excavation season was completed from 23rd July -12th August 2012, with 130 funders joining the excavation team to investigate the effects of dewatering on the buried archaeological structures.

In financial terms, this was undoubtedly a success; but as outlined in the preceding section, focussing purely on economic value does not necessarily reveal the multiple impacts of a project in terms of the actual difference made to individuals and communities. By creating a project specific evaluation matrix (fig. 3), relevant sections of the DigVentures theory of change that align with specific project activities can be selected (fig. 3, column a). The hypothetical linkages between measurable outputs and potential outcomes for heritage, people and communities can then be determined (fig. 3, column a and b).

The level of certainty of that these outcomes were a direct consequence of either the particular archaeological methodology or the innovative crowd-based funding and delivery (rather than something that would have happened anyway) can be assessed against the standards of evidence matrix (fig. 3, column d). To assist with this assessment, an evaluation survey was completed for both dig participants and site visitors to quantify audience demographics and spatial data, followed up with a qualitative study using a separate questionnaire methodology for both groups. Site visitors and dig participants were asked to complete a questionnaire on exit, combining both closed and open-ended questions that could easily be converted into statistical data using a four-point Likert scale to record responses.

Fig. 3. Project specific evaluation matrix for 'Flag Fen Lives', identifying activities, outputs, outcomes benchmarked against the achieved evidential standard.

Beginning with outcomes for heritage, and despite the unusual approach to funding the Flag Fen project, activities contributing to the archaeological research were designed in a conventional fashion, following Historic England's MORPHE project model (Management of Research projects in the Historic Environment) as a condition of permission to excavate under Scheduled Monument Consent. Outputs such as the project design were published in advance of the crowdfunding campaign, with prospective funders and interested parties encouraged to discuss the contents with the Site Director on social media. The principle aim was to provide baseline information on the Flag Fen Scheduled Ancient Monument by redefining the physical extent of the waterlogged Bronze Age platform; assess the physical condition of the post alignment and platform; and define the extent and character of Bronze Age settlement features on the dryland margin of Northey Island. This was achieved through a number of traditional field and archaeological science activities, including GIS (Geographical Information System) modelling and archive consolidation; auger survey; archaeological investigation (test pits and trenches); palaeoenvironmental assessment (pollen, plant macrofossils and insect remains); archaeological wood assessment; condition assessment of timber; faunal assessment; and finds assessment (pottery and struck flint).

The two evaluation trenches and three test pits were positioned in different locations on the waterlogged structures and dryland/wetland margin of the site, aiming to 'redefine and establish the precise physical extent of the site' (Wilkins *et al.* 2013). Few surprises were expected from these interventions, however, the largest structure on site – the waterlogged timber platform – remained elusive, despite a grid pattern of 15 boreholes placed across its postulated edge. A marked absence of extensive sub-fossil wood was observed in this area, a surprise given the overall projected dimensions of the two-hectare sized platform. The original Flag Fen report notes that the 'nature of the platform is hard to establish from so little evidence,' continuing '…if water played an important part in contemporary ritual practices… it would not be illogical to expect a 'little Venice of pools, creeks and relict streams, where rites could take place in privacy and safety, and be witnessed by an audience' (Pryor 2001, p. 165). The Flag Fen Lives project identified that there are still basic gaps in our knowledge of the platform, a major outcome with implications for the site's interpretation and future management.

Once excavated, archaeological and palaeoenvironmental samples were assessed to establish the integrity of the preservation environment, addressing concerns with the site's archaeological sustainability. Reductions in water levels have been known to result in oxidisation, fluc-

tuating acidity, and degradation of organic archaeological materials. To establish the extent that this was happening at Flag Fen, the analytical potential of the waterlogged wood was assessed using the same scale as used in the original 1990s excavations. A general decline in waterlogged wood condition was observed from previous investigations, with 60% achieved a 'moderately well preserved' condition score of '3', and 30% achieved a poorly preserved score of '2'. Microscopic analyses of the waterlogged wood have added to this picture considerably, with techniques including included maximum water content (Umax); Scanning electron microscopy (SEM); Fourier Transform Infrared Spectroscopy (FT-IR); and pyrolysis – Gas Chromatography (py-GC). All of the examined samples had undergone severe deterioration, with variability in degradation observable across the site, providing a tentative spatial model for predictive survival rates of archaeological material. In conjunction with the results of the excavation, the post-excavation assessment of material can be assigned a Level 3 confidence (fig. 3 column d). This assignation can be validated through a peer reviewed analytical report contrasting results with analogous investigations (in this instance, including earlier work on the same site) and providing a detailed methodology to enable effective replication at alternative sites (Wilkins *et al.* 2013).

Moving away from the more intrinsic outcomes of the research and conventional aspects of archaeological practice, the instrumental impacts focussed on reversing a decade of decline in visitor numbers at the Flag Fen Archaeology Park, helping to build volunteer capacity through a robust field skills training programme. Whereas the archaeological and heritage outcomes can be understood as an application of established 'best practice' methodologies to address a specific problem, the claims regarding the wider social impact for individuals and communities were more difficult to evidence, based on an entirely untested crowdfunded and crowdsourced model. The major difference between the Flag Fen Lives project and traditional arts and culture crowdfunding projects was that rather than focus primarily on sourcing financial contributions, the project sought to harness the non-financial contributions of crowdfunding projects as a way of empowering communities as catalysts and activists for local heritage.

The principle activities contributing to 'Outcomes for People' derived from framing the dig as a field school, with outputs including a curriculum, teaching sessions, individual skills tuition, and evening lectures from guest speakers. Assessing the effect this had on outcomes relied on an assessment of quantitative data, collected through the crowdfunding platform's digital analytics programme, and qualitative data derived from

questionnaire answers conducted during a pre- and post-experience exit interview for all dig participants. Questionnaires were designed to reveal 'whether or not people will have learnt about heritage, developed skills, changed their attitudes and/or behaviour, had an enjoyable experience'. Participants were separated into four categories: digital participants, who joined through the online platform offering daily film clips broadcasted from site, blogs and forum discussions; dig for a day/weekend participants, and field school participants who joined the team from one to three weeks, and casual visitors to the site.

This spectrum of engagement resulted in a 55% digital participants, 24% dig for a day, 12% dig for a weekend, and 9% for a week or longer. This group comprised local residents and UK-wide and international visitors of all ages and different levels of archaeological experience and knowledge. Project participants fell into a broad range of age ranges and were predominantly more female (65%). The largest age category was 40-44 reaching 20% of the total, and 17% of participants were under 24. In answer to the question 'what did you learn', 35% listed excavation skills, 30% team work, and 25% listed knowledge of the specific site. Whilst these results demonstrate that a positive difference was made for participants as a result of the intervention, this was deemed insufficient to confirm direct causality and outcomes for people were assigned to the Level 2 category (fig. 3, column d). With no comparative baseline data to contrast the Flag Fen Lives approach with other traditionally resourced community-based projects, or any detailed socioeconomic understanding of the project participants and their motivation, broader conclusions regarding the efficacy of the intervention could not be determined.

In terms of the wider societal impacts (outcomes for communities), the project attracted approximately 2,000 visitors to the Flag Fen visitor attraction over the duration of the three-week dig. It reached these people through a range of different media, both social and traditional, 75% of whom cited archaeology as the main reason for their visit. This represented a 30% year-on-year increase in visitors, accounting for a third of the site's annual gate fees; 60% of these people had never visited the site before, half of whom were local to the area. Once on site, a range of activities were offered from structured/unstructured tours to expert lectures. Of the site visitors questioned on exit, 90% would come to see similar archaeology events, and 70% would come to see the site when no digs were taking place. This data supports the contention that a crowdfunded and crowdsourced approach can attract a much wider audience to a site beyond the backers who support a campaign, and that

this uplift in visitors could contribute towards financial resilience beyond the lifespan of the excavation. Without a longitudinal study of site visitor numbers, however, or more clarity on how perceptions of archaeology may have changed for visitors, evidence of direct or lasting causality could not be determined and thus outcomes for communities were assigned a Level 2 category.

In totality, the results of the Flag Fen Lives project indicated an increased desiccation of the buried wooden structures, raising concerns from all parties over the long-term viability of the remaining archaeological and palaeoenvironmental deposits. The project's findings acted as a catalyst to stakeholders, implying that the most significant impacts can extend beyond the timeframe, and measurement indicators, of the project. A meeting of the Flag Fen Academic Advisory Group (comprising the DigVentures project team and wider stakeholder group) was called to discuss the results at English Heritage's Cambridge office in December 2012. Consensus was established that hydrological modelling was urgently needed to establish the impact of artificially-managed water resources and forthcoming development proposals. An agreement was made in principle that English Heritage would fund this work, with council representatives also agreeing in principle that future development proposals adjacent to the site would be sensitive to potential impacts, and follow the report's findings.

5. Conclusion – evaluation to inform design

DigVentures has subsequently gone on to refine and replicate the model launched at Flag Fen, leading 35 similar community excavation projects in the last five years, annually averaging approximately 1,000 participants, 3,000 primary school children and 15,000 open day visitors, delivering wide-ranging public activities alongside substantial programmes of archaeological research. The organisation's evaluation framework has been a crucial arbiter in scaling this model, with meta-analysis of pre- and post-experience surveys and independent audits ensuring impact progresses positively up the evidential scale. This work will be subject to forthcoming publications considering the implications for scholarship of a peer-to-peer collaborative platform approach, the ethics and impact of technology-enabled participation and a longitudinal study of several case studies elucidating the participatory scaffolding necessary for the successful outcomes (Wilkins in prep.). This approach has wider sector applicability, but with regards to current practice of evaluation of

public participation in archaeological projects, appears to run against the grain of conventional practice.

Ethnographic methodology of participant observation has been argued 'to hold the key to evaluating the sustainability and appropriateness of community archaeology in and for the future' (Simpson, Williams 2008, p. 87). Whilst the ethics of explicitly situating the nature of knowledge production are to be commended in this approach, the shortcomings of this mode of evaluation in community and public archaeology relate to a failure to capture whether the project had any negative effects, or what would have happened anyway in the absence of the initiative. Ellenberger and Richardson situate the 'increasing pressure to use evaluations' as a sector response to austerity and neoliberal economics in order 'to argue that archaeological projects are legitimate uses of economic resources' (2018, p. 65). They note that the 'use of impact metrics to measure the 'social, cultural and economic value' of academic work in higher education in the UK and elsewhere have emerged alongside governmental austerity agendas', questioning the potential negative repercussions 'with 'policy audit practices to garner legitimacy for demands over the public purse (irrespective of whether they, in fact, promote or muddle issues of transparency, democratic accountability and effectiveness)' (Ellenberger, Richardson 2018, p. 67, citing James 2018, p. 312, and Belfiore 2015, p. 96).

From this position, evaluation methodologies can be seen as a form of self-imposed policing: the burden of an overbearing audit culture subverting the capacity of practitioners to undertake socially engaged work. Richardson and Dixon go one step further still, rejecting the idea 'that the impact of our public engagement will only matter if we publish about it in any of those ways generally accepted as necessary for academic advancement' (2017, Section 3). The authors go on to assert that it is not 'for us, as the professional archaeologists involved in the establishment of the project, to interpret and make distinctions about evaluation and outcomes at the end-point of reception' (Richardson, Dixon 2017, Section 5).

Taking an opposing view, Gould argues that rather than play into a neoliberal agenda, 'only a concerted effort by archaeologists and cultural heritage professionals to define, refine, and promulgate methodologies that are effective – whether they originate in archaeology or in other disciplines – can address the [discipline's] ethical, practical, and financial issues' (Gould 2016, p. 15). This accords with Hewison and Holden's call to heritage organisations to 'shift their focus away from government towards the true source of their legitimacy, the public – a public that is be-

coming increasingly diverse' (Hewison, Holden 2014, p. 20). But this isn't an either/or proposition, and simultaneously arguing for the need to take the world on its own terms, they go on to argue that heritage organisations will 'continue to have to negotiate with government', articulating 'the intrinsic value of what it does, and demonstrate the beneficial instrumental outcomes that it generates' (Hewison, Holden 2014, p. 21).

Designed as a broad, inclusive and dynamic model that delivers discernible and measurable impacts, the tripartite division of the DigVentures evaluation framework – intrinsic dividends for site research and management, alongside wider instrumental benefits for participants and audiences – lends weight to the proposition that the same activity, output or outcome can be valued differently by multiple stakeholders. Or, to continue in Hewison and Holden's vein, by both the public and government. Just as participation in sports or the arts can help develop a range of instrumentalised skills such as building confidence or team working skills, these outcomes are intertwined with the intrinsic benefits of the artistic or sporting experience itself.

Separating these outcomes works as a heuristic device, but in a co-produced model the intrinsic benefits of a project (outcomes for heritage) are realised through activities that people want to participate in because it meets their individual needs (outcomes for people). Individuals may not be motivated by broader social considerations, but just as a social venture that enables people to save money on a heating bill could lead to a widespread reduction in the use of fossil fuels, the individual's actions lead to a wider societal gain (outcomes for communities). In an intentionally designed co-produced project model for archaeology, it makes no sense to think of 'primary' heritage outcomes or 'secondary' social outcome, or vice versa; the impact of the former is only fully realised through the latter, and vice versa.

The strength of the DigVentures evaluative methodology lies in its ability to direct future experimentation with technologically-enabled participation, elucidating the causal links between activity and change. This rises to Gould's call for a 'systematic, rigorous, and cumulative' methodology, with a framework designed to ensure that any claims made regarding the social impact of public participation are as substantively evidenced as conclusions about the past drawn from the excavation itself. The goal is to create a rapid feedback mechanism to help practitioners identify and then design down the barriers to participation, whilst increasing the quality of archaeological research.

Different aspects of a project, for instance outcomes for heritage, can be assigned a high degree of confidence that outcomes can be

tracked back to outputs, whereas the impacts relating to other aspects may be more complex and difficult to assign. This has enabled DigVentures to experiment with new service or product developments, applying the results of evaluative feedback to help refine and progress initiatives up the standards of evidence. It is based on a combination of deductive reasoning, where the security of conclusions relating to some forms of activity necessarily follow from the premise, and inductive reasoning where the truth or falsity is made more probable through the accumulation of confirming evidence – both source-side inferences and subject-side evidence (Wylie 1989). By tacking between evidential streams, this process can help to guard against the fallacy of affirming the consequent, both the overly optimistic, and overly critical negative framing, of technologically-enable participation with archaeology. This framework for measuring the social impact of public participation will hopefully be of use to practitioners who may also be interested in experimenting with crowd-based approaches, but are perhaps uncertain whether this will create undesirable social consequences or represent an improvement on existing provision.

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