

# Crowd- and Community-Fuelled Archaeology. Early Results from the MicroPasts Project

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## Abstract

*The MicroPasts project is a novel experiment in the use of crowd-based methodologies to enable participatory archaeological research. Building on a long tradition of offline community archaeology in the UK, this initiative aims to integrate crowd-sourcing, crowd-funding and forum-based discussion to encourage groups of academics and volunteers to collaborate on the web. This paper will introduce MicroPasts, its aims, methods and initial results, with a particular emphasis on project evaluation. The evaluative work conducted over the first few months of the project already demonstrates the potential for crowd-sourced archaeological 3D modelling, especially amongst younger audiences, next to more traditional kinds of crowd-sourcing such as transcription. It has also allowed a comparative assessment of different methods for sustaining contributor participation through time and a discussion of their implications for the sustainability of the MicroPasts project and (potentially) other archaeological crowd-sourcing endeavours.*

## Keywords

Crowd-sourcing, crowd-funding, Public Archaeology, online communities

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## 1. Introduction

MicroPasts is a web-enabled crowd-sourcing and crowd-funding project whose overall goal is to promote the collection and re-use of high quality research data via institutional and community collaborations, both online and offline. The MicroPasts model for participatory research should be seen in the context of recent developments in the field of Public Archaeology and in the practice of archaeological and heritage crowd-sourcing. Below, the aims and methods chosen to assess this model are discussed, together with the first results produced in the three months since the public launch of the MicroPasts crowd-sourcing website and forum. The final section of this paper then reflects more widely on some continuing challenges of archaeological crowd-sourcing and how these can be addressed.

### 1.1. Archaeology, Digital Technologies and 'the Public'

In the last few years, researchers in the field of Public Archaeology have urged a thorough review and consolidation of the theoretical and methodological approaches that can be applied to examine the multiple forms of the interaction between archaeology and society (see the discussion in Bonacchi 2014: 379, and a forthcoming issue of *World Archaeology* dedicated to Public Archaeology). A large part of these reflections have considered the impact of the rapidly changing media and communication landscape on the public's uses of archaeological resources for research and other purposes, as well as on their participation in heritage policing. Increasing attention

has been dedicated, in particular, to understand the potential of digital technologies for facilitating new, more collaborative and creative forms of public engagement with the human past (e.g. Bonacchi 2012; Richardson 2013). In parallel, in the area of archaeological science, researchers specialising in computational approaches to archaeology have addressed issues concerning open access and open data (e.g. Kansa et al. 2012; Lake 2012), sometimes also considering the wider implications of adopting these relatively novel practices for society at large, or specific online and offline communities (e.g. Beale 2012; Bevan 2012; Hole 2012). While investigating different aspects of the relationship between archaeology, new digital media (McQuail 2005: 38; Lister et al. 2009: 13) and citizens, these threads of research have ultimately had to confront (more or less explicitly) the question of the public value(s) of archaeology. By doing so, they have supported (and partly reflected) efforts made at national policy level to encourage the sustainability of heritage organisations and a more proactive social role for research institutions in a time of crisis. Expressions of these concerns by policy makers in Great Britain are, for example, the calls opened in 2013 by the UK Arts and Humanities Research Council (AHRC) for pilot projects and reviews intending to explore fresh ways of understanding the value of arts and culture, or to collaborate with galleries, libraries, archives and museums for developing and critically evaluating public engagement agendas.

## 1.2. Crowd-sourcing in Archaeology

In this broader context, crowd-sourcing, as a way of collecting information, services or funds in small amounts from large groups of people over the internet, has received growing attention from archaeologists as well as other cultural heritage professionals (Dunn and Hedges 2012). This method emerged less than a decade ago in the commercial sector, where companies had been looking for ways of ‘out-sourcing’ labour to potentially interested ‘crowds’ of workers around the globe (Howe 2006). Today, it is also being explored for not-for-profit purposes, for example as a means of conducting both science and humanities research, curating museum collections and managing heritage resources in collaboration with the public (see, for example, Oomen and Aroyo 2011; Dunn and Hedges 2012; Carletti et al. 2013; Ridge 2013). In archaeology more specifically, crowd-sourcing endeavours have spanned a wide array of activities, including the transcription of textual records (e.g. Ancient Lives project), the inspection of imagery for archaeological features (e.g. Field Expedition Mongolia), the interrogation of built architecture (e.g. Bodiam Castle Project) and the public recording of metal artefacts (e.g. Portable Antiquities Scheme), to name just a few.

Although increasingly popular, however, crowd-sourcing initiatives in archaeology have been primarily of a ‘contributory’ nature (Simon 2010; Oomen and Aroyo 2011: 139), inviting volunteers to offer their time, skills and experience to help with projects that had been designed entirely by ‘professionals’. Until now, the latter have largely sought help for transcription and geo-referencing processes requiring the completion of mechanical and editorial tasks (Dunn and Hedges 2012: 21, 36-37). In addition, a substantial number of projects have aimed at micro-financing (crowd-funding) archaeology. Being considered as a kind of crowd-sourcing by some commentators (Oomen and Aroyo 2011: 140) and rejected as such by others (Dunn and Hedges 2012: 6), crowd-funding is increasingly pursued to support a wide range of activities in the archaeological domain, spanning excavations, conservation, student dissertations or the production of documentary films. While the majority of these endeavours rely on ‘generalist’ commercial crowd-funding platforms like Kickstarter or Indiegogo, a minority use heritage-themed crowd-funding websites (e.g. CommonSites, DigVentures).

In summary, it seems that, until now, crowd-based methods have not been leveraged to encourage public involvement in the creation and use of archaeological information from the outset - in the sense of the “co-creative” projects described by Simon (2010). Furthermore, very little evaluative work has been conducted so far in order to investigate the motivations leading different people to engage with archaeological crowd-sourcing and crowd-funding, the ways in which volunteers participate, the value placed on these exercises by contributors and partner organisations, and their longer-term sustainability,

scalability and applicability beyond Anglophone countries. Amongst other goals, MicroPasts aims to address the two key concerns outlined above, by developing and evaluating a novel model for participatory archaeological research that utilises web technologies and crowd-sourcing.

## 2. The MicroPasts Model

### 2.1. Overview of the Project

MicroPasts is a collaboration between the Institute of Archaeology, University College London (UCL), and the British Museum, supported by the AHRC ‘Digital Transformations in Community Research Co-Production in the Arts and Humanities’ fund. This scheme was designed to facilitate research which proposes to draw on original digital methods for creating resources of enduring value to both academics and relevant communities. As part of the MicroPasts project, a website ([micropasts.org](http://micropasts.org)) was created where communities that are already established offline (e.g. archaeological and historical societies, groups of metal detectorists, etc.) as well as more ubiquitous online ‘crowds’ can participate in one or more of three activities in collaboration with ‘traditional’ academics. We hope that, while doing this, participants also progressively form new online communities of (general or particular) archaeological interest. Here we characterise a ‘crowd’ as largely anonymous and fleetingly involved, as opposed to a ‘community’ that is repeatedly involved, with clearer group consciousness and interconnectedness (Haythornthwaite 2009). The three activities that can be undertaken on the MicroPasts website consist of co-producing archaeological and historical open data via crowd-sourcing; designing new research agendas involving both volunteers and traditional academics; and crowd-funding some of these new collaborations that have been dreamt up collectively.

The first six months of the project were dedicated to developing a series of core open source web components through shared coding practices and version control using GitHub (<https://github.com/micropasts>). The forum ([community.micropasts.org](http://community.micropasts.org)) has been built using the Discourse discussion software<sup>1</sup>, which draws on Ruby on Rails, Postgres and Redis, while the crowd-sourcing site ([crowdsourced.micropasts.org](http://crowdsourced.micropasts.org)) relies on the PyBossa framework (code base: Python, Postgres, Bootstrap theme)<sup>2</sup>. Finally, the crowd-funding platform is constructed by modifying and extending the Neighbor.ly and Catarse<sup>3</sup> open source crowd-funding frameworks, which are built on Ruby on Rails, Postgres and Redis, and will (at least initially) use PayPal to process payments. Our aim is to encourage members of the public to first participate in crowd-sourcing and subsequently to get involved in the design of new projects and in crowd-funding.

We launched both the crowd-sourcing and forum components of the MicroPasts website on 16 April 2014,

1 See Discourse at <https://github.com/discourse/discourse>.

2 See Pybossa at <https://github.com/PyBossa>.

3 See <https://github.com/neighborly/neighborly> and <https://github.com/catarse/catarse>.

before the crowd-funding platform was completed. Our outreach strategy for the launch was articulated into two separate strands. The first consisted of tailored communications via email, talks and social media to reach our target audiences: archaeological and historical societies based in the UK, groups of metal detectorists and other ‘communities of interest’ connected to the partnering institutions (UCL and the British Museum). In order to attract an as yet unknown online ‘crowd’ potentially interested in archaeology, history, or (even) the digital methods that are used in the project, we drew instead on the joint action of the UCL and British Museum press offices, who contacted a number of local and national media outlets including newspapers, magazines, radio and TV broadcasters. As a result, news about MicroPasts circulated via the social media accounts of (amongst others) UCL, the UCL Institute of Archaeology, the British Museum and the Portable Antiquities Scheme, through mailing lists (e.g. the Museum and Computer Group, Heritage, the UCL Centre for Audio-Visual Study and Practice in Archaeology), numerous popular blogs (such as io9.com) and relevant websites (e.g. ICCROM, the Megalithic Portal, etc.). However, so far, the project has featured in very few magazines (e.g. Heritage Daily), and has received virtually no coverage from general media outlets with national or international reach.

## 2.2. Three Components: Crowd-sourcing, Crowd-funding and Co-design

The MicroPasts crowd-sourcing site was launched with just two initial types of applications, both focusing on British Prehistory and British Museum collections.

The first type involves archival transcription and geo-referencing tasks, while the second focuses on photo-masking to support 3D object modelling. By participating in archival transcription, volunteers can help digitise over 30,000 object cards that document Bronze Age metal artefacts found mostly in Britain from the nineteenth century onwards. These cards are part of the National Bronze Implements Index (NBII), an archive that was first developed around 1914 and has been housed at the British Museum since the 1960s. The NBII forms the first extensive catalogue of Bronze Age objects in Britain and Europe, and represents an untapped source of information about later prehistory. The cards are organised in numbered drawers by object type (e.g. spearhead, axe, sword, etc.) and find-spot (generally, county, town, and/or museum/private collection). Via crowd-sourcing, MicroPasts users transcribe object cards online and geo-reference the sites of discovery on a map powered by OpenLayers3 (Figure 1). By doing this, volunteers facilitate further research into the history of NBII (for example, by gaining information on the full geographic and chronological scope of its collections), as well as advancing existing knowledge of curatorial practices in Britain over the last century<sup>4</sup>. More importantly perhaps, this newly digitised resource will be invaluable for the study and comparison of Bronze Age objects, enriching the extensive Portable Antiquities Scheme’s (PAS) spatial database, which records metal artefacts discovered in England and Wales from 2003 to the present day. By combining these two databases, the MicroPasts project will complement the public-facing nature of the PAS as well as form potentially one of the largest digital archives on prehistoric metal objects anywhere in the world.

<sup>4</sup> See <http://finds.org.uk/info/advice/aboutus>.

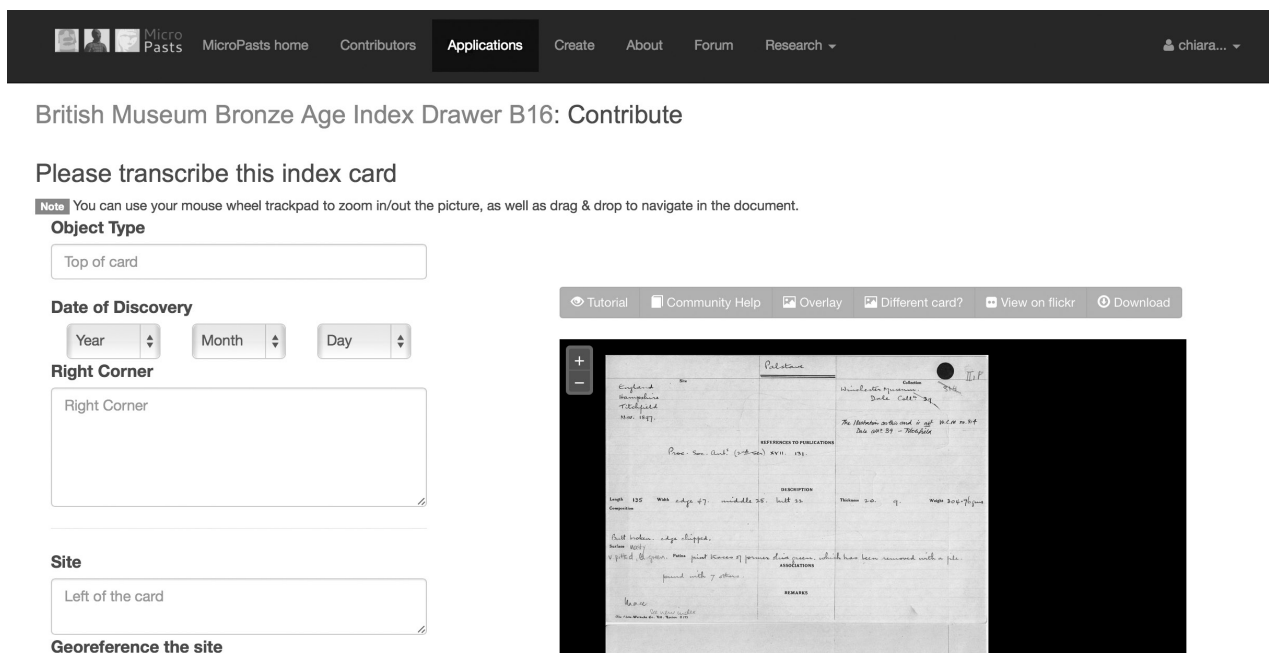


Figure 1: Interface of one of the MicroPasts transcription applications, showing the upper part of the form where data are entered by contributors (on the left), and the card that is being transcribed (on the right).

The second type of crowd-sourcing application involves ‘photo-masking’. Volunteers are invited to click around the outline of an artefact shown to them in a photograph. For each artefact, a set of at least 50 photographs that cover the object’s entire external surface (Figure 2) is captured. Via an increasingly popular method known as Structure-from-Motion, common features can be identified in overlapping photographs of the same object and these can then be used to build a high quality 3D model of the object (e.g. in archaeology, Dücke et al. 2011; Remondino et al. 2012; Verhoeven et al. 2012; Green et al. 2014). By drawing the outline of the object in each photograph, MicroPasts contributors allow us to ‘mask’ out the background and focus our model-building on the object only (Figure 3). This simple but important task considerably improves the quality of 3D models we can generate (Figure 4), and getting two contributors to mask each photograph makes it possible to check the quality of the results<sup>5</sup>. Currently, on the MicroPasts crowd-sourcing website, users can mask images for the creation of 3D models of Bronze Age palstaves and other metal artefacts that are recorded in the NBII archive. Once ready, large samples of models for similar objects will allow statistical shape analysis that is useful for rethinking artefact typologies (e.g. Bevan et al. 2014). On 2 July 2014 we also launched a new application, developed in collaboration with the Petrie Museum, to enable the photo-masking of an Egyptian funerary figurine, a shabti. Small-scale ‘pop-up’ applications of this kind are easy to implement, and while their role in a specific research agenda is often less clear-cut, they are usually proposed with aims of quality checking in mind, and allow diversifying the sub-types of crowd-sourcing applications and the range of participating institutions on the site (see the section 3.2.).

To offer opportunities for volunteers to learn more and develop further practical skills if they wish, we have developed a ‘Learning’ page on micropasts.org with a number of resources. These include step-by-step working notes explaining how 3D models can be created offline with different kinds of software, other aspects of method (for example concerning crowd-sourcing itself), and background information on the collections and on the geographic and chronological contexts with which MicroPasts is concerned. These resources can be discussed and enriched by volunteers via the forum, which is a space where contributors can debate how they would like the MicroPasts platforms and project to develop (Figure 5). At a more advanced stage in the production of crowd-sourced data, community.micropasts.org will also be useful to host open conversations on how the derived data produced by volunteers could support new research agendas. These newly co-designed archaeological projects will be able to seek funding via the MicroPasts crowd-funding website.



Figure 2: Photo-taking of Bronze Age implements at the British Museum. The images were then uploaded to Flickr and made available for photo-masking.

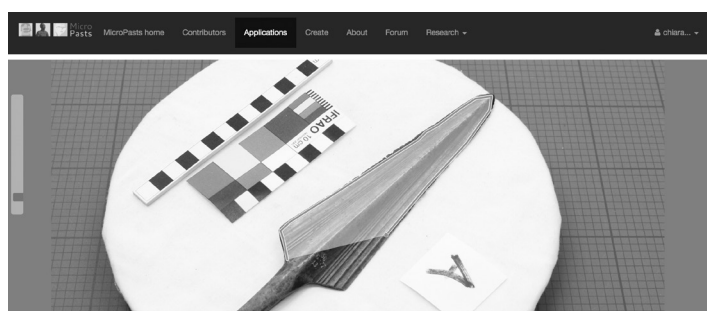


Figure 3: Outline drawing on one of the photo-masking applications.

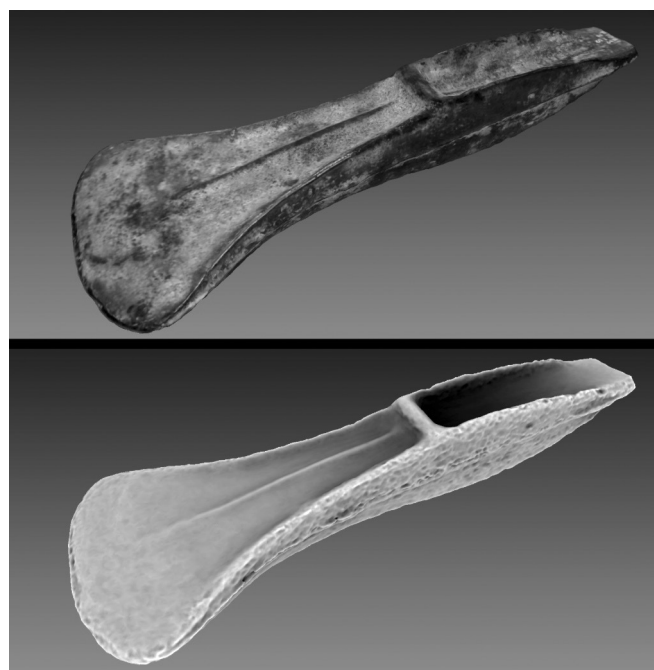


Figure 4: A 3D model of a Bronze Age palstave, shown both with a photographic texture and with an ‘ambient occlusion’ surface (for an online version visible in most browsers, see micropasts.org/3D/).

<sup>5</sup> The algorithm developed for quality validation purposes is stored on GitHub and is available at <https://github.com/findsorguk/MicroPasts-Scripts/blob/master/photoMasking.py>

Through the MicroPasts crowd-funding platform it is possible to raise funding for archaeological research projects not focusing on excavation and which have been developed jointly by mixed groups of academics and community partners, either on the MicroPasts forum or elsewhere. Teams of this kind are able to submit proposals indicating a minimum and a maximum funding goal (initially up to £5,000), aims and context of the collaboration as well as outcomes and digital outputs. The research findings from these projects will be made available online under open license. We are looking then to explore what rewards, beyond access to the final data, contributors really might wish to have from an archaeological project in exchange for financial support (e.g. direct participation, better access on special open days, participation in discussion with the project team, or something more traditional such as a T-shirt, a badge, or a book). Facilitating the crowd-funding of collaborations between academics and communities is also, ultimately, a way of opening up institutional doors to the public in a more structured and systematic manner, and of investigating the extent to which open access and open data can expand the already considerable impact of offline and local community archaeology, at least in certain countries such as the UK (Beale 2012).

### 3. Evaluation

#### 3.1. Aims and Methodology

The lead author of this paper has a particular research focus on evaluating: (a) the processes via which online communities of interest in the human past develop through the MicroPasts websites; (b) how these sites are used by different contributors to participate in archaeological and historical research and the value of this participation; (c) the likely longer-term sustainability of the MicroPasts model. To address these aspects and contribute to a wider discussion on the role of crowd-sourcing as a method for initiating and sustaining the co-production of science and humanities research, we draw on both quantitative and qualitative approaches, combining more traditional ‘digitised’ methods (e.g. online surveys) with ‘natively’ digital methods (i.e. methods that have not just been ‘transferred’ from the offline to the online world, but that exist exclusively online; see Rogers 2013), and offline ones (e.g. interviews). Throughout the project, information (anonymised where appropriate) will be collected on user motivations, behaviour, and socio-demographic characteristics. Not all of this information, however, has started to be collected yet or can be analysed at this early stage (as of 25 July 2014).

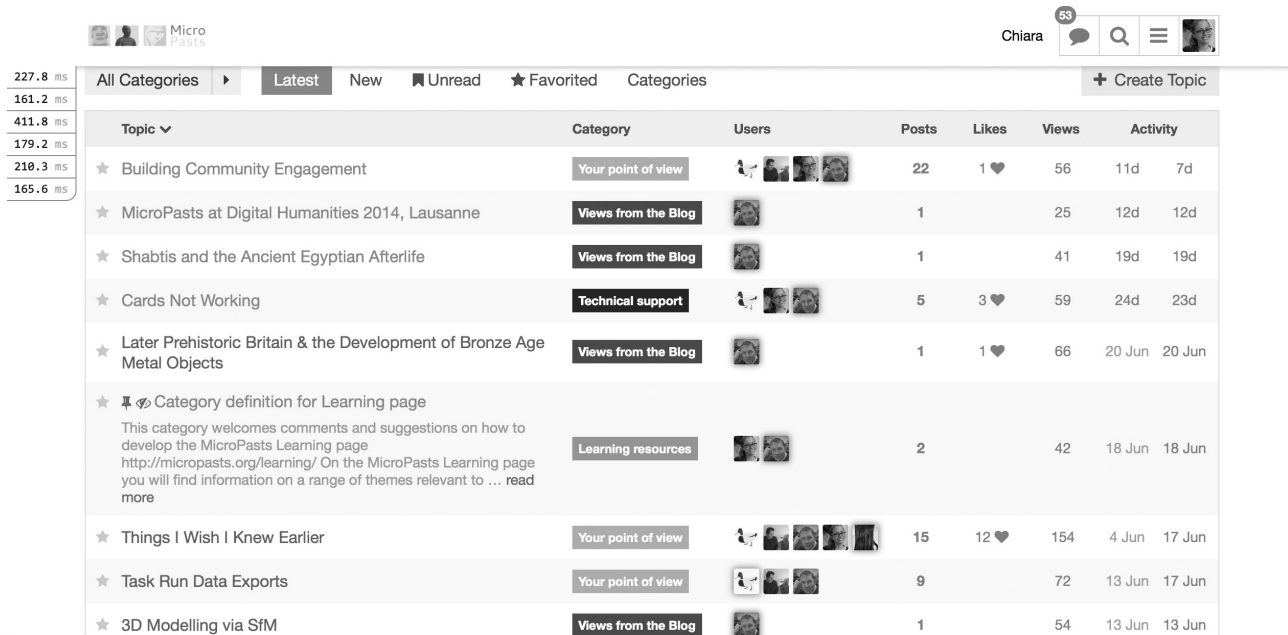


Figure 5: The MicroPasts community forum.

The discussion below moves on to consider how the MicroPasts volunteer society has formed so far, in what ways people have participated and, in the light of this, how sustainable the project might be (in this admittedly initial phase of its lifecycle). It draws upon 313 responses to an online survey that was coded in to pop up after the completion of the first crowd-sourcing task. The survey enquires about only three things via closed questions: how contributors have heard of MicroPasts<sup>6</sup>, whether they

“work with archaeology or history as part of their main job”<sup>7</sup>, and their age<sup>8</sup>.

6 How did you find out about MicroPasts? Tick ALL the options that apply. Options: 1. Via the Portable Antiquities Scheme; 2. Via British

Museum people/websites/social media; 3. Via University College London people/websites/social media; Via people/websites of another university (NOT University College London); Via an archaeological/historical society; From my school; I was told by someone who does NOT belong to any of the categories listed above; From an online newspaper/magazine; Casually, browsing the web.

7 Do you work with archaeology or history as part of your MAIN job? Please choose only ONE option from the list below. Options: No; Yes.

8 Your age: Please choose only ONE option from the list below. Options: 8-11; 12-17; 18-24; 25-34; 35-44; 45-54; 55-64; 65-74; 75+.

Other data that will be discussed are acquired via Google Analytics or extracted directly from the MicroPasts platforms. Finally, we will comment on the outcomes of an ad hoc survey emailed to three archaeological and historical societies who were introduced to the MicroPasts project through a talk (the Wiltshire Archaeological and Natural History Society and the Chess Valley Archaeological and Historical Society), or thanks to an email sent by British Museum curator Wilkin (to the Later Prehistoric Finds Group).

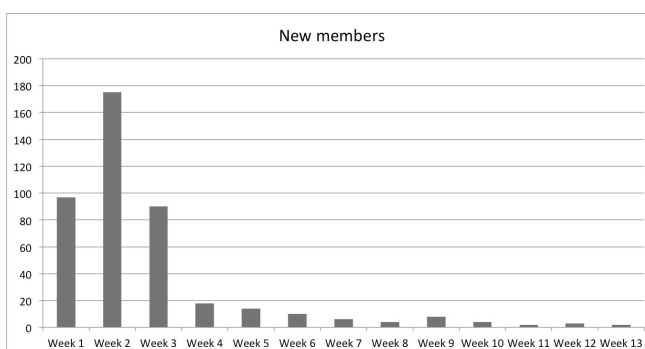
### 3.2. Initial Findings

A number of published articles and reviews have already commented on the kinds of citizen science groups that emerge from heritage crowd-sourcing, discussing their size, the level of interaction between participants and the nature of individual contributions (e.g. Dunn and Hedges 2012; Owens 2013; Proctor 2013; Ridge 2013, to name a few). These studies emphasise that, more often than not, 'crowd'-sourcing endeavours actually involve 'small' rather than 'very large' groups, and that most of the volunteers are already connected in some way to the institutions proposing the activities (e.g. Owens 2013; Proctor 2013). Despite being limited in quantity and mainly anecdotal, existing evidence suggests that archaeological crowd-sourcing has also tended to involve low numbers of (albeit often enthusiastic) contributors. This trend is apparent in the Ancient Lives and Bodiam Castle projects, as well as some web-based research collaborations engaging a handful of committed participants (e.g. the Durham Deanery project [Masinton 2014] - and the 'crowd-sourced' interpretation of LiDAR data presented in Duckers 2013).

As previously mentioned (section 2.1.), MicroPasts aims to further benefit, and benefit from, organised groups who are already pursuing archaeological or historical research offline, as well as a more dispersed and international 'crowd'. As of July 2014, after three months of operation, two main phases can be identified in the process of building a group of volunteers on crowdsourced.micropasts.org. The first three weeks saw a large number of people exploring the MicroPasts websites and registering as members of the crowd-sourcing site, in step with a flurry of news and publicity (Figure 6). By the end of the fourth week, however, as the initial publicity drive dropped off, sessions across all of the MicroPasts sites dropped as well, from 3,733 (sessions in the third week) to 1,381, and new membership rates tailed off to an average of just 7 new contributors per week. By this time, a previously large group of users based primarily in the UK and US, but also worldwide (as evidenced by Google Analytics) had transformed into a much smaller group of more active, regular volunteers. However, it is fair to say, that this latter group has mainly focused on completing the proposed tasks rather than using social media or the forum for wider discussion: for example, in the few cases where the forum was utilised by contributors, this was typically to raise technical issues. Hence, it is certainly not possible

to claim that a distinctively MicroPasts community (that talks amongst itself) exists yet, but that impression is not unlike the one noted by other heritage crowd-sourcing projects such as Transcribe Bentham (Causer et al. 2012: 14).

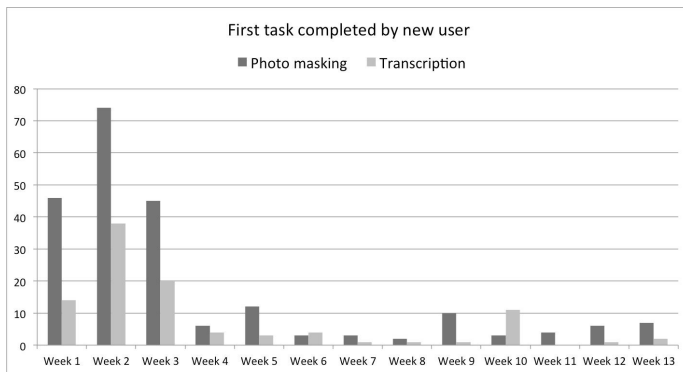
More positively, across both phases described above, MicroPasts has already managed to involve people who do not work with archaeology or history as part of their main job, with 71% of survey respondents falling into this category (see section 3.1.). However, only a very small proportion of these contributors belong to those already established communities of interest that we have been specifically targeting. No more than eight respondents out of 313 claimed to have heard of MicroPasts from an archaeological or historical society, and only 13 via the UK Portable Antiquities Scheme. In addition, only six members of the three archaeological societies who were invited to try MicroPasts and questioned about their experience via an ad hoc online survey actually submitted a completed questionnaire. Perhaps the limited take-up of MicroPasts amongst archaeological groups could be explained either in terms of a mismatch between the generally younger age of savvy users of digital technologies and that of societies' members, or due to these society members already getting their required access to archaeological activity offline. Regardless, the issue clearly requires further and closer scrutiny over a longer time period.



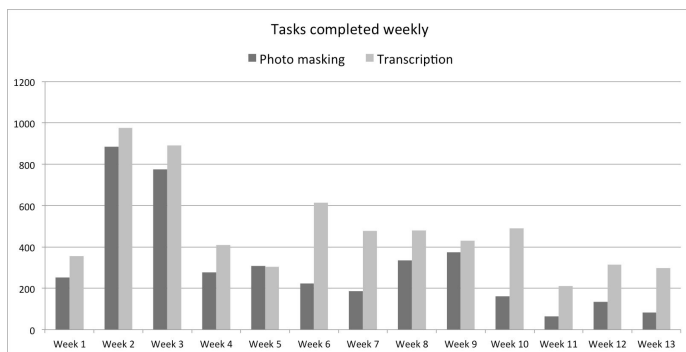
**Figure 6:** Number of contributors registering themselves as 'members' of the MicroPasts crowd-sourcing website every week. Week 1: 14-20 April 2014; Week 13: 7-13 July 2014.

For most volunteers, both anonymous and registered, participation in MicroPasts crowd-sourcing seems to start by trying out the photo-masking task (Figure 7). However, despite its initial appeal and the 'Learning' page and online 3D model viewer created to provide context and purpose to this kind of application, masking is soon abandoned by the majority of users and, overall, a greater number of transcription tasks than masking tasks are submitted (Figure 8). As shown in Figure 9, a handful of super-transcribers account for most of the transcription work, as frequently happens in crowd-sourcing projects (Holley 2010; Causer and Wallace 2012). Most probably, photo-masking holds people's attention for less time, because its purpose is less obvious, the end result (a 3D model) is not immediately produced, and the task is exclusively "mechanical" (Dunn and Hedges 2012: 36-37). Transcription also has a longer historical pedigree as

a task for skilled volunteers and therefore may seem like a more valuable kind of research to pursue. Notwithstanding these results, we should be careful before dismissing photo-masking too quickly, for example because there is a statistically significant difference between people under 35, who prefer these masking tasks, and those aged 35 and above, who are instead more active on transcription (Figure 10). The difference could be explained in the light of the stronger appeal of 3D modelling amongst younger volunteers and/or the greater popularity of transcription amongst older ones.



**Figure 7:** Number and type of 'first tasks' completed by a new user every week. Week 1: 14-20 April 2014; Week 13: 7-13 July 2014. The calculation is based on the number of responses to the survey appearing after the completion of a first task on [crowdsourced.micropasts.org](http://crowdsourced.micropasts.org).



**Figure 8:** Overall number of tasks completed weekly by anonymous and authenticated users. Week 1: 14-20 April 2014; Week 13: 7-13 July 2014.

Application	Total No. & kind of tasks	Min	1 <sup>st</sup> Qu.	Median	3 <sup>rd</sup> Qu.	Max
British Museum Bronze Age Index Drawer B16	968 tasks Transcription	1	1	2	5	564
British Museum Bronze Age Index Drawer B8	905 tasks Transcription	1	2	4	13.5	882
British Museum Bronze Age Index Drawer A9	1019 tasks Transcription	1	1	4	11	992
Photo Masking of British Museum Objects	1740 tasks Photo masking	1	1	3	9	1132
Photo Masking the Arreton Hoard	589 tasks Photo masking	1	1	2	8	55
Photo Masking Petrie Museum Shabti	110 tasks Photo masking	1	1	4	6	67
British Museum Bronze Age Index: Arreton Hoard	15 tasks Transcription	1	1	5	11	15

**Figure 9:** Summary statistics for all the transcription and photo-masking applications that have been available on the MicroPasts website until now.

The 'Min' and 'Max' columns indicate, respectively, the minimum and maximum number of tasks submitted by the same user for each crowd-sourcing application.

Cross-tabulation		Age		Total
Application type		12-34	35+	
Photo masking	Count	128	90	219
	Expected Count	115.7	102.3	219
	% within Application	58.7%	41.3%	100
	% within Age	78.0%	62.1%	70.9%
	% of Total	41.4%	29.1%	70.9%
Transcription	Count	36	55	90
	Expected Count	48.3	42.7	90
	% within Application	39.6%	60.4%	100
	% within Age	22.0%	37.9%	29.1%
	% of Total	11.7%	17.8%	29.1%

[ $\chi^2 = 9.458$  with 1 df;  $P = 0.002$ ].

**Figure 10:** Cross-tabulation between 'Age of contributors' and 'kind of first crowd-sourcing task completed' on MicroPasts.

Providing different kinds of applications probably makes the site look more diverse and interesting, but for now there is no evidence that greater variety in kind would lead to a significant increase in the number of tasks submitted by the same individual across more than one application type. For example, although most of the top 20 contributors in the leader board have explored both transcription and masking, they have in fact soon opted for one or the other (whilst still moving between applications of the same type). Hence, in the present state of our knowledge, it seems better (i.e. more effective in terms of responding to participants' interests) to increase the number of examples of the same kinds of application rather than provide lots of different types of applications, in order to sustain contributor enthusiasm through time and increase the completion rates of whole research projects.

A final comparison can be made between the completion rates of the four applications that were launched on 16 April 2014 and that of the Petrie Museum Shabti, which was made available to the public on 2 July 2014. In the case of the Shabti app, we tested a different crowd building strategy, consisting of launching an application with a low number of tasks, in order to create a 3D model of one artefact housed in a museum, whose help was also invoked to reach and involve new volunteers. The 110 tasks necessary to photo-mask the Shabti were completed in 13 days, meaning that an average of 8.5 tasks per day were submitted. This number is very similar to other applications (see Figure 11), suggesting that, even if applied systematically, this strategy of small, novel projects may not generate greater commitment from existing users. The result is in line with what was highlighted for example by Holley (2010): the greater the final goal of crowd-sourcing is, the more likely users are to perceive and pursue this as a common goal.

**Figure 11:** Completion rates for the four British Museum applications launched on the 16th of April 2014, compared to the smaller-scale Petrie Museum application launched on the 2nd of July 2014.

Photo Masking Petrie Museum Shabti	13 days for 110 tasks	8.5 average daily tasks
British Museum Bronze Age Index Drawer B8	92 days for 878	9.5 average daily tasks
British Museum Bronze Age Index Drawer A9	92 days for 815	8.9 average daily tasks
Photo Masking of British Museum Objects	92 days for 922	10 average daily tasks
British Museum Bronze Age Index Drawer B16	92 days for 687	7.5 average daily tasks

#### **4. Conclusions**

The MicroPasts project is the first to experiment with the use of crowd-based methodologies to enable a joint “contributory”, “co-creative” and “hosted” approach (Simon 2010) to participatory archaeological research. Building on the long tradition of offline community archaeology in the UK, this initiative is aiming to integrate crowd-sourcing, crowd-funding and forum discussions to facilitate the formation of a cohesive group (no matter how large or small) of academics and volunteers collaborating on the web. The current phase in the project lifecycle is not advanced enough to allow a measurement of the impact of the model on archaeological practice and heritage funding policy (not least because the crowd-funding platform has not been completed yet). However, the evaluation conducted so far already provides insights that are useful not only to inform the future development of MicroPasts, but also (beyond the specific case study) to support others who might consider crowd-sourcing as a means of fostering ‘citizen archaeology’.

The discussion of initial findings has revealed how the emergence of an interconnected online community is proving to be a challenge for MicroPasts, as for other crowd-sourcing projects in the cultural heritage and science domains in the past. It is to be expected, however, that time and the activation of the crowd-funding website will help overcome this issue, as volunteers become progressively more confident in the use of the platform and able to see (and comment on) the research outputs produced thanks to their commitment (cfr. the Old Weather project). In addition, successful crowd-funding bids, we hope, will lead to the development of new crowd-sourcing applications and it is our hypothesis that the latter will receive the attention of their donors, a (most probably large) part of whom will already have links with one another offline (e.g. being members of the same archaeological group).

An early assessment of the MicroPasts project also made clear the potential for archaeological 3D models based on crowd-sourced data, especially amongst younger audiences. Novel applications supporting the creation of 3D models of artefacts seem to be worth pursuing, next to those that have a more established tradition (e.g. transcription), as long as the notion of these tasks supporting a clear research agenda can be upheld. However, it will be necessary to study ways of enhancing the current photo-masking exercises proposed by MicroPasts in order to increase the extent to which this application is perceived as worthwhile by volunteers and (as a result) the overall duration of contributors’ engagement with masking. More generally, a method for sustaining volunteer participation through time, particularly for crowd-sourcing undertakings with limited time and financial resources secured from the outset (such as MicroPasts), is to focus on diversifying the content and examples of a same kind of application. Analysis of MicroPasts volunteer behaviour so far is instead suggesting that offering a variety of crowd-sourcing types on the same platform is not an effective

strategy to respond to contributors’ interests and increase completion rates of whole projects. Sustainability, together with the quality of the research data generated and the value assigned by volunteers to their participation, will be measures of the future success of the MicroPasts platform, but also of the adoption of a Public Archaeology approach for a more open and active role of archaeological research institutions in contemporary society.

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