# DELIVERABLE

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## D2.2 Key characteristics and requirements of e-Infrastructure for citizen scientists in digital culture

**Revision: FINAL v1.0**

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This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

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# EXECUTIVE SUMMARY

This deliverable summarises key characteristics and requirements of e-Infrastructure for citizen scientists in digital culture as identified in previous research and implementation work outside the Civic Epistemologies project and with the expert input gathered in focus groups and web questionnaire within the project. The web questionnaire was not initially included in the Description of Work but had been added as a useful component to survey the wider professional community.

The aim of this deliverable is not only to identify requirements, but also to start building a picture which of those requirements are key for the various stakeholders addressed by the project (**cultural heritage (CH) institutions, e-Infrastructure providers, academic institutions, citizens activist organisations**). The previous discussions of the project identified as relevant stakeholders funders and media but they are not addressed in detail here since they were not included in the work on requirements gathering and for them citizen science cannot be defined as core activity.

According to the initial work on the Roadmap, the requirements also address the following three stages of citizen science projects: **preparatory**, **deployment**, and **monitoring**.

This deliverable builds on the work done within D2.1, D3.1 and D3.2 version 0.3

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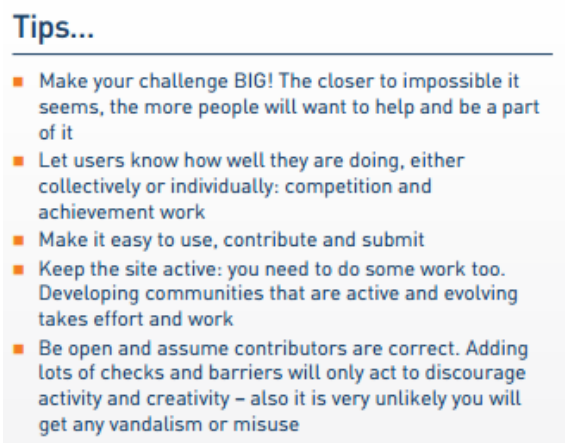


*"Capturing the Power of the Crowd and the Challenge of Community Collections", JISC, 2010*

# 1. INTRODUCTION

Citizen science is a contemporary reinvention of some research practices of the past when 'unprofessional' researchers contributed to scientific projects led by academics; a worth-noting peak of research undertaken in this paradigm had been observed in the 19th century. In the 21st century, citizen science mostly resides in digital environments and depends upon e-Infrastructures which not only provide citizens with access to research data management, but also play the role of novel scientific communication tools aiming to engage and support citizens in their research contribution.

The Green Paper on Citizen Science commissioned by the EC (2013) defines citizen science as "general public engagement in scientific research activities when citizens actively contribute to science either with their intellectual effort or surrounding knowledge or with their tools and resources".

*Citizen science* is often used as a synonym for *crowdsourcing*. Indeed, there are significant similarities in both domains, including the participation of the citizens and the technological infrastructures used. The use of the term "Citizen science" however is justified when the effort involving citizens is aiming a research project guided by an academic. When we consider the digital cultural heritage domain, crowdsourcing is still more popular and as a form which can be used to understand better the patterns of engagement, tasks for volunteers and benefits, our work on requirements included crowdsourcing as a more familiar concept.

Indeed, the practice of involving citizens in research in domains such as astronomy, lexicography and biology was well established in the 19th century; the phenomenon is currently studied in depth within the AHRC-funded project 'Constructing Scientific Communities: Citizen Science in the 19th and 21st Centuries' (2014) based in the Universities of Oxford and Leicester in the UK; sometimes these practices are called "proto-crowdsourcing" (see Ridge 2014, p. 5 – however all historical examples provided by Mia Ridge can in fact be considered citizen science in the sense that the contribution of volunteers is coordinated and integrated into a research activity by an academic or curator). One example of a long-running study integrating citizen science is the Christmas Bird Count

(n.d.) which started in 1900 and is still continuing; this effort aims to gather data on amounts and types of birds across different geographic areas and involves volunteer birdwatchers. Yet another wide-ranging effort is the creation of a dictionary of Mediaeval Latin which took 101 years to complete. This project produced seventeen lexicographic volumes the first of which was published in 1975 and the last one in 2013; however the contribution on them launched as early as in 1913 (Coughlan, 2014).

The advancement of ICT, Internet and mobile technologies opens new prospects for bringing together different communities unified by their interest to contribute to research. This resulted in a rapid growth of the citizen science initiatives around the globe, and subsequently in an increased body of academic publications discussing various aspects of it as demonstrated in (Dobreva, Azzopardi 2014). The current technological infrastructures facilitate two dimensions of citizen science: *scale* and *substance* of tasks performed. The current social media culture makes it easy to bring together big groups of people but also the modern technology offers mobile devices and a wide range of tools which could engage citizens in a variety of research-related tasks. Thus it is not coming as a surprise that the number of projects experimenting with citizen involvement across various sciences constantly grows. The most typical scenario is the one of citizens directed by professional researchers in studies which revolves mostly around observation of natural phenomena and notation in multiple locations or across longer time spans.

The interest to such projects grew to the extent that specialised platforms which allow to define research tasks and involve users had been created; e.g. Zooniverse (Smith et al., 2013), Curio Law et al., 2013), and CrowdCrafting (2013) developed in a collaboration between the Citizen Cyberscience Centre and the Open Knowledge Foundation (OKF). These platforms are used for research in different domains, but mostly in the Sciences with few implementations in the Humanities.

However, the spread of citizen science across domains is uneven. For example checking the numbers of projects offered on CrowdCrafting in the end of 2014 and 3 months later, it is noticeable that there is a very fast growth of the projects in the social science domain. Humanities mark growth but the number of such projects is considerably smaller than Science and Arts projects. Digital cultural heritage is closely connected to Humanities and a logical question is why Humanities are not using citizen science more actively?

This question is a complex one to answer and one of the possible approaches is to understand better what are the expectations and requirements of various stakeholders and users. This is the major goal of the work presented in this deliverable. Addressing the vibrant field which reinvents an older research practice open to wider contributions of the citizens, it seeks initial insights into questions which still need deeper research insight and can trigger adequate policy measures within the roadmap effort of the Civic Epistemologies project.

This deliverable is structured as follows: Section 3 explores requirements identifiable in the research literature produced outside the project. Section 4 adds the outcomes of the user studies within Civic Epistemologies. These are followed by conclusions.

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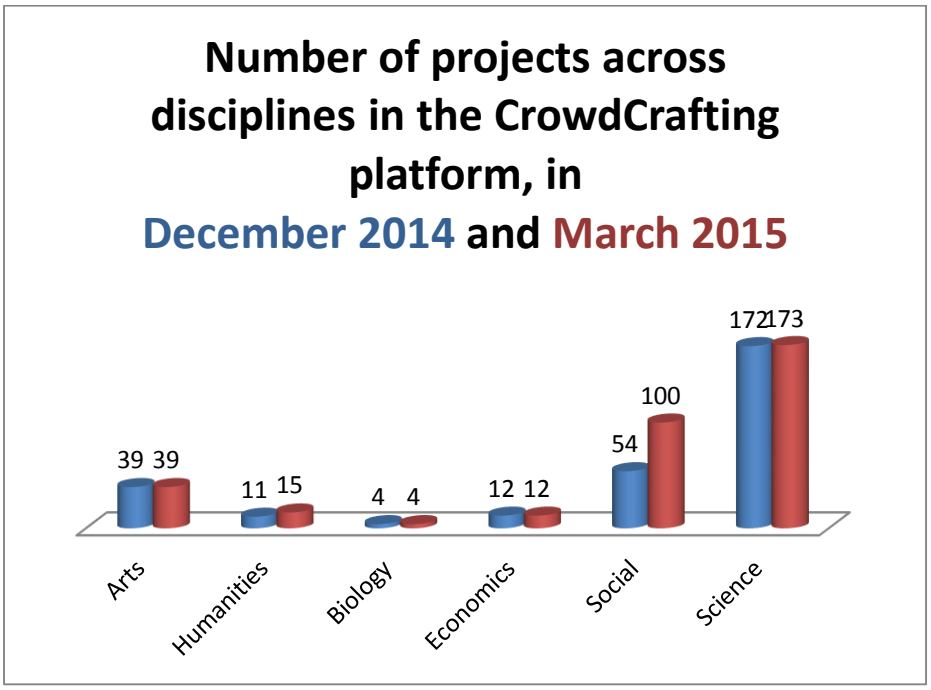


*Figure 1. Dynamics of numbers of citizen projects*

The characteristics and requirements related to various stakeholders are colour-coded in order to facilitate the reader as follows:

- CH institutions
- E-Infrastructure providers
- academic institutions
- citizens activists' organisations

Whenever possible, the stages when a certain requirement has to be considered (preparatory, deployment, monitoring stage) are also highlighted using the following symbols: ❍ for preparatory, ⊙ for deployment and ● for monitoring stage.

The most substantial part of the analysis is focused on CH institutions and e-Infrastructure providers; this is due to the fact that to some extent academic and citizen activists' organisations have more freedom of involvement while the heaviest burden on implementing citizen science in the DCH domain is on the first two types of stakeholders.

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# 2. REQUIREMENTS IDENTIFIED IN SCIENTIFIC BODY OF KNOWLEDGE

## 2.1 CITIZEN SCIENCE AND CROWDSOURCING IN CH INSTITUTIONS

Although the application of citizen Science in the field of Humanities has been less common than in the sciences, there are a number of examples of crowdsourcing projects which recently had been presented in an edited collection (Ridge 2014) and in overview of activities in the British Library (Ellis, 2014). The chapter in Mia Ridge's collection presenting the experience of the Welsh National Library (Dafis, Hughes, 2014) mentions citizen science but again within the context of crowdsourcing activities. In this section we will be looking at major characteristics of crowdsourcing in the DCH taking them as an inspiration for citizen science initiatives.

Recently, Noordegraaf et al (2014). suggested a model for crowdsourcing in the CH context which explores six pillars: institution, collection, goal, crowd, infrastructure, and evaluation (see Fig. 2). The rationale is that considering crowdsourcing should start with the major institutional dimensions (listed under *Institution*), then be narrowed down looking at the *Collection* pillar, and so on. One point of critique to this model is that the visual presentation can be confusing for some readers, the items below one category form the pillar, but there is no obvious horizontal connection between the components, as the table layout suggests.

| Institution | Collection | Goal | Crowd | Infrastructure | Evaluation |
|---|---|---|---|---|---|
| Institution Type | Medium | Beneficiaries | Characteristics | Complexity of Task | Qualitative Measures |
| Culture of Digitization | Size | Task Type | Training | Evolution of Task | Quantitative Measures |
| Budget | Complexity | Timeframe | Attracting Participation | Level of Scaffolding | Incorporation of project results into collection |
| Intellectual Property Rights | Appeal | Accuracy | Sustaining Participation | Generic Platform or Devoted Project Site? | Incorporation of project findings into workflow |

*Figure 2. The model proposed in Noordegraaf et al. (2014)*

Another possibly confusing point is who exactly from the various possible stakeholders should be in charge for various [components of] pillars. With these remarks it is informative to see the items identified by the authors of the model. It is worth noticing the components of the Infrastructure pillar which include complexity of the task, evolution of the task, level of scaffolding (identified as "limitation in variability in response (through the implementation of pull-down menus rather than open-text fields, for instance)", and generic platform or devoted project site). The authors summarise:

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> *"Therefore, the infrastructure of a project must be designed with concern for the variables […] the complexity of the task being asked of the crowd, whether it can be broken down further into components, whether or not the user interface should be scaffolded to encourage members of the crowd, and whether a generic platform should be used to host the project are all questions that arise in the design of the project infrastructure."* (Noordegraaf et al. 2014)

One should bear in mind that the specific solutions are still quite volatile and there are more questions then answers particularly in the CH domain:

> *"How can our tools act as scaffolds to help make the most of user efforts? What expertise can we embed inside the design of our tools to magnify user efforts? How can our tools put a potential user in exactly the right position, with the right knowledge, just at the moment he or she needs it, to accomplish a given activity?"* (Owens 2013)

However, we could translate into requirements relevant to our suggested stakeholders the following dimensions of the pillars:

- *CH institution should be familiar with digitization projects (1, ❍)*
- *CH institution should be able to resolve right concerns related to the citizen science project (2, ❍)*
- *CH institution should be able to plan, obtain and maintain the budget necessary for the citizen science project (3, ❍, ⊙, ●)*
- *CH institution should be familiar with characteristics of the targeted crowd. (4, ❍, ⊙, ●)*
- *CH institution should be able to train the members of the crowd for the citizen science task. (5, ❍, ⊙)*
- *CH institution should have the capacity to attract citizens. (6, ❍, ⊙)*
- *CH institutions should be able to sustain the citizen community involved in the project. (7, ❍, ⊙)*
- *CH institution jointly with the e-Infrastructure provider should identify the most useful workflow. (8, ❍, ⊙)*
- *CH institution should be capable to identify and apply quantitative and qualitative evaluation metrics to follow the development of the project. (9, ❍, ⊙, ●)*
- *CH institution should have the capacity to incorporate the project outcomes into its collections or their digital presentation, depending on the nature of the project. (10, ❍, ⊙, ●)*
- *CH institution should be capable to provide feedback on the workflow to the e-Infrastructure provider. (11, ●)*

Here we should add two caveats:

3. Crowdsourcing in the context of the publication of Noordegraaf et al. (2014) focused on digitisation; in the citizen science domain. In general the competences of CH could be different. Thus the first requirement could be generalised as follows:

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- *CH institution should have sufficient experience to advise on the tasks within the citizen science projects (1, ❍)*

4. Many of those requirements assume capacity within the CH institution as a lead, but for some of them it can develop useful partnerships with other stakeholders (academic institutions, citizen organisations) for the requirements 3, 4, 5, 6, 7, 9, 10 above.; these could be summarised as:
   - Academic institutions should develop and brand their competences related to citizen science initiatives implemented by CH institutions. *(1, ❍, ⊙, ●)*
   - Citizen organizations should consolidate and brand their competences related to citizen science initiatives implemented by CH institutions. *(1, ❍, ⊙, ●)*

   The following requirements to citizen science e-Infrastructures are emerging:
   - *Citizen science e-Infrastructure should take into account complexity of the task. (1, ❍)*
   - *Citizen science e-Infrastructure should address how the task(s) can be broken down into components. (2, ❍)*
   - *Citizen science e-Infrastructure should reflect scaffolding of user interface. (3, ❍)*
   - *Citizen science e-Infrastructure should be chosen to reflect the best solution in terms of generic platform or the design of a designated project infrastructure. (4, ❍)*
   - *Citizen science e-Infrastructure provider should be able to support CH institution in the implementation of suitable evaluation metrics. (5, ❍, ⊙, ●)*
   - *CH institution jointly with the e-Infrastructure provider should identify the most useful workflow. (6, ❍, ⊙)*

Other research publications provide additional insights into citizen science applications in DCH. As we discussed earlier, crowdsourcing is not necessarily aimed at research activities but is familiar to many cultural heritage institutions and can be used to explain how citizen science projects can be organised in real life practice. The work of Burgoyne at al. (2013) informs another characteristic of e-Infrastructures:

- *The outcomes of identical or similar e-Infrastructures in different cultural settings (e.g. countries) can result in different scales of uptake. (7, ❍, ⊙)*

This might be a surprising observation but it is based on the evidence that a similar game implemented in the Netherlands and the UK achieved citizen engagement of completely different scale which can not be simply explained with the difference in population in both countries; apparently there would be a longer process of discovery what technological solutions are preferred by citizens which will be informed by other e-Infrastructural work.

We would like to conclude this section with an observation that emphasizes on and deepens the insight into knowing the citizens who would be potentially able and willing to contribute to citizen science projects.

> *"This is one of the places where libraries, archives, and museums have the most to offer. As stewards of cultural memory, our institutions have a strong sense of purpose and their explicit mission is to serve the public good. This notion of motivation prompts*

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*further key questions for projects: Whose sense of purpose does this project connect to? What identities are involved? What kinds of people does this project matter to? And how can we connect with and invite the participation of those people?"* (Owens 2013).

In its own way, this observation continues the following requirements (numbers 6 and 7 below) already identified with a new one in the spirit of the application of the business model canvas of (Osterwalder, Pigneur, 2009) in the CH domain:

- *CH institution should have the capacity to attract citizens.* *(6, ❍, ⊙)*
- *CH institutions should be able to sustain the citizen community involved in the project.* *(7, ❍, ⊙)*
- *CH institutions should have a clear value proposition for the types of citizens they seek to engage in their citizen science initiative.* *(12, ❍)*

## 2.2 TYPICAL TASKS FOR CITIZENS IN THE GENERAL AND THE CH CASES

While we were not able to identify larger-scale surveys on citizen science applications in cultural heritage institutions, such work was systematically done in the last years by Angela Wiggins and Steven Crowston from the Syracuse University in the USA. Wiggins and Crowston (2012a and 2012b) summarise results from 63 surveys completes as a result of 840 emailed requests for participation which were used to create 128 project profiles.

The range of activities to which unprofessional researchers contribute in citizen-science projects as suggested by Wiggins and Crowston (2012b) include the following:

1. Define question
2. Gather information
3. Develop hypothesis
4. Design study
5. Data collection
6. Analyse sample
7. Analyse data
8. Interpret data
9. Draw conclusions
10. Disseminate results
11. Discuss results and ask new questions

Those activities assume different levels of creativity. The tasks of transcribing historical letters or providing geolocations would normally be considered to be quite trivial and are from the contributive type of citizen involvement in the CH domain as defined in (Bonne, 2009). Thus one research question for the future is how citizens involved in Humanities research could contribute to creative rather than trivial tasks?

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In their further study (Wiggins and Crowston 2015) revise the granularity of their previous classification of activities and arrive to the following structure of activities:

> *"The main research activities open to participation in the responding projects were observation, data entry, and species identification. This reflects the fact that most of the responding projects focused on data collection, frequently for observational data. The next most common tasks were measurement, site selection and/or description, and photography. These tasks are specific to certain types of field-based participation that can also include observation.*
>
> *Additional activities reported by respondents were diverse, primarily scientific tasks related to specific project requirements, and occasionally tasks related to stewardship and communication. These participant activities aligned with some of the primary goal areas discussed earlier.*
>
> - *Scientific tasks*
>   - *Posing new questions, literature reviews, paper writing, etc.*
>   - *Videography*
>   - *Monitoring*
>   - *Insect rearing*
>   - *Identifying animal tracks*
>   - *Creating maps*
> - *Stewardship*
>   - *Organization and landowner coordination*
>   - *Manual labor, habitat construction, shell recycling*
> - *Communication*
>   - *Communication with other participants and with scientists*
>   - *Sharing observations and findings at meetings of related groups."*
>
> (Higgins and Crowston, 2015)

Fig. 3 represents their original figure illustrating the typical tasks citizens are performing, based on the analysis of 77 completed surveys.

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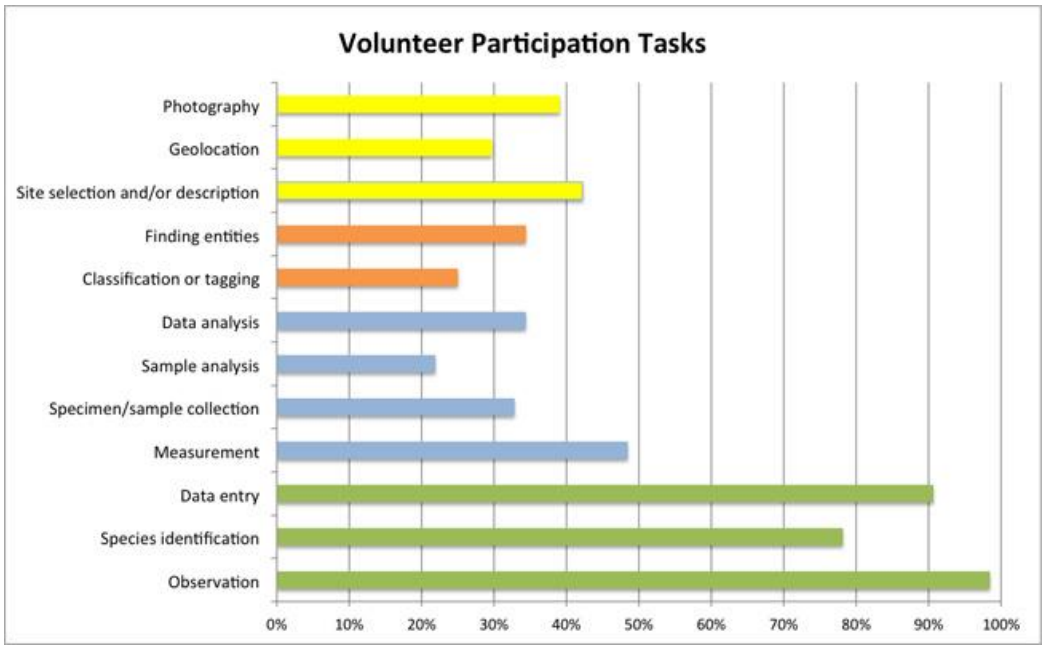


*Figure 3. Volunteer participation in scientific work tasks, with observation tasks in green, measurement tasks in blue, content processing tasks in orange, and site-based observation tasks in yellow. [Fig. 1 from (Wiggins and Crowston, 2015)]*

It is very informative to explore the evolution of the concept of activities and tasks in the works of Wiggins and Crowston as well as to compare their list of activities with proposal from the CH and Humanities domains.

A popular classification of typologies of crowdsourcing projects in the CH domain had been made by Oomen and Aroyo (2011). They suggest six different typologies of projects, each one linked to a different kind of study, and respectively tasks:

1. Correction and transcription – the citizen is given access to a database (this is usually a text-based database like scanned manuscripts) and then he gets the task of transcribing or making corrections to the text which was already transcribed electronically via a computer programme.
2. Contextualization – Citizens submit data such as letters, stories, films, photographs or other documentary material in order to gather a meaningful context.
3. Complementing Collection – Citizens are asked to add data into databases with the ultimate aim of completing them or making the collection grow.
4. Classification – Citizens tag the data, or label it, in order to easily group similar data and make the information more easily retrievable in the future.
5. Co-curation – This practise occurs mostly with projects involving the aesthetic arts. Citizens interact with institutions and voice their opinions when it comes to choosing articles or items for publication.

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6. Crowdfunding – Citizens are asked to gather together money and/or resources in order to support efforts initiated by others. Popular platforms used specifically for this purpose are: Kickstarter (https://www.kickstarter.com/) and Indiegogo (https://www.indiegogo.com/).

A different approach is proposed by Tobias Blanke and Mark Hedges (2013) within the context of Humanities e-Science; while their paper is not focused on citizen science it identifies some typical scenarios and illustrates how all of them are integrating a number of scholarly primitives, namely collecting, discovering, comparing, delivering, collaborating. While it would require an additional study to justify the use of the same or different set of primitives in citizen science, this is an approach which introduces different levels of granularity with the primitives as the smallest building blocks of more complex activities.

Such an approach might be particularly helpful within the DCH domain, because e-Infrastructures could concentrate on developing services which would implement such lowest level primitives. However this to the best of our knowledge has not been developed and implemented yet.

- *CH institutions should decide early on the granularity of tasks where citizen's contribution will be expected.* *(13, ❍, ⦿)*
- Academic institutions could boost the development of citizen science by furthering research on citizens' tasks and their granularity in the CH domain. *(2, ❍)*
- Citizen activists' organizations could promote most popular tasks which are still low in uptake in citizen science initiatives. *(2, ❍)*
- *e-Infrastructure can explore the feasibility of offering 'citizen science primitives' services within typical CH scenarios.* *(7, ❍)*

## 2.3 ADDITIONAL CONSIDERATIONS

The academic and practitioner publications offer in addition a number of considerations on other aspects of citizen science applications in DH.

### Realistic expectation on size of the crowd

*The 'size of the crowd' contributing to particular initiatives in the CH domain differs significantly. As the introduction of Mia Ridge (2014) demonstrates there are projects which attract hundreds of thousands of contributors. However, there is as well the opinion that huge involvement is not the critical success factor when volunteers are contributing to CH initiatives:*

> *"The most successful crowdsourcing projects in libraries, archives, and museums have not involved massive crowds and they have very little to do with outsourcing labor. The term "crowd" is somewhat misleading, since most successful crowdsourcing projects do not rely on large, anonymous masses of people.*
>
> *These projects succeed by inviting participation from engaged members of the public. The success is built upon a long-standing tradition of volunteerism and involvement of citizens in the creation and development of public good."* (Owens 2013).

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Furthermore, it is essential to under-stand what is the **motivation** of citizens to contribute to such projects. Some initial research on the motivation in citizen science projects in biodiversity had been done in Rotman et al. (2012) but detailed studies in the Humanities-related citizen science initiatives are still lacking.

We can translate these observations into the following characteristics and requirements:

- *CH institutions need to have an idea of minimum necessary involvement and implement suitable incentives to create long-term relationships with engaged public members. (14, ❍)*
- Academic institutions and especially information behaviour scientists could help with more extensive motivational studies of volunteers in CH initiatives. *(3, ❍)*
- Citizen activists' organizations could establish and support throughout citizen science projects communities of contributors. *(3, ❍, ⊙)*
- *e-Infrastructures could implement suitable tools supporting volunteers; it could be expected that these will be cross-fertilised with personalisation technologies. (8, ❍, ⊙)*
- *e-Infrastructures should implement analytics which could help to analyse what causes volunteers to stop their contribution (complexity of tasks; repetitiveness, or other factors). (9, ❍, ⊙, ●)*

### Expectation on tasks and importance of engagement

The granularity of tasks had been already discussed in Section 2.2; further essential characteristic of the task in the CH domain is to what extent they are engaging for the participants:

> *"It isn't about Sisyphean tasks; it is about providing meaningful ways for the public to enhance collections while more deeply engaging and exploring them." (Owens 2013)*

Possibly tasks which appear either too overwhelming or boring would disengage participants very quickly but it is a complex question what are the individual interests, knowledge and perseverance of individual contributors. One interesting recent example of an individual citizen science project was the work done by a single volunteer from Australia who painstakingly entered the data from over 50.000 digitized passport applications from the National Archives of Malta thus creating a database which is now used for various historical and sociological research tasks, in particular in Maltese diaspora studies (Caruana 2015). May be this could be taken as one rare or extreme case of long-term individual engagement, which constitutes a huge contrast with the notoriously difficult attention capture of the "google generation". However citizen science should offer ways for engagement of volunteers of different personal profiles and for the time being the mechanisms for assisting longer engagement are mostly tried but need further research.

The following characteristics and requirements for the main stakeholders addressed in this deliverable can be formulated based on the considerations presented above:

- *CH institutions and the intermediaries involved in citizen science projects should be familiar with main attractors and factors helping engagement. (15, ❍, ⊙)*
- Academic institutions could extend the understanding of longer-term engagement of different profiles of volunteers. *(4, ❍)*

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- Citizen activists' organizations could help with getting insights on factors contributing to longer-term engagement of volunteers. *(4, ❍)*
- *e-Infrastructures could pay special attention to solutions which help engagement (or at least do not contribute to disengagement, e.g. too complicated or confusing interfaces).* *(10, ❍)*

### Validations of contributions

The aspects of quality of contributions of citizen scientists are one of the key debate topics in the general body of research publications on this topic. Mia Ridge mentions this as one of the issues faced by crowdsourcing projects:

> *"Accepting contributions from members of the public for inclusion in collections documentation and other information systems has always raised issues about how to validate those contributions. … the ability to track data provenance computationally and verify remediated primary sources is particularly important for scholarly projects."* (Ridge, 2014:5).

The topic of quality of contribution is also discussed by Johan Oomen and Lora Aroyo who summarise that

> *"a combination of technological and interaction aids, psychology principles and community building rules can help to (1) establish behavioural norms, (2) build an image of the desired quality of content, and (3) filter or correct erroneous information."*
>
> (Oomen and Aroyo, 2011:147).

These observations can be translated into the following characteristics and requirements:

- *CH institutions should define image of the desired quality of volunteers' contributions to citizen science projects activities.* *(16, ❍)*
- *CH institutions should monitor the quality issues and revise accordingly workflows adopted within particular projects.* *(17, ❍, ⊙, ●)*
- Academic institutions and especially information behaviour scientists should advance in modelling behavioural norms for various types of volunteer contributions. *(5, ❍)*
- Citizen activists' organizations should advocate aspects of quality of voluntary contributions and most typical issues related to quality. *(5, ❍, ⊙)*
- *e-Infrastructures need to integrate tools which help to filter or correct erroneous inputs by volunteers.* *(11, ❍, ⊙)*
- *e-Infrastructures should test and make available tools for verifying data provenance in citizen science projects.* *(12, ❍, ⊙, ●)*
- *e-Infrastructures should offer tools for verifications of remediated primary sources .* *(13, ❍, ⊙, ●)*

## Funding models

There was also a substantial interest to the potential of citizen science in funding agencies that currently are the main source of funding of such projects. Wiggins and Crowston (2012b) invited some 840 projects to respond to a survey about citizen science and received

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63 complete survey responses. They summarised the most popular *funding sources* of the projects as follows: federal and other grants – 68 projects; in-kind contributions – 31 projects, private donations – 23 projects, participant fees: 11 projects. Some of their further data are used in this deliverable to compare existing experiences on the use of technological solutions for citizen science. These data represent the North American landscape; the emerging finding models for Europe and especially the link to open science and open data still need wider consultation as well as advocacy.

- *CH institutions should have a clear business model for the citizen science project. (18, ❍, ⊙, ●)*
- Within the Business Canvas model, academic institutions can play a key partnership role in citizen science projects initiated by CH institutions, but they can also be a customer of citizen science. The specific case needs to be clear in the beginning of the project. *(6, ❍)*
- Citizen activists' organizations can play different roles according to the business canvas model as well: the one requiring special consideration is of communication channel to contributors. *(6, ❍, ⊙)*
- *e-Infrastructures are most likely to form a key partnership with CH institutions providing technological services and expertise. (14, ❍, ⊙)*

# 3. NOVEL EVIDENCE ON CHARACTERISTICS AND REQUIREMENTS FROM CIVIC EPISTEMOLOGIES

Citizen science is composed of various elements such as applications, volunteers, and institutions, which need to work harmoniously together in order to reach the project's goals. One of the big challenges of this domain is what evidence could help to support the selection of successful models for future implementations. The practical experiences of different studies vary dramatically – some attract a 'viral' spread of involvement and others – modest if any attention. Even studies prepared by the same team in different environments can lead to substantial differences in the engagement. Engagement itself is one of the easiest components which can be monitored as a quantitative measure, but to be successful a future roadmap should include a combination of wisely selected characteristics which can be realistically measured and interpreted.

Civic epistemologies made an effort to gather quantitative data via a web survey launched in November 2015 and available online for three weeks. The survey aimed to gather data which would help to get insights into:

- the current level of awareness on citizen science in memory institutions;
- the patterns of involvement of cultural heritage institutions in citizen science;
- the attractiveness factors seen by cultural heritage professionals;
- the need in specific tools which facilitate citizen science deployment in this specific setting;

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- the awareness and interest in using citizen science in such domains like digital cultural content for creativity.

There were several aspects of the methodology of this study which deserve a special mention:

- The survey explores in parallel citizen science and crowdsourcing. This was a matter discussed at length within the consortium. Taking into account the project consortium observations than in many cases there is a confusion of these terms, and also that crowdsourcing gained popularity within the cultural heritage context, the project decided to make use of both concepts within the survey.
- For the first time we are aware of, a survey on citizen science includes questions which allow comparing the outcomes of this questionnaire with previous surveys on citizen science (e.g. Wiggins and Crowston, 2012a, 2012b and 2015).
- The survey also allows comparing the data gathered with outcomes from the focus groups; in this sense even if it has not been included initially in the project work plan it complements the work on WP2 (Requirements gathering) and WP3 (Designing a roadmap).

The detailed outcomes of the survey are presented in Annex 1. Here we capture some of the comparative outcomes of the survey.

To understand better the context of the survey, we should clarify that it had been distributed to various CH mailing lists by the participants in the Civic Epistemologies project. 85 responses from 23 countries, 19 European, 2 from North America and 2 from Asia, had been received. Our main possibility for comparison is with the work done over the last years by Wiggins and Crowston; however their surveys targeted preliminary identified respondents directly involved in citizen science projects. The various methodological choices of our approach and the selection of participants by Wiggings and Crowston is perfectly justified; our project has the main task to understand what are the emerging practices in the application of citizen science in DCH – a domain where we demonstrated citizen science uptake is not so impressive yet. While our main challenge is to identify the stumbling blocks in a domain of lower uptake, Wiggins and Crowston aimed to identify emerging patterns among already established citizen science projects.

The respondents to our survey included representatives of different CH institutions as well as academia. 46 of the responses in general indicated cultural heritage institution with almost equal participation of respondents from museums, libraries and archives, and a small fraction of art galleries (1%); 8% of the respondents have an aggregator role which was similarly to citizen science requires infrastructure and technological expertise – although of a very different nature.

The responses in the "Other" group included some organisations with conservation profile as well as foundations and voluntary researchers; however there were 16% of respondents coming from universities and 8% coming from research which demonstrates interest from the academic community as well (the general participation from the academic community would be 26% including as well art universities and institutes addressing specific areas of research). It is worth noting that there were also respondents with consultancy roles; from

mental health volunteer association, and from a semantic modelling company. It is encouraging to see that breadth of institutional affiliations since this confirms the interest to citizen science within a range of stakeholders. For further details see Question 1, Annex 1. The responses came mostly from institutions existing for over 50 years (42.5%) followed by those which existed between 10 and 50 years (38.8%) and with 18.8% of institutions created within the last decade (Question 2, Annex 1).

### Perception of citizen science and crowdsourcing

A set of questions was seeking to establish what is the preliminary knowledge and understanding of the respondents on citizen science and the relevant domain of crowdsourcing. These questions cannot be really compared with the work of Wiggins and Crowston due to the difference in the samples. However in our specific case of CH institutions they provide useful insights into requirements for various stakeholders. The survey demonstrated that overall the respondents were feeling confident they are familiar with examples of citizen science; 70 out of 85 (or 82%) provided from memory as free text examples of what they considered as examples of citizen science projects. Not all of those were indeed correct examples, but there were no examples which have completely no relevance to citizen science. (see Question 3, Annex 1). Since the invitation for the survey included the topic of the survey, one should not interpret this as excellent knowledge among all respondents because they potentially could have the chance to refresh their memory related to the survey topic.

The next question established the familiarity with both terms citizen science and crowdsourcing. The answers to this question (number 4 in Annex 1) reveal that less than half of the respondents felt familiar with both terms (41%), but in general at least one of the terms was known to those who responded to the survey. The term "crowdsourcing" was 4 times more popular than "citizen science" only. Some 14% of the respondent either did not encounter those terms before, or were not sure what they mean. This situation is indicative of the need to work more on the awareness of citizen science among cultural heritage professionals. This question was answered by 80 respondents, with 5 from those who took the survey not providing an answer.

Furthermore the survey explored what were the views of respondents on the overlap or differences in meaning of the terms "citizen science" and "crowdsourcing" (Question 5, Annex 1). This question aimed to explore whether participant see a difference in their meanings; when the Civic Epistemologies team did its initial literature survey, a view was formed that it is still happening that these terms are used as synonyms. Within the cultural heritage domain the familiarity with crowdsourcing was expected to be higher – and one of the initial avenues for work of the project team was to explore how positive experiences from use of crowdsourcing could be developed into motivating and inspirational experiences to introduce citizen science into the practice of memory institutions. Our survey shows that almost two thirds of the respondents (65.8%) agree that both terms have different meaning; however some 15.2% believe these terms are synonymous and those who provided comments (19%) show doubts in the meaning of citizen science in particular.

- *CH institutions should make sure the volunteers understand what does the citizen science concept entail when recruiting novices.* *(19, ❍)*
- Academic institutions have further space for spreading awareness on citizen science in DH/Humanities. *(7, ❍)*
- Citizen activists' organizations also can be involved more actively in awareness campaigns on citizen science. *(7, ❍)*
- *e-Infrastructure providers should not rely on complete familiarity with citizens with basic concepts and activities; this requires efficient help; possibly end user training, as well as potentially some resources for end user support.* *(15, ❍, ⊙)*

Furthermore, the uptake of citizen science and crowdsourcing initiatives within the institutions of the respondents is 25.6%; there is a firm "no" for half of the institutions, with the other ¼ of the responses being "not sure" (Question 6, Annex 1). Asked to provide descriptions of the citizen science or crowdsourcing experience of their institutions, 18 of the 20 participants who answered to the previous questions that their institutions have such experience, provided text comments. Some of them are not particularly informative ("yes" or "no"), but others pointed to Europeana 1914-18, or the development of specific tools (Question 7, Annex 1).

The last question in this series (Question 7, Annex 1) explored what anticipated benefits from a list of suggestions are most prominent according to the respondents. The major benefits from the use of citizen science and crowdsourcing are seen in expanding the knowledge on a certain topic, aiding the progress of existing research, helping initiating new research and improving the engagement of visitors with collections. Additional suggestions had been made for the use of citizen science/crowdsourcing for speeding up activities, and some suggestions were made for "Other", including one opinion that these activities cannot be directly helpful. The general assessment however is the use of citizen science/crowdsourcing could bring tangible benefits to the CH sector.

This is coherent the responses of the focus group participants held in Valletta, Stockholm and Barcelona as part of the Civic Epistemologies user studies (for more information on the focus groups see D2.1). Participants in these groups were invited to share their opinion on the usefulness of citizen science in different areas relevant to CH institutions using scales with values from 1 to 10. Although some of the focus groups participants were more critical than others to particular benefits, the average values for all criteria are over 5, which shows an average positive perception. However the differences across groups help to differentiate between the suggested domain of benefit and highlight "attracting more visitors to the CH institution" as the most popular anticipated benefit for the institutions.

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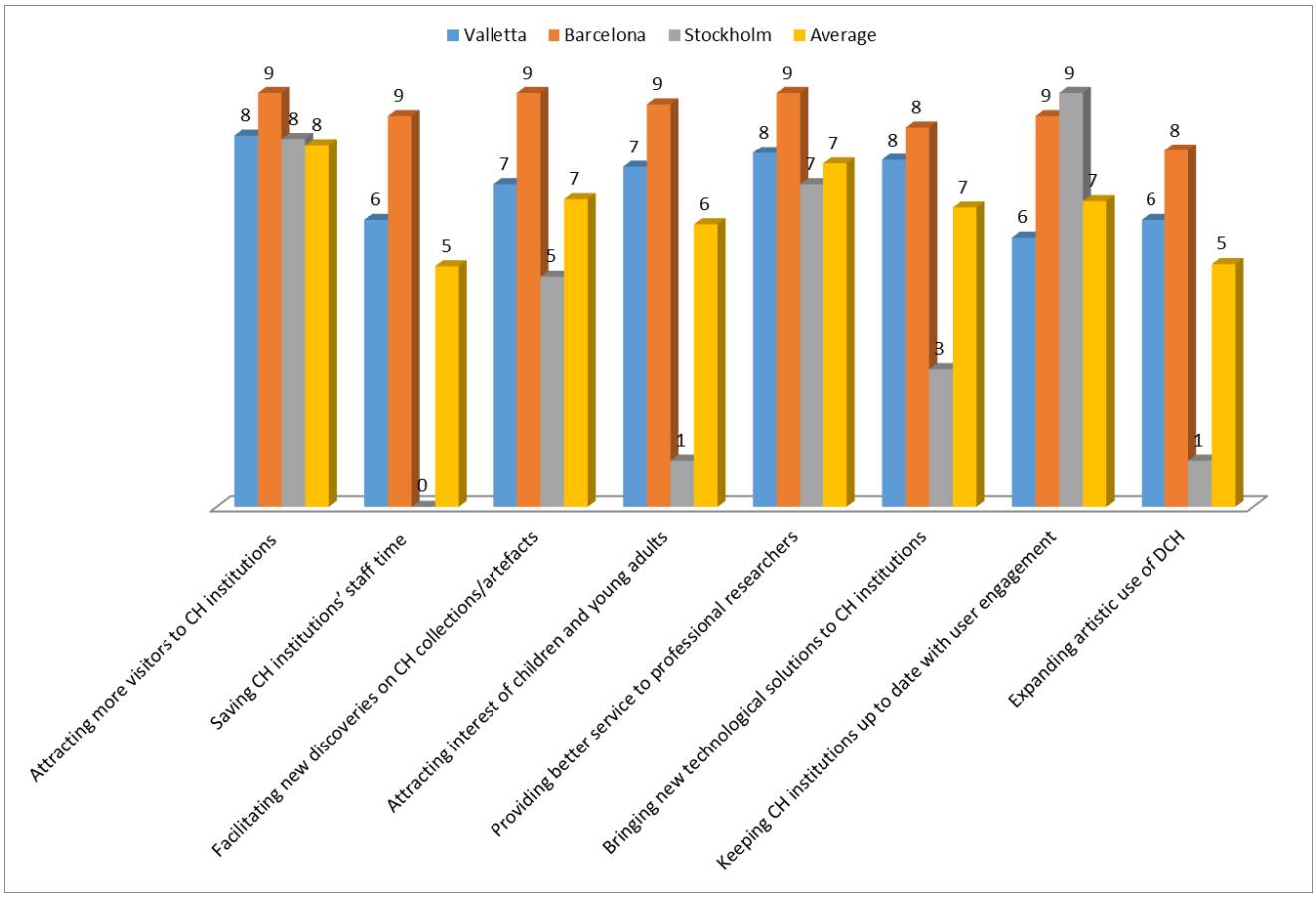


*Figure 4. Views on usefulness of citizen science expressed on [1, 10] scale across focus groups*

- *CH institutions should identify the most essential benefits they aim to achieve and to plan their citizen science activities accordingly.* *(20, ❍)*
- Academic institutions can benefit from some of the benefits for CH institutions directly (e.g. "providing better service to professional researchers" or could enhance other benefits (e.g. "Facilitating new discoveries on CH collections". *(8, ❍)*
- Citizen activists' organizations can structure their campaigns around identified benefits for CH institutions, academic institutions, and citizens. *(8, ❍)*
- *e-Infrastructure providers should adjust their services to the anticipated benefits; the different beneficent focus would have implications on the overall look and feel of their services, e.g. design aimed at supporting artistic use would differ from design for better service for professional researchers.* *(16, ❍, ⊙)*

### Feedback on e-Infrastructure aspects

The next group of questions addresses a number of e-Infrastructure issues.

Question 9 from Annex 1 explores what infrastructures which could be employed for citizen science projects are available in place.

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This question explored what tools are already in place in the institutions implementing citizen science projects. The most popular responses point out that the most important tolls are new/improved websites and Facebook accounts, reinforcing the social media dimension of citizen science/crowdsourcing. The feedback on this question can be compared with the data gathered by Wiggins and Crowston (2012b) since we decided to use in our survey a set of values already used in their study.

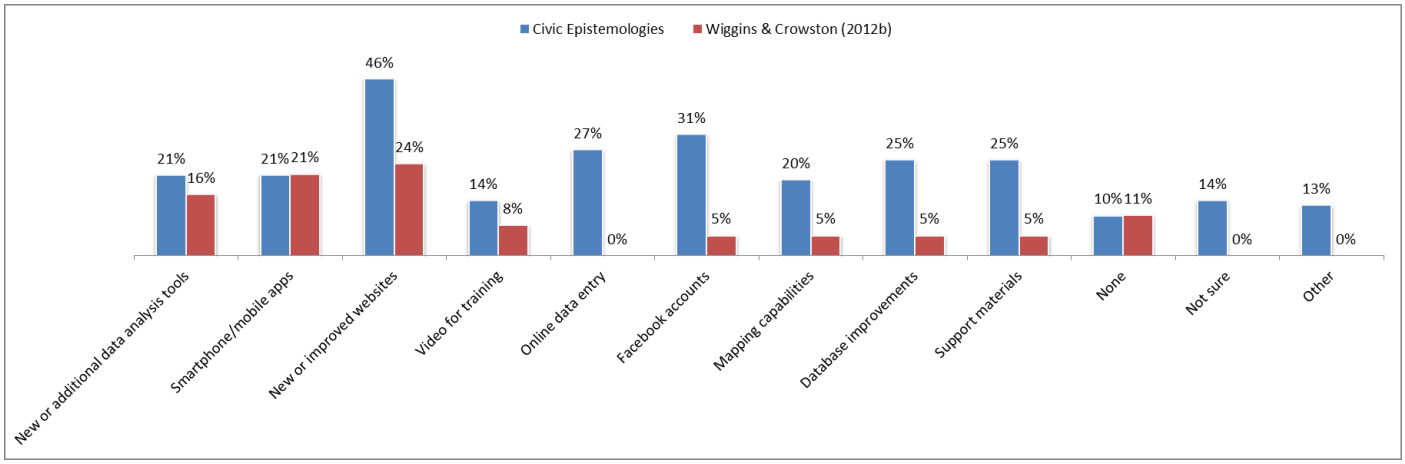


*Figure 5. Comparison of technological tools according to Civic Epistemologies web survey and Wiggins and Crowston (2012b)*

However there are some caveats for the interpretation of these data. During their study Wiggins and Crowston asked on plans to implement the listed technologies in the future. In our survey we asked what is available having in mind the intensity of uptake of new technologies. Also Wiggins and Crowston listed the values used to calculate percentages of responses, but they do not make clear how many other responses were obtained for this particular question. In general the graphic does not have any intention to be used for statistical judgements but as a qualitative illustration – for all suggested technologies three years ago in the context of future plans, there are instances of exploitation capabilities in place in 2014.

Also for this and the next questions the percentages for the web survey are based on the number of respondents who were able to pick multiple values; this calculation is closest to the calculation done for the survey results published in 2012.

- *CH institutions should make regular audits of the specialised tools/services available to them which can be deployed for citizen science initiatives.* *(21, ❍)*
- *During monitoring of citizen science experiences, CH institutions should include a summative evaluation of the experiences of using technological tools within this context, and plan for any necessary future changes either of the tools, or of aspects such as training.* *(22, ●)*
- *e-Infrastructure providers should gather feedback from CH institutions on various aspects of use of tools/services they are providing and plan for improvements accordingly.* *(17, ❍, ⊙, ●)*

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The next Question 10 explored what tools are missing from current technological infrastructures. The options within Wiggins and Crowston (2014b) were extended with tools specific for the CH domain, like real-time 3D visualisation tools and semantic annotation tools. Again any direct comparison of the values would not be justified but the aim of the diagram is to illustrate that all options suggested in the seminal survey studies of Wiggins and Crowston are relevant for the CH domains which also has its own specific tools.

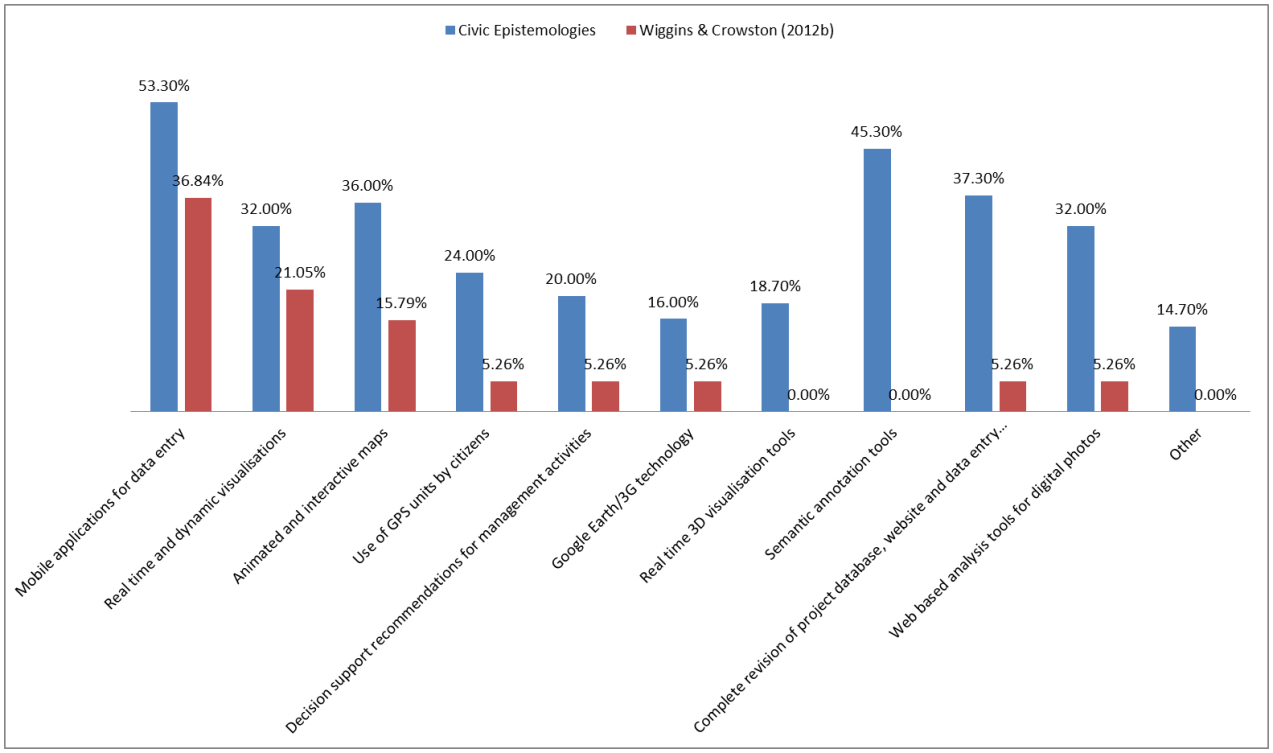


*Figure 6. Tools which are currently lacking in institutions but would need to be deployed in the future according to Civic Epistemologies web survey and Wiggins and Crowston (2012b)*

- *CH institutions should have a role which has a responsibility for technology watch and liaison with e-Infrastructure providers. (23, ❍)*
- *e-Infrastructure providers should have the capacity not only to develop but also to assess and integrate emerging (and open) services and tools, and support modernisation of workflows according to CH institution needs and joint evaluation. (18, ❍, ⊙, ●)*

The last question in this section (number 11) addressed the communication tools which are perceived as most useful in citizen science projects. The responses to this question are presented in their entirety in Wiggins and Crowston and this allows to make comparisons. In general there is noticeable difference with more intensive use of emails, research articles and maps in Wiggins and Crowston, but there is a higher value for use of social media according to the responses gathered within the Civic Epistemologies survey (67% vs 36% in the previous study). A logical explanation could be the increased spread of use of social media in these years, but this is only a hypothesis which can be explored in the future.

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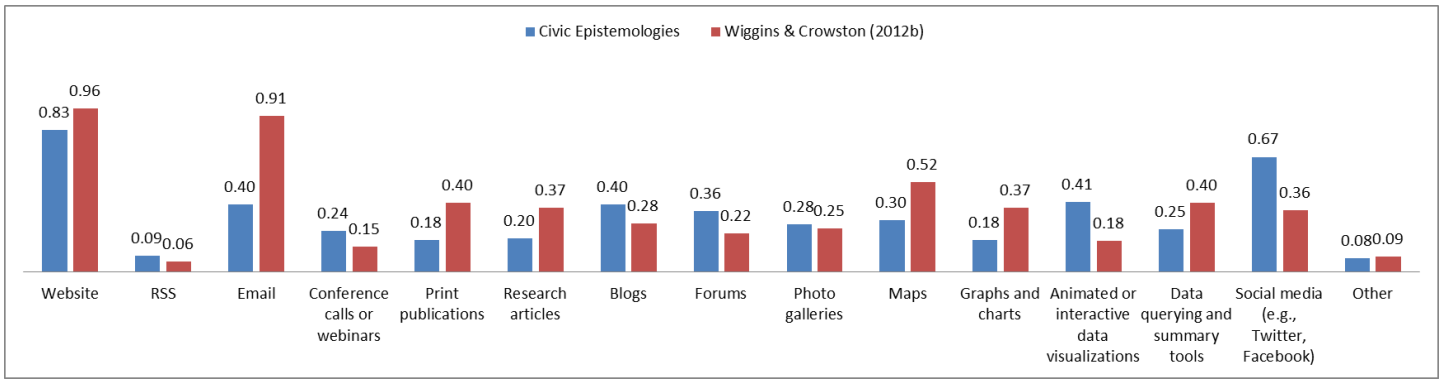


*Figure 7. Comparison of the response on use of communication tools in citizen science projects according to Civic Epistemologies web survey and Wiggins and Crowston (2012b)*

The feedback on communications informs the following characteristics and requirements:

- *CH institutions have to select an appropriate communication channels to reach volunteers, meet any relevant dissemination requirements of funders and maintain contacts with other stakeholders, including academics and e-Infrastructure providers. (24, ❍)*
- *e-Infrastructure providers should provide easy real time help on the most popular communication channels preferred by the volunteers. (19, ❍, ⊙, ●)*

### Organisational aspects emerging from the survey

The next set of questions in the Civic Epistemologies web survey addressed organizational aspects, the first one exploring whether policies regulating citizen science activities are in place. This area is still underexplored in general. According to our survey only 6.5% of the institutions represented have policies in place with 24.7% of the institutions working on policies in this domain. The majority of institutions (68.8%) however does not have or work on policies for these areas (see Question 12).

- *CH institutions should consider introducing policies regulating their citizen science activities. (25, ❍)*
- *e-Infrastructure providers should be familiar with the policies in place. (20, ❍)*

Question 13 explored the general perception on benefits of citizen science/crowdsourcing for the volunteers. In general the opinion of intermediaries (the representatives of memory institutions) are that the volunteers appreciate the importance of their contribution (77.9% of responses) while 22.2% are not sure. However there were no negative responses to the question.

One essential question for citizen science/crowdsourcing project is the need in additional training to staff members in institutions implementing such projects. Our survey showed on overwhelming opinion that such training is necessary indeed (Question 14), mostly for communication to volunteer communities and in organising events for volunteers.

- *CH institutions should choose and implement a strategy for training their staff. (26, ❍)*
- *e-Infrastructure providers could contribute on technological aspects of the training. (21, ❍)*

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Question 15 aimed to gather feedback on the dissemination of news on progress of citizen science projects according to the respondents of the survey most often took place on the institutional website. Other channels used are publications, research articles and press releases; one could not ignore the different ranking of these publication channels compared to the ones used for volunteers and reflected in the responses of Question 11 on Communication tools where social media had higher prominence.

- *CH institutions should choose and implement a dissemination strategy.* *(27, ❍)*
- *e-Infrastructure providers could contribute with appropriate dissemination infrastructure.* *(22, ❍)*

### Observations on aspects related to the volunteers' involvement

Surveying the opinion of intermediaries on the motivators of citizens to contribute to citizen science/crowdsourcing projects, the picture which emerged was dominated by the "opportunity to contribute personal knowledge" (72%) followed by "contribution to research" (67%) (see Question 16). This would mean that professionals in digital cultural heritage would work most intensively with informed contributors rather than people performing purely auxiliary technical tasks. This to some extent resonates with the opinion of (Arends et al., 2012) which states that identifying and engaging the appropriate crowd is more important than designing the right interface; surely e-Infrastructure providers will find themselves in disagreement on this point. In the infancy of digital preservation, one of the popular models was the three-stool model adapted for the domain by Nancy McGovern in 2004.


*Figure 8. The three-legged stool model applied to digital preservation, illustration from the Digital Preservation Management (English tutorial, 2004, http://www.dpworkshop.org/dpm-eng/eng_index.html)*

The logic of this model is that all stools need to be in balance for the domain to thrive. Indeed digital preservation can be replaces by crowd sourcing and this will create a new metaphor for this domain. There are the organisational issues, the technological issues orchestrated nowadays within the e-Infrastructure paradigm, and the resources issues – which include besides the financial resources also the organisation and the voluntary human resources!

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Question 17 explores to what extent volunteers help to extend the network of volunteers by attracting new ones to the task. It helps to understand how the volunteer communities grow is whether participating volunteers help to engage other volunteers. In the case of our survey half of the respondents believed that volunteers helped to attract other volunteers.

- *CH institutions should monitor the extension of the network and encourage via suitable incentives volunteers whose input is meeting or exceeding the quality standards to also work on expanding the network. They could be considered potential champions of the citizen science initiative. (28, ❍)*
- *e-Infrastructure providers could contribute to the network extension with tools which maximise the use of personal social media networks of the volunteers.. (23, ❍)*

Question 18 explored the most essential benefits for volunteers according to the surveyed intermediaries; they chose Satisfaction from contributing first, followed by Knowledge; Socialization, and Payment as least important benefit. This question is linked with the wider topic of motivation discussed earlier.

- *CH institutions should create a culture of appreciation of different personal motivations and introduce suitable reward mechanisms. (29, ❍)*
- *e-Infrastructure providers may introduce various gamification-style rewards (levels, badges, points, etc.) to meet popular personal motivation styles. (24, ❍)*

According to the surveyed participants, citizens taking part in their citizen science/crowdsourcing initiatives were very satisfied (72%) or somewhat satisfied (18%), this is extremely high positive response – and the remaining share is for "I don't know" rather than for a negative feedback on volunteers' satisfaction.

- *CH institutions should pay attention to the dynamics of satisfaction of volunteers. (30, ❍, ⊙, ●)*

The final question in this section explored the nature of feedback received by citizens taking part in initiatives (three participants were unsure about the feedback and one was involved in a project being currently set up, but the rest 14 participants who answered the question gave a range of positive feedbacks, from continuous engagement to desire to be involved in further initiatives).

### Aspects related to the further uptake of citizen science in CH

Question 21 explored what are the main stumbling blocks delaying the introduction of citizen science/crowdsourcing in cultural heritage organisations. The most popular reason was the lack of knowledge on how to organise such a project (74.5%) – which emphasizes the existing need in increasing awareness across the cultural heritage sector. The second most popular reason was the lack of personnel to work with the citizens (60.8%), followed by the lack of funds (52.9%). Most of those had already been touched upon in previous characteristics/requirements but surely have to be part of the planning for citizen science.

Question 22 explored how many of the respondents have ideas for citizen science projects. Over half of the respondents (52.4%) pointed out that they have one or more ideas for citizen science projects. The comments to this question (by further 11.1% of respondents)

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illustrate as well that there is a positive attitude in general but need in more time/knowledge to implement ideas.

Finally, our survey asked how citizens would be recruited to participate in a potential citizen science initiative. Half of the respondents would recruit citizens directly while 11.1% were prepared to outsource this to an external organisation. This is quite low and probably will be one of the rapidly changing parameters in citizen science because it is unlikely that many CH institutions will be able to organise citizen science projects in their entirety.

Additional insights were obtained in direct consultations with experts with three profiles – citizen researchers (Barcelona), policy makers (Malta) and citizen activists (Stockholm).

## 3.1 CITIZEN RESEARCHERS

Citizens add value and contribute to science in various ways either through their intellectual input and or via the resources and digital tools they offer a project. By a citizen contributing directly to a project the outcomes have the potential to change and possibly enhance the investigation. The focus group participants highlighted that by including citizen scientists in the collection of data, there is an openness which adds value to the overall activity. This transparency helps to capture a collective intelligence that may exist within a community that an investigator or researcher might not have known existed.

### The model of citizen research cycle

When analysing the data from the focus group, one can pull out that there is a pattern that emerges when engaging citizen scientists. Researchers carry out an investigation and ask questions which are then grounded within a certain methodological framework. The questions are posed to citizens within the sector who then offer data and help contextualize the knowledge that exists at a grassroots level. The Focus group highlighted that this collective knowledge can reflect a global or communal intelligence which in turn has an impact on the investigation and its findings. When this information enters its final stage, it may find its way into publications, recommendations to policy makers and other key stake holders in the field, which will hopefully lead to a positive change and outcome.

### Typical types of users

Participants from the focus group were unfamiliar with the term citizen science but once the definition was explained, they were quick to identify as citizen scientists and use the term throughout the session.

According to the participants, they agreed that a citizen scientist could be anyone from any ethnic background, with either a formal, informal and/or non-formal education, who contributes to an investigation or study. They also highlighted that participation can happen in a variety of ways and in a plethora of settings. The focus group participants explained that citizen scientists are volunteers who are interested and committed to a study but not for any monetary gain. A citizen scientist should be included in most or all investigations, where appropriate, as it raises the profile of the investigation and maintains a level of transparency. However, they pointed out that the offered information must be handled in a considered fashion and carried out with care and caution. Volunteers should be seen as integral parts of

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projects as they can identify, explain and offer solutions to questions/problems being researched. The participants also mentioned that citizen scientists are willing to participate in and possibly have a belief that their contribution could impact the activity and that their input is valuable to the outcome of the project.

### Functional and non-functional requirements identified

There were certainly some functional and non-functional requirements identified by the focus group. Functional requirements that were identified include:

- recruiting participants from various backgrounds for experiments, panels, focus groups, interviews,
- being able to select and access certain crowds and populations, and
- using existing platforms rather than creating new infrastructures which would allow specialized or diverse communities to connect.

Non-functional requirements that were identified included: availability, reliability, security, regulating investigations, data integrity and usability.

## 3.2 CITIZEN ACTIVISTS

In Sweden, activist (i.e. genealogical) societies are organising crowdsourcing activities themselves. Obstacles may consist of a lack of financial and technical resources and sometimes also the attitudes of the cultural heritage institutions. The cultural heritage institutions are seldom first on stage in these matters. An average "activist" has both the technical capacity (at home) and knowledge enough to take part in smaller crowdsourcing activities organised by citizen organisations. The lack of financial resources for organising these activities seems to be the main problem; sometimes also the attitudes of the cultural heritage institutions.

If the cultural heritage institutions take an initiative, there are some very distinct requirements that were set up during the focus group:

1. Use social media to communicate and/or acquire new participants in citizen science projects, not fact sheets or folders distributed via the institutions reading rooms; what is pointed out here is a lack of effective and adequate communication channels that can be a hinder for starting good projects;
2. the planning of activities has to be made in cooperation with citizens research representatives, in order to incorporate their knowledge and experiences right from the beginning; no clumsiness is accepted;
3. the technical facilities planned to be used have to be in place from the very beginning and also easy to use (i.e. software, special equipment and/or distributed services of different kind); a solid project need a solid e-infrastructure in place right from start;
4. the results of the activities have to be open for all to use ("open source");

### Citizen scientists

Best practice digital technology tools that can be used or that they personally use in their own work are:

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a) Computers, phones, music CD's, DVD's, informal talks that incorporate digital technologies, internet, specifically YouTube and Skype. Skype allows people to share knowledge, engage and contribute.

b) Social media can be used to recruit and engage with various citizens from various socioeconomic backgrounds and ages, and offers an immediate way to contribute.

The participants agreed that there is a plurality and democracy that can take place with the use of digital technology. It is a form of democracy which can lead to immediate changes and shifts. The internet can recruit and engage with many instantly.

### Activists

The most useful outcomes of organising citizen science projects are, from the perspective of a cultural heritage institution:

- increased interest in the institution and its collections/holdings;
- more work will be done;
- an opportunity to engage competences that are normally not available internally.

The drivers behind private persons taking part in citizen science projects are normally:

- reward of some kind (could be small, symbolic and of less monetary value);
- personal interest;
- idealism (helping the local society in some way, religious duty, etc.);
- that the results could be used in the person's private research.

The conditions for organising citizens' research activities (becoming obstacles if they are not fulfilled) are mainly:

- the results of the activities have to be open for all to use ("open source");
- the technical facilities have to be in place from the beginning and also easy to use;
- the planning of the activities has to be made in cooperation with citizens research representatives, in order to incorporate their knowledge right from the beginning.

## 3.3 POLICY MAKERS

The workshop on user requirements for policy makers was held in Malta.

### Digital heritage stakeholders

As already mentioned before, local Maltese cultural heritage professionals and policy makers were present at the workshop and were eager to voice their opinions and give out their recommendations to improve our research. Below are some of the key points that were raised in the discussion that took place on the second day of the workshop:

- Real accessibility needs to be available, not a theoretical one. The findings and results need to be shared with the community, with which a connection needs to be built and maintained.

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- When presenting the data, or connecting to the general public, one must not be too technical, specific, or academically snobbish since this might repel the people one is trying to connect with.
- A key factor to remember is that cultural heritage belongs to the people – the job of cultural heritage institutions is to protect the embodiment of our culture and present it back to the people.
- An issue that arose with great enthusiasm during the workshop was the element of FUN. Fun has the capability to make an activity a good experience which would help increase the popularity and would encourage people to take part in it and to disseminate it.
- Getting the commitment from the government in the aid of these institutions would also be a plus.
- For any endeavor making use of citizen science to succeed, three key factors need to be connected:
    1. Research
    2. Institution
    3. Citizens
- Artifacts or data which embody a community's cultural heritage need to be equally accessible to everyone. No curators or directors should deem themselves the exclusive owners of such a collection.
- Citizens should never be considered as a subject in the research, or as a source. Their role should be that of an active participant in the research.

Amongst these and other comments that were voiced during the discussion, multiple people shared one common thought; that they were all eager to see the results of the Civic Epistemologies project.

### Stakeholders providing technological infrastructure

A discussion on the technological infrastructure took place during the workshop, throughout which these issues were brought up:

- A basic framework needs to be developed which can then be adapted and reworked depending on the nature of the citizen science project that is being undertaken. This needs to be produced as a software or application.
- Constant support for the software needs to be available to whoever is using it.
- A serious issue that arose was the way users should be authenticated. A simple login via Facebook might not be enough, but users generally dislike creating and using additional accounts.
- In most of the use-cases access to data and meta-data storage, access and sharing space and solutions as well as collaboration tools is needed. Common, shared data

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space allow overcoming the limitations of end-user storage systems and enable collaboration on the shared and easily accessible data.

- Due to the fact that citizen science and crowd sourcing participants typically are not the IT experts convenient and easy to use interfaces are expected, preferably based on the Web applications and portals. Access from mobile platforms is also welcome.
- Scalable solutions at the e-Infrastructure side are necessary, that address wide range of the web-based collaboration use-cases, starting from small initiatives involving local community, up to those that address the large, national or cross country project.
- Dynamic scale-out feature at the infrastructure side may be necessary to address the changing needs of the service whose popularity is expected to grow significantly (and rapidly). Importance of such mechanisms was demonstrated several times in past – websites that attracted the attention of many users over a short period experienced issues with availability and heavy load, which resulted in bad user experience.
- From the course of the e-Infrastructure panel it might be concluded that articulating the e-Infrastructure related needs at the technical level is difficult for the CH scientists and activists. Therefore the dialog among e-Infrastructure provides and CH community must be conducted, including explaining technical offerings and opportunities on one hand (possibly including demonstrations, showcases as well as providing).

## 3.4 PERSONAE

The method of developing personae is a summative way to describe key characteristics of a typical user. The development of personae requires substantial evidence and the three personae presented below as examples of typical stakeholders based on the feedback provided during the three focus groups are initial attempts to capture the most evident characteristics of the representatives of the groups.

| | |
|---|---|
| *Teresa is a 65 year old female who considers herself a "citizen scientist." She regularly contributes to local projects carried out by regional and national cultural heritage institutions. Teresa lives in a neighborhood that has a medium-sized museum that is known to curate comprehensive and contemporary exhibitions that look at the immigration history of the city.*<br><br>*Teresa has saved over a dozen letters from her friends and family that date back to the 1960's. She would like to donate these to the local museum, as she knows that the curator of the museum is interested in a designing an exhibition that includes digital technologies and the local history of the area. Teresa is unsure if the letters are of any use and* | ***The citizen scientist,***<br>***Teresa***<br><br>  |

*wonders how the museum might include them but feels the letters offer insight into the era. She has a personal interest in the exhibition as she has been living in the neighborhood since the early 1960's.*

*Teresa is convinced that the main benefit in including citizen scientists in the creation of this exhibition, ensures that the displays and collections have an accuracy of the social history of the area that reflects the diversity of the neighborhood. She also believes that by including citizen scientists and other volunteers from the area, a community interest is generated and individuals who might not have visited the museum might be more inclined to enter the space.*

***The policy maker,***

## *Mark*

*Mark is a 40-year old CH professional from Malta with a role in defining the policies of his institution. He regularly uses CH collections not only for professional reasons but also because he has strong personal interest in the area. Mark is not quite sure how to use the digital collections of his institution for artistic purposes.*

*He is not that familiar with citizen science and has not played an active role in such projects but could be interested to try it in the future. Mark sees a range of benefits from using citizen science – mostly related to an improved relation and services offered to the general public but also to the visibility of his institution.*

*Mark is convinced that the main benefit from citizen science is not cutting any costs but better engagement with the general public.*

***The citizen activist,***

## *Stina*

Stina is a 65-year old woman with strong interest in her family history and also in local history. She is active in a local genealogical society and is also following the national genealogical news channels on the Web. She normally participates in annually events like "the archives day", when local archives all over the country have special programmes for visitors, and the national conference called "the Genealogical Days".

She has been working with administrative tasks since she left high school and after retirement more and more of her time is spent on family history. In her home she is equipped with a normal personal computer and a quite good Internet connection (50 Mbit downstream and 10 Mbit upstream).

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| | |
|---|---|
| She subscribe on yearly basis on several genealogical services which proved her with both registers of different kind and images of digitised records. Stina is not a regular visitor in archives, but make visits to fill gaps in the digitised material on Internet.<br><br>Stina has taken part in crowd sourcing projects organised by her genealogical society, mostly because of personal interest but also to help her local society. Of course she put more effort into such a task if the results could be of direct use in her private research. | |

# 4. CONCLUSIONS

The requirements presented in this deliverable aim to capture the current understanding and existing knowledge in the domain of citizen science applied particularly to DCH.

The requirements gathered were grouped according to the key stakeholders facilitating the advancement of citizen science in DCH. They also help to identify gaps of knowledge related to particular stakeholders. Since they appeared in different locations in the deliverable text, here we are providing a coherent set of lists.

## 4.1 CH INSTITUTIONS

- *CH institution should have sufficient experience to advise on the tasks within the citizen science projects* *(1, ❍)*
- *CH institution should be able to resolve right concerns related to the citizen science project* *(2, ❍)*
- *CH institution should be able to plan, obtain and maintain the budget necessary for the citizen science project* *(3, ❍, ⊙, ●)*
- *CH institution should be familiar with characteristics of the targeted crowd.* *(4, ❍, ⊙, ●)*
- *CH institution should be able to train the members of the crowd for the citizen science task.* *(5, ❍, ⊙)*
- *CH institution should have the capacity to attract citizens.* *(6, ❍, ⊙)*
- *CH institutions should be able to sustain the citizen community involved in the project.* *(7, ❍, ⊙)*
- *CH institution jointly with the e-Infrastructure provider should identify the most useful workflow.* *(8, ❍, ⊙)*
- *CH institution should be capable to identify and apply quantitative and qualitative evaluation metrics to follow the development of the project.* *(9, ❍, ⊙, ●)*
- *CH institution should have the capacity to incorporate the project outcomes into its collections or their digital presentation, depending on the nature of the project.* *(10, ❍, ⊙, ●)*

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- *CH institution should be capable to provide feedback on the workflow to the e-Infrastructure provider.* *(11, ●)*
- *CH institutions should have a clear value proposition for the types of citizens they seek to engage in their citizen science initiative.* *(12, ❍)*
- *CH institutions should decide early on the granularity of tasks where citizen's contribution will be expected.* *(13, ❍, ⊙)*
- *CH institutions need to have an idea of minimum necessary involvement and implement suitable incentives to create long-term relationships with engaged public members.* *(14, ❍)*
- *CH institutions and the intermediaries involved in citizen science projects should be familiar with main attractors and factors helping engagement.* *(15, ❍, ⊙)*
- *CH institutions should define image of the desired quality of volunteers' contributions to citizen science projects activities.* *(16, ❍)*
- *CH institutions should monitor the quality issues and revise accordingly workflows adopted within particular projects.* *(17, ❍, ⊙, ●)*
- *CH institutions should have a clear business model for the citizen science project.* *(18, ❍, ⊙, ●)*
- *CH institutions should make sure the volunteers understand what does the citizen science concept entail when recruiting novices.* *(19, ❍)*
- *CH institutions should identify the most essential benefits they aim to achieve and to plan their citizen science activities accordingly.* *(20, ❍)*
- *CH institutions should make regular audits of the specialised tools/services available to them which can be deployed for citizen science initiatives.* *(21, ❍)*
- *During monitoring of citizen science experiences, CH institutions should include a summative evaluation of the experiences of using technological tools within this context, and plan for any necessary future changes either of the tools, or of aspects such as training.* *(22, ●)*
- *CH institutions should have a role which has a responsibility for technology watch and liaison with e-Infrastructure providers.* *(23, ❍)*
- *CH institutions have to select an appropriate communication channels to reach volunteers, meet any relevant dissemination requirements of funders and maintain contacts with other stakeholders, including academics and e-Infrastructure providers.* *(24, ❍)*
- *CH institutions should consider introducing policies regulating their citizen science activities.* *(25, ❍)*
- *CH institutions should choose and implement a strategy for training their staff.* *(26, ❍)*
- *CH institutions should choose and implement a dissemination strategy.* *(27, ❍)*
- *CH institutions should monitor the extension of the network and encourage via suitable incentives volunteers whose input is meeting or exceeding the quality standards to also work on expanding the network. They could be considered potential champions of the citizen science initiative.* *(28, ❍)*
- *CH institutions should create a culture of appreciation of different personal motivations and introduce suitable reward mechanisms.* *(29, ❍)*
- *CH institutions should pay attention to the dynamics of satisfaction of volunteers.* *(30, ❍, ⊙, ●)*

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## 4.2 E-INFRASTRUCTURE PROVIDERS

- *e-Infrastructure can explore the feasibility of offering 'citizen science primitives' Citizen science e-Infrastructure should take into account complexity of the task.* *(1, ❍)*
- *Citizen science e-Infrastructure should address how the task(s) can be broken down into components.* *(2, ❍)*
- *Citizen science e-Infrastructure should reflect scaffolding of user interface.* *(3, ❍)*
- *Citizen science e-Infrastructure should be chosen to reflect the best solution in terms of generic platform or the design of a designated project infrastructure.* *(4, ❍)*
- *Citizen science e-Infrastructure provider should be able to support CH institution in the implementation of suitable evaluation metrics.* *(5, ❍, ⊙, ●)*
- *CH institution jointly with the e-Infrastructure provider should identify the most useful workflow.* *(6, ❍, ⊙)*
- *The outcomes of identical or similar e-Infrastructures in different cultural settings (e.g. countries) can result in different scales of uptake.* *(7, ❍, ⊙)*
- *e-Infrastructures could implement suitable tools supporting volunteers; it could be expected that these will be cross-fertilised with personalisation technologies.* *(8, ❍, ⊙)*
- *e-Infrastructures should implement analytics which could help to analyse what causes volunteers to stop their contribution (complexity of tasks; repetitiveness, or other factors).* *(9, ❍, ⊙, ●)*
- *e-Infrastructures could pay special attention to solutions which help engagement (or at least do not contribute to disengagement, e.g. too complicated or confusing interfaces).* *(10, ❍)*
- *e-Infrastructures need to integrate tools which help to filter or correct erroneous inputs by volunteers.* *(11, ❍, ⊙)*
- *e-Infrastructures should test and make available tools for verifying data provenance in citizen science projects.* *(12, ❍, ⊙, ●)*
- *e-Infrastructures should offer tools for verifications of remediated primary sources .* *(13, ❍, ⊙, ●)*
- *e-Infrastructures are most likely to form a key partnership with CH institutions providing technological services and expertise.* *(14, ❍, ⊙)*
- *e-Infrastructure providers should not rely on complete familiarity with citizens with basic concepts and activities; this requires efficient help; possibly end user training, as well as potentially some resources for end user support.* *(15, ❍, ⊙)*
- *e-Infrastructure providers should adjust their services to the anticipated benefits; the different beneficent focus would have implications on the overall look and feel of their services, e.g. design aimed at supporting artistic use would differ from design for better service for professional researchers.* *(16, ❍, ⊙)*
- *e-Infrastructure providers should gather feedback from CH institutions on various aspects of use of tools/services they are providing and plan for improvements accordingly.* *(17, ❍, ⊙, ●)*

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- *e-Infrastructure providers should have the capacity not only to develop but also to assess and integrate emerging (and open) services and tools, and support modernisation of workflows according to CH institution needs and joint evaluation.* *(18, ❍, ⊙, ●)*
- *e-Infrastructure providers should provide easy real time help on the most popular communication channels preferred by the volunteers.* *(19, ❍, ⊙, ●)*
- *e-Infrastructure providers should be familiar with the policies in place.* *(20, ❍)*
- *e-Infrastructure providers could contribute on technological aspects of the training.* *(21, ❍)*
- *e-Infrastructure providers could contribute with appropriate dissemination infrastructure.* *(22, ❍)*
- *e-Infrastructure providers could contribute to the network extension with tools which maximise the use of personal social media networks of the volunteers..* *(23, ❍)*
- *e-Infrastructure providers may introduce various gamification-style rewards (levels, badges, points, etc.) to meet popular personal motivation styles.* *(24, ❍)*

## 4.3 ACADEMIC INSTITUTIONS

- Academic institutions should develop and brand their competences related to citizen science initiatives implemented by CH institutions. *(1, ❍, ⊙, ●)*
- Academic institutions could boost the development of citizen science by furthering research on citizens' tasks and their granularity in the CH domain. *(2, ❍)*
- Academic institutions could extend the understanding of longer-term engagement of different profiles of volunteers. *(4, ❍)*
- Academic institutions and especially information behaviour scientists could help with more extensive motivational studies of volunteers in CH initiatives. *(3, ❍)*
- Academic institutions and especially information behaviour scientists should advance in modelling behavioural norms for various types of volunteer contributions. *(5, ❍)*
- Within the Business Canvas model, academic institutions can play a key partnership role in citizen science projects initiated by CH institutions, but they can also be a customer of citizen science. The specific case needs to be clear in the beginning of the project. *(6, ❍)*
- Academic institutions have further space for spreading awareness on citizen science in DH/Humanities. *(7, ❍)*
- Academic institutions can benefit from some of the benefits for CH institutions directly (e.g. "providing better service to professional researchers" or could enhance other benefits (e.g. "Facilitating new discoveries on CH collections". *(8, ❍)*

## 4.4 CITIZEN ACTIVISTS' ORGANISATIONS

- Citizen organizations should consolidate and brand their competences related to citizen science initiatives implemented by CH institutions. *(1, ❍, ⊙, ●)*

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- Citizen activists' organizations could promote most popular tasks which are still low in uptake in citizen science initiatives. *(2, ❍)*
- Citizen activists' organizations could establish and support throughout citizen science projects communities of contributors. *(3, ❍, ⊙)*
- Citizen activists' organizations could help with getting insights on factors contributing to longer-term engagement of volunteers. *(4, ❍)*
- Citizen activists' organizations should advocate aspects of quality of voluntary contributions and most typical issues related to quality. *(5, ❍, ⊙)*
- Citizen activists' organizations can play different roles according to the business canvas model as well: the one requiring special consideration is of communication channel to contributors. *(6, ❍, ⊙)*
- Citizen activists' organizations also can be involved more actively in awareness campaigns on citizen science. *(7, ❍)*
- Citizen activists' organizations can structure their campaigns around identified benefits for CH institutions, academic institutions, and citizens. *(8, ❍)*

Work on bridging some of these identified requirements could be particularly helpful for the Civic Epistemologies project.

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# 5. ABBREVIATIONS

| | |
|---|---|
| AHRC | Arts & Humanities Research Council (UK) |
| 3D | Three-dimensional |
| CH | cultural heritage |
| DCH | digital cultural heritage |
| EC | European Commission |
| OKF | Open Knowledge Foundation |

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# APPENDIX 1.

# INTERNAL REPORT

| | |
|---|---|
| **Project Acronym:** | **CIVIC EPISTEMOLOGIES** |
| **Grant Agreement number:** | **632694** |
| **Project Title:** | **Civic Epistemologies: Development of a Roadmap for Citizen Researchers in the age of Digital Culture** |

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## Online survey results on citizen science and crowdsourcing use in cultural heritage institutions

**Revision: Internal v1.0**

**Authors:**

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**Edel Jennings (WUT)**

| Project co-funded by the European Commission within the from the European Union's Seventh Framework Programme for research, technological development and demonstration | | |
|---|---|---|
| **Dissemination Level** | | |
| **P** | **Public** | **X** |
| **C** | **Confidential, only for members of the consortium and the Commission Services** | |

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# Revision History

| Version No. | Date | Author | Organisation | Description |
|---|---|---|---|---|
| Prep.work | 10-11.2014 | Milena Dobreva, Daniela Azzopardi | UoM | Preparation of the online survey and revision adopting the feedback of the consortium |
| 0.1 | 15.12.2014 | Daniela Azzopardi | UoM | Download of survey results |
| 1.0 | 30.03.2015 | Milena Dobreva | UoM | Revision |
| | | | | |

## Statement of originality:

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

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# EXECUTIVE SUMMARY

This internal document presents the outcomes of an online survey was open for three weeks and received 85 responses from 23 countries, 19 European, 2 from North America and 2 from Asia.

The web survey included demographic data and sections on familiarity with citizen science, e-Infrastructural aspects, reflections on citizens' participation, and aspects related to the future use of citizen science.

# INTRODUCTION

This report presents the data on all questions included in the online questionnaire which the Civic Epistemologies project launched in November 2015. The questionnaire aimed to gather data which would help to get insights into:

- the current level of awareness on citizen science in memory institutions;
- the patterns of involvement of cultural heritage institutions in citizen science;
- the attractiveness factors seen by cultural heritage professionals;
- the need in specific tools which facilitate citizen science deployment in this specific setting;
- the awareness and interest in using citizen science in such domains like digital cultural content for creativity.

There were several aspects of the methodology of this study which deserve a special mention:

- The survey explores in parallel citizen science and crowdsourcing. This was a matter discussed at length within the consortium. Taking into account the project consortium observations than in many cases there is a confusion of these terms, and also that crowdsourcing gained popularity within the cultural heritage context, the project decided to make use of both concepts within the survey.
- For the first time we are aware of, a survey on citizen science includes questions which allow comparing the outcomes of this questionnaire with previous surveys on citizen science (e.g. Wiggins and Crowston, 2012).
- The survey also allows comparing the data gathered with outcomes from the focus groups; in this sense even if it has not been included initially in the project work plan it complements the work on WP2 (Requirements gathering) and WP3 (Designing a roadmap).

There are some typos in the responses which are not corrected to retain the original look and feel on the feedback.

# OVERVIEW OF SURVEY RESULTS

This overview includes all questions in the survey. The titles highlighted in yellow indicate the section of the survey and the numbered headings present the questions including their original numbering.

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# DEMOGRAPHIC DATA

Data on the type of institution were included in the survey; in addition the location stamp in the results was used to get a profile on the countries of origin of the respondents.

## Country of origin

Responses from 23 countries and one coming from unspecified European location had been gathered (there was no question on a country of residence, but these data are based on the IP addresses of the respondents). Most came from European countries (Belgium, Bulgaria, Czech republic, Denmark, Estonia, Germany, Greece, Hungary, Italy, Malta, Netherlands, Poland, Portugal, Romania, Serbia, Slovenia, Spain, Sweden, UK) and four countries beyond Europe (Canada, Kazakhstan, Lebanon, USA). The countries where most responses came from include Italy (17), Serbia (12) and UK (10). However since the questionnaire had been advertised during international events in Italy, not all responses from this country could be considered as "local".

Fig. A-1 and Table A-1 present the distribution of the data on country of origin of respondents.

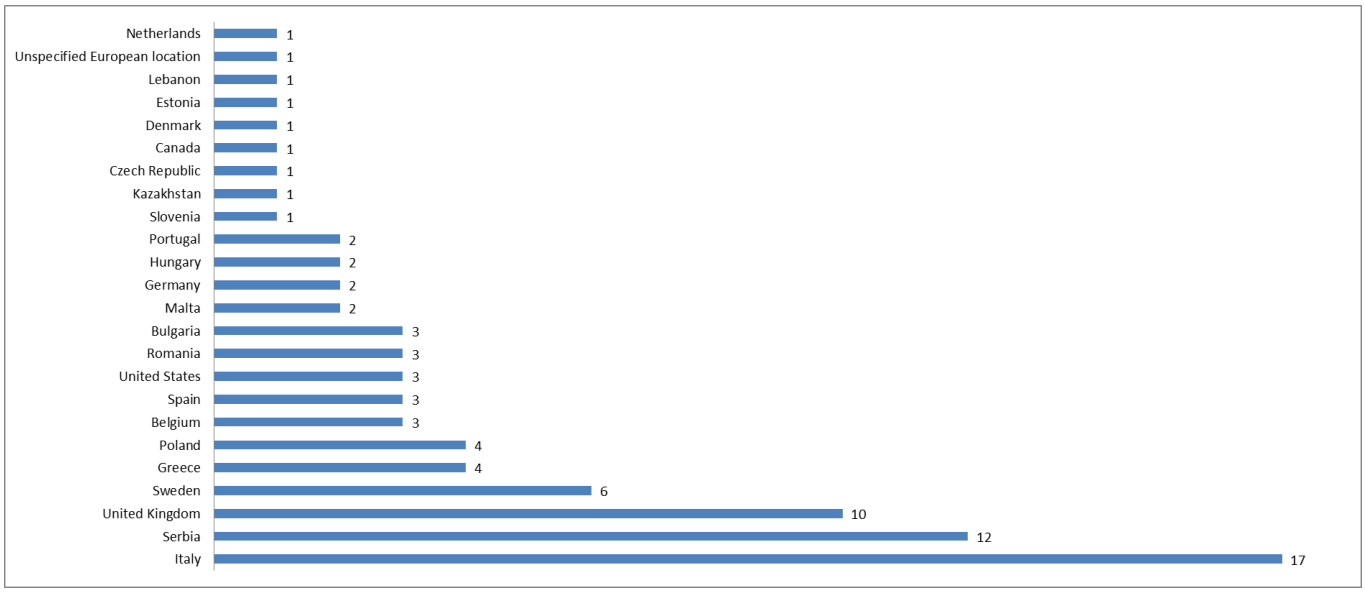


*Figure A-9. Number of respondents per country*

| Value | Count | Percent |
|---|---|---|
| Belgium | 3 | 3.5% |
| Bulgaria | 3 | 3.5% |
| Canada | 1 | 1.2% |

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| | | |
|---|---|---|
| Czech Republic | 1 | 1.2% |
| Denmark | 1 | 1.2% |
| Estonia | 1 | 1.2% |
| Europe | 1 | 1.2% |
| Germany | 2 | 2.4% |
| Greece | 4 | 4.7% |
| Hungary | 2 | 2.4% |
| Italy | 17 | 20.0% |
| Kazakhstan | 1 | 1.2% |
| Lebanon | 1 | 1.2% |
| Malta | 2 | 2.4% |
| Netherlands | 1 | 1.2% |
| Poland | 4 | 4.7% |
| Portugal | 2 | 2.4% |
| Romania | 3 | 3.5% |
| Serbia | 12 | 14.1% |
| Slovenia | 1 | 1.2% |
| Spain | 3 | 3.5% |
| Sweden | 6 | 7.1% |
| United Kingdom | 10 | 11.8% |
| United States | 3 | 3.5% |
| **Total** | **85** | |

*Table A-1. Data on respondents according to country of origin*

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## 1. What type of institution do you work in?

This question allowed to make multiple choices (library, museum, archive, art gallery, cultural content aggregator) or to specify a different value; 96 responses had been collected. The choice of predefined options reflected the target group since cultural heritage institutions It was possible to make multiple choice because for example a library can be as well an aggregator of content. 46 of the responses in general indicated cultural heritage institution with almost equal participation of respondents from museums, libraries and archives, and a small fraction of art galleries (1%); 8% of the respondents have an aggregator role which was similarly to citizen science requires infrastructure and technological expertise – although of a very different nature.

The responses in the "Other" group included some organisations with conservation profile as well as foundations and voluntary researchers; however there were 16% of respondents coming from universities and 8% coming from research which demonstrates interest from the academic community as well (the general participation from the academic community would be 26% including as well art universities and institutes addressing specific areas of research). It is worth noting that there were also respondents with consultancy roles; from mental health volunteer association, and from a semantic modelling company. It is encouraging to see that breadth of institutional affiliations since this confirms the interest to citizen science within a range of stakeholders.

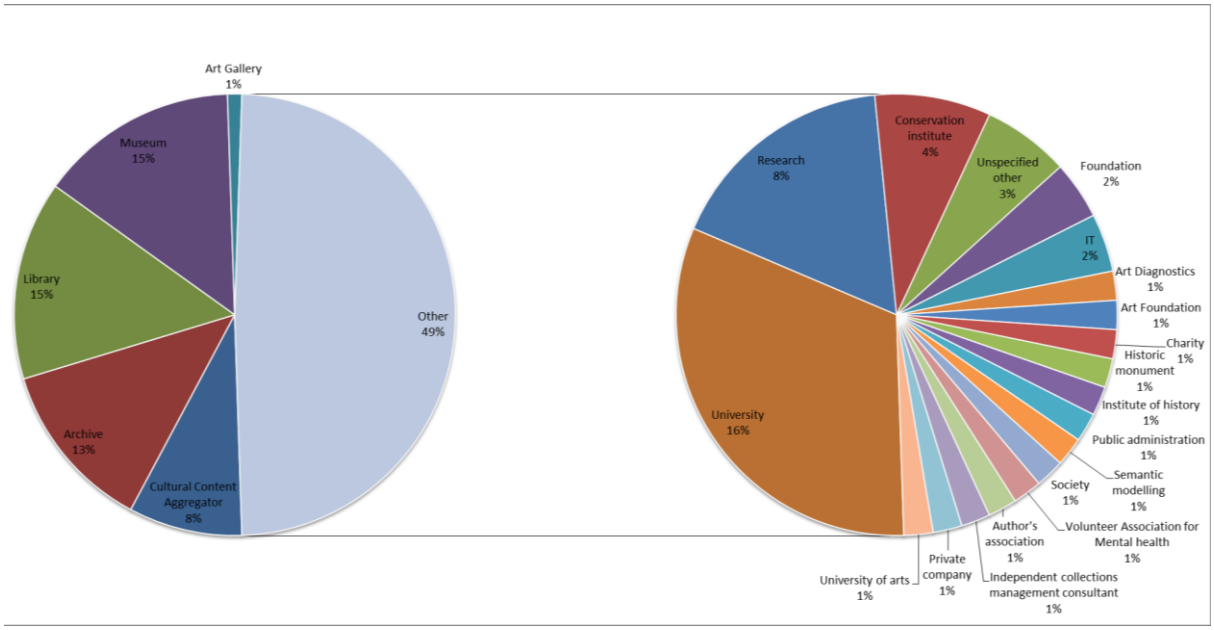


*Figure A-10. Distribution of institutions*

| Value | Count | Percent |
|---|---|---|
| Cultural Content Aggregator | 8 | 9.9% |

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| | | |
|---|---|---|
| Archive | 12 | 14.8% |
| Library | 14 | 17.3% |
| Museum | 14 | 17.3% |
| Art Gallery | 1 | 1.2% |
| Other | 47 | 58.0% |
| TOTAL (note that multiple choices were possible) | 96 | |

*Table A-2. Distribution of responses according to the institutional affiliation of respondents*

### 2. How many years has the institution been operational?

This question meant to help understanding if there might be a correlation between 'younger' institutions and the extent of use of citizen science. The responses came mostly from institutions existing for over 50 years (42.5%) followed by those which existed between 10 and 50 years (38.8%) and with 18.8% of institutions created within the last decade.

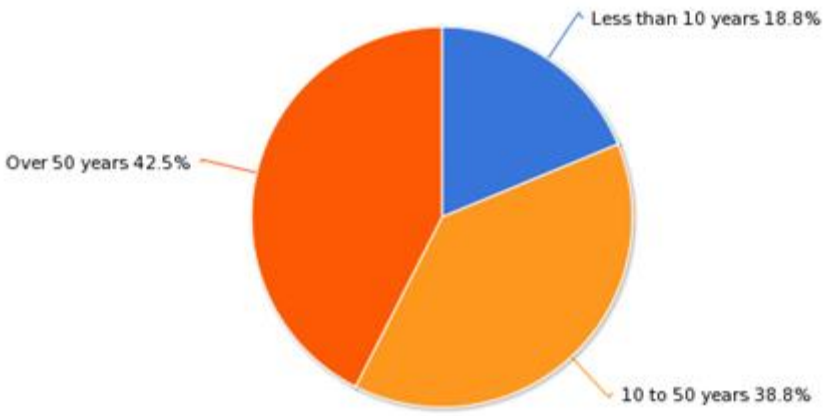


*Figure A-11. Distribution of respondents according to years of existence of their institution*

| Value | Count | Percent |
|---|---|---|
| Less than 10 years | 15 | 18.8% |
| 10 to 50 years | 31 | 38.8% |
| Over 50 years | 34 | 42.5% |

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| | | |
|---|---|---|
| **Total** | **80** | |

*Table A-3. Distribution of respondents according to years of existence of their institution*

## FAMILIARITY WITH AND INVOLVEMENT IN CITIZEN SCIENCE

### 3. Can you give an example of participation of citizens in a research project which impressed you?

This question established familiarity with citizen science projects. In general the participants demonstrated high activity with 83% providing examples; although it could be debatable if all of those responses are indeed examples of citizen science. Among repetitive examples were galaxy zoo (mentioned twice) and Europeana, in particular mentioned for the crowdsourcing efforts of Europeana 1914-1918. One of the respondents used in the response the term "crowdsourcing" which indicates that citizen science and crowdsourcing could be mixed or taken as synonyms.

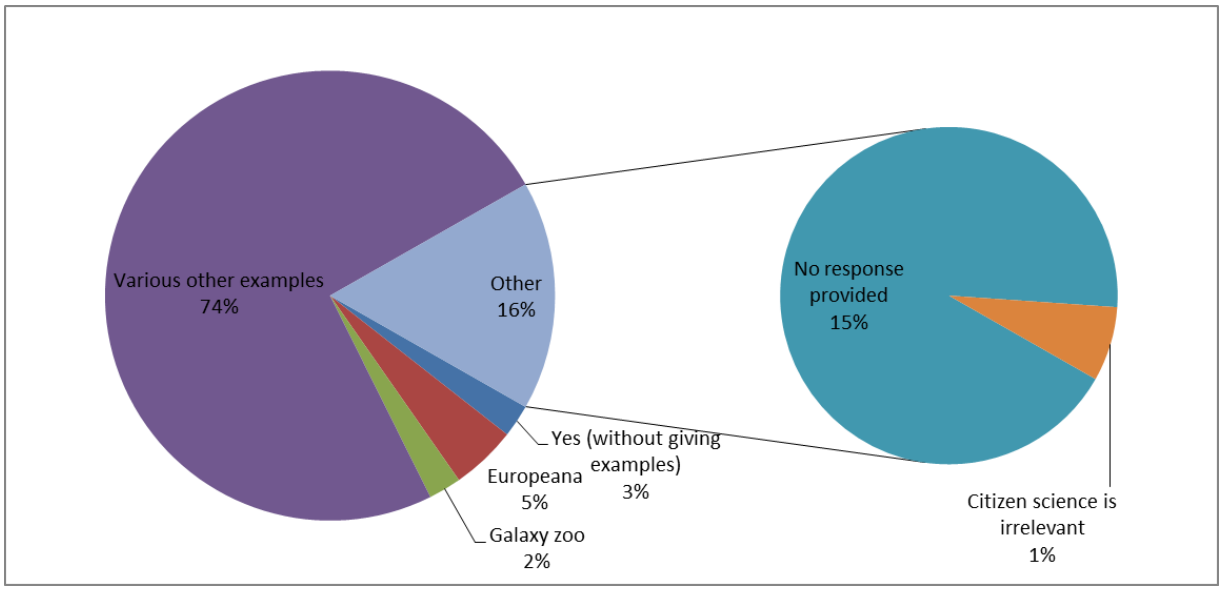


*Figure A-12. Familiarity with citizen science projects*

| Response | Count |
|---|---|
| No | **17** |
| 1) Europeana 1914-1918.eu is a hugely successful crowdsourcing project, completed in 21 countries across Europe and will continue into Turkey and other countries next year. With Europeana 1914-1918, we are piecing together a unique pan-European perspective of the Great War. Alongside the official records, stories, photographs and memorabilia from institutions such as museums, archives and galleries, we are asking the citizens of Europe to share their family stories and memories.<br>2) Not exactly a research project, but Europeana 1914-1918 has these Collection Days, during which we were collecting memories from WWI from the citizens, who were very keen to participate and leave the story or the memorabilia behind...for future generations. | **4** |

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| | |
|---|---|
| 3) http://www.europeana1914-1918.eu/en<br>4) Europeana projects | |
| 1) Galaxy Zoo (of course) has large numbers. What I found more interesting was a tour guide in Libya who used our online publication of Latin inscriptions, and then sent us updates on their current locations.<br>2) GalaxyZoo | **2** |
| http://www.mappi-na.it/ | **2** |
| Project RICHES | **2** |
| 1) EU-MEMOLA Project 2) "Citizen scientists" helping local wildlife and collecting data on bird distribution in the USA | **1** |
| 1) focused listservs as a source of information and information sharing 2) Brooklyn Museum of Art crowd sourcing an exhibition 3) tagging photos at the Smithsonian website | **1** |
| A colleague of mine is developing a project called "Orasul memorabil" (memorable city) collecting old photographs from citizens. Another colleague is also doing participatory projects with her NGO. | **1** |
| All Tolstoy in one click | **1** |
| An open exhibition after the workshop "The city and the water" | **1** |
| artigo.org a gaming platform building an art semantic search engine from the footprints left by players. | **1** |
| At the European Researchers Night, collection of milk teeth for their study; the set-up was a small event based on the image of a mouse that traditionally collects the teeth from under the pillow in Spain (Ratoncito Perez), with colouring activities etc.. A small gift for every child participating. Instead of dozens, over 500 teeth and molars were collected. | **1** |
| Citizens mapping air quality in their city by using lichens in parks (great bio-indicators). | **1** |
| Climate Watch | **1** |
| cropping of files in V&A | **1** |
| Cultural Heritage Trails | **1** |
| Different crowdsourcing projects in Finland. | **1** |
| During the Campiello project, local communities in Chania and Venice were engaged in activities to rediscover their local culture and enable tourists learn about it. | **1** |
| Foldit | **1** |
| Gra.fo Project https://grafo.sns.it | **1** |

| | |
|---|---|
| High profile projects such as the Zooniverse set of research seem to be very successful. | **1** |
| http://www.bbc.co.uk/news/business-13749897 http://www.digitalkoot.fi/ | **1** |
| http://www.tiltfactor.org/metadata-games/ | **1** |
| https://trove.nla.gov.au/newspaper | **1** |
| I am aware of the first 'call' for birds species observation. | **1** |
| In better communications between citizens and science and also for good implementation and presentation of cultural heritage of country. | **1** |
| **Irrelevant** ("Citizens of age's between 11 and 22, students") | **1** |
| Lay person panel to develop guidelines. | **1** |
| medical researches | **1** |
| MOSI, Turing's Sunflowers www.turingsunflowers.com | **1** |
| National Geographic's Genographic Project has used advanced DNA analysis and worked with indigenous communities to help answer fundamental questions about where humans originated and how we came to populate the Earth | **1** |
| Participation through gamification is one of the main interesting activities I've seen. Projects includes gaming approach are always been impressing me | **1** |
| Picturing phenomena, that you find interested, which could be relevant in professional research. | **1** |
| Pilot on archaeology in Rural Ireland will be nice to see. | **1** |
| Pithari project in Athens implemented by Diadrasis organization researches through a bottom up approach the heritage landmarks of Exarcheia neighbourhood. diadrasis@diadrasis.org | **1** |
| Postcolonial Visions http://igg.me/at/postcolonialvisions/x/7295216 "(Post) colonial visions will be a great shared archive of Italian colonialism and of the intercultural present. It will contain materials preserved in the homes of many Italians that witness the long and significant colonial phase of which Italy was a protagonist. The need to bring out the connections between the current stereotypes towards the "other" and our colonial past, can only begin from a re-appropriation "from below" of the remaining public and private memories of that time. Being able to read again even a single picture sent from the front, a letter, the words of an official document or the representation of colonized peoples made by advertising or in popular magazines, will help to reconstruct the emergence of many visual stereotypes that still dominate our culture. Those materials will be collected via a public call, beginning from Rome and Lazio and then continuing with the rest of Italy. We will ask people who own objects and stories from the colonial period to send them to us. All the materials will be digitalized and then | **1** |

| | |
|---|---|
| returned to their owners, in order not to deprive the donors of their personal memories. Together with the recovery of private documents detailed research inside historical archives and libraries will also be undertaken in order to render visible those materials that are often invisible due to the lack of public exposure. Furthermore the (Post) colonial visions archive will build a network of foundations, associations, universities, research centres and art institutes, with offices in the territories of the former Italian colonies, that are interested in colonial issues, to be able to collect in loco the same types of materials taken from private and public archives, and to imagine possible synergies and shared projects. The (Post) colonial visions archive won't just be a storage of objects, a container of memories, but also an open platform and an active social and cultural apparatus or "dispositif". From the outset we will invite artists, scholars, researchers, performers, musicians and writers to work on the materials in the archive, producing ad hoc artworks or events with them. All the productions made from the archive's materials will be published in a specific section of the archive's website and also exhibited and/or performed publicly in specifically organized events." (quote from the official website of the research project: http://igg.me/at/postcolonialvisions/x/7295216) | |
| Rideau River Project at the Canadian Museum of Nature | **1** |
| SETI is the one I am most familiar with. | **1** |
| Social Digitization Workshop | **1** |
| Socientize | **1** |
| Taking photographs of local monuments to create 3D models of them. | **1** |
| The British Library mechanical curator project where volunteers have found almost 22,000 maps and plans amongst a million images from old books | **1** |
| The NoTube project and Baird project Cfr Dan Brickley | **1** |
| There are project done by other institutions that I am aware about, most recently collecting The First World War memorabilia for example, but not in my institution. | **1** |
| Trove, in the National Library of Australia | **1** |
| We try to set up a virtual mathematical museum and all contributions are welcome. I am impressed by the idea and the participation of many people outside my institution. | **1** |
| With the help of our Guys (Mental disease Handicapped) we have produced tenth of Old people interviews catching small stories about mental disease, families, old habits, etc. in the years between two wars. The project has been called "Storiandoli" (Sketches of History, small stories). The interviews have been collected in a web portal and we are still in progress. | **1** |
| Yellow Star Houses (2014) Subjective Maps (exhibition, 2010) | **1** |
| 1) Yep<br>2) yes, but don't know its name | **2** |

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*Table A-4. Familiarity with citizen science projects*

**4. Are you familiar with the terms "Citizen Science" and "Crowdsourcing"?**

The answers to this question reveal that less than half of the respondents were familiar with both terms (41%), but in general at least one of the terms was known to those who responded to the survey. The popularity of the term "crowdsourcing" was 4 times higher than the knowledge of "citizen science" only. Some 14% of the respondent either did not encounter those terms before, or were not sure what they mean. This situation is indicative of the need to work more on the awareness of citizen science among cultural heritage professionals. This question was answered by 80 respondents, with 5 from those who took the survey not providing an answer.

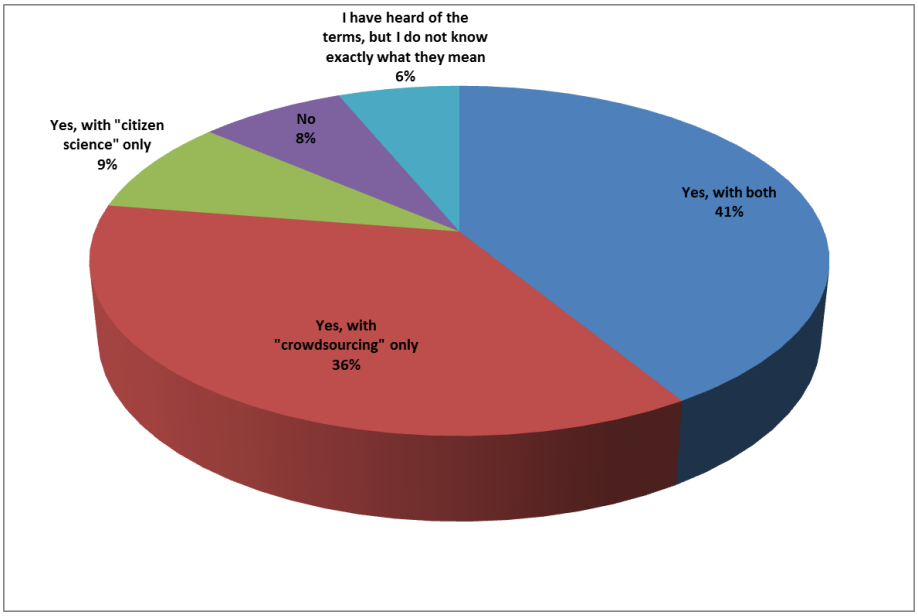


*Figure A-13. Responses to the question "Do you think that 'citizen science' and 'crowdsourcing' share the same meaning?"*

| Value | Count | Percent |
|---|---|---|
| Yes, with both | 33 | 41.3% |
| Yes, with "crowdsourcing" only | 29 | 36.3% |
| Yes, with "citizen science" only | 7 | 8.8% |
| No | 6 | 7.5% |

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| | | |
|---|---|---|
| I have heard of the terms, but I do not know exactly what they mean | 5 | 6.3% |

*Table A-5. Responses to the question "Do you think that 'citizen science' and 'crowdsourcing' share the same meaning?"*

### 5. Do you think that "Citizen Science" and "Crowdsourcing" share the same meaning?

After checking familiarity with the terms "crowdsourcing" and "citizen science", this question aimed to explore whether participant see a difference in their meanings. When the Civic Epistemologies team did its initial literature survey, a view was formed that it is still happening that these terms are used as synonyms. Within the cultural heritage domain the familiarity with crowdsourcing was expected to be higher – and one of the initial avenues for work of the project team was to explore how positive experiences from use of crowdsourcing could be developed into motivating and inspirational experiences to introduce citizen science into the practice of memory institutions. Our survey shows that almost two thirds of the respondents (65.8%) agree that both terms have different meaning; however some 15.2% believe these terms are synonymous and those who provided comments (19%) show doubts in the meaning of citizen science in particular.

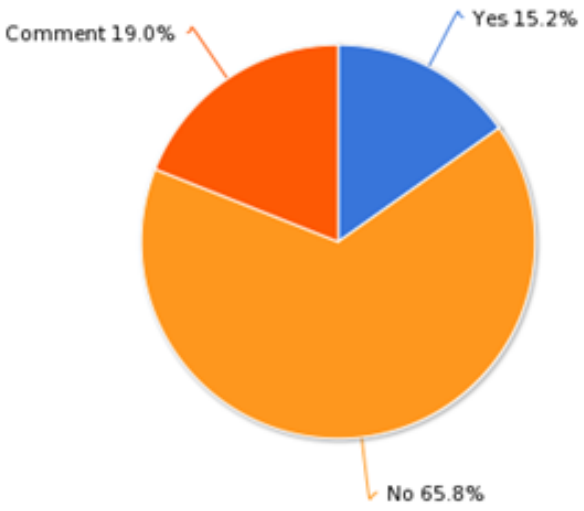


*Figure A-14. Opinions on "citizen science" and "crowdsourcing" sharing the same meaning*

| Value | Count | Percent |
|---|---|---|
| Yes | 12 | 15.2% |
| No | 52 | 65.8% |

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| | | |
|---|---|---|
| Comment | 15 | 19.0% |

*Table A-6. Opinions on "citizen science" and "crowdsourcing" sharing the same meaning*

| Open-Text Response Breakdown for "Comment" | Count |
|---|---|
| Don't think so | 1 |
| I don't know | 1 |
| I have no idea | 1 |
| I think the first contains the second | 1 |
| I'm aware what 'crowdsourcing' means, but I don't know what 'citizen science' covers. | 1 |
| Now I do | 1 |
| Crowdsourcing need not be scientific, it could be entirely artistic. | 1 |
| I have no idea | 1 |
| not familiar with citizen science | 1 |
| probably | 1 |
| there are similarities, most probably there will be more distinctions with further developments | 1 |
| In a way yes as it is a same class with 2 sub-uses. So implications are now different -because of the level of citizen involvement, e.g. crowdsourcing is usually referred to this "labor" work public is helping with while "citizen science" implicates more intellectual and research work by public. | 1 |
| Citizen science is somehow crowdsourcing tasks with a relevancy for scientific endeavours to a possibly selected "crowd" of non-experts. | 1 |

*Table A-7. Opinions on "citizen science" and "crowdsourcing" sharing the same meaning – open text comments*

### 6. Does your institution have any experience in using citizen science/crowdsourcing?

The uptake of citizen science and crowdsourcing initiatives within the institutions of the respondents is about ¼ (25.6%); there is a firm "no" for half of the institutions, with the other ¼ of the responses being "not sure".

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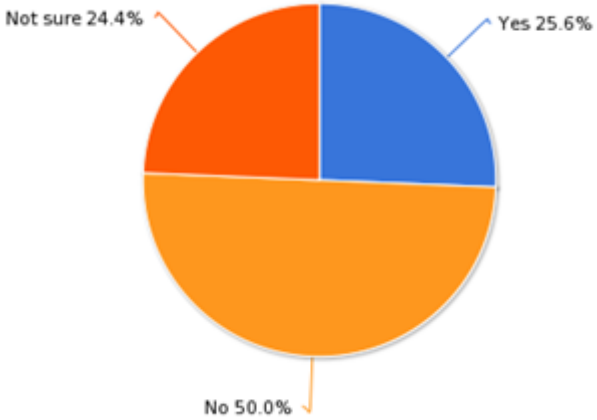


*Figure A-15. Responses to the question "Does your institution have any experience in using citizen science/crowdsourcing?"*

| Value | Count | Percent |
|---|---|---|
| Yes | 20 | 25.6% |
| No | 39 | 50.0% |
| Not sure | 19 | 24.4% |

*Table A-8. Responses to the question "Does your institution have any experience in using citizen science/crowdsourcing?"*

### 7. Could you post a link to a web page presenting the citizen science/crowdsourcing project(s) of your institution, or alternatively provide a short description?

Asked to provide descriptions of the citizen science or crowdsourcing experience of their institutions, 18 of the 20 participants who answered to the previous questions that their institutions have such experience, provided text comments. Some responses are not particularly informative ("yes" or "no"), but others pointed again to Europeana 1914-18, or the development of specific tools. This information will be fed into the registry of tools being developed by the Civic Epistemologies project.

| Response | Count |
|---|---|
| Into Excavations | **1** |
| No | **1** |

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| | |
|---|---|
| Sapienza University Digital Library http://sapienzadigitallibrary.uniroma1.it/ | **1** |
| We promote Wikipedia, probably the largest crowdsourced citizen science project | **1** |
| artigo.org | **1** |
| http://shareyourheritage.eu/home | **1** |
| http://www.bl.uk/maps/ | **1** |
| http://www.cenieh.es/en/node/1603 | **1** |
| http://www.music.tuc.gr/Project.show?ID=13 | **1** |
| http://www.nature.ca/rideau/g/g1-e.html | **1** |
| ibercivis.es umbrella initiative with several participatory projects | **1** |
| yes | **1** |
| I am currently involved in building a heritage Gazetteer for Cyprus, which is structured to admit crowd-sourcing. | **1** |
| http://www.techsoupforlibraries.org/blog/the-social-digitization-workshop-involving-the-community-in-the-creation-of-a-digital-library http://www.slideshare.net/SlaskaBC/the-social-digitization-workshop-ecei11-transformative-impact-of-libraries http://www.slideshare.net/SlaskaBC/the-social-digitization-workshop-of-the-silesian-digital-library-at-the-silesian-library | **1** |
| http://www.europeana1914-1918.eu/it The Institute in which I work, organized the Italian collection days (five) and many citizens contributed, telling personal stories and showing letters, diaries, notebooks, photographs and medals coming from the battle front.: • Forte Cadine, on 16 March 2013 about 100 visitors attended the event, 35 actual participants, about 2000 files digitized • Forte Monte Maso, Valli del Pasubio, on May 18 2013 , 130 visitors, 30 participants, 1800 files • Rome, on May 15, 2013200 visitors, 70 stories and 600 files • Forteza o May 23, 2013 about 100 people, 40 objects • Pordenone within Pordenonelegge (September 2013) were collected:<br>o 60 testimonies of about 300 people who stopped to see the video (WW1, Defense, film library of Friuli) we had placed in a special area of the local<br>o 148 documents and objects o 390 files generated • Milan - in collaboration with Corriere della Sera (May 2014) were collected:<br>o 146 testimonies from about 180 people who have submitted (the discard had submitted material damaged or not applicable)<br>o 1505 documents and objects<br>o 6588 files generated | **1** |

| | |
|---|---|
| Still it is not on-line but it is about User Generated Content for Europeana. http://www.europeana1914-1918.eu/en | **1** |
| http://www.yellowstarhouses.org/ http://www.verzio.org/ http://www.parallelarchive.org/ http://www.samizdatportal.org (currently under revision) http://www.budapest100.hu/ (now independent project) | **1** |
| I used to work as a project coordinator for a EU-funded citizen science project. In addition, I have implemented a citizen science programme for kids in primary schools in Paris. Lastly, I have co-written a chapter on citizen science and am a long live open and citizen science advocate. | **1** |
| TOTAL | **18** |

*Table A-9. Links to citizen science/crowdsourcing project(s) of participants' institutions*

### 8. How could citizen science/crowdsourcing projects be helpful to your institution?

The major benefits from the use of citizen science and crowdsourcing are seen in expanding the knowledge on a certain topic, aiding the progress of existing research, helping initiating new research and improving the engagement of visitors with collections. Additional suggestions had been made for the use of citizen science/crowdsourcing for speeding up activities, and some suggestions were made for "Other", including one opinion that these activities cannot be directly helpful. The general assessment however is that there could be benefits from the use of citizen science/crowdsourcing.

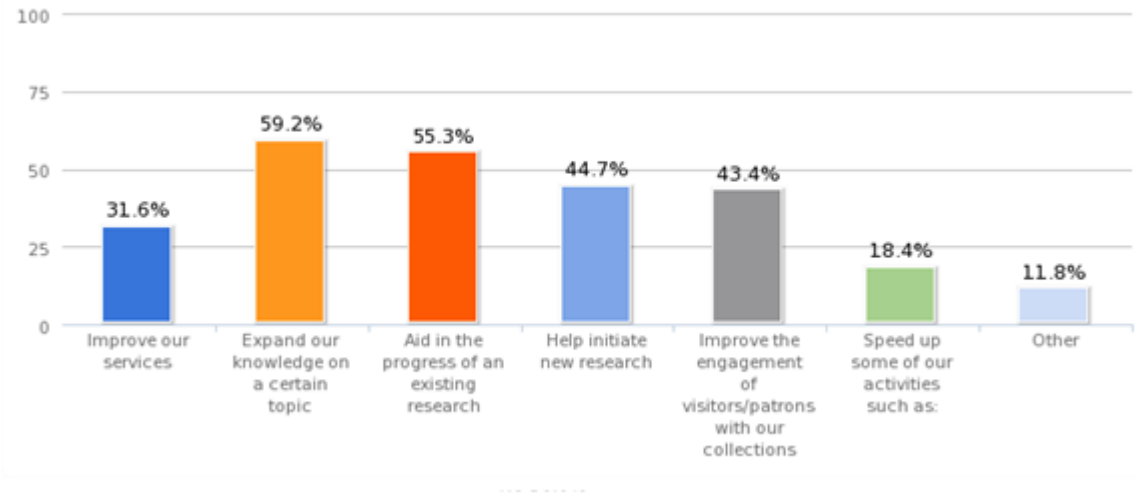


*Figure A-16. Major benefits from use of citizen science/crowdsourcing*

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| Value | Count | Percent |
|---|---|---|
| Improve our services | 24 | 31.6% |
| Expand our knowledge on a certain topic | 45 | 59.2% |
| Aid in the progress of an existing research | 42 | 55.3% |
| Help initiate new research | 34 | 44.7% |
| Improve the engagement of visitors/patrons with our collections | 33 | 43.4% |
| Speed up some of our activities such as: | 14 | 18.4% |
| Other | 9 | 11.8% |

*Table A-10. Major benefits from citizen science/crowdsourcing*

| Open-Text Response Breakdown for "Speed up some of our activities such as:" | Count |
|---|---|
| CH online content identification / characterization | 1 |
| Digitization and transcriptions | 1 |
| Language resources | 1 |
| OCR | 1 |
| acquiring and using images | 1 |
| collecting metadata for archives/photos | 1 |
| creating of digital library | 1 |
| databases | 1 |
| digital content | 1 |
| image analysis | 1 |
| inventory/cataloguing | 1 |
| make our activities and the museum known | 1 |

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| Open-Text Response Breakdown for "Other" | Count |
|---|---|
| ? | 1 |
| Expand reach | 1 |
| Give a work chance to our guys | 1 |
| UNESCO MoW project | 1 |
| experimental data gathering | 1 |
| find new opportunities | 1 |
| refresh the ideas in general | 1 |
| unlikely to be directly helpful | 1 |

*Table A-11. Additional text comments on the benefits from citizen science/crowdsourcing*

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# E-INFRASTRUCTURAL ASPECTS

### 9. What infrastructures do you have in place which could be employed for such projects?

This question explored what tools are already in place in the institutions implementing citizen science projects. The most popular responses point out that the most important tolls are new/improved websites and Facebook accounts, reinforcing the social media dimension of citizen science/crowdsourcing (see Fig. A-9 and Tables A-12 and A-13).

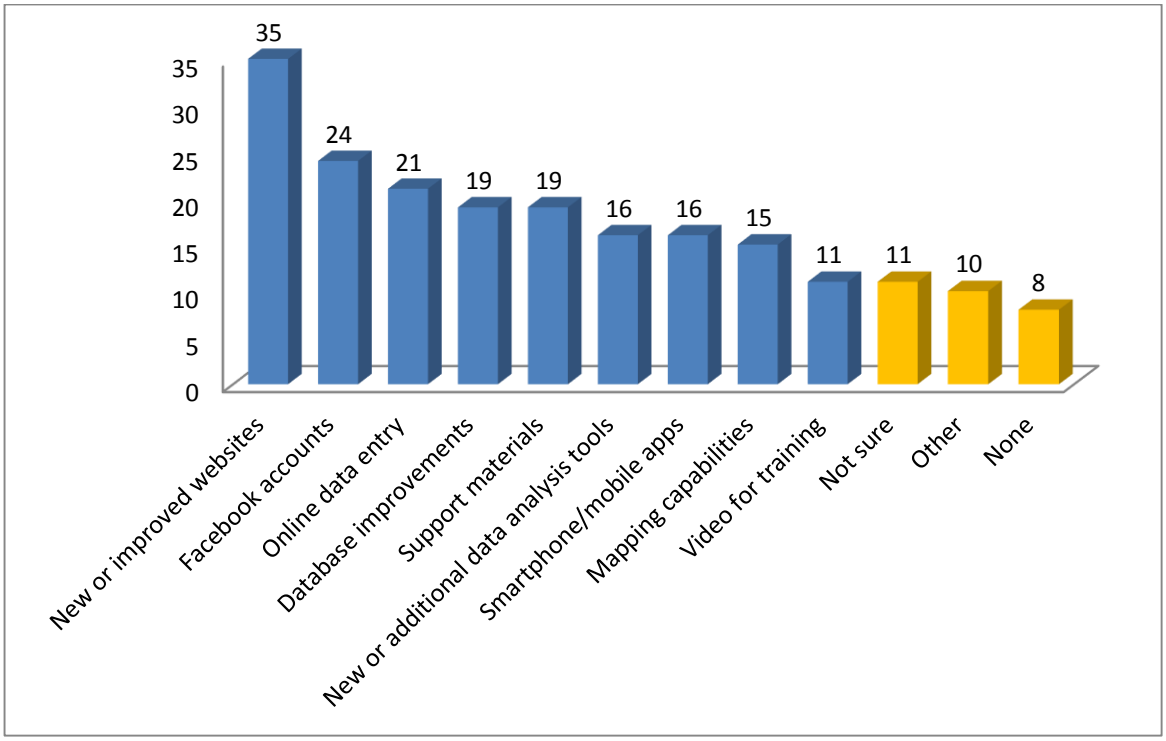


*Figure A-17. Infrastructures in place for use with citizen science projects*

| Value | Count | Percent |
|---|---|---|
| New or additional data analysis tools | 16 | 20.8% |
| Smartphone/mobile apps | 16 | 20.8% |
| New or improved websites | 35 | 45.5% |
| Video for training | 11 | 14.3% |
| Online data entry | 21 | 27.3% |

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| | | |
|---|---|---|
| Facebook accounts | 24 | 31.2% |
| Mapping capabilities | 15 | 19.5% |
| Database improvements | 19 | 24.7% |
| Support materials | 19 | 24.7% |
| None | 8 | 10.4% |
| Not sure | 11 | 14.3% |
| Other | 10 | 13.0% |

*Table A-12. Infrastructures in place for use with citizen science projects*

| Open-Text Response Breakdown for "Other" | Count |
|---|---|
| Computer and scanner stations | 1 |
| Conceptual Documentary modelling | 1 |
| Nothing beats good, old e-mail | 1 |
| Trainers | 1 |
| exhibition spaces | 1 |
| interactive maps | 2 |
| really, you word answers on the assumption that we already do it? | 1 |
| volunteer computing | 1 |

*Table A-13. Infrastructures in place for use with citizen science projects – open text comments*

### 10. What tools are missing or needed to facilitate the process?

This question explored what tools are currently missing but would be helpful within the citizen science context. The most popular ones included mobile applications for data entry and semantic annotation tools (see Fig. A-10 and Tables A-14, A-15).

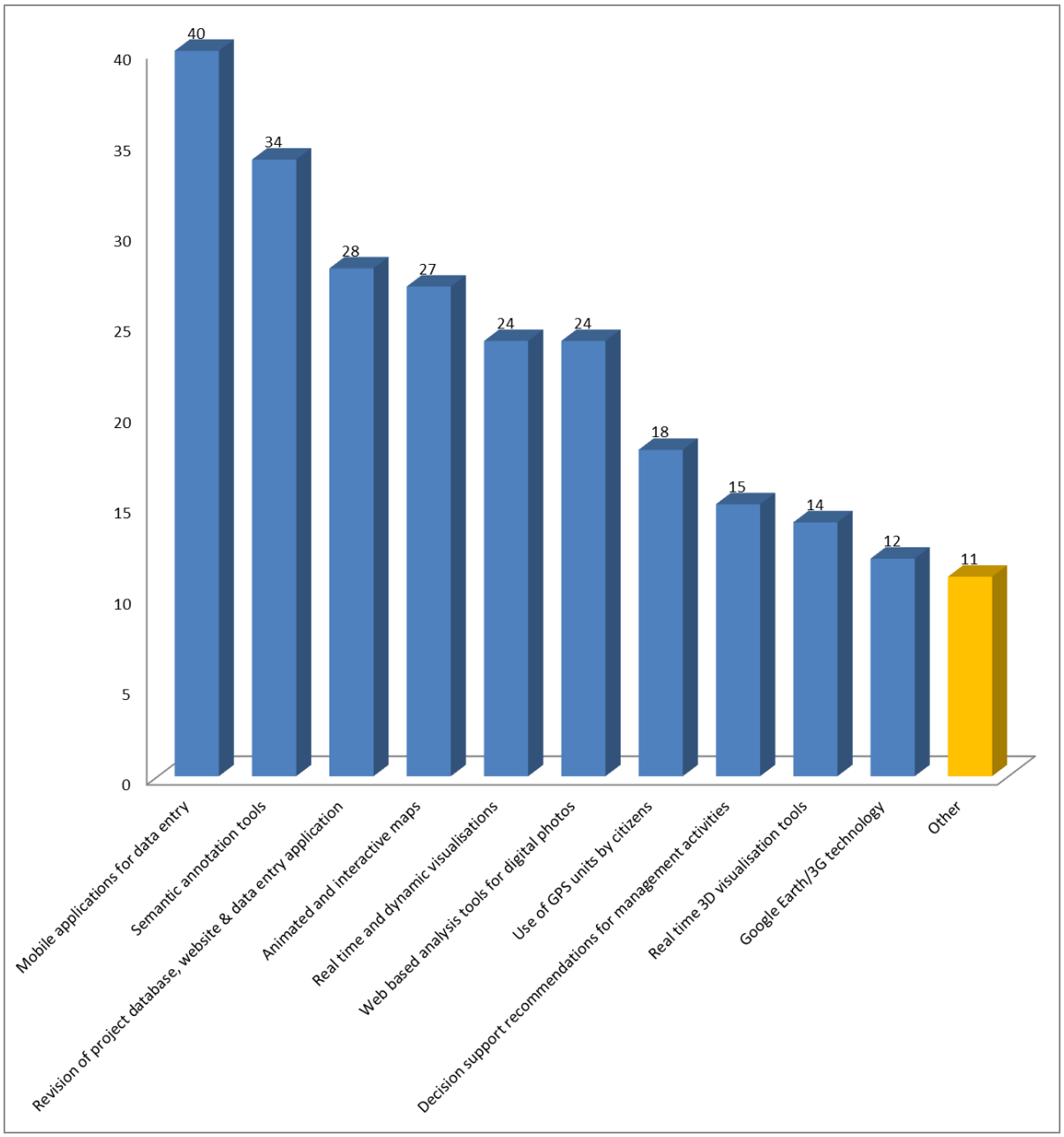


*Figure A-18. Missing or needed tools for citizen science/crowdsourcing uptake*

| Value | Count | Percent |
|---|---|---|
| Mobile applications for data entry | 40 | 53.3% |
| Real time and dynamic visualisations | 24 | 32.0% |
| Animated and interactive maps | 27 | 36.0% |

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| | | |
|---|---|---|
| Use of GPS units by citizens | 18 | 24.0% |
| Decision support recommendations for management activities | 15 | 20.0% |
| Google Earth/3G technology | 12 | 16.0% |
| Real time 3D visualisation tools | 14 | 18.7% |
| Semantic annotation tools | 34 | 45.3% |
| Complete revision of project database, website and data entry application | 28 | 37.3% |
| Web based analysis tools for digital photos | 24 | 32.0% |
| Other | 11 | 14.7% |

*Table A-14. Missing or needed tools for citizen science/crowdsourcing uptake*

| Open-Text Response Breakdown for "Other" | Count |
|---|---|
| ? | 1 |
| An engaged IT department | 1 |
| Increased use of open licences | 1 |
| Not sure | 1 |
| all of the above | 1 |
| finances | 1 |
| n/a | 1 |
| not sure | 1 |
| off line courses and discussions | 1 |
| this is getting daft. | 1 |
| non of above. We need (but we have) software for creating digital content of the digital library. | 1 |

*Table A-15. Missing or needed tools for citizen science/crowdsourcing uptake – additional suggestions*

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### 11. Which communication channels would you consider most helpful in citizen science/crowdsourcing projects?

The next area of interest was to check which communication channels are considered most useful in citizen science/crowdsourcing initiatives. Websites and social media are again appearing as most helpful (see Fig. A-11 and Tables A-16, A-17).

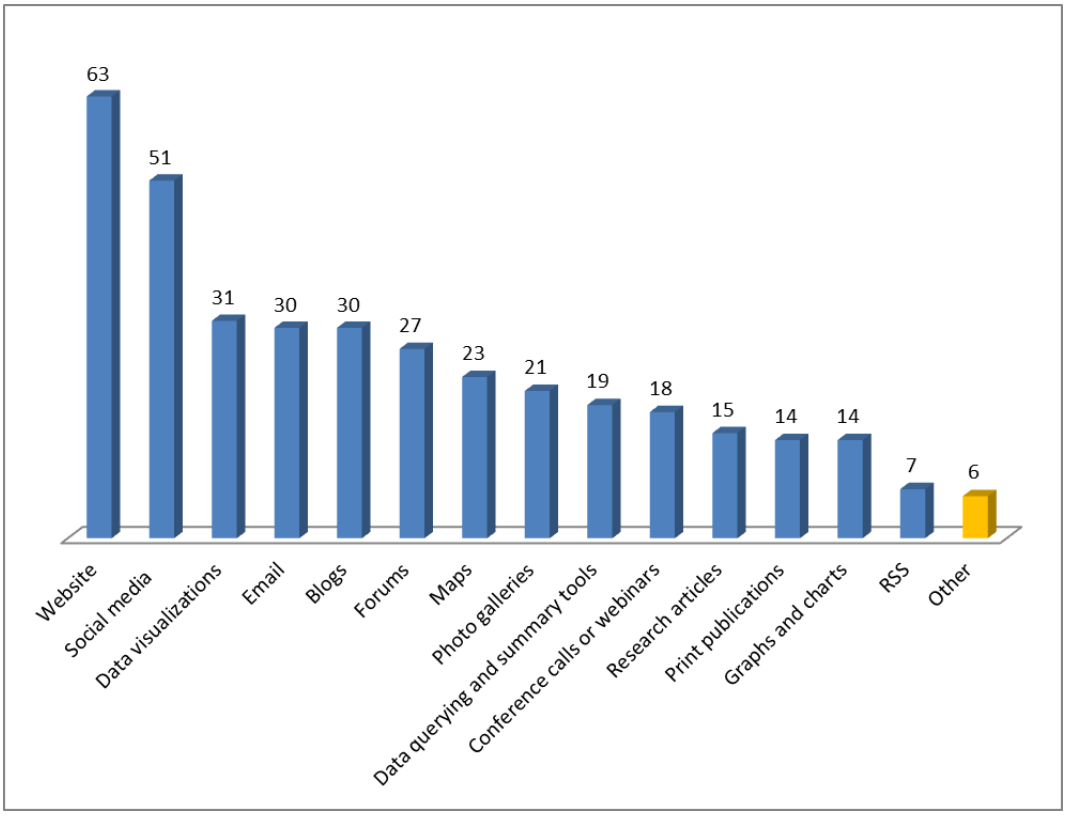


*Figure A-19. Communication channels most suitable for citizen science/crowdsourcing projects*

| Value | Count | Percent |
|---|---|---|
| Website | 63 | 82.9% |
| RSS | 7 | 9.2% |
| Email | 30 | 39.5% |
| Conference calls or webinars | 18 | 23.7% |
| Print publications | 14 | 18.4% |

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| | | |
|---|---|---|
| Research articles | 15 | 19.7% |
| Blogs | 30 | 39.5% |
| Forums | 27 | 35.5% |
| Photo galleries | 21 | 27.6% |
| Maps | 23 | 30.3% |
| Graphs and charts | 14 | 18.4% |
| Animated or interactive data visualizations | 31 | 40.8% |
| Data querying and summary tools | 19 | 25.0% |
| Social media (e.g., Twitter, Facebook) | 51 | 67.1% |
| Other | 6 | 7.9% |

*Table A-16. Communication channels most suitable for citizen science/crowdsourcing projects*

| **Open-Text Response Breakdown for "Other"** | **Count** |
|---|---|
| ? | 1 |
| Communication campaigns | 1 |
| Volunteers | 1 |
| and yet again, not the smartest of questions. | 1 |
| town hall style meetings, workshops | 1 |

*Table A-17. Communication channels most suitable for citizen science/crowdsourcing projects – additional suggestions*

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# ORGANISATIONAL ASPECTS

## 12. Does your institution have policies in place regulating citizen science/crowdsourcing projects?

One currently underexplored area is to what extent institutions have in place policies related to citizen science/crowdsourcing. According to our survey only 6.5% of the institutions represented have policies in place with 24.7% of the institutions working on policies in this domain. The majority of institutions (68.8%) however does not have or work on policies for these areas (see Fig. 12 and Table 18).

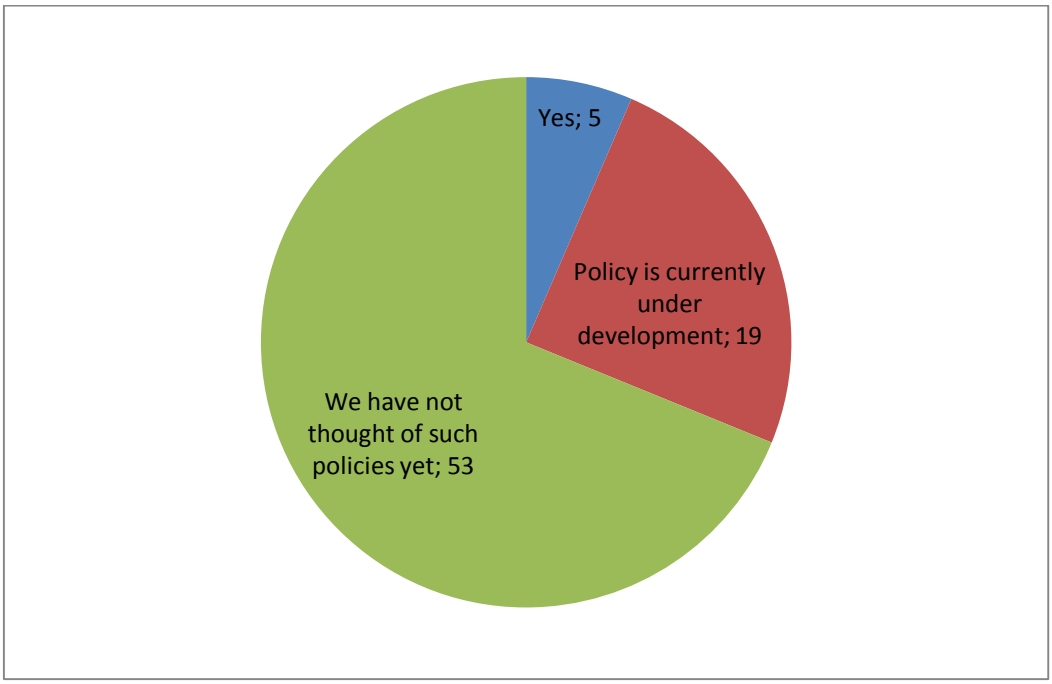


*Figure A-20. Availability of policies regulating citizen science/crowdsourcing projects*

| Value | Count | Percent |
|---|---|---|
| Yes | 5 | 6.5% |
| Policy is currently under development | 19 | 24.7% |
| We have not thought of such policies yet | 53 | 68.8% |

*Table A-18. Availability of policies regulating citizen science/crowdsourcing projects*

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### 13. Do you think that citizen science/crowdsourcing projects already implemented by your institution resulted in an increased appreciation by participants of the importance of their contribution to the project?

This question explores the general perception on benefits of citizen science/crowdsourcing for the volunteers. In general the opinion of intermediaries (the representatives of memory institutions) are that the volunteers appreciate the importance of their contribution (77.9% of responses) while 22.2% are not sure. However there were no negative responses to the question.

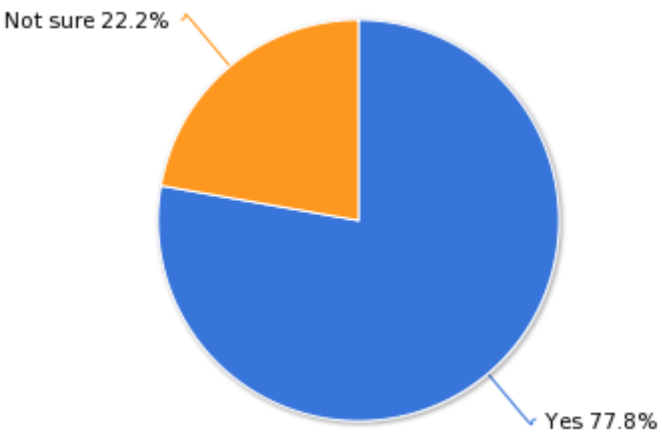


*Figure A-21. Influence of citizen science/crowdsourcing on appreciating contribution of volunteers*

| Value | Count | Percent |
|---|---|---|
| Yes | 14 | 77.8% |
| No | 0 | 0.0% |
| Not sure | 4 | 22.2% |

*Table A-19. Influence of citizen science/crowdsourcing on appreciating contribution of volunteers*

### 14. Did you have to provide additional training to staff members involved in citizen science projects?

One essential question for citizen science/crowdsourcing project is the need in additional training to staff members in institutions implementing such projects. Our survey showed on overwhelming opinion that such training is necessary indeed, mostly for communication to volunteer communities and in organising events for volunteers.

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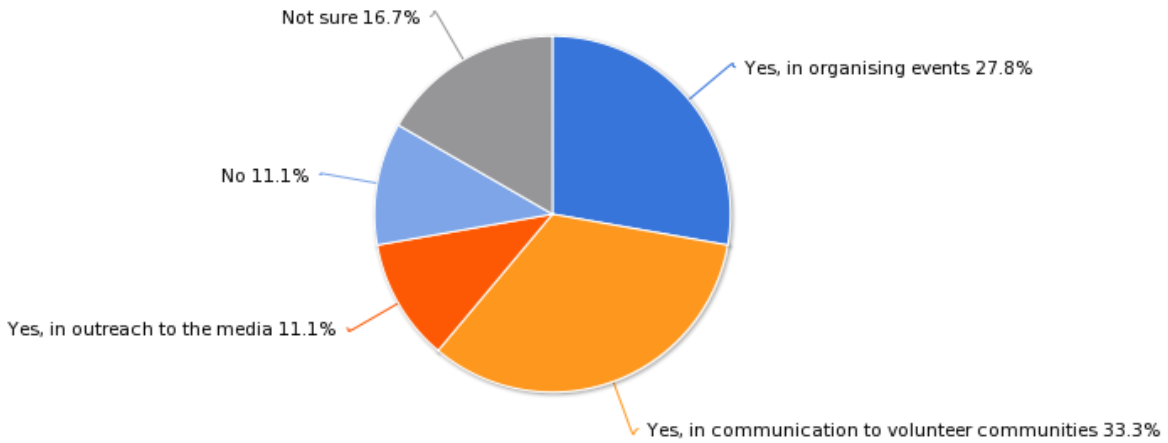


*Figure A-22. Need to provide additional training to staff members*

| Value | Count | Percent |
|---|---|---|
| Yes, in organising events | 5 | 27.8% |
| Yes, in communication to volunteer communities | 6 | 33.3% |
| Yes, in outreach to the media | 2 | 11.1% |
| Other | 0 | 0.0% |
| No | 2 | 11.1% |
| Not sure | 3 | 16.7% |

*Table A-20. Need to provide additional training to staff members*

### 15. How did you share the progress of the citizen science project?

The dissemination of news on progress of citizen science projects according to the respondents of the survey most often took place on the institutional website. Other channels used are publications, research articles and press releases.

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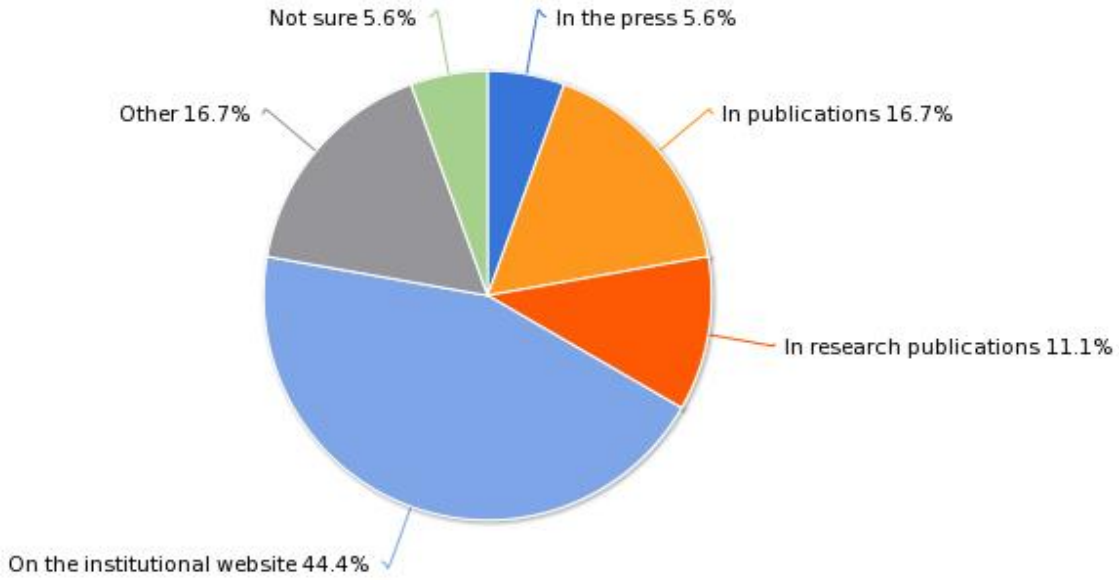


*Figure A-23, Means to share progress on citizen science projects*

| Value | Count | Percent |
|---|---|---|
| In the press | 1 | 5.6% |
| In publications | 3 | 16.7% |
| In an exhibition | 0 | 0.0% |
| In research publications | 2 | 11.1% |
| On the institutional website | 8 | 44.4% |
| Other | 3 | 16.7% |
| Not sure | 1 | 5.6% |

*Table A-21. Means to share progress on citizen science projects*

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# OBSERVATIONS ON CITIZENS CONTRIBUTING TO SUCH INITIATIVES

### 16. In your opinion, what is the main motivator for citizens to contribute to citizen science/crowdsourcing projects?

Surveying the opinion of intermediaries on the motivators of citizens to contribute to citizen science/crowdsourcing projects, the picture which emerged was dominated by the "opportunity to contribute personal knowledge" followed by "contribution to research". This would mean that professionals in digital cultural heritage would work most intensively with informed contributors rather than people performing purely auxiliary technical tasks.

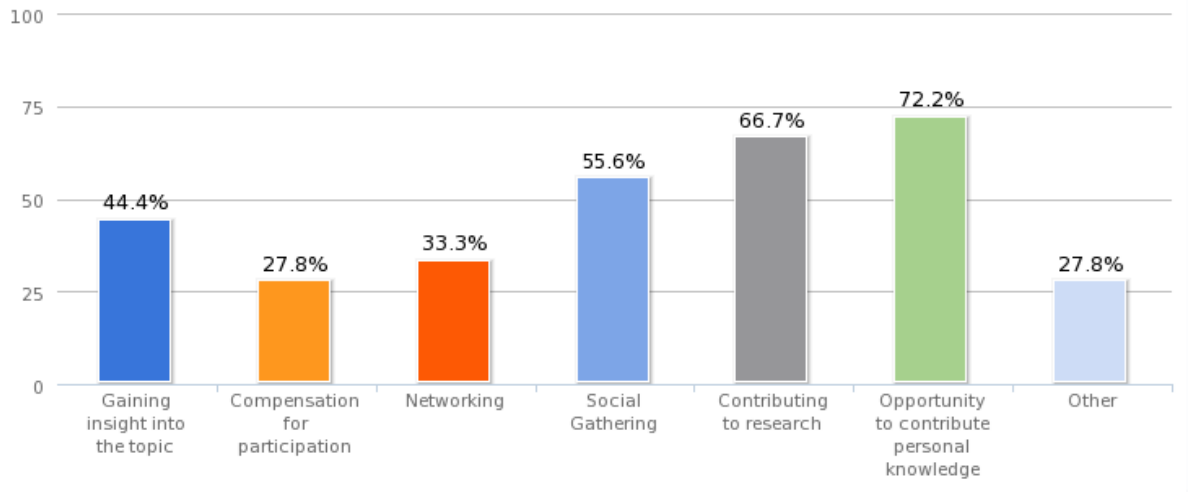


*Figure A-24. Motivation of citizens*

| Value | Count | Percent |
|---|---|---|
| Gaining insight into the topic | 8 | 44.4% |
| Compensation for participation | 5 | 27.8% |
| Networking | 6 | 33.3% |
| Social Gathering | 10 | 55.6% |
| Contributing to research | 12 | 66.7% |
| Opportunity to contribute personal knowledge | 13 | 72.2% |
| Other | 5 | 27.8% |

*Table A-22. Motivation of citizens*

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| Open-Text Response Breakdown for "Other" | Count |
|---|---|
| Community feeling | 1 |
| altruism | 1 |
| altruism and pleasure | 1 |
| learning, discovering | 1 |
| There can sometimes be political motivations (a wish to give a particular viewpoint) which could be a problem. | 1 |

*Table A-23. Motivation of citizens – other comments*

### 17. Did the participants help in expanding the network of citizen scientist by getting other people involved?

One question which helps to understand how the volunteer communities grow is whether participating volunteers help to engage other volunteers. In the case of our survey half of the respondents believed that volunteers helped to attract other volunteers (see Fig. A-17 and Table A-24).

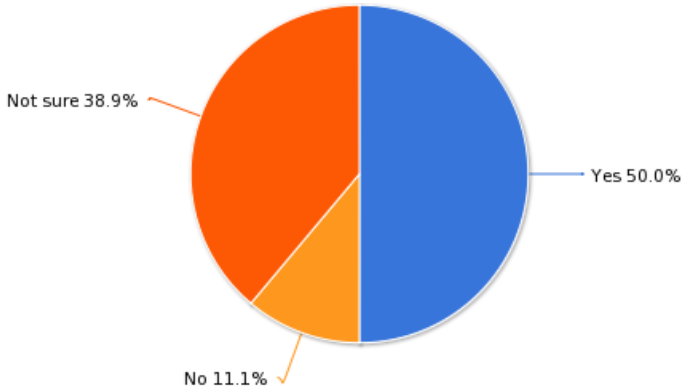


*Figure A-25. Help of volunteers to expand the network of contributing citizens*

| Value | Count | Percent |
|---|---|---|
| Yes | 9 | 50.0% |
| No | 2 | 11.1% |
| Not sure | 7 | 38.9% |

*Table A-24. Help of volunteers to expand the network of contributing citizens*

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### 18. What is your impression of the most important benefits for the citizens who participated in the research? Rank them from most important to less important

Participants were also asked to rank the most essential benefits for volunteers; they chose Satisfaction from contributing first, followed by Knowledge; Socialization, and Payment as least important benefit (see Table A-25).

| Item | Score | Overall Rank |
|---|---|---|
| Satisfaction from contributing | 60 | 1 |
| Knowledge | 55 | 2 |
| Socialization | 43 | 3 |
| Payment | 22 | 4 |

*Table A-25. Benefits for citizens*

### 19. Satisfaction of citizens

Participants were also asked whether citizens taking part in their citizen science/crowdsourcing initiatives were satisfied.

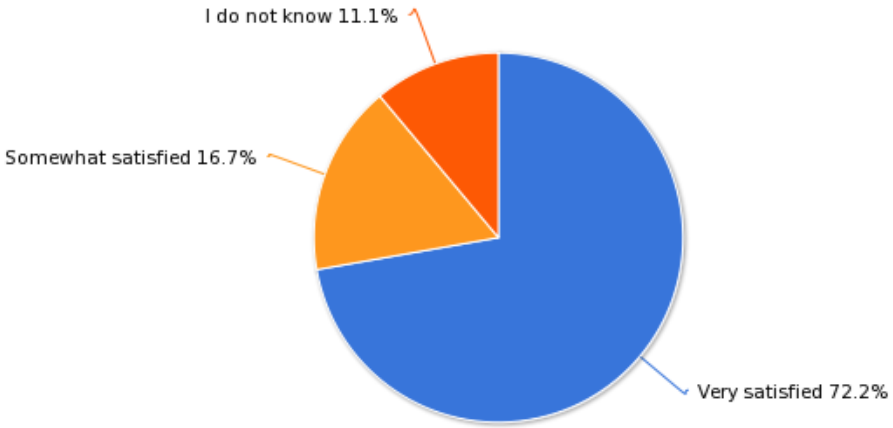


*Figure A-26. Responses to the question "From your experience, citizens participating in such initiatives were mostly satisfied or dissatisfied"*

| Value | Count | Percent |
|---|---|---|
| Very satisfied | 13 | 72.2% |

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| | | |
|---|---|---|
| Somewhat satisfied | 3 | 16.7% |
| Dissatisfied | 0 | 0.0% |
| Neither satisfied nor dissatisfied | 0 | 0.0% |
| I do not know | 2 | 11.1% |

*Table A-26. Responses to the question "From your experience, citizens participating in such initiatives were mostly satisfied or dissatisfied"*

### 20. What feedback did they give the institution?

The respondents also were positive about the feedback received by citizens taking part in initiatives (three participants were unsure about the feedback and one was involved in a project being currently set up, but the rest 14 participants who answered the question gave a range of positive feedbacks, from continuous engagement to desire to be involved in further initiatives, see Table A-27).

| Response | Count |
|---|---|
| A great participation for sharing their family stories and memories | **1** |
| Cool, we want more! | **1** |
| Do not know | **1** |
| I am not sure about the question. | **1** |
| Mainly on the evolution of usable user interfaces. | **1** |
| Not sure | **1** |
| Precisely not much although overall they were very happy. | **1** |
| That they love to go the excavations and the fact of going on next year | **1** |
| That they would willing contribute again | **1** |
| They liked the initiative | **1** |
| They were very happy that we organised such event. | **1** |
| good | **1** |

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| | |
|---|---|
| they continue to contribute to it. | **1** |
| very positive | **1** |
| very positive via survey | **1** |
| They would like a library to expand this kind of activity. They are sure that there are many people interested in the participation. | **1** |
| I can't really answer these questions because the project is still being set up. The challenge (given the history and politics of Cyprus) is whether a project there can be completely open to crowd-sourcing. | **1** |
| Users are generally happy to be involved in projects that fit into their research/personal interests | **1** |

*Table A-27. Citizens' feedback to institutions implementing citizen science/crowdsourcing projects*

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# ASPECTS RELATED TO FURTHER UPTAKE OF CITIZEN SCIENCE

### 21. What do you think are the main reasons which delay the introduction of citizen science/crowdsourcing projects in cultural heritage institutions?

The next question explored what are the main stumbling blocks delaying the introduction of citizen science/crowdsourcing in cultural heritage organisations. The most popular reason was the lack of knowledge on how to organise such a project (74.5%) – which emphasizes the existing need in increasing awareness across the cultural heritage sector. The second most popular reason was the lack of personnel to work with the citizens (60.8%), followed by the lack of funds (52.9%).

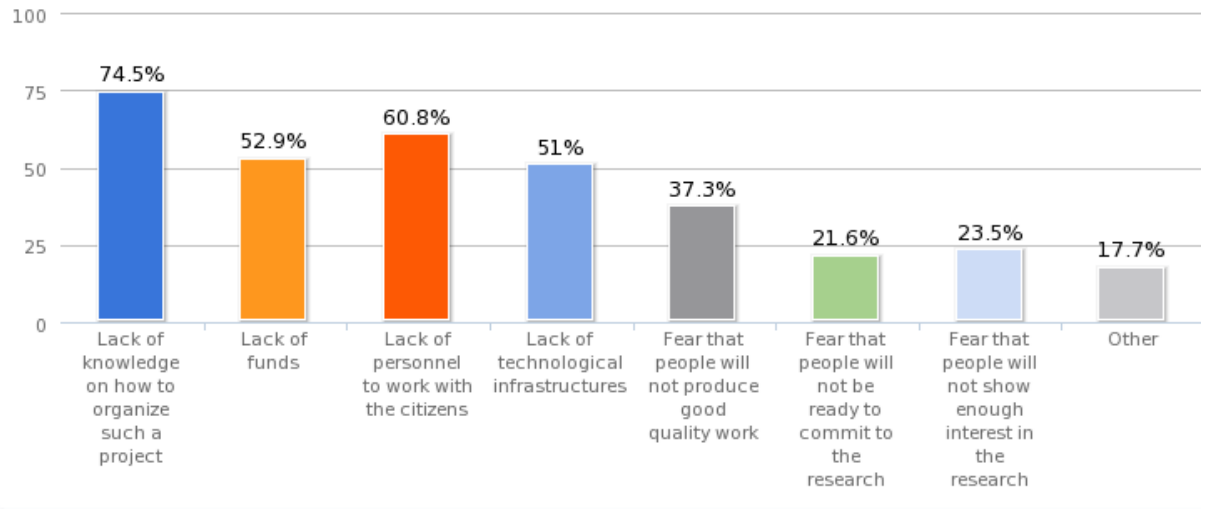


*Figure A-27. Main reasons delaying the introduction of citizen science/crowdsourcing projects in cultural heritage institutions*

| Value | Count | Percent |
|---|---|---|
| Lack of knowledge on how to organize such a project | 38 | 74.5% |
| Lack of funds | 27 | 52.9% |
| Lack of personnel to work with the citizens | 31 | 60.8% |
| Lack of technological infrastructures | 26 | 51.0% |
| Fear that people will not produce good quality work | 19 | 37.3% |
| Fear that people will not be ready to commit to the research | 11 | 21.6% |

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| | | |
|---|---|---|
| Fear that people will not show enough interest in the research | 12 | 23.5% |
| Other | 9 | 17.7% |

*Table A-28. Main reasons delaying the introduction of citizen science/crowdsourcing projects in cultural heritage institutions*

| Open-Text Response Breakdown for "Other" | Count |
|---|---|
| Because of the most part of cultural heritage institutions are public. | 1 |
| Copyright & Intellectual Control! | 1 |
| Inability to evaluate research proposals due to ignorance | 1 |
| It's not very popular as a subject | 1 |
| Political limitations | 1 |
| Vanity of the museum's employees | 1 |
| lack of staff time | 1 |
| no tradition | 1 |
| Lack of understanding by those who think that such projects could work everywhere and make the world a better place. | 1 |

*Table A-29. Main reasons delaying the introduction of citizen science/crowdsourcing projects in cultural heritage institutions – additional comments*

### 22. Is there a specific citizen science project you are interested in initiating?

Over half of the respondents (52.4%) pointed out that they have one or more ideas for citizen science projects. The comments to this question (by further 11.1% of respondents) illustrate as well that there is a positive attitude in general but need in more time/knowledge to implement ideas.

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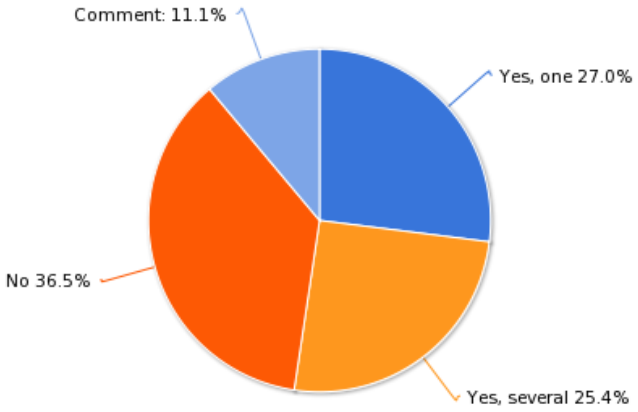


*Figure A-28. Interest in initiating citizen science projects*

| Value | Count | Percent |
|---|---|---|
| Yes, one | 17 | 27.0% |
| Yes, several | 16 | 25.4% |
| No | 23 | 36.5% |
| Comment: | 7 | 11.1% |

*Table A-30. Interest in initiating citizen science projects*

| Open-Text Response Breakdown for "Comment:" | Count |
|---|---|
| Actually, this questionnaire gives me some ideas. | 1 |
| Archaeological survey (private project and not with my institution) | 1 |
| I have an idea to initiate a global project, not through library though. | 1 |
| No, but we would be open to a discussion like this. | 1 |
| Not currently but very soon | 1 |
| Semantic mark-up | 1 |
| not sure what a citizen science project is | 1 |

*Table A-31. Interest in initiating citizen science projects*

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### 23. Would you recruit the citizens directly or outsource the activity to another institution?

Finally, our survey asked how citizens would be recruited to participate in a potential citizen science initiative. Half of the respondents would recruit citizens directly while 11.1% were prepared to outsource this to an external organisation.

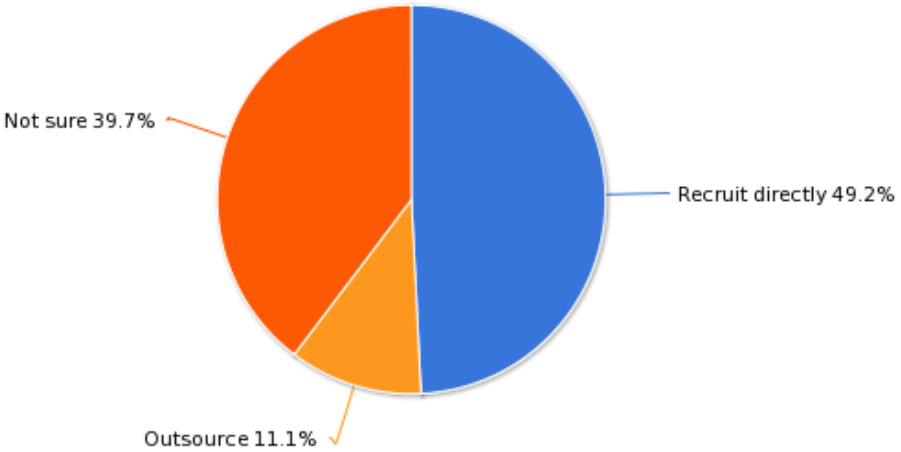


*Figure A-29. Recruiting citizens*

| Value | Count | Percent |
|---|---|---|
| Recruit directly | 31 | 49.2% |
| Outsource | 7 | 11.1% |
| Not sure | 25 | 39.7% |

*Table A-32. Recruiting citizens*

# REFERENCES

Wiggins, A., K. Crowston. (2012). Describing Public Participation in Scientific Research, iConference 2012 Toronto, Ontario, Canada. Available: http://crowston.syr.edu/system/files/iConference2012.pdf