Digital Archaeology and Citizen Science: : Introducing the goals of FindSampo and the SuALT project

Wessman, Anna Pia Frederike

Suomen keskiajan arkeologian seura
2019-08-21

Wessman , A P F , Thomas , S E & Rohiola , V 2019 , ' Digital Archaeology and Citizen Science: Introducing the goals of FindSampo and the SuALT project ' , SKAS , vol. 2019 , no. 1 , pp. 2-17 .

http://hdl.handle.net/10138/304879

publishedVersion

Anna Wessman, Suzie Thomas and Ville Rohiola

DIGITAL ARCHAEOLOGY AND CITIZEN SCIENCE

INTRODUCING THE GOALS OF FINDSAMPO AND THE SUALT PROJECT

ABSTRACT

Metal-detecting in Finland is growing in popularity, and with responsible metal-detectorists wishing to report their finds to the authorities, so also grows the pressure on the heritage sector to respond. But recording finds made by metal-detectorists is not merely a matter of providing a service to a certain group of enthusiasts; research in Finland and elsewhere shows that the archaeological data uncovered by non-professionals can have a big impact on archaeological knowledge production if the right fields of data and metadata are recorded. In this article we present the SuALT project (Suomen arkeologisten löytöjen linkitetty avoin tietokanta - the Finnish Archaeological Finds Linked Open Database), intended as a solution for making the most of the increasing number of artefacts found by metal-detectorists and other members of the public. This is a four-year project carried out in collaboration between the University of Helsinki, Aalto University and the Finnish Heritage Agency, with the common goal of creating an open database, named FindSampo (Fi. Löytösampo, Swe. Fyndsampo), of archaeological finds made by the public - most commonly through the hobby of metal-detecting. We give background to the project in terms of its European context and the framework of 'citizen science' in archaeology, and discuss the planned benefits of the project for both heritage management and archaeological research.

Keywords: Metal-detecting, Archaeology, Linked Open Data, Digital Archaeology, Citizen Science
Hakusanat: Metallinetsintä, arkeologia, linkitetty avoin data, digitaalinen arkeologia, kansalaistiede

INTRODUCTION: THE CHALLENGE OF RECREATIONAL METAL-DETECTING IN FINLAND

Recreational metal-detecting grew enormously in Finland during the early 2010s (Table 1). The increasing amounts of metal-detected finds demanded an update of the manual recording system at the Finnish Heritage Agency (FHA).[1] It is a requirement of the Finnish Antiquities Act (295/1963) that movable objects that are expected to be at least 100 years old and that do not have a known owner are immediately to be reported and/or delivered to the FHA.[2]

In addition to the pragmatic need to streamline the current process, research shows that metal-detected finds have the potential to contribute meaningfully to archaeological research. There are several ar-

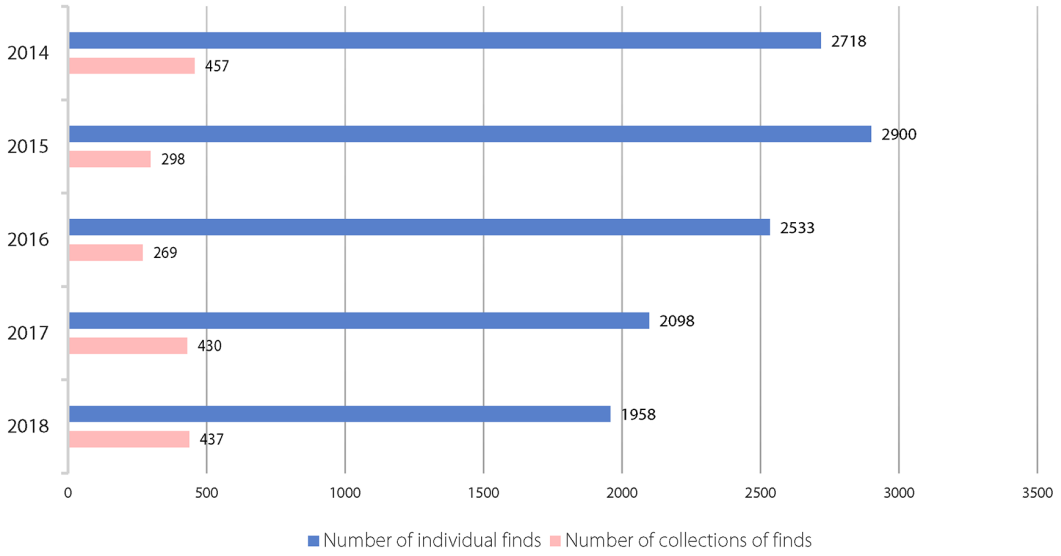

Table 1: The number of finds made by public delivered to the Archaeological Collections of the Finnish Heritage Agency during 2014–2018. The collections of finds describe the entities of individual finds delivered to the FHA from different find sites by different finders.

eas in Finland where metal-detected finds have contributed greatly to the understanding of the settlement pattern concerning the Iron Age especially. For instance, the Uusimaa region and Northern Ostrobothnia have gained important information about both new settlement sites and burials that was not known before metal-detecting began in these areas.[3]

Past archaeological collaboration projects with metal-detectorists have appeared to be fruitful and a win-win for all parties. Detectorists can provide much needed assistance and methodological help for archaeologists in archaeological surveys for example, but these projects have also given valuable insight to detectorists concerning how archaeological research is done.[4] Educating metal-detectorist on such issues as the importance of context in archaeological research is especially important at a stage when we are still building bridges between the public and the archaeological community.[5] It is equally important that new archaeological information also reaches the detectorist community. For example, **Tuija Kirkinen** has recently recommended that metal-detected finds should be handled with great care because their surface might contain scientifically important fibres.[6] Naturally detectorists are instructed by FHA to follow the Antiquities Act (295/1963) that prohibits the cleaning of the objects, but this might be difficult because cleaning the surface also helps to identify the object.

There are other challenges, too. The detectorist community still needs educating about the importance of accurate finds recording. The Archaeological Collections at the FHA has emphasized the importance of precise coordinates for each find and the importance of the irreplaceable findspot context information. With diligent documentation in the field, a finder has the unique chance to make observations that are indispensable for professional archaeologists to define the context's composition. In the beginning of the 2010s, it was

common that the finds delivered to the Archaeological Collections were documented without precise coordinates or with just one dot that described the findspots of several finds from a widespread area. Recently, habits have changed so that it is more common that each find is reported with precise coordinates. This is a clear improvement, but there is more educational work needed. The metal-detecting community is heterogeneous with a constant flow of new beginners to the hobby. To emphasize the importance of responsible recording behaviour, we need input from everyone working with metal-detector archaeology.

It has become clear that a solution is needed not only from a general curation and management perspective, but also in order to capture archaeologically sensitive data that might otherwise be lost, but that has the potential to reveal important information about Finland's archaeological past. An easy-to-use web-tool to report finds in Finland has thus been needed for a long time. SuALT was devised as a direct response to this challenge.

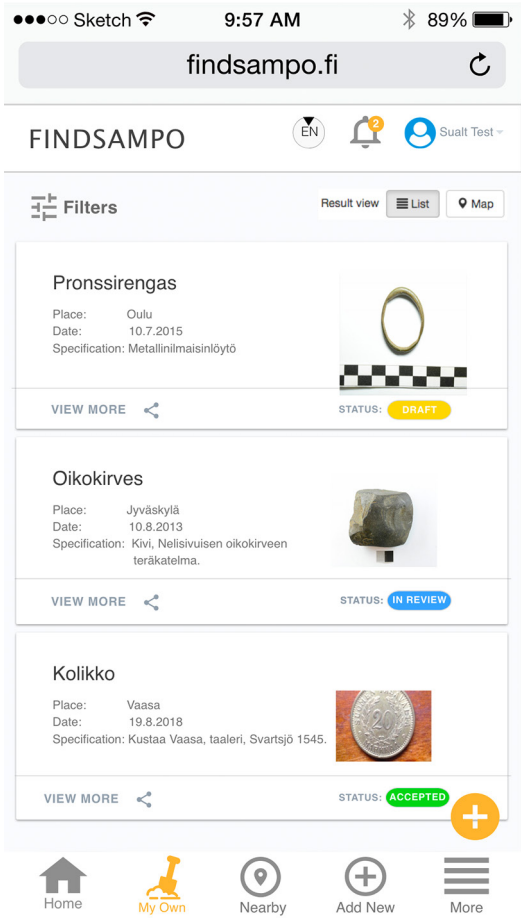

Figure 1: A mockup prototype image of how part of the FindSampo mobile application could look. In this page we see how users might browse information on recorded artefacts. Design: Pejam Hassanzadeh, Aalto University.

THE GOALS OF SUALT

While access to digitized material has exploded during the past decade, the digitization process is still an expensive investment for cultural heritage organizations. Yet, digitizing archaeological collections democratizes cultural heritage by making it more inclusive[7], with people able to browse and study collections at all times and anywhere in the world. It also protects objects, in the sense that they can be studied without handling, which in turn also saves costs on conservation. The Finnish Archaeological Finds Recording Linked Open Database (Suomen arkeologisten löytöjen linkitetty avoin tietokanta – SuALT) is a four-year consortium project involving the FHA, Aalto University and the University of Helsinki. The project started in September 2017 and is funded by the Academy of Finland.

Our goal is to produce a digital web service, which will be called FindSampo (Fig. 1), where archaeological objects discovered by the public, including metal-detectorists, will be recorded. The digital platform will

give students, researchers and others easy access to search and study objects and find spots online. Moreover, FindSampo will enable its users to retrieve contextualized data about other related finds through linked data from other databases in Finland and Europe.[8]

By encouraging the public to report all finds into FindSampo we wish to make also younger objects, currently not taken into museum collections, accessible for study. At the moment it appears that not all finds are reported to the authorities. Detectorists might feel that some of the objects they find are not scientifically unique enough (so-called mass-finds), but also they sometimes consider the current recording system too laborious. In turn, this results in large private collections, potentially significant, nonetheless staying outside of the awareness of authorities and researchers. Within our project we wish also to include this material, anticipating that with the help of a fast, easy and a user-friendly digital tool this could happen.[9]

To achieve this, we have connected the designers and developers of FindSampo with the end users. By engaging the users democratically we are giving them the chance to influence the end product. Hence, we are currently doing user experience (UX) research amongst different stakeholders and end users of the application. With the help of UX research we are able to discover and analyse the user needs in a better way. The application will be developed in light of this feedback.

One of the key ideas of FindSampo is to provide its users with good intellectual and computational support for analyzing and contextualizing finds and to provide expert support online. Even though much can be done through machine learning (AI) detectorists have repeatedly asked for more feedback and expressed that they want to interact more with professionals. If we can meet these demands, we hope that detectorists will stay motivated in sharing their finds data.[10] Another important goal is to have close collaboration with international partners, discussed below.

A CITIZEN SCIENCE APPROACH

According to the Cambridge Online Dictionary, citizen science is something done by 'ordinary people, often for or with the help of scientists'.[11] Citizen scientists are, in other words, amateurs or non-professionals who assist science by observing, analyzing or collecting large data quantities,[12] voluntarily. At best, citizen science is a partnership between ordinary people and the scientists, which generates new knowledge.[13] According to the Ten Principles of Citizen Science, all parties should benefit from taking part in citizen science projects, the citizens should be acknowledged for their work and they should also get feedback. In addition, all data and metadata should be open access.[14]

Finns have participated in science by observing or collecting data for a long time, especially in projects surrounding weather, nature and recording bird observations.[15] Other big citizen science projects have involved digitizing newspapers (Project Runeberg) or digitizing through an awarding and game-like environment as in the Digiloikka project by the National Library.[16] A large EU-financed Horizon 2020 project where the National Archives of Finland is involved, is currently digitizing church books with the help of citizens (READ project).[17]

Even though the roots of citizen science lie in the 18th century and especially in bird taxonomy, it is the developing technology that has enabled citizen science to expand into what it is today.[18] New technology, such as smartphones, have made it possible for citizens to collect, track, analyze, upload, share and discuss data on their own terms, when they have the time for it. GPS locators, microphones, good quality cameras and a diversity of applications enables the citizen scientist to use their phones outdoors in the field. Moreover, through the phone this data can easily be registered and sent onwards. Constant access to the internet provides added information in the field and it can also assist the citizens if they need help. This means that technology has made citizen science grow enormously, more openly and with better opportunities for interaction with others.[19]

Citizens have contributed to archaeological research for a long time, also in Finland (Fig. 2). While this has often been more passive work, where amateurs have been following the instructions of a professional archaeologists, there are examples where citizens have taken a much more active role, such as spotting rock art (Suomen Muinaistaideseura/ Finnish Society for Prehistoric art) or cup marks, or sport divers searching for wrecks and/ or documenting them on-site. This has resulted in a more nuanced way of looking at public archaeology.

Public or community archaeology means that the archaeologists and the public work in an environment of mutual respect, learning from each other, and knowing that their skills and knowledge are valued and taken seriously.[20] Metal-detecting is an important aspect of this. The behaviour of several metal-detectorists and clubs in Finland can

Figure 2. A Crusade Period bell shaped pendant (KM 41821) from the sand dunes of Hietatievat in Enontekiö. The pendant was found by chance by a botanist who was visiting the area as part of a University field trip. Photo: Ville Rohiola, Finnish Heritage Agency.

be labeled under the concept of *serious leisure*[21]; the hobby has become systematic and more or less a way of life for many people. Metal-detecting is especially rewarding because detectorists gain new knowledge and they are able to develop their skills through experience and depending on how much time they are able to invest in their hobby. These skills are not only connected with searching and finding objects but also in touch with the skills they develop on identifying and dating objects.[22] In this sense, metal-detectorists have much to offer citizen science. Even though metal-detectorists do not identify as citizen scientists (yet), their investments and engagement with the cultural heritage meets the requirements.

While the romance and excitement of discovering ancient objects (for example, see Figs. 3–4) is a high motivation[23], it is important to involve the public in other stages of the discipline in order for it to be more open and inclusive. This might be dif-

ficult as scientists use a complex terminology and have long training that citizen scientists often lack.[24] Not only is the language barrier a problem, most academic outputs are published in journals that are hidden behind expensive paywalls, making science exclusive. In order to prevent this while also gaining trust, citizen science needs to be more open, plural and inclusive in its nature.[25] We must also remember that citizens might have skills and knowledge that archaeologists lack, meaning that instead of looking at the public as merely passively allowed to participate, or as producing data of variable quality, we should try to interact more and learn from each other. This would also increase public awareness in matters of cultural heritage. There are already several large citizen science platforms in the UK alone[26], were the public collaborates with cultural heritage institutions (e.g. MicroPasts, Zooniverse, Historypin and Heritage Helpers) but here in Finland we are only beginning to develop this approach. A good non-digital example of this is the Adopt-a-Monument programme that has spread from Tampere to several other cities around the country.[27]

Figure 3: A 15th-century pendant icon of Saint George (KM 41820), a metal-detecting find from Kitee Pennala. Photo: Ville Rohiola, Finnish Heritage Agency.

SuALT is a citizen science project in its core. Citizens are encouraged to help with the development and design phases, but they will also be the end users and producers of the database, since they will produce most of its content. Within the UX research led by **Anna Wessman**, we investigate the needs and requirements of future users. The project is keen to develop a database designed according to the needs of not only detectorists but also researchers and others. Through UX research we will be able to ensure that the database is accessible and easy to use but also offers a fulfilling experience to its end users. In order for this project to be truly responsible in its initiatives we must aim for a genuine partnership between the different user groups instead of falling into a more passive consultation-like approach.

So far, we have conducted both qualitative research (interviews, focus group meetings) and quantitative research (online survey) among the three major user groups of FindSampo (detectorists, researchers and cultural heritage managers). At the time of writing, one of the authors (Wessman) has interviewed over 45 people around Finland often in connection to public talks or university lectures. Because the interview processes are still ongoing we have not yet fully analyzed the data. Once SuALT reaches the stage of testing the prototype, we will be able to study in more detail also user behaviours and reactions. This will enable us to learn from feedback and to make further developments and improvements.

Resources and time allowing, we hope also to continue this research after launch-

ing the application by asking participants about their views and experiences of the projects' processes and its outcomes.[28] This would indicate that we are indeed caring for our users also after the product is finished. Therefore, we hope to seek for further research funding to ensure follow-up and evaluation.

Figure 4: A Medieval iconographic ring with central motif depicting the Seat of Grace (KM 41822), a metal-detecting find from Eura Isotalo. Height of the bezel is 24,5 mm. Photo: Ville Rohiola, Finnish Heritage Agency.

INTERNATIONAL COLLABORATION AND COMPARABLE SCHEMES ELSEWHERE

A key goal for developing FindSampo – combining technical expertise with needs of different user stakeholder perspectives, and involving the FHA as part of the research team – is to make sure that the final resource is not only fit for purpose, but that it also becomes an integrated part of the Finnish digital cultural heritage landscape. Equally important is the project's connections to similar initiatives elsewhere in Europe. This opens up new possibilities for transnational study of the archaeological record.

In addition to the national finds databases outlined below, SuALT also participates in the huge European project ARIADNEplus, which grows the existing ARIADNE portal (http://portal.ariadne-infrastructure.eu). ARIADNE is a research infrastructure, with a portal providing access to archaeological data from across Europe. Finland was not involved in the original ARIADNE project, so it is extremely important to be represented in ARIADNEplus as the initiative expands.

Projects similar to SuALT are found in European countries (or in the case of Flanders, federal regions) where metal-detecting is permitted, and where there has been opportunity to develop open finds databases. Notwithstanding the various, sometimes very strongly held, views concerning metal-detecting itself, these databases represent part of a pragmatic approach to ensuring that information from hobbyist activities is preserved for research purposes[29], with much research at doctoral level and beyond[30] already emerging from the oldest of the finds databases: the Portable Antiquities Scheme (PAS). PAS operates alongside English and Welsh legislation, primarily the Treasure Act 1996, which requires certain categories of archaeological find to be reported to the authorities. The main purpose of PAS is to encourage voluntary recording of all the material which is not legally required to be recorded, but nonetheless can enrich the archaeological record.[31] Data recorded through PAS is added to their Finds Database (https://finds.org.uk/database), which in August 2019 had some '1,430,882 objects within 920,383 records' in its system.

In 2016, a new project began in the Netherlands, to respond to new legislative conditions brought about by the Dutch Heritage Act, permitting metal-detecting in the Netherlands under certain conditions.[32] Portable Antiquities in the Netherlands (PAN – https://www.portable-antiquities.nl/pan/#/public), led by the Free University of Amsterdam, works to principles that are similar to PAS, also using a regional network of Finds Liaison Officers (FLOs) to work within the different regions to be an on-the-ground point of contact for detectorists and others. Like PAS, it also has an online finds database.

In the Flanders region of Belgium, there is the MEDEA finds database (https://medea.weopendata.com/). MEDEA, like PAN, is a response to changes in the law, with metal-detecting becoming legal also in 2016 – although many note the hobby was de facto tolerated for many years before then.[33] MEDEA is managed currently by the Free University of Brussels, which collaborated with digital heritage company PACKED to develop its software and UX research.

DIME (Digitale Metaldetektorfund – https://www.metaldetektorfund.dk/), aside from SuALT, is the youngest to date of these finds databases. Covering Denmark and spearheaded by Århus University, the database launched in September 2018. In only two months the database had already almost 800 registered users and over 7000 recorded objects.[34] Since detectorists record their finds into DIME by themselves, which will also be the case for FindSampo, DIME will probably be the closest related in terms of functionality to the Finnish database. DIME intersects with Danish legislation and policy, under which it is permitted to metal-detect in most circumstances 'except on or within two meters of protected heritage monuments and sites'[35], and metal-detectorists are compensated for any finds declared treasure trove (*Danefæ*).

Not only can all these different projects share experience and best practices, but also by keeping in contact and visiting each other's projects and teams, we make sure that the data produced is compatible across schemes. As well as having all these projects represented on SuALT's advisory panel (in addition to relevant specialists from our near neighbour countries – Sweden and Estonia), researchers have spent time visiting the different related projects. At the time of writing, SuALT researchers have spent time at the British Museum and the University of York (**Eero Hyvönen** and **Jouni Tuominen**), the Free University of Amsterdam (Anna Wessman), and at Århus University and the National Museum of Denmark (**Ville Rohiola**). The University of Helsinki has hosted a researcher from Brussels Free University (**Pieterjan Deckers**) in 2018, and in Spring 2019 hosted University of Reading researcher **Eljas Oksanen**, who has experience of investigating PAS data, to evaluate the research potential of SuALT. **Suzie Thomas** spent time in the USA at the University of Oklahoma in 2018, not for finds database expertise but to learn from the university's award-winning state-wide public archaeology programme, and to draw upon their scholars' experiences of engaging with collectors and artefact hunters. In October 2019 Wessman will spend a month at Århus University.

THE BENEFITS OF FINDSAMPO AND SUALT

When the project ends, responsibility of the FindSampo platform will move to the FHA

who will ensure the sustainability of the database. As an outcome, this digitally recorded information is opened to the public in a new way that emphasizes the idea of shared cultural heritage.

The idea is to provide a sustainable digital data resource that comprises different user needs. One of the challenges for SuALT is to engage the public, especially the heterogeneous crowd of metal- detectorists to be active and continuous users of the service. Over time the platform should develop to suit the diverse, sometimes even contradictory needs of users. Although the FHA will have primary responsibility for the database, it is important that professional archaeologists also interact with the application.[36] According to a questionnaire survey made by the project there could be an interest among archaeologists in validating and interpreting finds.[37]

For the FHA, FindSampo will offer an essential tool to manage information and processes dealing with archaeological finds made by public. To manage new information, FindSampo's interoperability with the FHA's existing databases is essential. It is important that the FHA's register of archaeological sites, for example, provides correlated and updated information to ensure the protection of ancient monuments and archaeological sites. FindSampo will also be an important source regarding administrative duties at cultural heritage sites or land-use planning work, such as zoning areas with cultural heritage importance. With the interoperability of the databases the updated information of the new finds and the evaluations of the protected archaeological sites will be available for administration, as well as for researchers and for the public.

From the perspective of the FHA's Archaeological Collections, it is vital that the self-recorded finds data is compatible with the FHA's collections management. The FHA is currently initiating work to develop an ontology of archaeological objects. The collaborative work with the Finnish Terminology Center will form a concept-based vocabulary of archaeological object names that will be a part of the Finnish thesaurus and ontology service Finto (https://finto.fi). Use of the ontology is essential for the database to record find information accurately, but also to fulfil its purpose as a detailed search tool. At the same time, it enables the finds data to be more interoperable with other databases, including international databases.

On 15th of February 2019, the FHA launched a new web service called Ilppari for public to report archaeological finds. At this point, Ilppari is the FHA's 'prototype' to report finds and it works mainly as an administrative tool to receive information of public-discovered finds. With FindSampo's launch, the recording system will move to another level. It will take into account the advantages of community-contribution to accomplish different user needs, which means that FindSampo will provide new collaboration opportunities between the public and professional archaeologists. It will also function as a communication forum where expertise is shared among finders, authorities and researchers. The high-quality open data will support academic research. It is also important to notice that the SuALT database records information for finds that are not accessioned to Archaeological Collections, including finds that are not considered antiquities by the Antiquities Act. In this way FindSampo also conserves knowledge of 'modern' finds that can be valuable in the future.

Recently a change in archaeological material curation has shifted emphasis from material evidence and its curation to the manner of an approach that enables people to explore collections.[38] Recording archaeological information digitally is rapidly changing customs of curating archaeological material. Digital web collection management supports more fluently practices to capture archaeological data, store it and provide large datasets for analyses. Digital collection management also enables public-oriented platforms to collect catalogued data that is recorded by the public. It enhances management practices to store more information than before and on the long-term saves time and costs in administrative work.

The digital interfaces and database need continuous development to maintain the sustainability. One of the key challenges in our project is to sustain the reciprocal collaboration between the different user levels. To maintain its active usability, it is important that the database provides benefits to all user levels. By engaging with all the different user levels in the development process it is possible to achieve a coordinated platform for sharing knowledge of archaeological experience.

POSSIBLE THREATS AND CHALLENGES WITH A CITIZEN SCIENCE APPROACH

There has traditionally been a high level of trust in experts and authorities in Finland but studies have shown that expertise is expanding due, for example, to a rising level of education. It means that new actors are becoming involved in the field of science and thus also archaeology. Therefore, we need to start looking at alternative perspectives and expand our own, perhaps restricted, views on expertise, and let citizens participate and evaluate issues that previously were the sole responsibilities of scientists.[39]

In natural science the observations from ordinary people have been seen as trustworthy and reliable for a long time.[40] But, will this also be possible in archaeology, where the professionals have so far been the authorities leading all public involvement? During the interviews and stakeholder meetings, which are part of the user experience research, several professional archaeologists have raised concerns towards the reliability of the data that will be uploaded to the database by detectorists. Can this information be trusted? What if they (detectorists) begin trolling? Shouldn't professionals do this work, instead?

Some of these concerns are valid. Citizen scientists might not fully understand the archaeological context and they might produce unreliable data through non-deliberate, but still erroneous, find identifications. This is especially due to the metal-detecting community being heterogenous, with a constant flow of newcomers who have no or limited knowledge of the ethics and rules of metal-detecting. Citizen scientists do make mistakes but they also learn fast. Learning, for example, object typology is a learnable task even though it is time-consuming. In addition, it is a skill that many detectorists already possess due to published object catalogues and handbooks.[41] Nonetheless, we will need to provide the database with enough information and tutorials. These could include training videos on how to take measurements on-site, how to take proper photographs, areas where not to metal-detect, how to handle the objects and so on. We are also discussing within the project of applying different software solu-

tions into FindSampo, which could help identify finds, such as image recognition through artificial intelligence. Another way of providing information through the platform could be short but informative info boxes about finds. These could be 'object of the month' information boxes, which would provide information about the most common find categories made by detectorists. In time, this would grow into a large information bank that would function also as an educational tool for beginners to the hobby. All these tools would naturally also impact the quality of the data in a positive way. Another way to ensure the quality of the data in FindSampo is supporting the detectorists in their recording work through resources such as thesauruses, which would minimize the open answer possibilities within the application.[42]

According to Freitag et al.[43] experience and training are the main tools by which volunteers can learn how to eliminate problems of credibility. From a citizen scientist perspective learning through experience might actually be the key motivator to take part in a project.[44] In Project Runeberg, which is a citizen science project digitizing newspaper materials in Finland, the public has not only been involved in the digitization process, but they have also been trusted and thus able to correct mistakes directly in the database. This is an excellent example of a citizen science project where those who are voluntarily participating are treated as equal partners. Moreover, the data has been tested and proven to be reliable.[45]

A harsh reality today is that the FHA, like most heritage authorities across the world, will probably never have the financial resources to hire enough trained professionals, or even students for that matter, to do all the finds validation in FindSampo. This is a challenge also in other sciences.[46] Hence, we should appreciate the high number of volunteers who are interested and willing to participate in this work without payment.

Another important question when discussing citizen participation relates to rewarding the public for their input. How are we able to motivate people to use the database but also continue using it once the novelty is gone? Would a game-like citizen science approach work for FindSampo? This could for example give the most active users credits on the front page of the database or award the public with stars according to how many correct object validations they have made online. According to our UX research detectorists often hope for more feedback about their finds from the authorities.[47] Feedback and interaction also increases detectorist motivation to collaborate with professionals[48], which would work as a 'carrot', but it would also demand input from owners (the FHA). A justified question is then that of time and resources. Nonetheless, one motivation for metal-detecting is obtaining status by exhibiting expertise in validating objects on different metal-detectorist forums. Engagement with FindSampo can be rewarded also by providing the users with a personalized view to the application, enriched with data from the national authorities as well as the fellow detectorists for community building. Therefore, we should ask ourselves how much the metal-detecting community will actually gain from joining FindSampo and taking it into active use. If they feel that they do not gain anything new from this, then it might not be a tempting option and there is a risk that they do not record their finds data at all.[49]

The core questions with citizen science are those of trust and credibility but also those about ownership. Can we ex-

pand expertise also to amateurs? Is the past 'the property of a cultured elite, a property valorised and defined exclusively by professionals'?[50] This was the situation before entered a moment in time when the power relations between citizens and professionals have shifted towards the grassroots level. Cultural heritage is no longer the domain of experts only.

CONCLUSIONS

Metal-detecting in Finland is in transition. The number of active metal-detectorists is growing and so are the number of finds. Compared to other European countries with a long-standing history of metal-detecting, Finland is now familiarizing itself with the new participants in the cultural heritage field. At the moment metal-detecting is showing its potential in broadening and enlarging our archaeological knowledge with new material and information. By understanding metal-detecting as a form of citizen science, professional archaeologists will find a new way to collaborate with the public in a reciprocal manner.

Since detectorists will record their finds into FindSampo by themselves, this is a collaborative citizen science initiative where members of the public are producing new data side by side with professionals. This means that instead of looking at the public as simply volunteers we are trying to interact and truly learn from one another. Looking beyond the current project it is to be hoped that this citizen science-based model for enriching our knowledge of the past can continue, and add value to Finland's archaeological record for all.

Hobbyist metal-detecting is here to stay, regardless of the often polarized debates surrounding it. Instead of focusing on the emotive arguments, we should set our focus on the scientific value of objects found by the public. However, first these objects need to become accessible, which is one of the SuALT projects goals. This can be done by digitizing archaeological collections in addition to linking this data to other sources in Finland and beyond.

ACKNOWLEDGMENTS

This article is an output of SuALT — The Finnish Archaeological Finds Recording Linked Open Database (Fi: *Suomen arkeologisten löytöjen linkitetty avoin tietokanta*), which is funded by the Academy of Finland, decision numbers 310854, 310859, and 310860. SuALT is a collaborative consortium project between the University of Helsinki, Aalto University and the Finnish Heritage Agency.

Anna Wessman
anna.wessman@helsinki.fi

Suzie Thomas
suzie.e.thomas@helsinki.fi

Department of Cultures,
P.O. Box 59, 00014 University of Helsinki

Ville Rohiola
ville.rohiola@museovirasto.fi

Museovirasto, Library, Archives and Archaeological Collections,
P.O. Box 913, 00101 Helsinki

NOTES

1 Ehrnsten 2015: 52; Rohiola 2014: 25.
2 National Board of Antiquities 2016: 8.
3 Hakamäki 2018; Wessman 2015.
4 Moilanen 2015; Siltainsuu & Wessman 2014.
5 Knuutinen 2017: 6–7.
6 Kirkinen 2019: 77, 79.
7 Dobat 2013; Parland-von Essen & Nyberg 2014: 54.
8 Thomas et al. forthcoming.
9 Thomas et al. forthcoming.
10 Wessman et al. 2019.
11 Cambridge Online Dictionary 2019.
12 Bonney et al. 2009.
13 Ponciano & Brasileiro 2014.
14 The European Citizen Science Association 2015.
15 E.g. Tiira.fi; BirdLife Suomi; Laji.fi; see also Väliverronen 2016: 188.
16 Karttunen 2011.
17 READ 2019.
18 Sahlman 2015: 7.
19 Devisch & Veestraeten 2013: 67–68.
20 E.g. Banks et al. 2017: 4.
21 For the determination see Stebbins 2007; and see Ferguson 2013 for the concept's application to metal-detecting.
22 Wessman forthcoming, Stebbins 2007: 5–12.
23 E.g. Immonen & Kinnunen 2018; Maaranen 2016; Thomas 2012; Wessman et al. 2016; Wessman forthcoming.
24 Barnes 2018.
25 Väliverronen 2016: 13, 156, 183.
26 Bonacchi et al. 2015.
27 Adoptoi monumentti 2019.
28 See Bossen et al. 2012.
29 See Bland 2005.
30 E.g. Daubney 2016; Robbins 2012.
31 See also Thomas 2014 for a longer overview.
32 Vos et al. 2018: 14.
33 Deckers et al. 2016.
34 Dobat et al. 2018: 4.
35 Dobat 2016: 51.
36 Thomas et al. forthcoming.
37 Wessman et al. 2019.
38 Merriman & Swain 2017: 81.
39 Rask 2008: 14–20.
40 Freitag et al. 2016.
41 E.g. Kivikoski 1973; Oravisjärvi 2016; see also Ehrnsten 2015.
42 Wessman et al. 2019.
43 Freitag et al. 2016.
44 Väliverronen 2016: 190.
45 Parland-von Essen 2014: 61.
46 Cohn 2008: 193.
47 Wessman et al. 2019.
48 Ehrnsten 2015: 52.
49 Thomas et al. forthcoming.
50 Soininen 2018: 57.

BIBLIOGRAPHY

Adoptoi monumentti 2019. Adoptoi monumentti, https://adoptoimonumentti.fi/ (read 8.2.2019)

Antiquities Act. 295/1963. Accessed February 15, 2019 (in Finnish only). https://www.finlex.fi/fi/laki/alkup/1963/19630295.

Banks, Iain, Koskinen-Koivisto, Eerika & Seitsonen, Oula 2017. Public engagements with Lapland's Dark Heritage: Community archaeology in Finnish Lapland. *Journal of Community Archaeology & Heritage*, 1–10. https://doi.org/10.1080/20518196.2017.1383672.

Barnes, Jodi 2018. Public archaeology is citizen science in Arkansas. *Journal of Community Archaeology & Heritage*, 5(1), 4–16. https://doi.org/10.1080/20518196.2017.1308296.

BirdLife Suomi 2019. https://www.birdlife.fi/tapahtumat/pihabongaus/osallistuminen/ (read 23.1.2019).

Bland, Roger 2005. A pragmatic approach to the problem of portable antiquities: the experience of England and Wales. *Antiquity* 79(304), 440–447.

Bonacchi, Chiara, Pett, Daniel, Andrew Bevan, Andrew & Keinan-Schoonbaert, Adi 2015. Experiments in Crowd-funding Community Archaeology. J*ournal of Community Archaeology & Heritage*, 2(3), 184–198.

Bonney, Rick, Cooper, Caren, Dickinson, Janis, Kelling, Steve, Phillips, Tiina, Rosenberg, Kenneth & Shirk, Jennifer 2009. Citizen Science: A Developing Tool for Expanding Science Knowledge and Scientific Literacy. *BioScience* 59(11), 977–984.

Bossen, Claus, Dindler, Christian & Sejer Iversen, Ole 2012: Impediments to User Gains: Experiences from a Critical Participatory Design Project. Kim Halskov, Heike Winschiers-Theophilus, Yanki Lee, Jesper Simonsen, Keld Bødker (eds.), *Proceedings of the 12th Participatory Design Conference: Research Papers*, Vol. 1, 31–40. Roskilde, Denmark. Available online: https://dl.acm.org/citation.cfm?id=2347635 (read 1.2.2019).

Cambridge online dictionary, https://dictionary.cambridge.org/dictionary/english/citizen-science, (read 21.1.2019).

Cohn, Jeffrey 2008. Citizen Science: Can Volunteers Do Real Research? *BioScience* 58(3), 192–197, https://doi.org/10.1641/B580303.

Daubney, Adam. 2016. *Portable Antiquities, Palimpsests, and Persistent Places: A Multi-period Approach to Portable Antiquities Scheme Data in Lincolnshire*. Leiden.

Deckers, Pieterjan, Bleumers, Lizzy, Ruelens, Sanne, Lemmens, Bert, Vanderperren, Nastasia, Marchal, Clémence, Pierson, Jo & Tys, Dries 2016. MEDEA: Crowd-Sourcing the Recording of Metal-Detected Artefacts in Flanders (Belgium). *Open Archaeology* 2(1), 264–277.

Dobat, Andres 2013. Between Rescue and Research: An Evaluation after 30 Years of Liberal Metal Detecting in Archaeological Research and Heritage Practice in Denmark. *European Journal of Archaeology* 16(4), 704–725. https://doi.org/10.1179/1461957113Y.0000000041.

Dobat, Andres. 2016. Metal Detecting in Denmark: Advantages and Disadvantages of the Liberal Model. Jes Martens and Mads Ravn (eds.), Pløyejord som kontekst: Nye utfordringer for forskning, forvaltning og formidling Artikkelsamling, Portal forlag og Kulturhistorisk museum, Arkeologisk seksjon. Oslo, 51–68.

Dobat, Andres, Christiansen, Torben, Henriksen, Mogens, Jensen, Peter, Laursen, Stine, Jessen, Mads, Ruhe, Rikke, Arntsen, Freddy & Holst, Mads 2018. DIME – Digitale Metaldetekorfund. Den Danske Registreringsportal for Detektorfund. *Arkeologisk Forum* 39, 3–13.

Devisch, Oswald & Veestraeten, Daniel 2013. From Sharing to Experimenting: How Mobile Technologies Are Helping Ordinary Citizens Regain Their Positions as Scientists, *Journal of Urban Technology* 20:2, 63–76. https://doi.org/10.1080/10630732.2013.769313.

Ehrnsten, Frida 2015. Hukkuuko Museovirasto kolikkoihin? Yleiskatsaus metallinilmaisinlöytöihin 2013–2015. *SKAS* 1–2/2015, 45–54.

Ferguson, Natasha 2013. Biting the bullet: the role of hobbyist metal detecting within battlefield archaeology, *Internet Archaeology* 33. https://doi.org/10.11141/ia.33.3.

Freitag, Amy, Meyer, Ryan & Whiteman, Liz 2016. Strategies Employed by Citizen Science Programs to Increase the Credibility of Their Data. *Citizen Science: Theory and Practice*, 1(1), 1–11. http://dx.doi.org/10.5334/cstp.91.

Hakamäki, Ville 2018. Seeing behind stray finds. Understanding the Late Iron Age settlement of Northern Ostrobothnia and Kainuu, Finland. University of Oulu, Oulu. Available online: http://urn.fi/urn:isbn:9789526220949.

Immonen, Visa & Kinnunen, Joonas 2018. 'Quidditching' and the Emergence of New Heritage Identities – Amateur Metal Detecting in Finland. *Public Archaeology* 15(4), 1–23.

Karttunen, Sarianna 2011. Kansalliskirjaston kokoelmia digitoidaan kaikille avoimella tietokonepelillä. Yle Kulttuuri, 15. 2. 2011. https://yle.fi/uutiset/3-5080810 (read 29.1.2019).

Kirkinen, Tuija 2019. *Between Skins. Animal Skins in the Iron Age and Historical Burials in Eastern Fennoscandia*. Academic Dissertation, Archaeology Department of Cultures, University of Helsinki.

Kivikoski, Ella 1973. *Die Eisenzeit Finnlands. Bildwerk und Text*. Finnische Altertumsgesellschaft. Helsinki.

Knuutinen, Tarja 2017. 284 syytä nostaa kissa pöydälle. Raaseporin Slottsmalmenin tapaus, metallinilmaisinharrastajat ja arkeologinen tutkimus. *SKAS* 1/2017, 3–14.

Maaranen, Päivi 2016. Metal Detecting and Archaeology in Finland: An Overview of the Hobby and its Consequences. *ISKOS* 21, 273–284.

Merriman, Nick & Swain, Hedley 2017. Archaeological Archives: Serving the Public Interest? Robin Skeates (ed.), *Museums and Archaeology*. Routledge, 77–92.

Moilanen, Ulla 2015. Piipparoijat koulun penkille? Yksi kokemus metallinetsijöiden kurssittamisesta. *Muinaistutkija* 2/2015, 2–7.

National Board of Antiquities 2016: Antiquities, ancient monuments and metal detectors: an enthusiast's guide. The National Board of Antiquities' guidelines and instructions 13. https://www.museovirasto.fi/uploads/Meista/Julkaisut/antiquities-and-metal-guide-2017.pdf

Oravisjärvi, Jani 2016. *Opas Suomen rahalöytöihin*. Turun museokeskuksen julkaisuja 77. Turku.

Parland-von Essen, Jessica & Nyberg, Kenneth 2014. Historieforskning i den digitaliserade världen. Jessica Parland-von Essen & Kenneth Nyberg (eds.) *Historia i en digital värld*. Digihist.se, version 1.0.1., maj 2014. Available online: https://digihist.se/ (read 31.1.2019).

Parland-von Essen, Jessica 2014. Digitalisering av källor. Jessica Parland-von Essen & Kenneth Nyberg (eds.) *Historia i en digital värld*. Digihist.se, version 1.0.1., maj 2014. Available online: https://digihist.se/ (read 31.1.2019).

Ponciano, Lesandro & Brasileiro, Francisco 2014. Finding Volunteers' Engagement Profiles in Human Computation for Citizen Science Projects. Human Computation 1(2), 247–266. http://dx.doi.org/10.15346/hc.v1i2.12.

Rask, Mikko 2008. Expansion of Expertise in the Governance of Science and Technology. *National Consumer Research Centre* 4, Helsinki. http://lib.tkk.fi/Diss/2008/isbn9789512294947/isbn9789512294947.pdf (read 20.2.2019).

READ (Recognition and Enrichment of Archival Documents) project 2019.https://www.arkisto.fi/en/the-national-archives-2/projects-2/READ-4 (read 29.1.2019).

Robbins, Katherine. 2012 *From past to present: understanding the impact of sampling bias on data recorded by the Portable Antiquities Scheme*. PhD diss., University of Southampton. https://eprints.soton.ac.uk/360475/ (read 26.2.2019).

Rohiola, Ville 2014. Metallinilmaisinlöydöt ja -harrastajat. Katsaus Kansallismuseon kokoelmien metallinilmaisinlöytöihin vv. 2011–2014. *SKAS* 2/2014, 17–25.

Sahlman Enni 2015. *Kansalaistiede meni nettiin. Tapaustutkimus verkkosivuista Citizen Science Center, SciStarter ja Zooniverse*. Pro gradu tutkielma, valtiotieteellinen tiedekunta, Helsingin yliopisto. Available online: https://helda.helsinki.fi/handle/10138/157858 (read 29.1.2019).

Siltainsuu, J. & Wessman, A. 2014. Yhteistapahtumia ja esineiden tunnistusta: Espoon kaupunginmuseon metallinilmaisinyhteistyö vuonna 2014. *Muinaistutkija* 3/2014, 34–40.

Stebbins, Robert 2007. *Serious Leisure: A Perspective for Our Time*. Transactions Publishers, New Brunswick.

Soininen, Tuija 2018. Adopt a Monument – conserving the cultural environment for the people, with the people. Anna-Maija Halme, Tapani Mustonen, Jussi-Pekka Taavitsainen, Suzie Thomas & Astrid Weij (eds.), *Heritage is ours. Citizens participating in decision making*. Publication based on the Forum of the European Heritage Congress in Turku, Finland, 11–15 May 2017. Europa Nostra Finland, 56–61.

Suomen lajitietokeskus, https://laji.fi/ (read 28.1.2019).

The European Citizen Science Association 2015.Ten Principles of Citizen Science, https://ecsa.citizen-science.net/sites/default/files/ecsa_ten_principles_of_citizen_science.pdf (read 28.1.2019)

The Project Runeberg 2019. http://runeberg.org/ (read 29.1.2019).

Thomas, Suzie, Wessman, Anna, Ikkala, Esko, Tuominen, Jouni, Koho, Mikko, Hyvönen, Eero & Rohiola, Ville forthcoming. (Co-)Creating a Sustainable Platform for Finland's Archaeological Chance Finds: The Story of SuALT. Ethan Watrall & Lynn Goldstein (eds.), *Digital Heritage and Archaeology in Practice*. University Press of Florida.

Thomas, Suzie 2012. Searching for Answers: A Survey of Metal-Detector Users in the UK. *International Journal of Heritage Studies* 18(1), 49–64.

Thomas, Suzie 2014. The Portable Antiquities Scheme in England and Wales. *SKAS* 1/2014, 25–36.

Tiira 2019. https://www.tiira.fi/ (read on 23.1.2019).

Vos, Daniella, Stijn Heeren, Niek van Ruler, Kiki Smallenbroek, & Lassche, Ronnie 2018. PAN (Portable Antiquities of the Netherlands): Harnessing Geospatial Technology for the Enrichment of Archaeological Data. *GI_Forum 2018,* 6, 13–20.

Väliverronen, Esa 2016. *Julkinen tiede*. Vastapaino. Tampere.

Wessman, Anna 2015. Women along the River banks. New Iron Age Finds from Espoo. In J. Harjula, M. Helamaa, J. Haarala, & V. Immonen (Eds.), *Mankby – A deserted medieval village on the coast of the southern Finland*. Archaeologia Medii Aevi Finlandiae XXII, The Society for Medieval Archaeology in Finland. 17–29.

Wessman, Anna forthcoming. Searching for the past – Metal-detecting and its impact on cultural heritage in Finland. Mike Bintley, John Hines, Andrew Richardson, Andy Seaman & Ellen Swift (eds.), *Neue Studien Zur Sachsenforschung. 68. Internationales Sachsensymposion 'Lands and Seas: Post-Roman transitions and relations across the Channel, North Sea and Baltic worlds'*, Canterbury. Stuttgart.

Wessman, Anna, Koivisto, Leena & Thomas, Suzie 2016. Metal detecting in Finland – An ongoing debate. *Open Archaeology* 2(1), 85–96.

Wessman, Anna, Thomas, Suzie, Rohiola, Ville, Koho, Mikko, Ikkala, Esko, Tuominen, Jouni, Hyvönen, Eero, Kuitunen, Jutta, Parviainen, Helinä & Niukkanen, Marianna 2019. Citizen Science in Archaeology: Developing a Collaborative Web Service for Archaeological Finds in Finland. John H Jameson & Sergiu Musteață (eds.), *Transforming Heritage Practice in the 21st Century: Contributions from Community Archaeology*. Springer, 337–352.