Preservation, Recording & Participation: A comparison of national databases for the registration of private metal detector finds in North-Western Europe

Linda Marie Bjerketvedt, Edinburgh

Abstract

Metal detecting is a popular hobby that is growing both in popularity and scale. With the steady increase in the number of finds being recorded, several European countries have developed databases to handle the large amount of data. This paper explores how different countries in North-Western Europe have responded to the growth of private metal detecting through the creation of national databases. It seeks to contextualise some national databases currently in existence and reflect on the socio-political factors contributing to their similarities and differences. The compatibility of three databases – PAS (Portable Antiquities Scheme) in England and Wales, PAN (Portable Antiquities of the Netherlands) and DIME (Digitale Metaldetektorfund) in Denmark – is explored in detail, with a practical application of the data to better understand the composition of a particular artefact category. The results demonstrate how the structure of the databases plays a vital role in how differences between them are generated. Compatibility between the databases is one remaining issue that needs to be solved in order to better facilitate transnational studies. Nevertheless, the datasets clearly complement each other and hold great potential for understanding the past, the present, and the complex relationship between the two.

1. Introduction

Metal detecting is a popular hobby that allows the public to directly engage with the past. As a result of improved technology and cheaper detectors, the hobby is growing both in popularity and scale. The relationship between private metal detectorists and professional archaeologists, however, has often been heated, hostile and full of scepticism. This tension is reflected in the different policies and legislations adopted within Europe. Most countries maintain a conservative approach and continue to ban metal detecting, whereas others have adopted more liberal attitudes concerned with legalisation and cooperation. The contested and divided approaches towards private metal detection – including how to deal with the data produced – is therefore a growing issue in archaeology. With the steady increase in the number of finds being recorded, several European countries have developed databases to handle the large amount of data. Although the finds recovered by private metal detectorists and other members of the public present an "enormous and unique research potential" (Dobat 2013, 717), gaining a comprehensive picture of the datasets is a challenge. This is further complicated by the need to understand what impacts the data if we want to use it for research purposes.

This paper explores how different countries in North-Western Europe have responded to the growth of private metal detecting through the creation of national databases. It seeks to contextualise some national databases currently in existence, and reflect on the socio-political factors contributing to their similarities and differences. As part of a Master of Science thesis (Bjerketvedt 2020), the compatibility of three databases – PAS (Portable Antiquities Scheme) in England and Wales, PAN (Portable Antiquities of the Netherlands) and DIME (Digitale Metaldetektorfund) in Denmark – was explored through the practical application of extracted data in spatial and statistical analysis. Part of this work included looking at the composition of the Dutch, Danish and British datasets in relation to artefact categorisation, dating and materials, which in turn revealed the distinctive character of the individual databases. The paper begins with an introduction to the legislative background of private metal detecting in the above countries, followed by a summary of how private metal detectors are currently integrated into archaeological research. A detailed description of the structure of the databases is provided in section four. The practical application of the data, which included data collection and comparison, is expanded upon in section five. Metal axe heads were chosen as a study category to look at changes through time and space in more detail as this made it easier to understand what constitutes the datasets. The final discussion looks at the compatibility of PAS, PAN and DIME, including recommendations on how to improve the research for future reference.

2. Legislative background: the regulation of private metal detecting

Legislation is a perhaps the defining factor influencing the practice of private metal detecting. Across Europe, the legislation regarding private metal detecting varies greatly, with some countries considering it a criminal activity and others supporting it (Thomas 2016, 143). Since the legislation is decided at a national level, private metal detecting is not universally defined, thus resulting in differing, and sometimes conflicting, opinions from one country to the other (Deckers et al. 2016, 426). According to Article 3 in the Valletta Convention (Council of Europe 1992), "the use of metal detectors and any other detection equipment or process for archaeological investigation" is "subject to specific prior authorisation". This paragraph only refers to the use at professional archaeological excavations and investigations, and not to the hobby activity of private metal detectorists.

Private metal detecting is perhaps such a debated topic in archaeological heritage management because it inherently questions the traditional notion of an ownership and stewardship of the past (Thomas 2016, 140). In line with discussions surrounding the question 'who owns the past?', the role (and right?) of archaeologists as protectors of the past has been questioned (Smith 2004, 81–82). Furthermore, the Faro Convention (Convention on the Value of Cultural Heritage for Society) recognises the right of every person to "engage with the cultural heritage of their choice" and the need to "involve everyone in society in the ongoing process of defining and managing cultural heritage" (Council of Europe 2005, 1). It highlights both the "right to benefit from" and the "individual and collective responsibility towards" cultural heritage (Article 1a–b; Article 4a–b). Voluntary organisations are explicitly regarded as partners as well as "constructive critics of cultural heritage policies" (Article 12c). Therefore, the problem is not necessarily the differing laws across Europe regarding private metal detecting, but the lack of engagement with the metal detecting community and their desire to participate in archaeology (Deckers et al. 2016, 427).

Denmark, England, Wales, and more recently also the Netherlands, are some of the more liberal countries globally when it comes to private metal detecting. Since the late 1970s, metal detecting has been legal in Denmark, "except on or within two meters from protected heritage monuments and sites" (Dobat 2013, 705). Rather than focusing on confrontation and criminalization, the Danish approach values cooperation and inclusion (ibid. 704). Allowing everyone access to the cultural heritage is not only rooted in democratic thinking, but also reflects the high levels of trust often considered to be typically Scandinavian (Dobat et al. 2018, 6). The trust between citizens as well as between citizens and official authorities and institutions has enabled a unique level of cooperation to develop in Denmark (ibid). On the other hand, Danish museums and institutions struggled for decades to organise the great amount of discoveries, which were increasing yearly, and saw the need for a centralised database (Beck 2017). This was not realised until recently (2016–2017) with an open and shared platform for private metal detectorist finds termed DIME (Digitale Metaldetektorfund).

In England and Wales, on the other hand, the relationship between metal detectorists and archaeologists has been slightly more turbulent. From the mid-1960s until the early 1980s, the metal detector became commercially available across the UK, leading to a rapid growth in popularity (Thomas 2012, 65–66). A license was needed to operate a metal detector up until 1980, when this requirement was abolished (ibid. 72). At the same time, archaeologists were increasingly concerned about the potential dangers of metal detecting. In 1980, a nationwide STOP (Stop Taking Our Past) campaign launched to inform the public about the threat to archaeological heritage (ibid. 68). With the creation of The Ancient Monuments and Archaeological Areas Act in 1979, metal detecting on scheduled monuments without consent became – and still is – a criminal offence (Robbins 2012, 7). As the dispute grew stronger, a legislative change to the treasure trove law was desperately needed. Realised in 1996 with the new Treasure Act, finders continue to have a legal obligation to report all finds considered 'Treasure' (which had been re-defined) to the newly established Portable Antiquities Scheme (PAS). The success of the Treasure Act has largely been enabled through the accompanying database, and in combination, both have had "a significant and positive impact on Britain's archaeological knowledge" (British Museum 2017, 5; Lewis 2016, 136). England and Wales were also the first to introduce such a database in Europe.

A comparable situation is currently taking place in the Netherlands. PAN, short for Portable Antiquities of the Netherlands, is a database piloted by the scientific community to document and publish mobile archaeological finds. The need for this type of documentation arose when a new Heritage Law was passed on the 1st of July 2016, legalising metal detection down to 30 cm depth of the topsoil whilst retaining the ban on private metal detecting of protected archaeological monuments. Vrije Universiteit Amsterdam received funding to develop a centrally organised database which would first and foremost document and publish private collections. Despite a legal obligation in the Netherlands to report finds, this was hardly done prior to 2016, one reason being the lack of an infrastructure for dealing with artefacts found by the public. The PAN project has aimed to solve the above issues. It is planned that the responsibility for PAN will be taken over by the Dutch Ministry of Cultural Heritage in 2020.

Archaeologists, heritage professionals and policy makers face several challenges associated with both liberal and conservative approaches to metal detection. Some scholars have attempted to determine the effects, benefits and disadvantages of the different policies, with varying and sometimes contradictory results. An empirical study sought to investigate whether the restrictive regulations in Germany resulted in less private metal detection (Karl/Möller 2016, 215). Such restrictive policies aim to "create a deterrent effect" (ibid). According to the study, Germany has over three times more members in metal detecting forums per capita than the United Kingdom (ibid). These findings are peculiar, as one would assume the restrictive legislation of Germany to result in less active metal detectorists, but this does not seem to be the case. The study stands in stark contrast to a quantitative analysis by Hardy (2017), which investigated online forums and social networks to estimate the scale and intensity of metal detecting. He concludes that permissive regulation is "ineffective in minimising harm to heritage assets", while prohibitive policies more effectively prevent the loss of archaeological heritage (ibid. 1).

As a response to Hardy, Deckers et al. (2018) claims the study to be too simplistic and not conscious of the complexities associated with the metal detecting phenomenon. Although liberal approaches may increase the number of detectorists – perhaps even foster the notion of a financial reward in some cases (Lewis 2016, 135) – it does not necessarily result in the 'cultural damage' claimed by Hardy (Deckers et al. 2018, 323–324). While liberal schemes cannot guarantee that more finds are reported, it can provide support and visibility for finders to report at a later stage or when asked (ibid. 324–327). Without private metal detecting, many artefacts would not have been recovered at all. Either way, it currently remains impossible to estimate how much is lost and how much is salvaged as a result of metal detecting (ibid. 324).

One serious problem remains regardless of the different legislative approaches, namely illegal metal detecting. Illicit trade and nighthawking (the use of a metal detector without permission or on prohibited land) can have a big impact on the reputation of the metal detector community (Oxford Archaeology 2008, 93). A survey conducted by Oxford Archaeology on behalf of English Heritage between 2007 and 2008 concluded that nighthawking remains under-reported, largely because the "lack of response from the police" leads to landowners losing faith in police capacity (ibid. 99). This, alongside the low levels of penalties and number of prosecutions, results in a false picture of the situation (ibid. 105). The police need to treat nighthawking and illicit trade as a recordable offence in order to better monitor the scale of the problem, and in turn make comparisons with legislative approaches (ibid). At the same time, the number of Scheduled Monuments in England affected by nighthawking has decreased: whereas 1.3 % of all Scheduled Monuments in 1995 were affected, in 2008 it was only 0.41 % (ibid. 71).

The severity and scope of these problems are also extremely difficult to assess in both Denmark and in the Netherlands (Dobat/Jensen 2016, 79; Erfgoedinspectie 2012). For the latter, a conservative estimate of between 5000 and 10,000 cases per year of excavations without permit or failures to report important finds – many involving private metal detectorists – has been suggested (Erfgoedinspectie 2012, 4). The government and archaeological institutions take few measures to prevent these illegal acts, resulting in the border between legal and illegal remaining unclear to many citizens (ibid). Preventing illegal metal detecting is less about 'choosing' a permissive, restrictive, or prohibitive policy, and more about heritage professionals working with landowners and the police to combat heritage crime (Daubney/Nicholas 2019, 159).

3. Involvement of private metal detectorists in research

Many heritage authorities are increasingly liaising with private metal detectorists and including them in research (British Museum 2017, 5). If given proper training in data collection and documentation by archaeologists, particularly in terms of the importance of archaeological context, the efforts of private metal detectorists are valuable (Robbins 2014, 13). In several cases, research based on amateur archaeological datasets has even radically changed our understanding of the past (Dobat 2013, 705–707).

There are different ways in which private metal detectorists and their finds are integrated into archaeological research. First of all, the artefacts may become part of a dataset, which can be utilised in numerous ways for different purposes. The level of documentation and recording determines how informative artefacts may be. When finds are discovered, most detectorists tend to fully or partially excavate on their own (Lewis 2016, 133). For singular and small finds, this is generally accepted, but for large, unusual or a concentration of finds – or when in doubt – professional help should be sought (Department for Digital, Culture, Media and Sport 2002, section 33; Rijksdienst voor het Cultureel Erfgoed 2019, 11). Obtaining the appropriate archaeological help is beneficial because it is likely to result in further archaeological information being discovered. This was for instance the case for the Frome Hoard, which consisted of a 45 cm diameter pot filled with 52,503 Roman coins, discovered by detectorist Dave Crisp in Somerset (Moorhead et al. 2010). After digging down to reveal the top of the pot alongside some coins, Crisp correctly assumed he was dealing with a coin hoard and decided to fill the hole in, immediately contacting the local PAS Finds Liaison Officer (Moorhead 2017). The Frome Hoard gave rise to a project funded by the Arts and Humanities Research Council (AHRC) to explore hoarded metalwork in Roman Britain during the 3rd century AD (UKRI, no date). Moreover, Crisp's approach proved to have an "enormous impact on other metal detectorists' practices", resulting in the professional excavation of several coin hoards discovered by detectorists since then (Moorhead 2017).

Another possibility is to engage the detectorists in planned projects run by professional archaeologists such as field surveys or excavations. Several scholars have demonstrated that working with experienced metal detectorists produces "more consistent and systematic results" than an unskilled archaeologist with limited operational knowledge (Reeves 2015, 265; van der Schriek/van der Schriek 2014, 241; Sutherland 2005). Particularly in battlefield archaeology, the metal detector is a crucial instrument for locating individual metal objects and has had a vital impact on the methodological approaches for the archaeological investigation of battlefields (Ferguson 2013). Because small metal finds can easily be missed during archaeological excavations, many projects are welcoming the use of the tool both in pre-excavation surveys and during the excavation – a shift that essentially relocates the hobby metal detectorist from the spoil heaps to the trench (Lewis 2016, 134).

Danish archaeology has a long tradition of liaising with hobby metal detectorists, an example of which is the large Smørenge hoard on the island of Bornholm. Located in one of the archaeologically richest areas in Denmark, the site was excavated in 1983 and subsequently surveyed on an annual basis (Horsnæs 2002, 131). The close cooperation between the archaeologists working at the Bornholms Museum and the metal-detector association of Bornholm enabled amateurs to undertake traditional and metal detector surveys as well as participate in excavations organised by the museum (ibid). In many cases, the same fields were surveyed repeatedly over many years (Watt 2000, 84). Because many of the Danish private detectorists are members of one or more associations – either local, national or both – the associations play an important role as "an institutional link between detectorists and museums or other research institutions" (Dobat/Jensen 2016, 75). These associations become treasured partners when systematic surveys of larger areas are needed, saving the professional archaeologists both time and money (Christiansen 2016, 24).

Private metal detecting has also had a significant impact on how archaeologists perceive the destruction of the archaeological record (Lewis 2016, 131). The plough-zone has traditionally been something of less interest and something that needed to be stripped off to get to the 'real' archaeology (Addyman/Brodie 2002, 180). In fact, most development-led excavations remove the topsoil and/or the modern plough horizon mechanically with a digger and often ignore finds from the top layer (Deckers et al. 2018, 324). At the same time, preservation in situ has become one of the key principles of archaeological heritage management in Europe (Högberg et al. 2017, 639). What research is revealing, however, is that in-situ preservation is nearly impossible in cultivated plough-soil (Noble et al. 2019; Haldenby/Richards 2010). Archaeologists have to deal with a reality in which the archaeological deposits and cultural landscapes are under widespread threat due to the intensification of land use (Trow 2010, 19).

Paradoxically, the majority of private metal detector finds from North-West Europe derive from cultivated land and the plough zone (Deckers et al. 2018, 323; Dobat 2013, 710; Robbins 2012, 20). Seeing as portable finds from the topsoil have proven crucial for understanding underlying archaeology and the historic environment (Lewis 2016, 131), archaeologists are recognising the plough horizon as an important and informative resource. It has been argued that hobby detectors are best suited for the vast task of salvaging archaeological artefacts from destruction caused by farming (Rasmussen 2014, 89). The recovery of finds by private metal detectorists – whether legal or illegal – is perhaps nothing compared to the "real, tangible threats to archaeological heritage" (Moshenska 2010, 27).

Finally, the increased use of the data generated by hobby detectors has prompted more investigations into the behaviour and attitudes of private metal detectorists. One of the first attempts at systematically examining the biases inherent in the data was done by Robbins in her doctoral thesis 'From past to present: Understanding the impact of sampling bias on data recorded by the Portable Antiquities Scheme' (2012). Her research revealed the "choices made by collectors, recorders and landowners" which had the most influence on the distribution of the data (Robbins 2012, 1). Similar empirical studies have been performed in Scotland (Bailie/Ferguson 2016), Denmark (Dobat/Jensen 2016), Norway (Rasmussen 2014) and Finland (Immonen/Kinnunen 2016). More research is needed in this area, simply because the behaviour of private metal detectorists directly influences the spatial patterns. We cannot assume that the findings made in the British surveys are directly transferable to the behaviour of for instance Dutch or Danish private metal detectorists. In fact, such surveys have difficulty to capture "the whole range of opinions and methods within the metal detecting hobby" (Robbins 2012, 242). This is largely because the detecting community is far from homogeneous and uniform.

4. Database structure

Understanding how a database is structured is arguably crucial if you want to better understand the data contained within it. With the exponential growth of digital data, archaeologists need to improve their data literacy skills to "make these different types and sources of data useful (and usable)" (Kansa/Kansa 2021, 81). There is a growing call for more reuse and sharing of archaeological data, but this can only be achieved if expertise in data management is developed (Marwick 2017; Marwick/Birch 2018). The follow section provides a survey of how the different databases for private metal detecting are structured. It summarises the historical background as well as the technical construction.

4.1 England and Wales: Portable Antiquities Scheme (PAS)

The PAS database can in many ways be considered a 'pioneer' among the amateur archaeological databases, having paved the way and inspired many younger counterparts such as DIME and PAN. Since its development over 20 years ago, the database has experienced significant changes as a result of trial and error. In 1998, PAS took the form of a Microsoft (MS) Access database which did not provide any analytical functions and was not internet based (Robbins 2012, 15). Since the data was recorded individually and remained on local machines, it was collected into one central database on an annual basis, parts of which were published online. This structure did not prove a long-term solution and a new database was created in 2002 and 2003. At the same time, an IT Officer as well as five National Finds Advisors (NFAs) were appointed (ibid. 16). The latter would "monitor the quality of the data" (ibid). The new and central database provided open access to anyone via internet and improved the quality and consistency of the recorded data (Pett 2010, 1).

A third database was launched in 2010 after several issues needed to be addressed. The new system had to be made more user-friendly because many users experienced the existing system as too complex and slow (Pett, no date). Considering the 'boom' in both number of registered users and registered research projects, this final version has proved highly successful in improving the use of the database (Bland et al. 2017, 114–115). The data is more accurate as a result of better support, guidance and validation methods (Robbins 2012, 15–16).

At the moment, PAS is managed by the British Museum and Amgueddfa Cymru – National Museum Wales as part of a vast network of staff: three Central Unit members (i.e. Resource Managers and Head of Scheme and Treasure), forty FLOs (Finds Liaison Officers), five NFAs, and five Treasure Registrars (responsible for cases falling under the Treasure Act 1996). As the first point of contact, the FLOs play an important role in recording archaeological finds (PAS, no date). The FLOs are in turn trained by the NFAs, who are specialists in specific fields (ibid). On the database itself, only NFAs can edit all records and publish them. FLOs and the Treasure Team can "edit records made by members, researchers and those at their institution" and also validate them (Bryan 2010, part 1). There are six different levels of access to the database in total, each of which determine the user's ability to see, create, edit – and for some even validate and publish – records and other types of information (Fig. 1 and 2).

Despite the impressive number of people recording finds, it is impossible to record everything (Lewis 2016, 131). The Finds Liaison Officers (FLOs) have to be selective and will prioritise the oldest artefacts instead of more recent ones, e.g. industrially made objects and/or younger than around 1540 (ibid). To cope with the large number of finds, finders have been able to register their own finds under supervision since 2010 (Bland et al. 2017, 114–115). Training is organised by PAS staff and is complimented by the Portable Antiquities Scheme Volunteer Recording Guide (Bryan 2010, revised in 2017 by Geake and Costin). The online guide serves as a reference with detailed descriptions on how to fill in every field of a record. Additionally, the PAS Explorers project (2014–2019) was set up to provide regular training courses and support volunteers working with PAS (Speed 2019). Before volunteers may start recording, they have to contact their local FLO and receive training. Although volunteers and self-recorders are welcomed, the FLOs can only "take on a certain number at any time" (PAS, no date). Figure 3 provides an overview of how an artefact is recorded in PAS.

PAS has been quoted as "the most successful public archaeology scheme ever" and is held in high regard for the work it has done and continues to do in managing the heritage of England and Wales (DC Research 2018, 17). At the same time, most people involved with the Scheme see opportunities for developing it over the

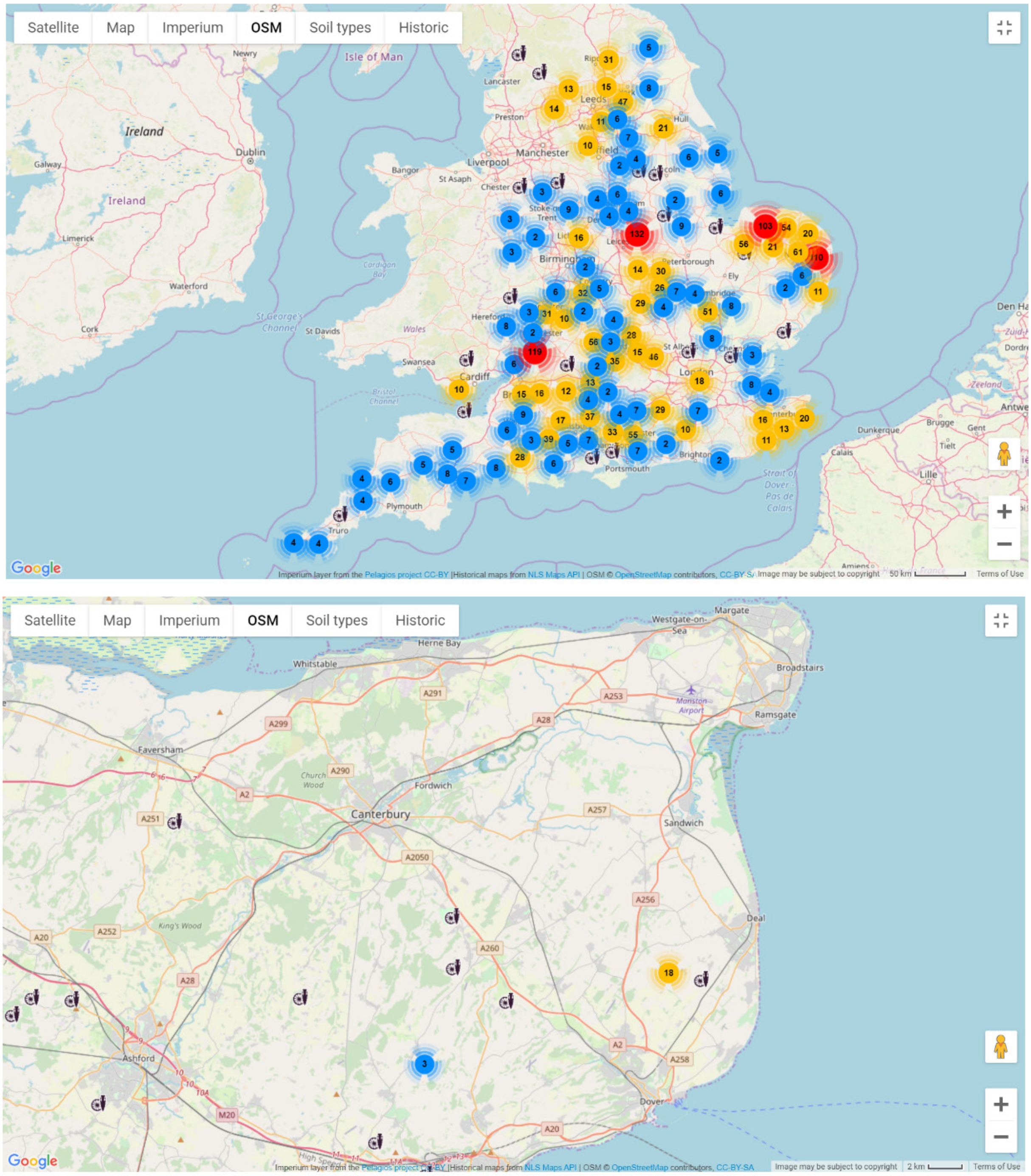
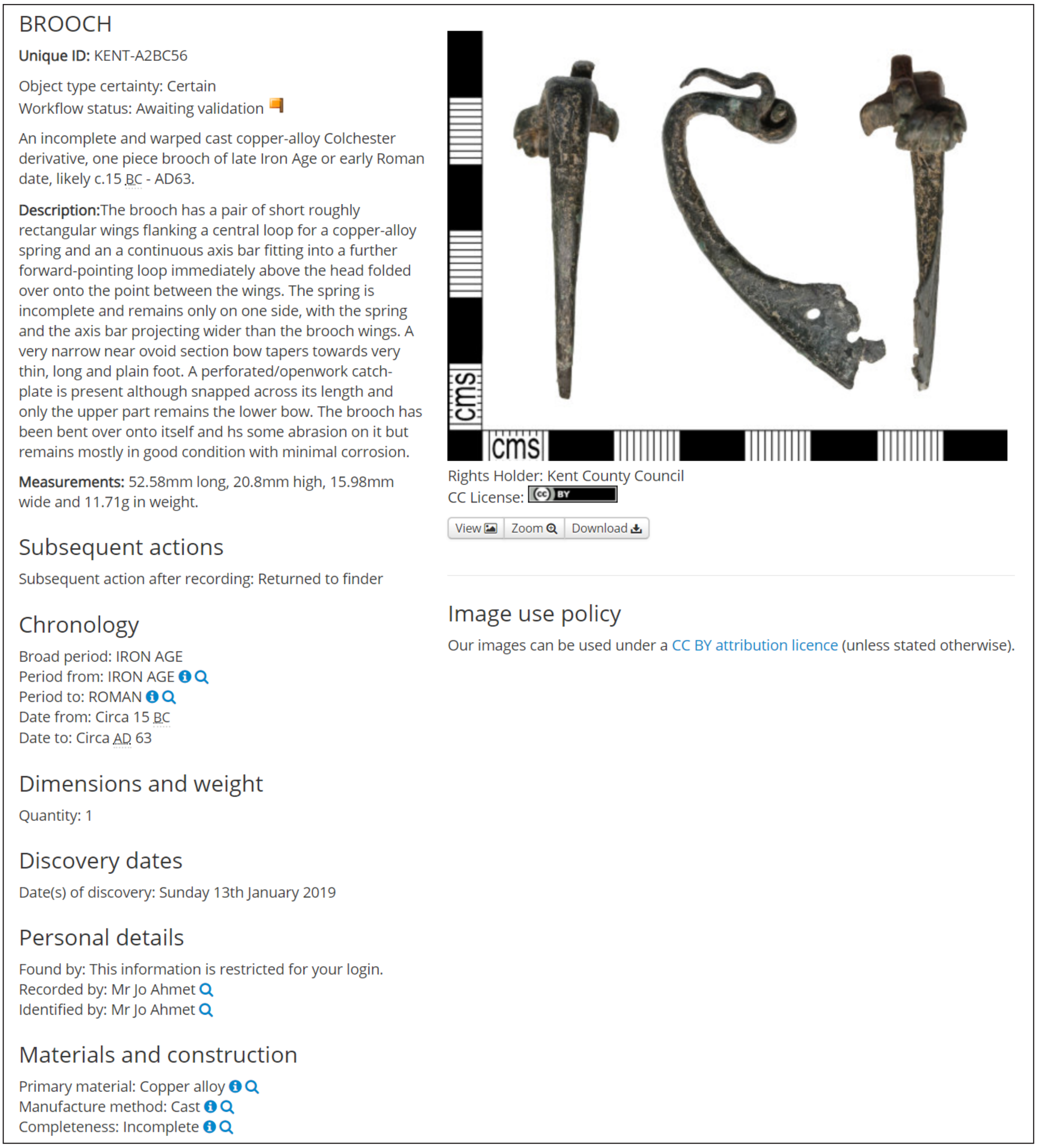


Fig. 1. Example of map overview for a public user who has not logged in on a national scale and on the closest zoom. Only the first 2000 records are mapped. The dark-blue symbol gives direct access to a specific record whereas the coloured hotspots provide no further detail. (Bjerketvedt 2020) (Viewed on 15/10/2019)

coming years (ibid. 20). The biggest issue is securing long-term funding as the current funding arrangements need to be adapted to the present situation (ibid. 14). Several measures need to be taken in order to secure the sustainability of PAS, most of which are addressed in the 'Portable Antiquities and Treasure Strategy: 2020'. This document gives a detailed overview of the current situation versus what will be achieved by 2020. While PAS continues to serve as a model for other similar recording systems, the Scheme has also expressed the potential of a pan-European platform for documenting archaeological finds discovered by members of the public (Lewis 2015).



BROOCH

Unique ID: KENT-A2BC56

Object type certainty: Certain
Workflow status: Awaiting validation

An incomplete and warped cast copper-alloy Colchester derivative, one piece brooch of late Iron Age or early Roman date, likely c.15 BC - AD63.

Description: The brooch has a pair of short roughly rectangular wings flanking a central loop for a copper-alloy spring and an a continuous axis bar fitting into a further forward-pointing loop immediately above the head folded over onto the point between the wings. The spring is incomplete and remains only on one side, with the spring and the axis bar projecting wider than the brooch wings. A very narrow near ovoid section bow tapers towards very thin, long and plain foot. A perforated/openwork catch-plate is present although snapped across its length and only the upper part remains the lower bow. The brooch has been bent over onto itself and hs some abrasion on it but remains mostly in good condition with minimal corrosion.

Measurements: 52.58mm long, 20.8mm high, 15.98mm wide and 11.71g in weight.

Subsequent actions

Subsequent action after recording: Returned to finder

Chronology

Broad period: IRON AGE
Period from: IRON AGE
Period to: ROMAN
Date from: Circa 15 BC
Date to: Circa AD 63

Dimensions and weight

Quantity: 1

Discovery dates

Date(s) of discovery: Sunday 13th January 2019

Personal details

Found by: This information is restricted for your login.
Recorded by: Mr Jo Ahmet
Identified by: Mr Jo Ahmet

Materials and construction

Primary material: Copper alloy
Manufacture method: Cast
Completeness: Incomplete

Rights Holder: Kent County Council
CC License: BY

View Zoom Download

Image use policy

Our images can be used under a CC BY attribution licence (unless stated otherwise).

Fig. 2. An example of a recorded find viewed as a public user with no log in. A wide range of detailed information is available. The main restriction is viewing the finder (privacy issue) and the exact findspot. For the latter, only a 4-figure OS grid reference (1km square) is published whereas the most sensitive findspots are not referenced to this accuracy publicly. (Bjerketvedt 2020) (Viewed on 15/10/2019)

4.2 Denmark: Digitale Metaldetektorfund (DIME)

DIME is organised to provide a user-driven and standardised recording system for members of the public to record their private metal detector finds (Dobat et al. 2018, 3). The database offers tools to register and record finds, allowing the users to keep a digital catalogue of their own finds and find spots (ibid). This drastically reduces and simplifies the workload and administration which usually takes place at museums. A mobile version of DIME is available and performs similarly to an app, meaning it can be used in the field to record the GPS coordinates and take photos of the finds (ibid. 4). The design and structure of DIME is largely influenced by several meetings between the various stakeholders, interviews with the focus group and online questionnaires distributed to different metal detectorist associations (ibid. 7–8). At the present, the database is designed with metal artefacts in mind, but in principle, any archaeological object can be registered in DIME.

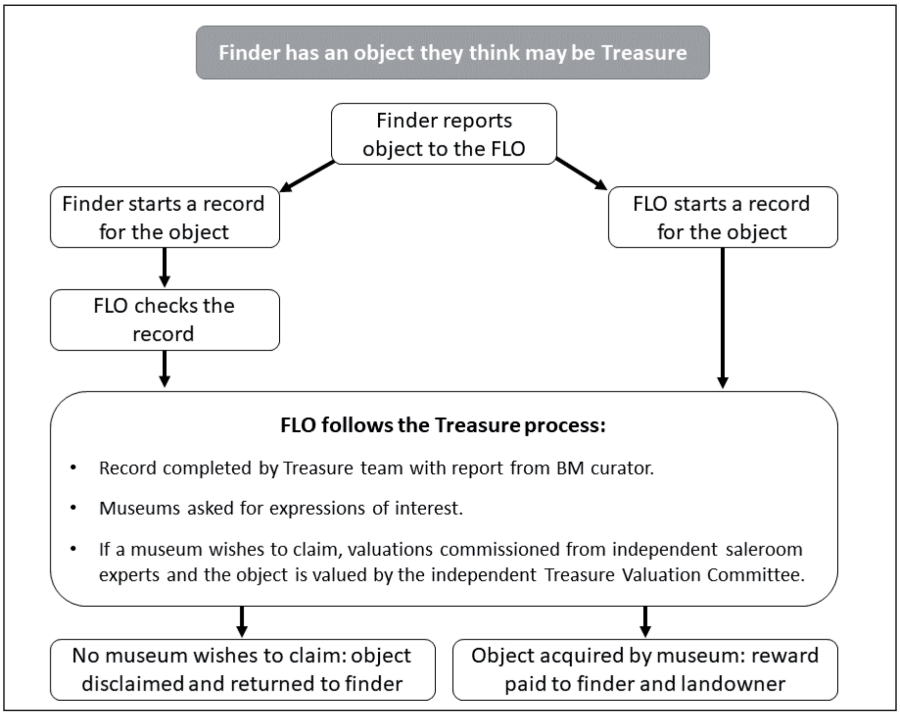


Fig. 3. Overview of how a find record is authored and edited within PAS. (Reproduced with permission © Trustees of the British Museum's Portable Antiquities Scheme)

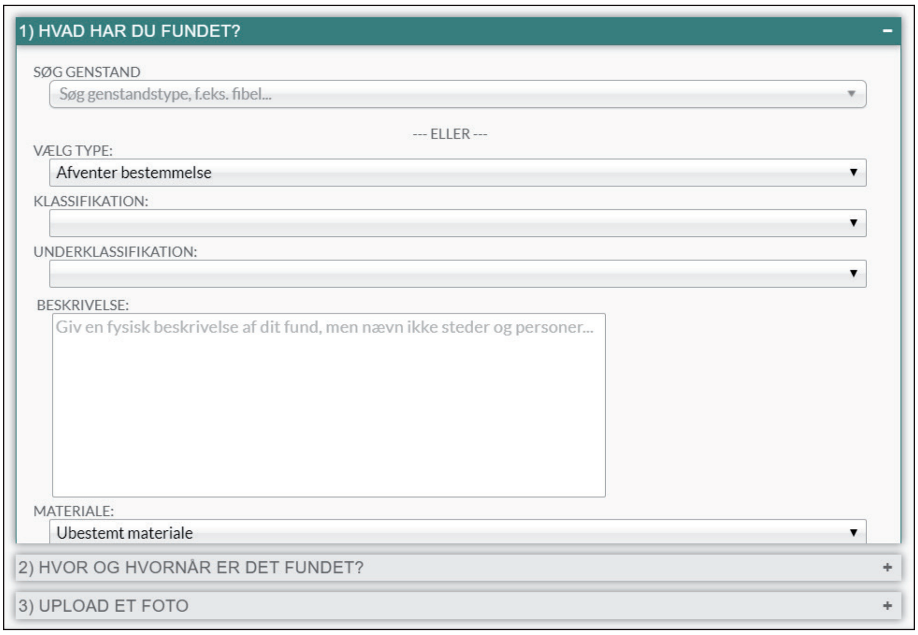


Fig. 4. Screenshot of the first step of uploading a find to DIME. (Bjerketvedt 2020) (Viewed on 15/10/2019)

It is also freely accessible but operates with four different user groups (apart from admin users) of varying access and editing rights (ibid):

1. Public users do not need to log in and may search the database, providing access to selected information
2. Finders (private metal detectorists) can upload, see and edit their own finds and the associated information
3. Museum users (professionals working with handling private metal detectorist finds at museums) can see and edit all finds and the associated information related to the area of responsibility of their museum

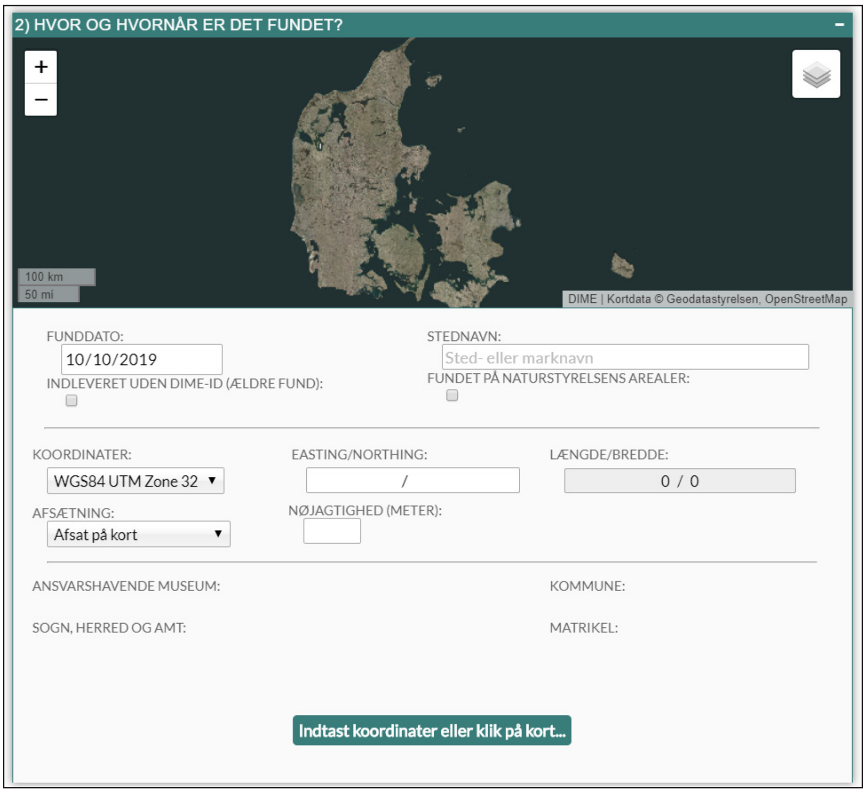


Fig. 5. Screenshot of the second step of uploading a find to DIME. (Bjerketvedt 2020) (Viewed on 15/10/2019)

4. Researchers (associated with heritage management and universities) can see all finds and the associated information related to a specific project, for a limited time and following an application procedure

In order to register a find, it is mandatory to provide the GPS coordinates, at least one photo and a classification (which may be "undefined"). The registration itself is very simple and consists of three steps.

First, the object type is defined alongside any potential classifications and sub-classifications (Fig. 4). The material and a written description can also be filled in. In the second step, the GPS coordinates are given, either manually or using a map (Fig. 5). Finally, one (or more) pictures are uploaded. A unique DIME-ID is then generated, and more information can be added to the object later (ibid. 9). After creating a record for the find (Fig. 6 and 7), it is possible to hand in the object to the local museum and similarly inquire if the local museum is interested in the object. This can be done with a direct message function.

The structure of the database is extremely flexible and allows a direct flow of the data between different systems, formats and institutions. In principle, DIME can be employed at all stages: starting with the discovery in the field, followed by processing at local museums, and in some cases ending as treasure (*danefæ*) at the Danish National Museum (ibid. 10). In comparison to PAS and PAN, DIME does not require any validation from admin and/or specialist users. If there are any doubts regarding an artefact, the finder can either contact their local museum directly or use Facebook groups to reach out to the community for help. The latter is actively encouraged by the developers of DIME and follows the user-driven philosophy of the database. Through an accompanying support group on Facebook, DIME continues to be improved and developed to make it even more useful for its different users. It has proved a great success, despite taking on a slightly different approach than its British and Dutch counterparts.

4.3 The Netherlands: Portable Antiquities of the Netherlands (PAN)

At the present, PAN is predominately occupied with recording and publishing objects – mainly metal – from private collections (Vos et al. 2018, 15). Particularly older collections curated by metal detector users who have been searching since the 1970s are prioritised because in many cases, the exact findspot of these objects is only known by the finder (ibid). PAN is the first attempt to systematically document these collections in the Netherlands. Private metal detectorists

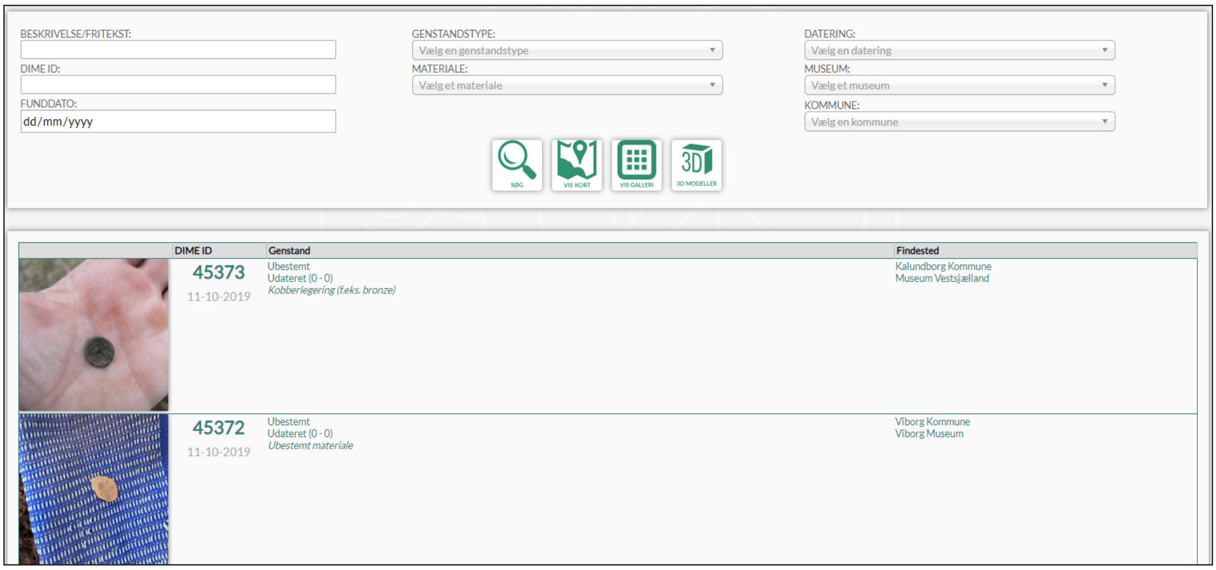


Fig. 6. Screenshot of the search bar in DIME and the list of finds. (Bjerketvedt 2020) (Viewed on 15/10/2019)

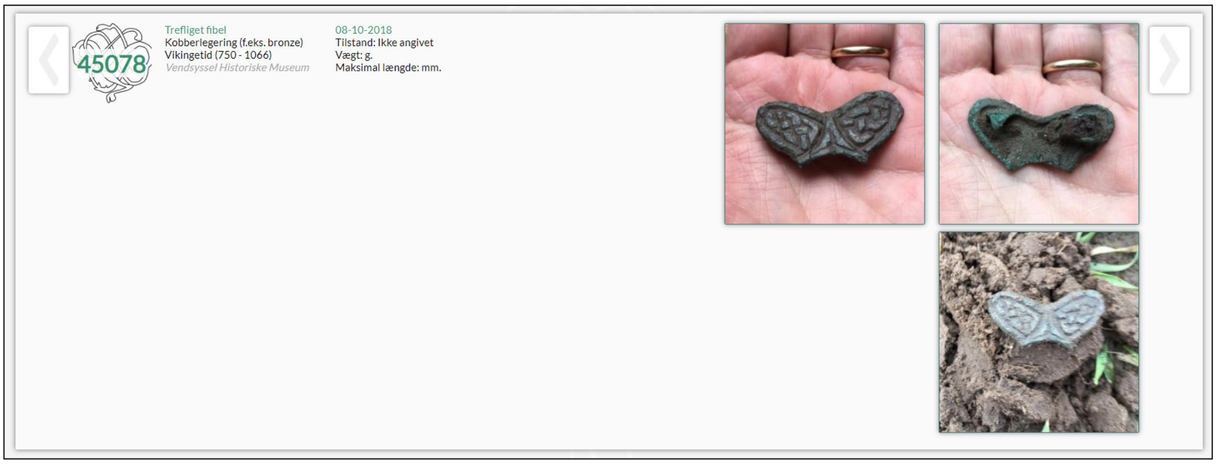


Fig. 7. Screenshot of a description page for a find in DIME. (Bjerketvedt 2020) (Viewed on 15/10/2019)

who have made new and current discoveries are also encouraged to report their finds. The documentation of new finds will become an increasingly important part of PAN once the Cultural Heritage Agency takes over the responsibility for the database in 2020 (Roymans/Heeren 2017, 24–25).

Finds are reported to and documented by one of the eight Find Liaison Officers, each responsible for their own region. They either visit the collectors in their homes or meet in museums to document the finds. Furthermore, two finds specialists provide help with scientific identification and descriptions. The whole project is currently managed by Prof. Dr. Nico Roymans and Dr. Stijn Heeren from the Vrije Universiteit Amsterdam. Additionally, several volunteers are actively involved. It has been suggested that in the future, users may be able to upload and record their own finds (NWO, date).

The database, particularly the public section, was designed to be a "user-friendly online environment", offering a clear overview and easy navigation (Vos et al. 2018, 16; Fig. 8 and 9). Depending on the user rights, two types of datasets are available from PAN: the total number of finds and validated finds. The former encompasses finds situated at various points in the workflow (see Fig. 10). A find becomes validated when a user with administrative rights approves of the description and categorisation given to a specific object. At the time of writing (10/10/2019), the database contained 59,326 total finds, of which 22,792 are validated. A user account is not necessary to view the validated finds, but neither the total number of finds nor the detailed find location are visible (Fig. 11). Users with research rights have access to a separate research portal, where the validated finds are listed with

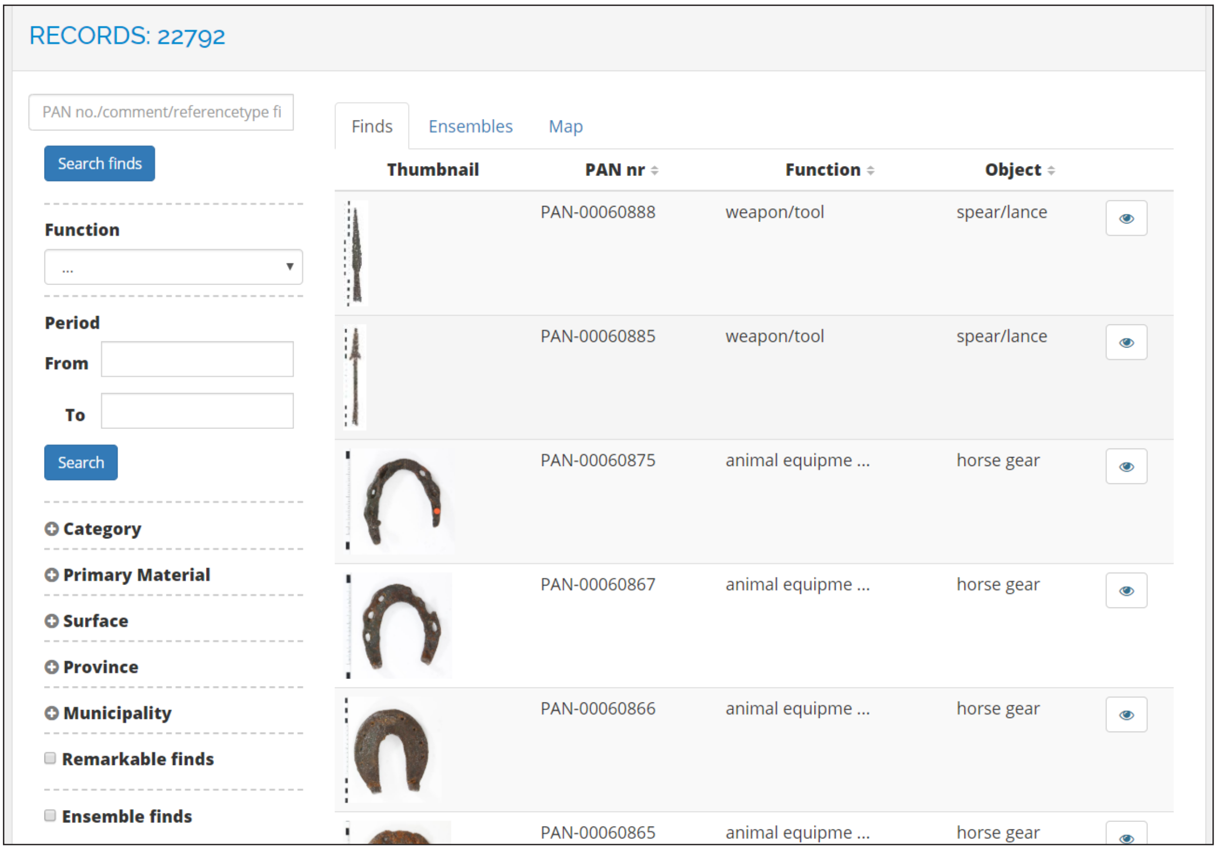


Fig. 8. Screenshot of PAN as a public user with no log in. (Bjerketvedt 2020) (Viewed on 15/10/2019)

full information and may be exported. Only administrators are able to export the total number of finds as a dataset.

Depending on how and why the data is to be used, one has to decide whether to work with the total number of finds or only with the validated finds. Either one comes with its own advantages and disadvantages. Although the total dataset is useful for large-scale, quantitative studies of distribution patterns, it is relatively unsuitable for detailed, qualitative studies. In some cases, items may have been wrongly categorised and/or dated. This problem is largely eliminated when using the validated dataset. Currently, the validated finds make up approximately 38% of the total dataset. It is an extensive task for the users with administrative rights to work their way through the high amount of finds that are waiting for validation. The latter is the result of the project consciously prioritising documentation over validation and publication in an attempt to salvage information. Using the total dataset makes sense when one is aiming to gain an impression of the realistic artefact distribution. The validated finds do not necessarily reflect the 'true' distribution of finds, but rather a random selection of finds that are no longer in a queue awaiting validation.

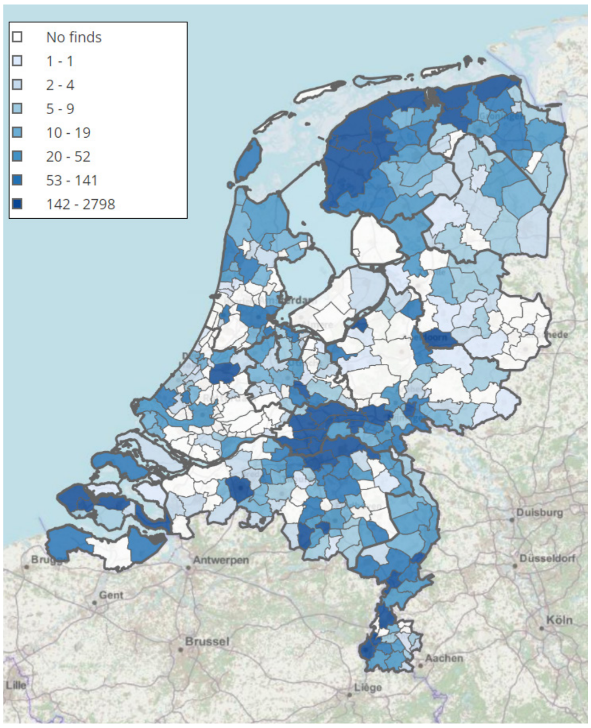


Fig. 9. Screenshot of the interactive map available in PAN to public users with no log in. The map shows finds per province. (Bjerketvedt 2020) (Viewed on 15/10/2019)

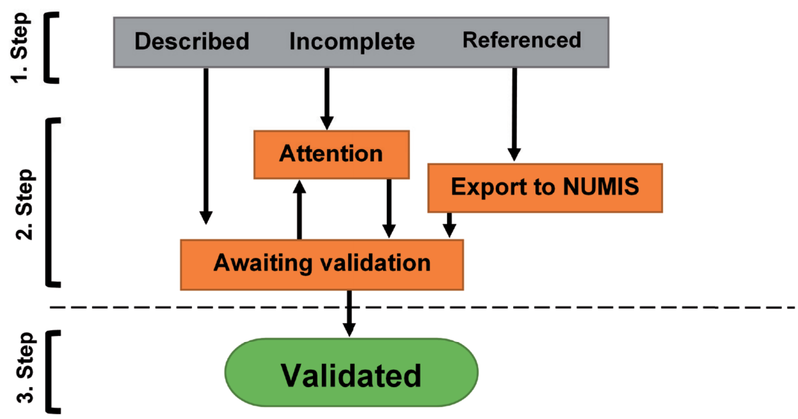


Fig. 10. Workflow chart illustrating the process of registering finds in PAN. (Bjerketvedt 2020)

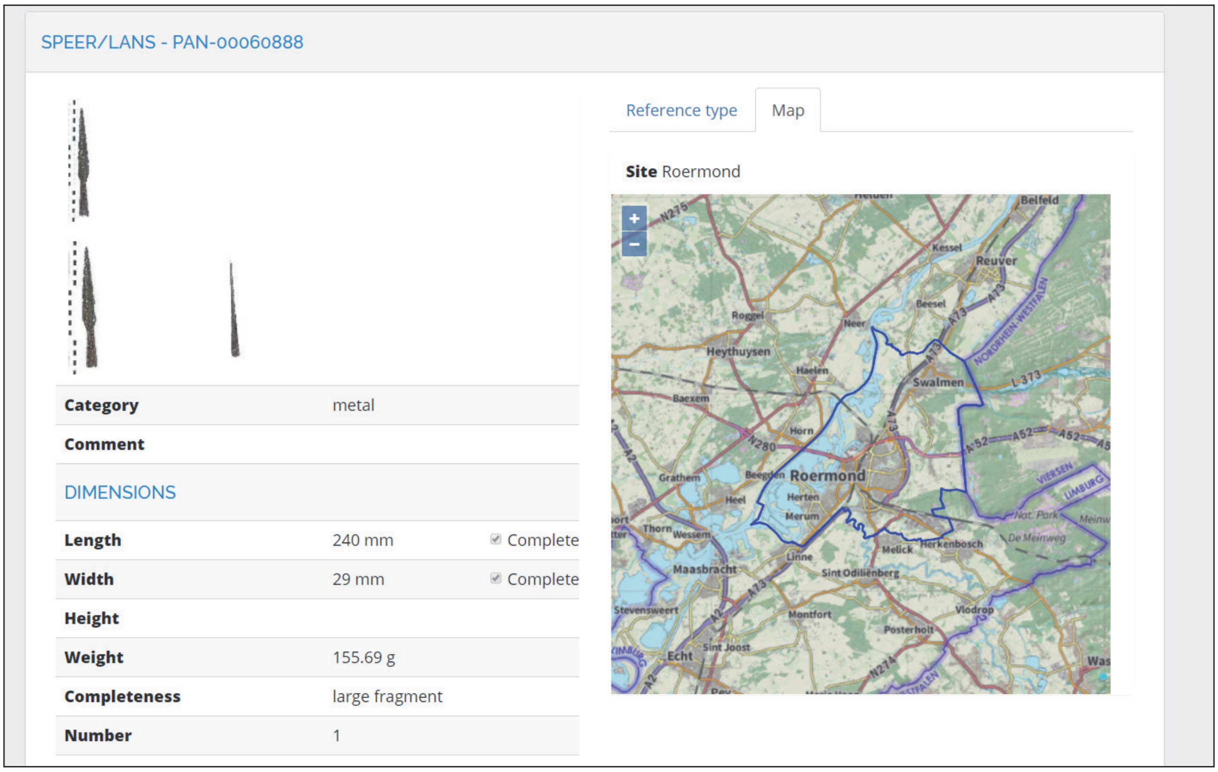


Fig. 11. Screenshot of the description page of a find in PAN. The find location is not detailed for public users. (Bjerketvedt 2020) (Viewed on 15/10/2019)

5. Working with and applying the data

Assessing the integrity of a dataset is a necessary step for identifying any errors or problems (Kansa et al. 2019, 10). Data generated by private metal detectorists is considered to be not just unique and extensive, but also partial and biased (Robbins 2012, 1–2). In order to utilise the data in such a way that it may inform us about past societies, we first need to understand the datasets themselves. There are many choices, decisions and considerations associated with the data collection that may affect the ensuing analysis. The following case study serves as a practical example of how data of a particular artefact category (axe heads) can be collected and compared from the three databases.

5.1 *Data collection*

This study made use of primary datasets that are digitally available for reuse. Just like the current society is becoming more and more digital and web-based, so is

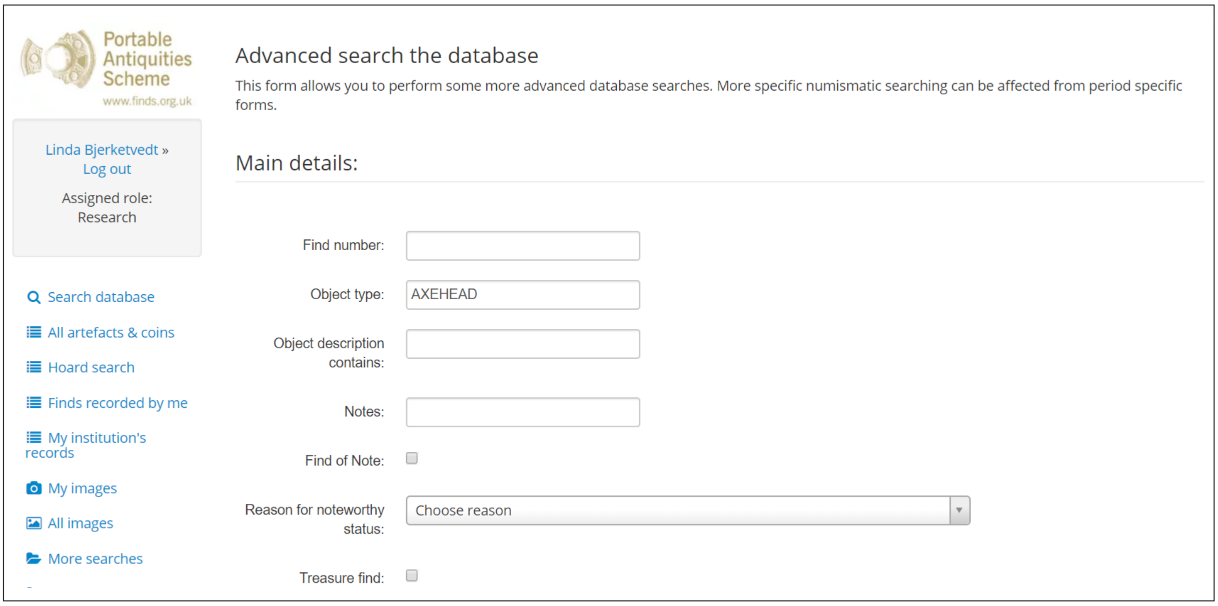


Fig. 12. Screenshot of an advanced search in PAS, showing the different fields. (Bjerketvedt 2020) (Viewed on 15/10/2019)

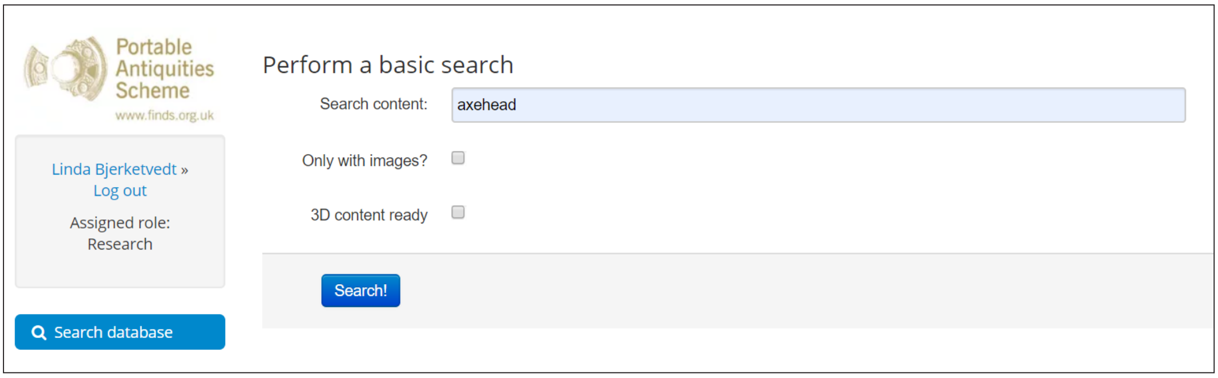


Fig. 13. Screenshot of a basic search in PAS, which includes a free text field. (Bjerketvedt 2020) (Viewed on 15/10/2019)

archaeology required to "face the cognitive challenges posed by digital environments" (Marchetti et al. 2018, 447). As a result, movements related to Open Access and Open Data are suggested for making archaeology accessible, diverse and sustainable (Kansa 2012). The ability to access resources shared by others and reuse data in order to generate and build new research can prove extremely beneficial not only to individual researchers, but also for the discipline as a whole (Marwick et al. 2017).

But how do we go about collecting digital data online? Accessing open data is not necessarily free of issues or bias. Firstly, the databases PAS, PAN and DIME are not open access *per se* because only users with research rights may download the datasets. Access needs to be supported by a reference from another scholar or professional archaeologist and is offered conditionally based on the agreement with the terms and conditions. Gaining research access – without which the data collection cannot take place – is in some cases a lengthy process of several weeks. Secondly, the archaeological data itself is not something "waiting to be discovered", but is rather something that is created, arbitrary and interpretative (Gattiglia 2015, 117; Huggett 2014). This interpretation starts during the selection and export of the data. Depending on how the database is searched, different results may be produced. A search in PAS with 'AXEHEAD' as the object type produced less finds than 'axehead' in the free text/description bar of the simple search (Fig. 12 and 13): 3195 finds compared to 3985 finds (data viewing on 07/10/2019). Furthermore, using an additional space in the word, i.e. 'axe head', in the free text search produced 1019 finds. In comparison, a search in PAN for all validated axe finds by their reference type (in this case PAN-type 16) resulted in 158 finds (Fig. 14); the same number as when searching for 'bijl' (axe) in the free text bar (Fig. 15).

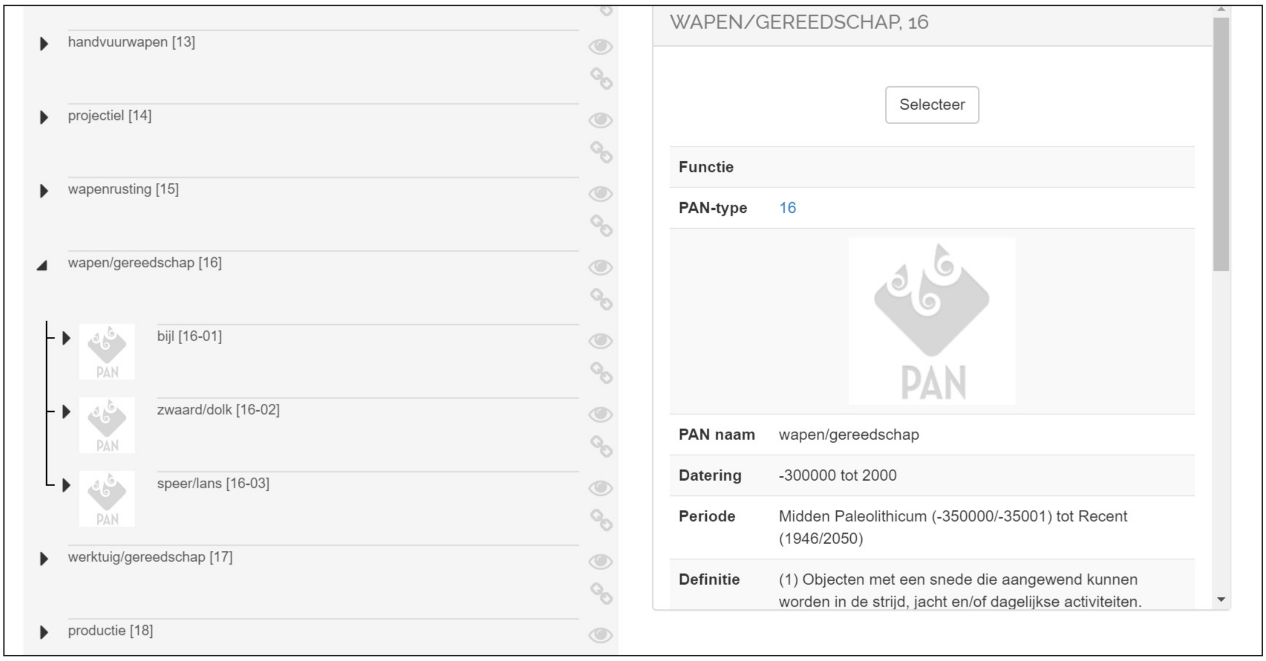


Fig. 14. Screenshot of a search in PAN using reference types, in this case 'bijl' (axe). (Bjerketvedt 2020) (Viewed on 15/10/2019)

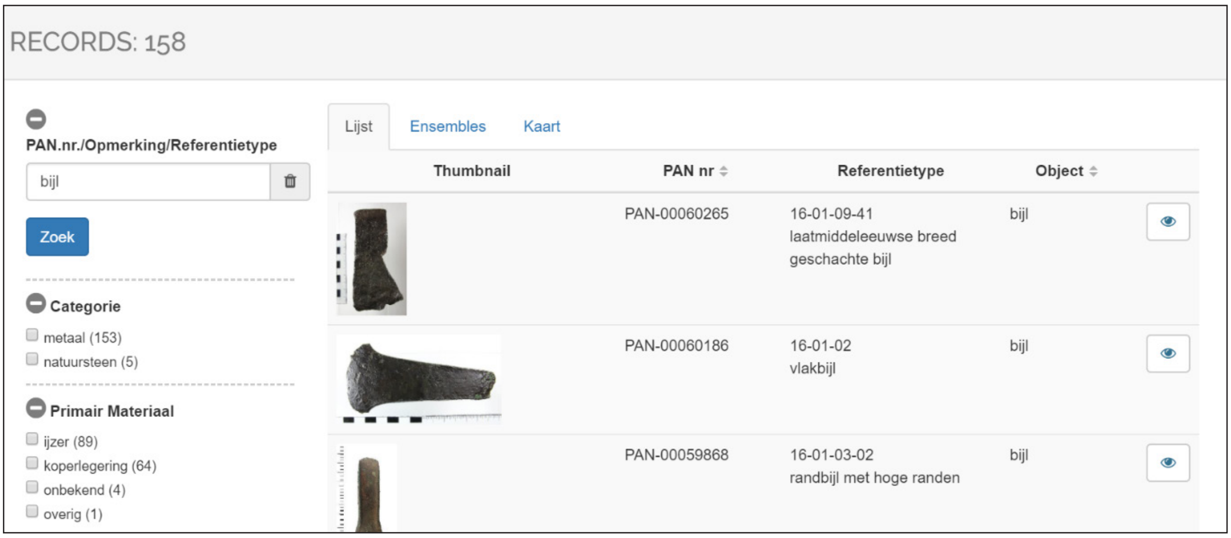


Fig. 15. Screenshot of a general search in PAN and some of the categories that may be used to find objects, including a free text field on the top. (Bjerketvedt 2020) (Viewed on 15/10/2019)

During the data collection (Tab. 1), it quickly became obvious that exporting data is already a selective process. Do we search for the artefact in 'object type', or 'object description contains'? Do we use an object category, the free text search, or both? The inconsistencies in the number of finds produced through the different searches require the researcher to compare the various datasets to find the one they actually wish to use. This issue is, of course, not made easier when working with three different databases from three different countries. The data should ideally be collected on the same day because the numbers of finds change – even if minimally – on a daily basis.

5.2 *Data comparison*

Due to the datasets deriving from three databases, the differences are largely a product of different structures in the databases themselves. There are varying levels of information available from each country, the most detailed of which is the PAS dataset, followed by PAN, and finally DIME. The majority of metal axes date to

	PAN (NL)	PAS (UK)	DIME (DK)
Total number of finds	59,006 (of which 22,369 are validated)	1,441,296	36,731
Date of collection	26/09/2019	18/09/2019	25/09/2019
Number of collected finds	158	3966	133
Collection method	Research portal – Free text search: bijl (downloaded by author)	Simple search – Free text search: axehead (downloaded by author)	CSV-file provided by support team of DIME per email
Coordinate system	EPSG:28992 – Amersfoort/RD New	EPSG:4326 – WGS 84	EPSG:4326 – WGS 84
Remarks	Only admin users can download the full dataset	Records can only be downloaded if less than 12,000 finds are selected	Users can only export datasets they have produced themselves (i.e. their own registered finds)

Tab. 1. Overview of the metal axe head datasets collected from the three countries

the Bronze Age, although early modern/recent finds account for a large number in PAN while many of the Danish finds remain undated. Copper alloy is frequently the dominant material apart from in the Netherlands, where over half of the metal axe heads are iron. Comparing the object types was not particularly fruitful.

Portable Antiquities Scheme (PAS)

For the analysis, a total number of 3966 axe heads were used. Table 2 and Figure 16 illustrate the strong emphasis on the Bronze Age, with close to 60 % of the axe heads dating to this period. The Neolithic accounts for roughly a quarter of all axe heads (Tab. 2). The remaining time periods are smaller in numbers and make up the last 15 %.

Out of the 3966 axe heads, 68 % (2713 finds) are made of metal whereas 32 % (1253 finds) are stone or flint. Again, most metal axe heads date to the Bronze Age (Tab. 3 and Fig. 17). Roman and Iron Age metal axe heads make smaller contributions, but not in a significant way. Stone and flint axe heads were not considered further in the analysis. Among the metal axe heads, 131 finds have no coordinates and therefore cannot be included in the spatial and statistical analysis. The total count of metal axe heads with coordinates is 2582.

It was unfortunately not possible to quantify the primary material of metal axe heads because this information is not provided in a separate column, but in the free text column 'description'. The primary material is, however, quantified when browsing the database (Fig. 18). A query of PAS (07/11/19) showed a clear dominance of copper alloy whereas iron was heavily underrepresented. Although the number of finds changed since data collection, we can assume that the proportion of copper alloy to iron/other materials is likely to be more or less the same.

The different object types for metal axe heads were counted and summarised in QGIS (Tab. 4). A

Period	Count	Percentage
Palaeolithic	20	0.50 %
Mesolithic	219	6 %
Neolithic	1015	26 %
Bronze Age	2355	59 %
Iron Age	66	2 %
Roman	150	4 %
Early Medieval	15	0 %
Medieval	50	1 %
Post Medieval	31	1 %
Modern	1	0 %
Unknown	41	1 %
Total	**3963**	**100.00 %**

Tab. 2. Chronological division of PAS axe heads

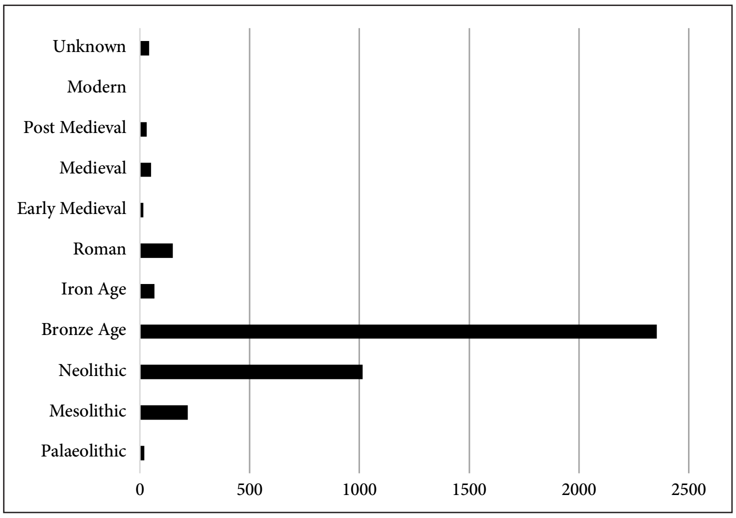


Fig. 16. Chronological division of PAS axe heads. (Bjerketvedt 2020)

Period	Count	Percentage
Neolithic	1	0 %
Bronze Age	2355	87 %
Iron Age	66	2 %
Roman	150	6 %
Early Medieval	15	1 %
Medieval	50	2 %
Post Medieval	31	1 %
Modern	1	0 %
Unknown	41	2 %
Total	**2710**	**100 %**

Tab. 3. Chronological division of PAS metal axe heads

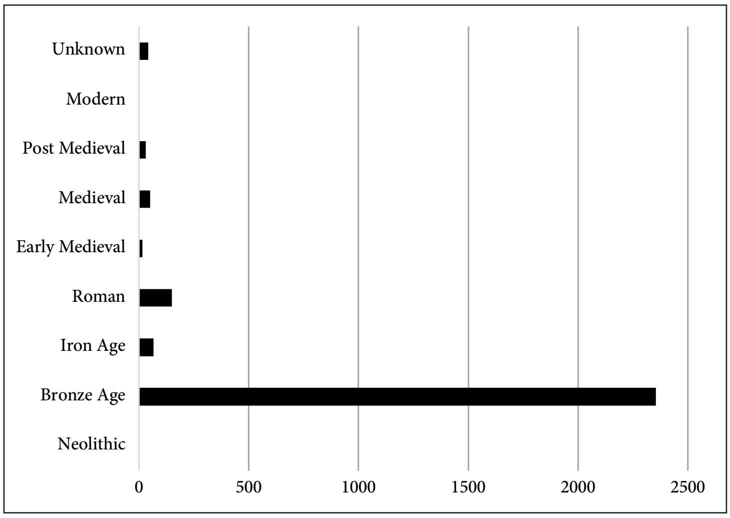


Fig. 17. Chronological division of PAS metal axe heads. (Bjerketvedt 2020)

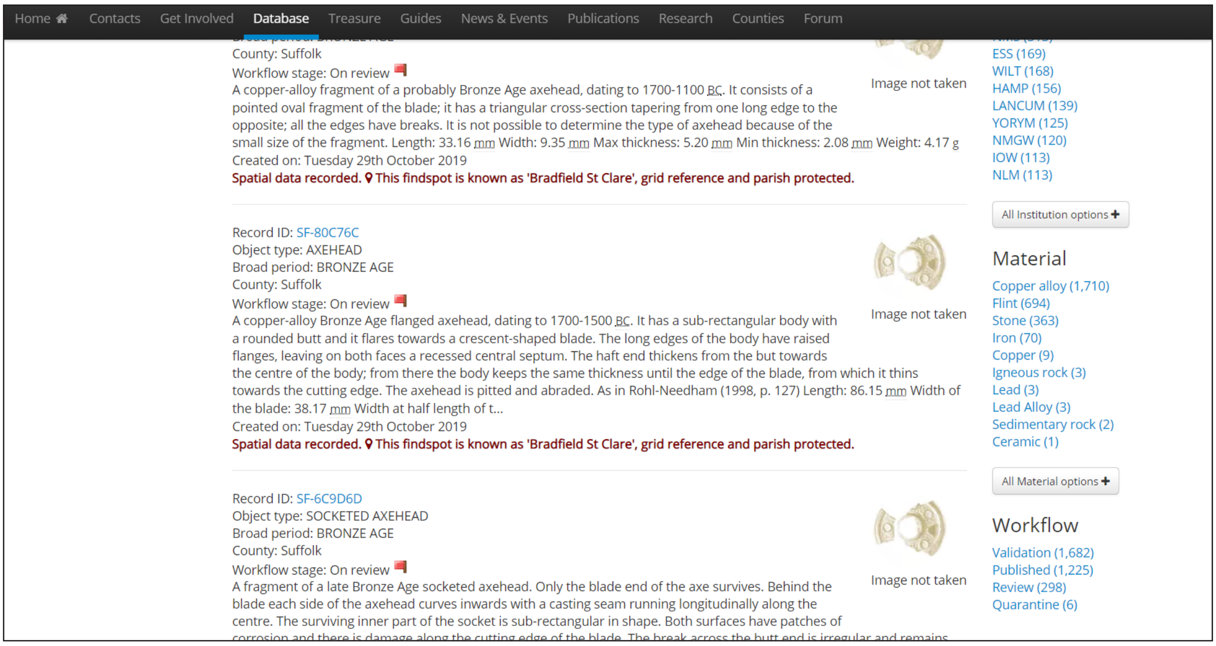


Fig. 18. Screenshot from a simple search for axe heads in PAS on 07/11/19, showing the number of the different materials. (Bjerketvedt 2020) (Viewed on 07/11/2019)

few surprising categories pop up, including brooch (eleven finds), pendant (two finds) and two categories related to lithics (i.e. lithic implement and whetstone). These are clearly errors occurring due to faults in the data collection, for example using too broad search terms. Since the total number of wrongly exported finds is relatively low compared to the total number of finds, this is unlikely to have any significant impact on the analysis. Miniature objects, which are small-scale reproductions of axes, are included in the study because they can give valuable insights into the relation between full-sized and miniature weaponry (Farley 2011). Most of the miniature axe heads (75 %) in PAS date to the Roman Period, while 13.6 % have been dated to the Iron Age and 10.4 % to the Bronze Age. Lastly, the large number of hoards (79 in total) in which metal axe heads have been found is worth mentioning. Again, most of these hoards (74 records) are Bronze Age.

A particularly interesting feature of the PAS dataset is the column 'discovery method', which gives a detailed overview of the ways in which the finds were discovered (Tab. 5). Despite there being a wide range of ways in which metal axe heads could potentially be

Object type	Count	Percentage
Socketed axehead	1280	47 %
Axehead	381	14 %
Flat axehead	321	12 %
Miniature object	154	6 %
Palstave	148	5 %
Flanged axehead	139	5 %
Axe	103	4 %
Hoard	79	3 %
Unidentified object	15	1 %
Brooch	11	0 %
Chisel	7	0 %
Votive model	5	0 %
Winged axehead	5	0 %
Metal working debris	5	0 %
Casting waste	4	0 %
Hammer	3	0 %
Strap fitting	3	0 %
Dagger	3	0 %
Mount	3	0 %
Spear	3	0 %
Ingot	2	0 %
Whetstone	2	0 %
Lithic implement	2	0 %
Pendant	2	0 %
Badge	2	0 %
Coin	2	0 %
Knife	2	0 %
Vessel	2	0 %
Axehead roughout	2	0 %
(Remaining items of only singular examples)	23	1 %
Total	**2713**	**100 %**

Tab. 4. Count of object types for PAS metal axe heads

Discovery method	Count	Percentage
Metal detector	2567	95 %
Other chance find	77	3 %
Agricultural or drainage work	15	1 %
Chance find during metal detecting	12	0 %
Metal detector during controlled archaeological investigation	11	0 %
Fieldwalking	8	0 %
Controlled archaeological investigation	8	0 %
Gardening	5	0 %
Building work	4	0 %
Unknown	1	0 %
Controlled archaeological investigation (unstratified)	1	0 %
Total	**2709**	**100%**

Tab. 5. Different discovery methods for PAS metal axe heads

recovered, the majority of metal axe heads (95 %) were discovered with a metal detector. Only a very small number (eleven finds) were found with a metal detector during controlled archaeological investigation. Quite a few of the axe heads are chance finds, either found during metal detecting or under other circumstances, for example outdoor recreational activities.

Portable Antiquities of the Netherlands (PAN)

The Dutch dataset consists of 158 axe heads, of which 153 finds are metal and five finds are stone or flint. In terms of chronology (Tab. 6 and Fig. 19), both the Bronze Age and the Middle Ages/Early Modern Period have more or less the same number of metal axe heads (29 % and 27 % of all metal axe heads respectively). The Iron Age and the Roman Period are represented to a lesser degree, but still notable if the transitional periods are taken into account; approximately 27 finds span from the Iron Age to the Roman Period. In comparison to the PAS dataset, the PAN finds show far more chronological spread, with a substantially larger focus on medieval and more recent history. Most of the metal axe heads are made of iron (89 finds = 58 %), followed by copper alloy (64 finds = 42 %).

The most common object type (Tab. 7) is 'metal axe with shaft eye' (Dutch: *metalen bijl met schachtoog*), which is quite an open category. It contains finds dating from the Latène to Early Modern, and includes axe types such as francisca, bearded axe, double axe, adze etc. Compared to PAS, there are far less socketed axes in the PAN database (47 % in PAN, 20 % in PAS). The remaining object types related to axe styles are represented in smaller ratios, totalling 27 % of all metal axe heads. Three finds have been included by error, namely two seal stamps and a brooch, all of which have axe-related decoration. Lastly, it is worth mentioning the level of completeness for the metal axe heads (Tab. 8). The degree of fragmentation is remarkably low: Most of the finds (91 %) are either complete or largely preserved.

Digitale Metaldetektorfund (DIME)

At the time of data collection (25/09/19), DIME contained 88 metal axe heads that had been safely

Period	Count	Percentage
Bronze Age	44	29 %
Middle Ages to Early Modern Period	42	27 %
Late Roman Period to Early Middle Ages	22	14 %
Roman Period	14	9 %
Middle Bronze Age to Early Iron Age	11	7 %
Iron Age	7	5 %
Middle Iron Age to Early Roman Period	6	4 %
Middle Neolithic to Early Bronze Age	6	4 %
Late Iron Age to Late Middle Ages	1	1 %
Total	**153**	**100 %**

Tab. 6. Chronological division of PAN metal axe heads

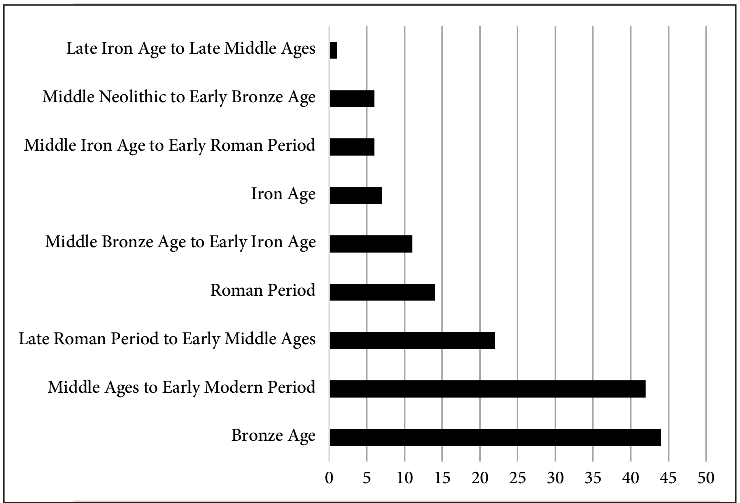


Fig. 19. Chronological division of PAN metal axe heads. (Bjerketvedt 2020)

Object type	Count	Percentage
Metal axe with shaft eye	79	52 %
Socketed axe	30	20 %
Flanged axe	17	11 %
Palstave	11	7 %
Flat axe	6	4 %
Flanged palstave	6	4 %
Seal stamp, round metal face	2	1 %
Winged axe	1	1 %
Brooch, double axe	1	1 %
Total	**153**	**100 %**

Tab. 7. Count of object types for PAN metal axe heads

Fragmentation degree	Count	Percentage
Complete	85	56 %
Largely preserved	53	35 %
Small part preserved	10	7 %
Complete; reused/destroyed in the past	3	2 %
Largely preserved; reused/destroyed in the past	2	1 %
Total	**153**	**100 %**

Tab. 8. Level of completeness for PAN metal axe heads

identified as such. Compared to PAN and PAS, information about objects is heavily restricted, making it impossible to quantify object type or other information. The majority of metal axe heads (52 %) are undated, followed by a considerably fraction from the Bronze Age (in total 38 %, see Tab. 9 and Fig. 20). All other periods are not considerably represented. Most of the metal axe heads (67 finds) are made of a copper alloy whereas eleven finds are made of iron (Tab. 10). For eight of the axe heads, neither the date nor the primary material is known.

6. Compatibility: Strengths and Issues

Based on the composition of metal axe heads in Denmark, the Netherlands, England and Wales, we can conclude that there are both similarities and differences which need to be addressed in more detail. A major characteristic is the dominance of Bronze Age finds made of copper alloy, particularly for metal axe heads from PAS and DIME. Iron is known to be far more unstable and likely to corrode than copper (Robbins 2012, 31), meaning that metal axe heads made from iron may simply not be as well preserved. Many metal detectorists are also known to consciously set their metal detector to ignore the signal from iron objects in order to focus on other (precious) metals such as gold and silver (ibid. 99–100). This practice creates a prejudice against other types of metal, and archaeological iron is known to particularly suffer from discrimination (ibid). It would certainly explain why iron is heavily underrepresented amongst the metal axe heads in PAS and DIME.

On the other hand, how do we explain the metal axe heads from the Netherlands, where iron is dominant and medieval to recent finds are largely represented? One possible inference from these observations is that the context in which the datasets were conceived contributes towards different compositions in the three databases. Whereas PAN has primarily focused on recording old collections of finds discovered decades ago, both PAS and DIME are supported by current and active metal detectorists. Perhaps what is seen is the differing preferences of private metal detectorists, i.e. the popularity of finding medieval/modern and/or iron axe heads in the Netherlands. It would therefore be useful to examine these observations in relation to the total datasets available in PAS, PAN and DIME so that one may identify deviations. At the time of writing (13/12/19), copper alloy was by far the dominant type of material in the total PAS dataset (around 62 % of all PAS finds) while iron objects only amount to 0.5 % of all finds in PAS. This echoes the primary material of metal axe heads. In terms of dating, however, most objects in PAS are Roman (40 %) or Medieval to Post-Medieval (43 %). Bronze Age finds only make up a small fraction of 1.25 %. The fact that most British and Welsh metal axe heads are dated to the Bronze Age could point towards a particular process which is worth further exploring. Similarly, the majority of PAN finds are Roman, followed by Medieval to Early Modern finds; prehistoric finds only account for a small percentage. Most objects in PAN are made of copper alloy (79 %), with iron objects only comprising of 5.7 %. The slight dominance of iron axe heads and the large share of Bronze Age axes are significant observations, as they deviate from the total dataset. Unfortunately, DIME does not enable a comparison with the whole dataset as information about quantities within the different categories (e.g. material, period etc.) are not available to the user.

Period	**Count**	**Percentage**
Undated	46	52 %
Bronze Age	13	15 %
Early Bronze Age	7	8 %
Late Bronze Age	5	6 %
Early Bronze Age, period 2	2	2 %
Late Bronze Age, period 4	2	2 %
Late Bronze Age, period 5	2	2 %
Late Bronze Age, period 6	2	2 %
Prehistory until AD 1050	1	1 %
Germanic Iron Age	1	1 %
Late Medieval	1	1 %
Post-Reformation/Recent	1	1 %
Medieval	1	1 %
Roman Iron Age	1	1 %
Iron Age	1	1 %
Early Bronze Age, period 1	1	1 %
Recent	1	1 %
Total	**88**	**100 %**

Tab. 9. Chronological division of DIME metal axe heads

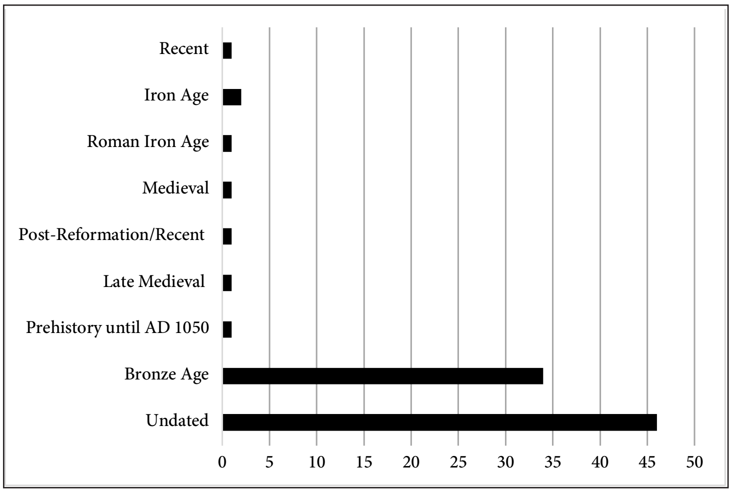


Fig. 20. Chronological division of DIME metal axe heads. (Bjerketvedt 2020)

Primary material	**Count**	**Percentage**
Copper alloys	67	76 %
Iron	11	13 %
Unknown	9	10 %
Copper	1	1 %
Total	**88**	**100 %**

Tab. 10. Primary material of DIME metal axe heads

Researchers, institutions and funding bodies all encourage the increased accessibility and comparability of digital archaeological data, which in turn is expected to transform archaeological practices (Cooper/Green 2016, 272). There is, however, a lack of studies that explore the challenges "researchers may face in the analysis of datasets produced by others" (Atici et al. 2013, 664). In broader approaches, such as the transnational perspective employed here, gathering coherent and compatible data is pivotal. At the end of 2019, the databases from the three countries studied here launched the network EPFRN (European Public Finds Recording Network) online together with two other national finds recording schemes, MEDEA in Flanders and SuALT in Finland. One of the key visions is to recognise "recorded public finds as an important body of archaeological evidence for human behaviour and interaction" (University of Helsinki 2019). International collaboration "between heritage management, research and the interested public" stands at the core of the network (ibid). It is evident that colleagues from countries with more restrictive legislations have shown interest in exchanging information and experience, as EPFRN organised a session at the 26th Annual Meeting of the EAA (European Association of Archaeologists) to initiate a "Europe-wide debate" together with partners from Hungary, Germany, Norway and Moldova (Wessman/Deckers, no date).

While the work presented here is very much tied in with the ethos of the EPFRN, several remarks can be made to guide further research in the area. Exploring the datasets from a supraregional perspective, as has been encouraged by the network, proved to be not so easy in practice. This is largely because the data from these databases is hard to compare. One contributing factor is language: the databases are naturally in the language of their respective countries. Whilst the linguistic 'closeness' of English, Dutch and Danish does simplify the use, it may still lead to misunderstanding and confusion. At the same time, the databases need to be user-friendly, and that means being available in a language the users feel confident using. The solution to this conundrum is not obvious and requires much further work.

Furthermore, the different datasets have varying levels of detail and are often restricted, particularly in DIME. While this study did not require a great deal of additional information concerning the objects, more artefact-related studies would perhaps have difficulties. Only the PAN data contains information about degree of fragmentation, despite (intentional) breakage and destruction of metal objects being a common topic in archaeology (Knight 2019; Hansen 2016; York 2002). Because the three databases have different ways of recording the data, the datasets share some – but not all – columns. This has serious implications for interoperability, as it proved hard to compare the data side by side. Consistency in data recording, including standardised vocabulary, would improve coherence and allow users to seamlessly combine data (McKeague et al. 2020).

Overall, the notable differences between the countries can be explained in various ways. Clusters may, for instance, be the result of intensive searching by private metal detectorists; they could also relate to areas of increased activity in prehistory; or perhaps environmental reasons are the causal explanation. Therefore, none of the datasets can be analysed independently. This conclusion was also drawn by Robbins (2012, 139), who has expressed that the PAS data is not "truly representative of past distributions of human activity" on its own. From the experience of the author, the methodologies of transnational approaches need to consider the influence of scale on research outcomes. Incorporating the human element, for example by bringing the metal detectorists themselves into the analysis, would positively benefit the analysis. Modern factors are largely responsible for determining whether private finds are regarded as valuable, mainly through legislation but also the incentive of research groups, who promote the value of the artefacts. Currently, the Portable Antiquities Scheme has by far produced the most research output; this situation is in the process of being rectified, with contributions from other countries and experiences. Continued work in the field will undoubtedly provide further knowledge about data generated by private metal detectorist for understanding the past, the present, and the complex relationship between the two.

7. Concluding remarks

The way the databases are structured play a vital role in how differences between them are generated. Since the PAS has been around for over 20 years, the database and its associated recording practices have gone through substantial changes and improvements. PAN and DIME, on the other hand, have only been around since 2016. Despite being able to profit from the experiences of PAS, the Dutch and Danish counterparts still have to adapt to the particular situation in the respective countries. This is for instance reflected in the focus of PAN on documenting old collections and the intention of DIME to be user driven. Legislation and the socio-political context in which the databases were conceived will thus have an effect on the composition of the datasets, as exemplified here through axe heads. The extensive nature and spread of the English data in comparison to PAN and DIME, for instance, can mostly be attributed to the long history of PAS. Areas where the schemes have been more successful and/or were first trialled tend to have greater densities of finds, in part because of pre-existing (and good) relationships between professional archaeologists and avocational detectorists (Brindle 2014, 4). Another factor contributing to the differences may be the metal detectorists themselves. 'Hotspots' of finds may be attributed to areas which see more active/intensified metal detecting taking place. The composition of axes is therefore largely influenced by modern recovery processes (ibid. 7). While differences and similarities were identified, more level of detail is needed to reveal the archaeological aspect of these patterns. There are many choices, decisions and considerations associated with the data collection that may affect the ensuing analysis. Compatibility between the databases is one remaining issue that needs to be solved in order to better facilitate international studies. As demonstrated in this paper, the datasets clearly complement each other. Identifying differences and similarities in the distribution of particular artefacts – as exemplified by axes – has enabled one to gain a better impression of both modern biases and archaeological patterns.

Acknowledgements

I would like to express my sincere gratitude to my supervisors, Prof. Dr. Elke Kaiser and Dr. Georg Roth. I am forever grateful for the freedom and trust I have been given by both of them. Prof. Dr. Nico Roymans and Dr. Stijn Heeren provided a lot of help and guidance during my exchange at the Vrije Universiteit Amsterdam. It was a great honour to be allowed to conduct preliminary research on the PAN dataset, which ultimately led to my thesis. I would like to acknowledge that there has been further research in the field of private metal detecting since my thesis was completed (March 2020); these could unfortunately not be included in the scope of this paper. All remaining errors are my own.

Bibliography

Addyman/Brodie 2002: P. Addyman/N. Brodie, Metal-detecting in Britain: catastrophe or compromise? In: N. Brodie/K. W. Tubb (eds.), Illicit Antiquities: the theft of culture and the extinction of archaeology (London/New York 2002) 179–184.

Atici et al. 2013: L. Atici/S. W. Kansa/J. Lev-Tov/E. C. Kansa, Other peoples' data: a demonstration of the imperative of publishing primary data. Journal of Archaeological Method and Theory 20,4, 2013, 663–681.

Bailie/Ferguson 2016: W. R. Bailie/N. Ferguson, An Assessment of the Extent and Character of Hobbyist Metal Detecting in Scotland. Online research report. URL: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=3de69b89-5f55-481e-9819-a70c00990d96 [Accessed: 25/10/2021].

Beck 2017: M. A. Beck, Archaeology is being revolutionised by amateur collectors. Online article. URL: https://sciencenordic.com/archaeology-citizen-science-denmark/archaeology-is-being-revolutionised-by-amateur-collectors/1441123 [Accessed: 25/10/2021].

Bjerketvedt 2020: L. Bjerketvedt, Treasured hunters? The application of amateur archaeological datasets from North-Western Europe in spatial analysis. Unpublished Master's thesis. Freie Universität Berlin (Berlin 2020).

Bland et al. 2017: R. Bland/M. Lewis/D. Pett/I. Richardson/K. Robbins/R. Webley, The Treasure Act and Portable Antiquities Scheme in England and Wales. In: G. Moshenska (ed.), Key Concepts in Public Archaeology (London 2017) 107–121.

Brindle 2014: T. Brindle, The Portable Antiquities Scheme and Roman Britain (London 2014).

British Museum 2017: British Museum, The Portable Antiquities Scheme Annual Report 2017. Online report. URL: https://finds.org.uk/documents/annualreports/2017.pdf [Accessed: 25/10/2021].

Bryan 2010: J. Bryan, Portable Antiquities Scheme Volunteer Recording Guide. Revised 2017 by H. Geake and C. Costin. Online guide. URL: https://finds.org.uk/volunteerrecording [Accessed: 25/10/2021].

Christiansen 2016: T. T. Christiansen, Recreational Metal Detecting and Archaeological Research: Critical Issues Concerning Danish Metal-Detector Finds. In: J. Martens/M. Ravn (eds.), Pløyejord som kontekst: Nye utfordringer for forskning, forvaltning og formidling (Kristiansand 2016) 23–36.

Cooper/Green 2016: A. Cooper/C. Green, Embracing the Complexities of 'Big Data' in Archaeology: The Case of the English Landscape and Identities Project. Journal of Archaeological Method and Theory 23,1, 2016, 271–304.

Council of Europe 1992: Council of Europe, European Convention on the Protection of the Archaeological Heritage (Revised). European Treaty Series – No. 143 (Strasbourg 1992).

Council of Europe 2005: Council of Europe, Council of Europe Framework Convention on the Value of Cultural Heritage for Society. Council of Europe Treaty Series – No. 199 (Strasbourg 2005).

Daubney/Nicholas 2019: A. Daubney/L. Nicholas, Detecting Heritage Crime(s): What We Know about Illicit Metal Detecting in England and Wales. International Journal of Cultural Property 26,2, 2019, 139–165.

DC Research 2018: DC Research, Review of the Portable Antiquities Scheme Partnership Model: The British Museum. Online report. URL: https://finds.org.uk/documents/file/DC-Research-PAS-Partnership-Review-Final-Report-280318-CF.pdf [Accessed: 25/10/2021].

Deckers et al. 2016: P. Deckers/M. Lewis/S. Thomas, Between Two Places: Archaeology and Metal-detecting in Europe. Open Archaeology 2, 2016, 426–429.

Deckers et al. 2018: P. Deckers/A. Dobat/N. Ferguson/S. Heeren/M. Lewis/S. Thomas, The Complexities of Metal Detecting Policy and Practice: A Response to Samuel Hardy, 'Quantitative Analysis of Open-Source Data on Metal Detecting for Cultural Property' (Cogent Social Sciences 3, 2017). Open Archaeology 4, 2018, 322–333.

Department for Digital, Culture, Media & Sport 2002: Department for Digital, Culture, Media & Sport, The Treasure Act 1996 Code of Practice. 2nd Revision (London 2002).

Dobat 2013: A. Dobat, 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, 2013, 704–725.

Dobat/Jensen 2016: A. Dobat/A. Jensen, "Professional Amateurs". Metal Detecting and Metal Detectorists in Denmark. Open Archaeology 2, 2016, 70–84.

Dobat et al. 2018: A. Dobat/T. T. Christiansen/M. B. Henriksen/P. Jensen/S. L. Vestergaard/M. D. Jessen/R. Ruhe/F. Arntsen/M. K. Holst, DIME – Digitale Metaldetektorfund. Den Danske Registreringsportal for Detektorfund. Arkæologisk Forum 39, 2018, 3–12.

Erfgoedinspectie 2012: Erfgoedinspectie, Grenzen overschreden? Onderzoek naar onrechtmatig handelen op de gebieden van archeologie en archieven. Online report. URL: https://www.inspectie-oe.nl/binaries/inspectie-oe/documenten/rapport/2012/11/07/grenzen-overschreden/grenzenoverschreden.pdf [Accessed: 25/10/2021].

Ferguson 2013: N. Ferguson, Biting the bullet: the role of hobbyist metal detecting within battlefield archaeology. Internet Archaeology 33, 2013, DOI: 10.11141/ia.33.3.

Gattiglia 2015: G. Gattiglia, Think big about data: Archaeology and the Big Data challenge. Archäologische Informationen 38, 2015, 113–124.

Haldenby/Richards 2010: D. Haldenby/J. D. Richards, Charting the effects of plough damage using metal-detected assemblages. Antiquity 84,326, 2010, 1151–1162.

Hansen 2016: S. Hansen, A short history of fragments in hoards in the Bronze Age. In: H. Baitinger (ed.), Materielle Kultur und Identität im Spannungsfeld zwischen mediterraner Welt und Mitteleuropa. Akten der Internationalen Tagung am Römisch-Germanischen Zentralmuseum Mainz, 22.–24. Oktober 2014. RGZM-Tagungen 27 (Mainz 2016) 185–208.

Hardy 2017: S. A. Hardy, Quantitative analysis of open-source data on metal detecting for cultural property: Estimation of the scale and intensity of metal detecting and the quantity of metal-detected cultural goods. Cogent Social Sciences 3, 2017, DOI: 10.1080/23311886.2017.1298397.

Horsnæs 2002: H. W. Horsnæs, New gold hoards from Bornholm with rare types of Valentinian III solidi. Revue numismatique, 6e série, tome 158, 131–138.

Högberg et al. 2017: A. Högberg/C. Holtorf/S. May/G. Wollentz, No future in archaeological heritage management? World Archaeology 49,5, 2017, 639–647.

Huggett 2014: J. Huggett, Promise and paradox: accessing open data in archaeology. In: C. Mills/M. Pidd/E. Ward (eds.), Proceedings of the Digital Humanities Congress 2012. Series: Studies in the Digital Humanities. Online article. URL: https://www.dhi.ac.uk/openbook/chapter/dhc2012-huggett [Accessed: 25/10/2021].

Immonen/Kinnunen 2016: V. Immonen/J. Kinnunen, 'Quidditching' and the Emergence of New Heritage Identities – Amateur Metal Detecting in Finland. Public Archaeology 15,4, 2016, 163–185.

Kansa 2012: E. Kansa, Openness and archaeology's information ecosystem. World Archaeology 44,4, 2012, 498–520.

Kansa et al. 2020: S. Kansa/L. Atici/E. Kansa/R. Meadow, Archaeological Analysis in the Information Age: Guidelines for Maximizing the Reach, Comprehensiveness, and Longevity of Data. Advances in Archaeological Practice 8,1, 2020, 40–52.

Kansa/Kansa 2021: Digital Data and Data Literacy in Archaeology Now and in the New Decade. Advances in Archaeological Practice 9,1, 2021, 81–85.

Karl/Möller 2016: R. Karl/K. Möller, Empirische Untersuchung des Verhältnisses der Anzahl von MetallsucherlInnen im deutsch-britischen Vergleich. Oder: wie wenig Einfluss die Gesetzeslage hat. Archäologische Informationen 39, 2016, 215–226.

Knight 2019: M. G. Knight, Going to Pieces: Investigating the Deliberate Destruction of Late Bronze Age Swords and Spearheads. Proceedings of the Prehistoric Society, 1–22.

Lewis 2015: M. Lewis, Treasuring Our Past: Portable Antiquities & Treasure Strategy 2020. Online report. URL: https://finds.org.uk/documents/file/PAS-strategy-2019.pdf [Accessed: 25/10/2021].

Lewis 2016: M. Lewis, A Detectorist's Utopia? Archaeology and Metal-Detecting in England and Wales. Open Archaeology 2, 2016, 127–139.

Marchetti et al. 2018: N. Marchetti/I. Angelini/G. Artioli/G. Benati/G. Bitelli/A. Curci/G. Marfia/M. Roccetti, NEARCHOS. Networked Archaeological Open Science: Advances in Archaeology Through Field Analytics and Scientific Community Sharing. Journal of Archaeological Research 26,4, 2018, 447–469.

Marwick 2017: B. Marwick, Computational Reproducibility in Archaeological Research: Basic Principles and a Case Study of Their Implementation. Journal of Archaeological Method and Theory 24, 2017, 424–450.

Marwick et al. 2017: B. Marwick/J. d'Alpoim Guedes/C. M. Barton/L. A. Bates/M. Baxter/A. Bevan/E. A. Bollwerk/R. K. Bocinsky/T. Brughmans/A. K. Carter/C. Conrad/D. A. Contreras/S. Costa/E. R. Crema/A. Daggett/B. Davies/B. L. Drake/T. S. Dye/P. France/R. Fullagar/D. Giusti/S. Graham/M. D. Harris/J. Hawks/S. Health/D. Huffer/E. C. Kansa/S. W. Kansa/M. E. Madsen/J. Melcher/J. Negre/F. D. Neiman/R. Opitz/D. C. Orton/P. Przstupa/M. Raviele/J. Riel-Savatore/P. Riris/I. Romanowska/J. Smith/N. Strupler/I. I. Ullah/H. G. van Vlack/N. van Valkenburgh/E. C. Watrall/C. Webster/J. Wells/J. Winters/C. D. Wren, Open science in archaeology. SAA Archaeological Record 17,4, 2017, 8–14.

Marwick/Birch 2018: B. Marwick/S. Birch, A Standard for the Scholarly Citation of Archaeological Data as an Incentive to Data Sharing. Advances in Archaeological Practice 6,2, 2018, 125– 143.

McKeague et al. 2020 – P. McKeague/A. Corns/Å. Larsson/A. Moreau/A. Posluschny/K. van Daele/T. Evans, One Archaeology: A Manifesto for the Systematic and Effective Use of Mapped Data from Archaeological Fieldwork and Research. Information 11,4, 2020, 222. DOI: 10.3390/info11040222.

Moorhead et al. 2010: S. Moorhead/A. Booth/R. Bland, The Frome Hoard (London 2010).

Moorhead 2017: S. Moorhead, The Frome Hoard voted top Treasure. Online article. URL: https://blog.britishmuseum.org/the-frome-hoard-and-its-impact/ [Accessed: 25/10/2021].

Moshenska 2010: G. Moshenska, Portable Antiquities, Pragmatism and the 'Precious Things'. Papers from the Institute of Archaeology 20, 2010, 24–27.

Noble et al. 2019: G. Noble/P. Lamont/E. Masson-Maclean, Assessing the ploughzone: The impact of cultivation on artefact survival and the cost/benefits of topsoil stripping prior to excavation. Journal of Archaeological Science: Reports 23, 2019, 549–558.

NWO, no date: Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO), Wealth of archaeological discoveries online: Archaeological amateur discoveries on new website. Online article. URL: https://www.nwo.nl/en/cases/wealth-archaeological-discoveries-online-archaeological-amateur-discoveries-new-website [Accessed: 25/10/2021].

Oxford Archaeology 2008: Oxford Archaeology, Nighthawks & Nighthawking: Damage to Archaeological Sites in the UK & Crown Dependencies caused by Illegal Searching & Removal of Antiquities. Online report. URL: https://historicengland.org.uk/images-books/publications/nighthawks-nighthawking/nighthawks2/ [Accessed: 25/10/2021].

PAS, no date: Portable Antiquities Scheme (PAS), Finds Liaison Officers (FLOs) and their work. Online article. URL: https://finds.org.uk/getinvolved/guides/pressures [Accessed: 25/10/2021].

Pett 2010: D. Pett, The Portable Antiquities Scheme's Database: its development for research since 1998. In: S. Worrell/G.

Egan/J. Naylor/K. Leahy/M. Lewis (eds.), A Decade of Discovery: Proceedings of the Portable Antiquities Scheme Conference 2007. British Archaeological Reports British Series 520 (Oxford 2010) 1–18.

Pett, no date: D. Pett, About this site. Online article. URL: https://finds.org.uk/info [Accessed: 25/10/2021].

Rasmussen 2014: J. M. Rasmussen, Securing Cultural Heritage Objects and Fencing Stolen Goods? A Case Study on Museums and Metal Detecting in Norway. Norwegian Archaeological Review 47,1, 2014, 83–107.

Reeves 2015: M. Reeves, Sleeping with the "Enemy": Metal Detecting Hobbyists and Archaeologists. Advances in Archaeological Practice 3,3, 2015, 263–274.

Rijksdienst voor het Cultureel Erfgoed 2019: Rijksdienst voor het Cultureel Erfgoed, Metaaldetectie in Nederland – Gedragscode en regels voor verantwoord gebruik van de metaaldetector in Nederland. Online guide. URL: https://www.cultureelerfgoed.nl/binaries/cultureelerfgoed/documenten/publicaties/2019/01/01/metaaldetectie-in-nederland/Metaaldetectie+in+Nederland.pdf [Accessed: 25/10/2021].

Robbins 2012: K. J. Robbins, From Past to Present: Understanding the Impact of Sampling Bias on Data Recorded by the Portable Antiquities Scheme. Volume 1. Unpublished PhD thesis. University of Southampton (Southampton 2012).

Robbins 2014: K. J. Robbins, Portable Antiquities Scheme – A guide for researchers. Online guide. URL: https://finds.org.uk/documents/guideforresearchers.pdf [Accessed: 25/10/2021].

Roymans/Heeren 2017: N. Roymans/S. Heeren, Doe mee met PAN. Het belang van archeologische vondsten in privé-bezit. Archeologie in Nederland 1,1, 2017, 18–25.

Smith 2004: L. Smith, Archaeological Theory and the Politics of Cultural Heritage (London/New York 2004).

Speed 2019: L. Speed, PASt Explorers Conference 2019. Online article. URL: https://finds.org.uk/counties/blog/tag/past-explorers/ [Accessed: 25/10/2021].

Sutherland 2005: T. L. Sutherland, Battlefield Archaeology. A Guide to the Archaeology of Conflict. Online guide. URL: http://www.bajr.org/BAJRGuides/8.%20Battlefield%20Archaeology%20%20A%20Guide%20to%20the%20Archaeology%20of%20Conflict/BAJRBattleGuide.pdf [Accessed: 25/10/2021].

Thomas 2012: S. Thomas, Archaeologists and metal-detector users in England and Wales: Past, Present and Future. In: R. Skeates/C. McDavid/J. Carman (eds.), The Oxford Handbook of Public Archaeology (Oxford 2012) 60–81.

Thomas 2016: S. Thomas, The Future of Studying Hobbyist Metal Detecting in Europe: A Call for a Transnational Approach. Open Archaeology 2, 2016, 140–149.

Trow 2010: S. Trow, Farming, forestry, rural land management and archaeological historical landscapes in Europe. In: S. Trow/V. Holyoak/E. Byrnes (eds.), Heritage Management of Farmed and Forested Landscapes in Europe. EAC Occasional Paper 4 (Brussels 2010) 19–25.

UKRI, no date: UK Research and Innovation (UKRI), Crisis or continuity? The deposition of metalwork in the Roman world: what do coin hoards tell us about Roman Britain in the 3rd century AD? Online article. URL: https://gtr.ukri.org/projects?ref=AH%2FK000438%2F1 [Accessed: 25/10/2021].

University of Helsinki 2019: University of Helsinki, European Public Finds Recording: Vision and Aims. Online article. URL: https://www.helsinki.fi/en/networks/european-public-finds-recording-network/vision-and-aims [Accessed: 25/10/2021].

van der Schriek/van der Schriek 2014: J. van der Schriek/M. van der Schriek, Metal Detecting: Friend or Foe of Conflict Archaeology? Investigation, Preservation and Destruction on WWII sites in the Netherlands. Journal of Community Archaeology & Heritage 1,3, 2014, 228–244.

Vos et al. 2018: D. Vos/S. Heeren/N. van Ruler/K. Smallenbroek/R. Lassche, PAN (Portable Antiquities of the Netherlands): Harnessing Geospatial Technology for the Enrichment of Archaeological Data. Journal for Geographic Information Science 6,2, 2018, 13–20.

Watt 2000: M. Watt, Detektorfund fra bornholmske bopladser med kulturlag. Repræsentativitet og metode. In: M. B. Henriksen (ed.), Detektorfund – hvad skal vi med dem? Dokumentation og registrering af bopladser med detektorfund fra jernalder og middelalder. Skrifter fra Odense Bys Museer 5 (Odense 2000) 79–98.

Wessman/Deckers, no date: A. Wessman/P. Deckers, Beyond Dogmatic and pragmatic: debating the relative impact of avocational metal detecting – Session #330. Online article. URL: https://submissions.e-a-a.org/eaa2020/sessions/overview/preview.php?id=330 [Accessed: 25/10/2021].

York 2002: J. York, The life cycle of Bronze Age metalwork from the Thames. Oxford Journal of Archaeology 21,1, 2002, 77–92.

Linda Marie Bjerketvedt, MA (Hons), MSc, FSA Scot, PCIfA
John Sinclair House
16 Bernard Terrace
Edinburgh
EH8 9NX
Scotland