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OpenArchaeoSurvey, or ‘Being Educated by the Digital Fieldwork Assistant’

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Abstract:

The practice of using mobile survey applications (or a digital fieldwork assistant, dFA) has a tradition of more than a decade in the context of archaeological field survey. In their 2002 CAA paper “Educating the Digital Fieldwork Assistant”, Martijn van Leusen and Nick Ryan wrote extensively about the advantages and practicalities of using a digital field notebook combined with a GPS receiver for field surveys. The OpenArchaeoSurvey project is aimed at improving such applications, building on recent developments in mobile technology. The ‘open’ in our project stands for ‘open source software’, but also for allowing real-time data exchange and communication using the fieldwork application. In addition to the practical advantages, this creates the possibility for all participants to reflect on the collected data. Therefore, the development of the OpenArchaeoSurvey goes hand in hand with a tentative exploration of improved possibilities for Mobile Learning, or, how students can be ‘educated by the fieldwork assistant’.

Keywords:

Field Survey, Mobile Technology, Mobile Learning

1. Introduction

The practice of using a mobile survey application, also known as ‘digital fieldwork assistant’ (dFA) has a tradition of more than two decades in the context of archaeological field survey (introduced in Pascoe et al. 1998, Ryan et al. 1998 and Ryan et al. 1999a/b). In their 2002 CAA paper, “Educating the Digital Fieldwork Assistant”, Martijn van Leusen and Nick Ryan wrote extensively about the advantages and practicalities of using a digital field notebook combined with a GPS receiver for archaeological field surveys (Leusen and Ryan 2002). The benefits are related partly to the potential of using GPS locations projected on a map, thus simplifying navigation and facilitating more accurate mapping, and partly to the functionality of a mobile device with GIS technology, being able to bring a large amount of contextual data with you in the field, and allowing for efficient recording of archaeological information (see also Tripcevich 2004). The advantages of mobile technology have also been acknowledged outside the field of archaeology, predominantly in a variety of geo- and environmental sciences (Wagtendonk and De Jeu 2007, 651). In general, the potential of

mobile computing methods is optimal when the following factors are applicable to your research practice (freely adapted from Wagtendonk and De Jeu 2007, 652): the importance of digital data used in the office workflow and the desired speed of data acquisition; the importance of exact field locations; the number of repetitive field measurements; the importance of revisiting measurement locations; the importance of digital field analysis; the importance of objective data collection; direct error control and validation; and the need for real-time information in the field. These factors are all relevant for archaeological field survey, which largely explains the success of digital fieldwork applications in the discipline. The last few years have seen developments, such as the rise in powerful portable computing devices, integrated GPS receivers and affordable 3G network connections, in combination with the maturing of open source software solutions, which offer a huge potential to improve the utilization of the dFA. The OpenArchaeoSurvey project aims to explore this potential. To illustrate where our project takes off, we will start with a short review of the history of the dFA in archaeology. We will then shed light on the improved mobile functionality of our application and explain our experiments in using mobile technology to

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improve an important aspect of archaeological field surveys: educating students. Finally, we will set out our plans for the coming phase of the project.

2. Early Life of the Digital Assistant

In order to understand how the OpenArchaeoSurvey project aims to improve the 'traditional' dFA, a short history of the digital assistant in archaeology is presented below.

2.1 A Context-Aware Notebook

The early endeavours in using mobile technology in the field were mainly oriented towards using context-awareness in order to enhance information retrieval and storage (e.g. Ryan et al. 1998). Computer and/or GPS recorded information such as location, time, temperature or user identity could be used to make important notes about a specific location pop-up, for example, and simultaneously to tag collected data. This FieldNote system, intended to work on an Apple Newton device, consisted of a set of modules that under different tasks allowed location tracking, the taking of notes and the display of information (Fig. 1). The application was designed to notify the user, when approaching a location, about which important information was stored in the system. This pre-loaded information could be visualized as either forms or dots on a map. Furthermore, the application allowed for real-time collection of data. The system was designed to run on cheap and lightweight fieldwork computers, to be easy to learn and to avoid distracting the user (Leusen and Ryan 2002, 15). The setup was tested extensively during the University of Groningen Sibaritide 2000 campaign, where its capabilities were successfully utilized in a site-revisiting programme. The main advantages were that the system provided means for an immediate comparison of information collected during previous campaigns, but, most importantly, it was successful in efficiently



Figure 1. FieldMap on an iPAQ Pocket PC as used in the Sibaritide.

performing “typical and frequently occurring fieldwork tasks” (Leusen and Ryan 2002, 15). The main vulnerability of the FieldNote system turned out to be GPS accuracy, which is highly dependent on the availability of satellite signals and their quality, and can be a problem in rugged and high relief areas.

2.2 Lightweight Mobile GIS: ArcPad

In the early 2000s, development of an archaeology-specific dFA took a step forward with the adoption of ESRI's ArcPad as a mobile GIS platform. One example is the archeosurvey application, developed by the Spatial Information Laboratory (SpinLab) of VU University Amsterdam. ArcPad, a lightweight GIS application, offered techniques known from desktop GIS such as layers, map symbology and inquiry tools, but had a compacted user interface optimized for a Personal Digital Assistant (PDA) screen running Windows Mobile (Fig. 2). The ArcPad Application Builder facilitates the production of custom plug-ins to expand functionality, which was used to develop the archeosurvey application.

The archeosurvey plug-in introduced some of the improvements already mentioned above in relation to the FieldNote application (Leusen and Ryan 2002, 13-14), that is, a preconfigured setup (defining pre-loaded data and geographic extent) and on-screen mapping (digitizing polygons). One of the most

significant features of the application was the customizable recording form that popped up after digitizing a feature. This tabbed form featured expanded functionality in terms of form validation, required fields and pull-down lists. Data was stored directly in the attribute table of a shapefile (.shp) and updated in real-time on the screen. This allowed improved control over data quality in terms of completeness, accuracy and consistency. Using this data format rather than the HTML files used by FieldNote permitted its use with a range of desktop GIS programs, increasing the portability of the data. Location information was provided by an external Bluetooth (BT) GPS receiver. BT communication was automatically handled by Windows Mobile, and ArcPad dealt out-of-the-box with the GPS information. The wireless, self-powered BT GPS unit turned the field kit into a more flexible tool for a full day of field walking.

An extensive evaluation of this application showed clear advantages over traditional paper-based methods. The main effects were the effectiveness of navigation, an increase in spatial accuracy, efficiency of data processing in the field and in the office, and the reduction of time spent on error-checking (for the full report see Wagtendonk and De Jeu 2007). Additionally, the use of shapefiles to create an easily updatable GIS database facilitated data flow in the fieldwork project and allowed for teams to take data immediately back into the field for further reference and/or updating. Finally, in relation to the problems concerning GPS accuracy, using multiple high-resolution, compressed raster images as reference material relieved the problem of the GPS being the single source of location information. In general, detailed georeferenced maps and/or aerial or satellite photographs could be used to identify and digitize the contours of a sample unit, with GPS only used for general navigation or where reference material was not sufficient.

The main drawbacks of the archeosurvey application recognized in the evaluation were

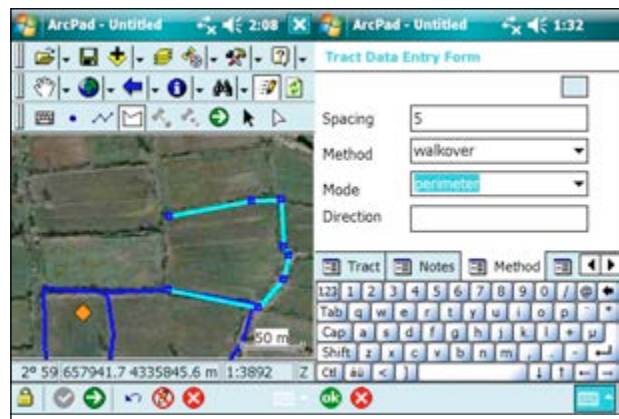


Figure 2. Screenshots of the archeosurvey plug-in for ArcPad as used in Halos; on-screen mapping (left) and recording form (right).

the requirements in terms of cost and expertise. The time and skill needed to set up and support the PDA with the archeosurvey application remained a clear disadvantage (Wagtendonk and De Jeu 2007, 657).

3. The OpenArcheoSurvey Project

As mentioned above, the OpenArcheoSurvey project is aimed at improving the dFA by making use of modern mobile technology. The latter can be characterized by three main developments: operation of smart devices, the adoption of free open source software and the functional benefits of the internet due to affordable 3G data services.

3.1 Smart Devices

The latest generations of mobile devices clearly offer a vast range of new possibilities for mobile fieldwork applications. Netbooks, smartphones and a new generation of tablet-pc's have dramatically increased the variety in choice of lightweight and high-powered portable computers. Regular fieldwork equipment such as GPS receivers and cameras are regularly built-in to these devices and most offer the necessary technology for a 3G connection. Modern tablets, with their compact form, large screens and integrated functionality,

may be seen as a logical point of departure for an improved dFA. As the OpenArchaeoSurvey project started before their introduction, a different, temporary solution was needed. A netbook with an integrated camera, 3G modem and a collapsible screen, turning it into a tablet PC, a so-called netvertible, was used as a development and testing platform. This device, in combination with a USB GPS receiver, although not particularly optimized for outdoor use, appeared flexible enough to represent the new generation of mobile devices. Moreover, with an unlocked bootloader, it offered the opportunity to install an operating system (OS) of choice.

3.2 Free Open Source Software (FOSS)

A major innovation of the OpenArchaeoSurvey project lies in the choice to move from proprietary software, Windows Mobile and ArcPad, to a free open source environment. This choice was motivated by a series of practical arguments.

In the short term, we realized that using an internet connection would prove problematic with ArcPad, since it does not allow communication with an external port. In the long term, we wanted to minimize costs and be rid of any potential hindrances to the free choice of device and platform, and avoid the so-called 'vendor lock-in' (see Weber 2005 for vendor lock-in business models). Furthermore, the general adherence of FOSS to open standards ensures that file formats will be widely usable by a range of software programs and services, increasing the compatibility of the OpenArchaeoSurvey application.

On a more ideological level, though still very practical, was the decision to release the OpenArchaeoSurvey application as FOSS itself. Not only do we have no reason to make it a proprietary and/or closed software application, but open sourcing it may encourage others both to use it and contribute to it, which is likely to increase versatility and longevity.

To maximize our possibilities, Linux, being the OS of choice of a huge range of FOSS packages and surrounded by an enthusiastic user community, was chosen as the development environment for the OpenArchaeoSurvey application. At the start of development, Android, a Linux-based operating system (OS), was rising as a mobile platform at the cost of Windows and iOS. This dominance of Linux-derived operating systems in the mobile market strengthened our expectation that by developing for a very base-standard Linux platform we would not end up too far from code compatibility with at least one of these operating systems by the time their market shares stabilized – whether that was going to be Maemo, MeeGo, Tizen or Android.

As for the GIS environment, we chose Quantum GIS, which is a FOSS alternative to professional proprietary GIS suites. The main benefits of this to our project were the ability to work with a relational database back-end and its extensible plug-in architecture. Comparable to the archeosurvey application, QGIS provides common GIS functionality essential for the application, a Python plug-in takes care of customized behaviour. The user-controlled functions of the plug-in can be accessed through a toolbar, presenting a series of buttons to access its features (Fig. 3). A large part of these are basically a rewrite of the classic tools of the dFA, such as capturing location information from the GPS and projecting it as a cursor on a map, on-screen mapping of collection units and data-entry using a customizable data form. Some features, however, have been explicitly developed for the use of an internet connection.

3.3 3G Data Services

It was envisioned that the main advantage of a 3G connection would be the use of a central database stored on a server accessible to all teams and specialists in a fieldwork project (a potential improvement already mentioned by Ryan et al. 1998, Leusen and Ryan 2002 and Wagtendonk and Reus 2004). This would

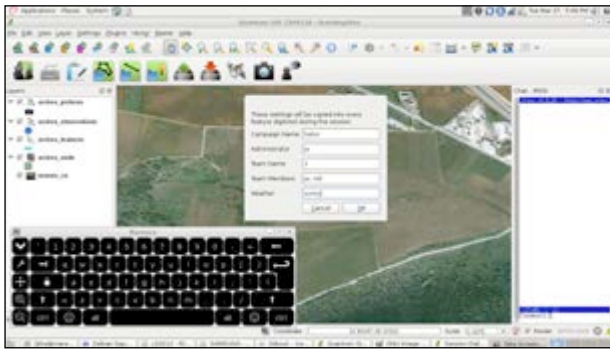


Figure 3. Screenshot showing QGIS with the OpenArchaeoSurvey toolbar (large buttons). The recording form (center), on-screen keyboard (below) and chat window (right) have been activated using the toolbar.

not only allow for easy data management (i.e. no more issues with diverging datasets, automated back-ups), but also enable anyone in the project real-time access to that data (an approach tested using a WIFI setup by Hall and Gray 2004). This would potentially improve the effectiveness of data collection procedures, especially if every specialist could reflect on this data continuously. Furthermore, using a central database on a server would allow access to maps and other reference material that might be useful in the field when encountering unexpected or enigmatic/puzzling archaeological features.

Because a 3G connection without disruptions cannot be guaranteed in remote areas, the OpenArchaeoSurvey application is designed to work with a local dataset consisting of a SQLite database with a SpatiaLite extension. Using the OpenArchaeoSurvey toolbar, the local dataset can be synchronized with the PostgreSQL/PostGIS database on the server at any time a 3G connection is available. This synchronization is record-based and will upload new and/or existing data and download data in a specified time-frame (Fig. 4). Updating the data on the server takes place using a strict policy that avoids overwriting newer records with older information. In the case of downloading data, the application simply downloads and replaces all records in the local database and immediately refreshes the map view.

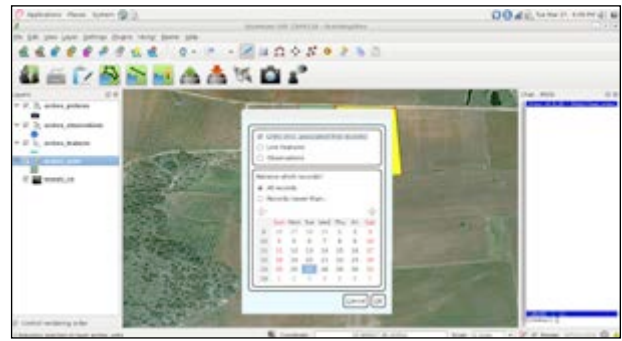


Figure 4. Screenshot of the synchronization form of the OpenArchaeoSurvey application. The dialog allows specification of data-type and time-frame.

To enhance the potential of sharing data during fieldwork, two more features were developed. First, the internal camera of the mobile device was integrated into the application. Pictures can be taken using a button on the OpenArchaeoSurvey toolbar that accesses the camera, and the GPS information can be used to anchor it to the location where it was taken. The photograph then appears as a location on the map, showing a thumbnail when clicked. These photographs can be exchanged with other teams and specialists using the central server. Second, a chat-client was integrated into the QGIS layout which connects automatically to a preconfigured IRC server, enabling users of the application to discuss findings and provide direct feedback.

A specific advantage of 3G network access is, evidently, the ability to consult online resources. Although implementation of a website as part of the OpenArchaeoSurvey project was initially modest, a community site has been set up. The use of the site has been twofold. Initially it acted as a back-up for use in the field should the OpenArchaeoSurvey application breakdown, with the community site featuring a chat room and the possibility to up- and download files. Subsequently, a logical next step seemed to be to develop this website into an online community using a forum and a wiki (with a manual and a trouble-shooter for the software), providing online resources for users in the field.

4. Being Educated by the Fieldwork Assistant

As may be clear from the application description, the 'open' in our project not only stands for FOSS but also reflects the idea of opening up the digital data to all participants in the project using the fieldwork application. Apart from the practical benefits, sharing data, combined with the possibility of experts reflecting on that data, opens up possibilities for education. Therefore, the development of the OpenArchaeoSurvey project goes hand in hand with a tentative exploration of improved possibilities for Mobile Learning, or, how students can be 'educated by the fieldwork assistant'.

Our project included a few tests, executed as fieldwork pilots, to see what the additional benefit might be with respect to educating students during fieldwork. While the OpenArchaeoSurvey application was developed within a broader project aimed at improving education through IT, we were no experts in 'mobile learning'. Nonetheless, we attempted to intuitively and experimentally apply basic concepts of mobile learning in our project setting.

4.1 Mobile Learning Principles in a Nutshell

A point of departure was the Manolo Project, which was aimed at exploring the possibilities of mobile learning and led to the development of the initial archeosurvey application (see Wentzel et al. 2005 for an introduction). Mainly oriented according to the 'anytime-anywhere' paradigm in mobile learning (unlimited access to learning materials), the project hoped to increase the learning impact by bringing the classroom to field locations where the objects of study were at hand. This 'virtual classroom' consisted of learning materials provided on mobile devices and/or communication with peers and teachers (see also Armstrong and Bennet 2005). As the learning materials were rarely actively assessed

by students in the field, and a 3G connection was not implemented in the fieldwork setup around the archeosurvey application, actual mobile learning remained relatively modest. The main learning results pertained to students becoming familiar with the concepts of mobile GIS and navigation using GPS, and gaining an understanding of the potential of these techniques in the context of archaeological field survey (Wagtendonk and De Jeu 2007, 659). An indirect, though intentional effect on learning conditions was the reduction in data processing time, allowing the students more time to participate in the scientific evaluation of that data (Wagtendonk and De Jeu 2007, 259). In the end, the archeosurvey application was a modest but firm step forward in increasing the opportunity for education during field surveys.

More recent approaches to mobile learning focus on adapting learning material to user pre-knowledge and learning preferences, called 'adaptive m-learning' (Burghardt et al. 2007), which aims to find a compromise between intrinsic learning activities and support from outside. It focuses on adjusting to spatial as well as temporal contexts, considering the learning process of the user under changing conditions. On the practical side, this amounts to capturing user knowledge and learning progress, modelling user activities and context, adjustment of the learning content presented and the evaluation of the mobile learning environment. In the end, the 'anytime-anywhere' approach to mobile learning is redefined as "any sort of learning that happens when the learner is not at a fixed, predetermined location, taking advantage of the learning opportunities offered by mobile technologies" (Burghardt et al. 2007). This type of mobile learning is therefore highly dependent on a 3G connection, allowing teachers to monitor and adjust the learning content of assignments.

4.2 The Learning Scenarios

Our attempt at mobile learning could be characterized as an adaptive m-learning

approach, heavily based on continuous monitoring, providing feedback and adjusting assignments for students depending on the data and its context. The difference, however, was that we worked with predefined learning scenarios, a prepared assignment and a specific learning objective, organized in addition to regular surveying. This approach was chosen because the OpenArcheoSurvey project was an extension of classroom education, which also has distinctive learning objectives.

The first learning scenario was aimed at making students aware of the rationale for recording sample context data. This scenario has been tested in Molise, Italy, during the Sacred Landscape Project and on Zakynthos, Greece, during the Zakynthos Archaeology Project (for recent reports, see Pelgrom and Stek 2010 on the Sacred Landscape Project, Van Wijngaarden et al. 2008 on the Zakynthos Archaeology Project). Students were sent to fields that had been sampled five years earlier, with the assignment to repeat the data collection. The result was exchanged with the GIS expert in the field office, who produced weighted density maps and compared results with the maps of five years ago. The outcome was sent back to the students, who were challenged to explain differences by looking at find circumstances, recent agricultural activity, etc. While this was potentially a nice scenario and executed to some success, the learning effect was compromised by the complexity of setting up the scenario. It proved quite difficult to find a real-world situation (e.g. a readily accessible field, preferably with changed agricultural conditions) in which the data and context observations actually made useful sense (e.g. the results would not differ much).

The second learning scenario revolved around site revisits. This scenario has been tested in Thessaly, Greece, during the Halos Archaeology Project (for an introduction to the project see Reinders 1998). Students were equipped with georeferenced maps showing site locations surveyed a decade ago. They were

asked to retrace a site, draw its boundaries and collect data using clearly defined criteria. After uploading their results they would then receive immediate feedback from pottery specialists and a GIS/methodology expert on their decisions and possibly be asked to redefine criteria and data collection strategies. Again, although the scenario was executed to some success, in many cases the difficulties of retracing the sites alone turned the assignment into a complex undertaking. The intervention of experts was often needed much earlier, before the actual the assignment could be executed.

Though the use of the learning scenarios was not without merits, they often turned out to be too complex to put into practice. However, it became clear that merely staging and continually monitoring simple revisits with the OpenArcheoSurvey application provoked the participants into asking questions. The exchange of information amounted to a discussion between students (e.g. about the functionality of the application or GPS navigation), as well as requests for feedback on information or expert opinions (e.g. What does the paper report say on site x? or What dimensions should feature y typically have?). It appeared that by enabling continuous interaction and data exchange, the application could function as a learning-community builder. The learning was directed by the specific circumstances and problems the teams confronted during their task, and they benefited by gaining insight into the decisions and opinions of experts or senior staff members. In our view, this appears to reflect Burghardt's conclusion that "m-learning has great potential to support the independent formation of knowledge by exploration" (Burghardt et al. 2007). Other than learning effects, the continuous exchange of information and opinions showed the potential to increase the efficiency of fieldwork, simply because the teams were 'smarter' and more involved. Based on these conclusions, our aim for future deployment of the application will be to refine an approach of defining education objectives that expand upon this type of mobile learning.

5. Future Prospects

Apart from aspects of mobile learning, the OpenArchaeoSurvey application is currently still under development and we have some specific improvements planned. Furthermore, the evaluations have led us to focus on a series of features that are likely to be our future fields of study and development.

5.1 Development Platform

Recently it has become clear that the Linux kernel will be updated with the Android code produced by Google, effectively merging the Linux and Android kernels, considerably increasing code compatibility for Linux and Android applications (Corbet 2011). For the OpenArchaeoSurvey project specifically, this means that the prospect of Quantum GIS running on Android with a functional Python run-time environment will become probable, which would make it run on out-of-the-box Android devices somewhere in the foreseeable future.

As for the code in its current state, we are finalizing the documentation of OpenArchaeoSurvey version 1.0. The code will be available via the code hosting site Bitbucket. The release of the application will be announced on the community website and accompanied by an open invitation for everyone interested to download, test and use the application, as well as participate in its development.

As mentioned above, tablets are becoming increasingly of interest to us, and currently we are staging a pilot using the application on a tablet PC for the 2012 summer fieldwork season. Moreover, we eagerly await the arrival of the first consumer tablets with PixelQi screens, due to their superior outdoor readable screen technology.

5.2 Functionality

While currently not part of planned

improvements to the OpenArchaeoSurvey, below we list what we consider to be beneficial enhancements regarding functionality.

- Integration of a finds-processing database

Having access in the field to data available in a finds-processing database could be very useful, all the more when combined with visual representation of that material. This would offer the potential to assess data that may answer questions that come up during fieldwork and will make the processing of new finds even more efficient. Finally, having examples at hand for reference, it is likely to improve the accuracy of determining newly collected material.

- WMS

The option to access maps using a web map service (WMS) would be relatively easy to implement, which is a feature already available in QGIS. Maps could be retrieved from existing databases as well as a database built with project-specific material using an application such as MapServer. Of course, this option would only be beneficial if the mobile device itself was unfit to store a spatial database of considerable size. An interesting use would be to have access to old aerial photographs when encountering unexpected or puzzling/enigmatic archaeological features.

- Integration of other data recording features/equipment

In addition to pictures, voice notes could be relatively easily recorded and georeferenced (experimented with by Tripcevich 2004, 21). Using a wireless network or BT connectivity, output from other devices could be integrated into the spatial database of the OpenArchaeoSurvey application. Some options have already been noted, for example, barcode readers for finds processing (Leusen and Ryan 2002, 12), though additional cameras, remote-sensing equipment or even the traditional clicker would most likely also prove to be useful

improvements (Tripcevich also notes digital callipers and scales, Tripcevich 2004, 17). Not only would this increase efficiency and accuracy, it would also make teams more flexible as data could be collected by several team members.

- Augmented reality

When access to the internet through 3G or 4G networks becomes truly reliable and fast enough in remote areas, real-time projection of data available onto the internet will become a realistic option. Maps and forms could be augmented with data from, for example, Wikipedia, Flickr and/or archaeology-specific services.

5.3 Support

An intended effect of the project is that the application may be used by other parties. In addition to archaeologists, biologists, geoscientists and social scientists can also apply fieldwork settings for learning and data gathering processes. As previously mentioned, one of the main problems with these kinds of applications is the high level of investment in expertise and equipment (Wagtendonk and De Jeu 2007, 657). In the current phase of the project, we are concentrating on this problem. The main focus will be the website (see below) where we will offer materials to support the setup and use of the OpenArcheoSurvey application. We plan to record screencasts to assist others through the necessary steps, we will host a manual and necessary documentation and open a forum for discussion and FAQ. On the technical side, we hope to be able to produce a virtual appliance that will help users to set up a preconfigured server. We will also make the forms used in the application compliant with the Quasar Toolkit (Qt), so an existing graphical application can be used to adjust forms for project-specific databases.

5.4 Website

As described above, the website for the OpenArcheoSurvey project initially concerned

features supporting the application and its in-field use. However, given the emphasis of the project on improving learning possibilities, the site was quickly deployed for secondary support. Course syllabi were processed into wiki pages to provide background material on survey methodology and computational archaeology to fieldwork students. To allow for interaction and building an FAQ, a forum was set up for discussion of more general topics. With the realization that such a knowledge-base and communication platform would have merits beyond the OpenArcheoSurvey project, it became an entirely new e-learning project in itself (see Waagen et al. 2012).

6. Conclusions

Technological developments over the past decade have opened up a wide range of potential improvements for the traditional digital fieldwork assistant used in archaeological field survey. We focused on three areas of modern technology to explore this potential: modern mobile devices, free open source software and 3G networks. Additionally, enabling data exchange and direct communication, we tentatively experimented with the potential for applying mobile learning during fieldwork. To conclude, we would like to sum up some of the preliminary results of the OpenArcheoSurvey project. They are necessarily of a qualitative nature because, due to the emphasis of the project on mobile learning, its practical and organizational benefits over the archeosurvey application have not been evaluated in measurable units. Since the pilots have been of limited scale (one team) and the learning effects cannot be simply measured in the short term, quantitative data is not yet available. However, adding to the findings already mentioned above, below we present a summary of the main advantages and disadvantages.

6.1 Disadvantages

Most disadvantages relate to practical issues which primarily concern the use of a

device that is not yet optimized for rugged outdoor use. Furthermore, setting up the hardware and software requires a relatively high level of technical knowledge and can be rather time-consuming. Finally, learning scenarios developed for survey fieldwork tend to be difficult to put into practice.

6.2 Advantages

In addition to the benefits of the pre-existing archeosurvey ArcPad application mentioned in the paper, OpenArcheoSurvey application allows users to choose a lightweight, powerful integrated device (from a wide range of types and brands). The software is free open source, increasing its potential longevity and versatility and making it available to any interested party. It can increase the efficiency of both data management and a project's workflow in general and it demonstrates interesting potential for adaptive mobile learning.

Finally, ten years ago we were 'educating the digital fieldwork assistant', now we are developing software that provides the opportunity to 'be educated by it'. Apart from the practical benefits, we believe that archaeological field surveys can gain much from mobile learning: if all participants are involved and better informed this encourages more enthusiastic participation, in turn improving data quality and the educational potential of a fieldwork project.

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Disclaimer

The OpenArcheoSurvey project formerly bore the name Learning Sites, and was presented as such at the 2012 CAA in Southampton. However, to avoid confusion with an already existing American virtual heritage company called Learning Sites we changed our name. Hereby we state explicitly that there is not, nor has there been, any relationship between our OpenArcheoSurvey project, formerly Learning Sites, and the Learning Sites company, Williamstown, USA.

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