Apps under the surface. Problems with Cultural Heritage apps

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Apps for mobile devices are being developed with the goal of telling the story about a heritage site to the general public. However, their effectiveness is often not clear. This is of particular relevance in the Netherlands, as most apps are partially or completely financed with public money and are being developed for local government organizations.

Apps are being conceived and developed for use in the real world. Theory and practice can diverge quite a lot and the authors questioned why apps and initiatives such as those shown at CHNT20 did not appear in some form or other. The apps that were available in the app-store were considerably more limited than expected. When the download-data was analysed, it also became clear that many apps were not downloaded and installed very often. This article presents some observations about how apps come to be created and some consequences of the processes involved.

From the local government side, there seems to be a lack of understanding of what could or should be achieved. The main goal is often to simply have an app that displays and tells the story of a cultural heritage site without having a plan or goal behind it. A commercial company obtains a set of parameters and simply builds an app around it. Furthermore, the promotion of apps is limited after the initial presentation.

Not everything mentioned above can easily be remedied or even explained, but a better understanding of which goals an app should have, and what can be achieved, combined with better promotion can lead to better apps and a better use of them by the general public. That results in a better return on the (often) public spending for developing the app, not to mention the raising the awareness of the specific cultural heritage site presented.

1. INTRODUCTION

Multiple apps for cultural heritage have been launched in the Netherlands during the last couple of years. The authors encountered several of them during their work for local municipalities. Around

the same time, the session *"New Realities"* of CHNT20 took place, at which an impressive number of apps was presented. This session made clear that there were noticeable differences in both quality and set-up in the majority of recently launched applications in the Netherlands.

The authors of this article come from two different sides of the cultural heritage sector. Willem Beex has a background in Pre-History and Classical Archaeology, and is currently involved with digital measuring, 3D reconstructions, GIS and DEM. Daniel Stiller has worked for commercial archaeological companies and has extensive experience with regional and municipal government. In the Netherlands, it is often on a municipal or regional government level where decision making concerning archaeological and cultural heritage sites takes place. It is usually at this level that the decision to make an app is made. Non-Government organisations and foundations also sometimes take the initiative, but this is practically always as part of a (government) subsidized program to put the spotlight on a piece of local cultural history. Commercial initiatives are, with an occasional exception, limited to the role of developer of the app. The exceptions are when it is an app that has to be purchased in an app store. The subsidized apps are, to the best knowledge of the authors, all free to download.

This article has its origins in observations of daily practice in real life. At the session "New Realities" at CHNT20, it became clear to the authors that apps launched in the Netherlands were, at the time, of a lower standard compared to what was shown at the session. At best, the apps themselves were technically competent but often not very interactive or enticing. Technology develops fast, so it could be that an older platform or software was used.

However, when this was discussed with other colleagues, civil servants and policymakers, some curious remarks were made. The most common remarks were: "The budget didn't allow it," "We haven't given it any thought" and "We didn't know that was an option." This was even the case with one of the apps for which the author gave professional input. When the authors were asked for a second opinion about what could be achieved with apps by a municipality, a lack of understanding with the policymakers became apparent. For this second opinion, the authors also did a small survey of download-data of the apps. It showed that archaeology-themed apps were not downloaded very often.

CHNT20 showed that there is a lot of potential for apps as a medium to disseminate and present information about an archaeological site [Debenjak and Mäki-Petäjä 2016, Dionisio and Jasink, 2016, Gabellone et al. 2016, Gheorghiu and Ștefan 2016, Silvestru 2016.]. That potential however, is barely being utilized. This article intends first to highlight the daily practice of the decision-making process for the commissioning of an app, and second to discuss the realization that most apps are not being used often. It does not intend to look deeply at the technical side of apps. It is the end product that matters in this case, as this is what the public sees. It was also beyond the scope of this article to investigate the place and role that apps play in the framework of heritage interpretation. This is something that has to be analyzed, as the authors are of the opinion that such a framework is important for presentation and dissemination of information about an archaeological cultural heritage site. This is, however, a follow-up step towards finding a solution to the problems with the apps themselves and their use by the public. First, a problem has to be established before closer examination is possible. The authors have as a goal the highlighting of problems with apps that come

about as a result of chaotic daily reality, and hope to pinpoint the direction for some solutions and for further study. In the end, these kinds of problems can degrade a theoretically great app to something that is less engaging or even unsuccessful.

For this paper, the authors have mainly used their own experiences and observations, complemented by interviews with other colleagues directly involved at regional and municipal government levels. The effectiveness of an app is presented by a small survey of download-data. This has been offset to the costs of the app in order to give an impression of how much was spent to develop the app per download at the time of writing. For practical reasons, the authors have concentrated on free or gratis apps with an archaeological theme, but the same observations can be made about apps that have to be purchased, as well as apps focussing on other sectors of cultural heritage.

2.   OBSERVATIONS ON THE DECISION-MAKING PROCESS

During the multiple observations that were made, several basic situations and problems were encountered. These are definitely not all completely new, nor have they led to ground-breaking new insights, but to the surprise of the authors, the same issues kept recurring over and over again.

The first observation was that often there is not a clearly defined idea why, or for whom, the app is being made in the first place. For instance, when asked: "What audience are you targeting with the new app?", the most common answer was: "Everyone!". This reply in itself is already almost a guarantee for at least a partial failure. The general public is, after all, not one homogeneous group that can be reached with a single effort. Perhaps it may work well when an app is made for a very specific subject, such as a temporary exhibition. However, in reality most apps are being made with a longer lasting period in mind. The general public is impossible to reach with just one approach. Even on a basic level there has to be a distinction between children and adults. They each require a different approach in order to be reached. Other questions such as: "What is the goal of the app?" and "What does one want to achieve?" were met with similar non-specific answers. It is even questionable if it is known what the public actually wants from a cultural heritage app. The initiative often comes from local government or other, outside entities or foundations. Sometimes it even comes from the commercial companies that build and want to sell the apps. Local historians or archaeologists are almost always consulted, but this is only for content information and as a quality check.

In some instances, it almost seemed that the goal was just to have an app because *everyone else has an app*, or perhaps just to get some nice and useful reconstructions of the environment and buildings. All (other) justifications are then added at a later time. Sometimes this made the app more of a fashion statement or a gadget, instead of a tool to reach the public.

Directly related to this is another observation. The decision to create an app is often made without any thoughts on what it (the app itself) should accomplish, or what would be needed for its development. This involves both the content as well as the technological side. As a logical result, the variation in quality of the apps is enormous. Some of them are just barely useable on mobile phones, but they do work well on tablets. Or parts of the app, for example the navigation (within the app) is tedious, but the actual content is beautifully delivered. In other words, the overall design and the presentation of the content can vary greatly.

A third observation was that there is often little or no planning for what should happen after the app has been launched. There is some maintenance from the app-builders themselves, but content adding and promotion of the app is often minimal or non-existent. Only in one case, (route-apps; see below section 4.2) does an app appear to be integrated as part of a larger program. Others are self-contained, even though in setup and in subject matter there is a connecting theme.

Finally, there is the observation, at least in the Netherlands, that currently there are only a few companies which specifically develop apps for the archaeology/cultural heritage-sector that are intended for the general public. Since there is only a small group of suppliers, there is almost no competition between app-builders. As a result, there are almost no options for the "client" to choose among. The client, often a municipality or a non-profit organization, has to accept to a large extent what is on offer, or they need to use an app-builder who has no real experience with archaeology. Such an app-builder then has to figure everything out on his own. The results are often not very original, because a lot of time, money and energy will have gone into understanding the archaeological content and, unfortunately, not into the presentation of the subject. On a side note, it should also be mentioned that the opposite is often also true, when an archaeologist is determining on how the app should look. In most cases he/she has no experience or extensive knowledge of what is technically possible, or how the information can be presented. That can also result in an uninspiring end product.

A consequence of the lack of preparation by the initiator of the app (the municipality or non-profit organization) is that there is no clearly defined concept, goal or expectation for the end product. Basically, this gives the app-builder almost free rein to determine the look, feel and content of the app, and how to develop it. The initiator is often simply happy with the result, because he/she didn't have any idea what to expect in the first place. The public is presented with an app and is expected to use it.

3.   PRACTICAL CONSEQUENCES

How is all this expressed in practice? The authors have seen that one thing can lead to another. When an app is more of a fashion statement, there is no need or reason to think about promoting it after the launch, or to incorporating any content-updates. But if it is to be used as a tool for bringing the cultural heritage to the attention of the public, then the app should have a lifespan that such further considerations are necessary.

For instance, if the public will consist primarily of tourists, the promotion of the app at the appropriate (tourist) outlets and venues becomes more important. If the product was created with locals or with or returning visitors in mind, regular content-updates are then necessary. This is clearly visible in the museum world. The app for the *Rijksmuseum*, for example, is regularly updated with each new exhibition. A frequent visitor would install the newest version of the app before a visit. Afterwards, the app has served its purpose and can be safely deleted. The next time he/she visits the museum, the process will be repeated. But in between installations the app has had an update, with information about the new exhibition. Thus, during each visit, the app will have new information and is therefore once again relevant to the visitor of the museum.

In reality, an archaeology app is a one-time use gadget for a lot of users. Unlike a museum environment, there are usually no, or far fewer, new exhibitions or other developments. Local users will perhaps use it once or twice and after that they will have no further need for it.

If the aim is to have the app used more often, the idea is to keep promoting the app and if possible (and appropriate) having its content updated regularly. This will ensure that new and old users keep picking it up. But if the app is only made for the local citizens, the reality will be that the app still will only have a limited impact. This can be fine if that is what is expected, but as already observed, often none of these aspects are considered during the start-up phase.

The main problem at this stage is not knowing what public is targeted. As illustrated above, these could be tourists, locals, interested people, students, etc. This determines the requirements and goals for presentation, promotion and possible follow-up programs (e.g., content updates, more promotion). All of these must be taken into account when the budget is determined. However, most apps are simply aiming for everyone, the general public. As stated previously this is in reality not a homogeneous group. When done correctly, making an app for everyone will result in an app with either a very large content package, with a lot of subsections catering to all the different groups, or one that doesn't really relate to the majority of the people for whom it was intended, assuming, of course, that there is already a clear idea what the target groups would like or need.

All of the above seems very logical and is nothing really new, but surprisingly enough, as has been written before, these subjects have not in most cases been given too much thought. In that respect, this is not very different from the time when the internet was on the rise. In those early years lots of groups in society wanted to have a website, but without a clear idea of what they expected from it or what a website could offer. The website itself was the end goal, as is now the case with many apps.

The second set of problems is partly a result of archaeology itself and its information-sources. Often it is not clear what is needed content-wise as a basis for creating an app. The clients, often local or regional governments, will have little experience with this. Determining the subject is something different than acquiring information and content for the creation of the app. This in turn also influences the ideas of what the app should do. This extends to the content itself and also to how the content is presented within an app (3D reconstruction, movie, sound, etc.). To some extent these problems solve themselves during the process of development, but it always comes with an additional cost. The authors saw examples where the app-builder simply did all the work. The company employed an archaeologist to analyse the data and information on the site. Consultations with the local municipality and archaeologist were only done during the early stages of the project and at the conclusion as a quality check. If, for instance, there are reconstructions available, why develop them again from the ground up, that is, starting with interpreting the excavation plans instead of using the reconstructions as the starting point? Even if the intent was to give the app-builder free rein, it will be far more expensive as opposed to a direct involvement by the local specialist. Money would be saved that could have been invested in a better (app) design.

The last problem is the promotion of the app itself and keeping the app relevant. Usually there is a lot of interest at the launch. This can be on the internet, through using the local newspaper, or during the opening of an exhibition or festival. But most of the time there isn't any follow up. If people want to search for an app afterwards—and this is especially the case with apps that were made for the

municipalities—it can be very difficult to find. In several cases it has been noted that the link to the app (or to its location in an app-store) only appears at the bottom of a subsection of the municipal webpage. And if it is searched for in the app-store, and the correct name itself is not known, the app does not even show up at all. This makes the app almost invisible in the app-store itself.

In this respect, it should be mentioned that this is not a big problem for museums or similar institutions. They usually have a special dedicated website and brand names that can be used to flag the app in the app-store. In contrast, the municipal websites are not dedicated to just one subject. They contain a lot of other (local) information and news, so any specific item can be easily overlooked.

At present, most apps are being sold as complete packages by the app-builders. The app is the end-product for them. Besides maintenance, often nothing else is done to add new content or to keep the app (content-wise) up-to-date. But if the app is to be used more than once, and is intended to keep the local population interested, there has to be an incentive to come back. That incentive could be regular changes and additions.

The importance of maintenance of the app itself, however, should not be underestimated. Even if the content is not updated, the app itself continues to be available. Technical updates can also improve the usability immensely, as the authors have seen. The authors want to emphasise this, as almost all of the apps which were analysed in detail benefited greatly from the maintenance updates. Especially the improvement of functionality can make a big difference in the long run on how the app is perceived and appreciated, even when it is used only once. It does, however, raise the question whether the app was fully developed and mature on release. The launch version cannot be some kind of *beta-test* version that is tested by the public in practice.

4. THE APPS THEMSELVES: SEVERAL EXAMPLES

In the Netherlands, there are generally speaking two kinds of apps. The majority consists of completely standalone apps for just one site, or for a few specific sites. A minority is actually content for an app platform. The latter includes the so-called "routes apps," with walking, cycling, and other kinds of routes. At the time of writing, at least in the Netherlands and as far as known to the authors, there are no apps for other purposes, such as education.

4.1 Example 1: a standalone app for an archaeological site in the Netherlands

As an example of the standalone app, several apps developed by the same company and with the same format were chosen; their subject is a site along the Roman border (*limes*) in the Netherlands. The commercial company that developed them created almost all of the archaeology-themed apps launched in 2015 and 2016. The subjects were mainly Roman sites, with a few exceptions such as post-medieval settlements.

The first thing that was noticed was that after download and installation, there was another mandatory download and installation session. When a user is already at the location, this is not something that should happen. If the user doesn't have a large data package and good cell phone coverage at the location, he/she will not or cannot use the app.

The app shows how the archaeological site looks at the present day and how it would have looked in the past, in the same way as Google Streetview. From pre-selected locations, the user can get a 360-degree view (Figg. 1, 3 and 4). Although the app does work with a GPS-location, it can also be used at home. Besides the reconstruction there is also some extra text-information presented (Fig. 2). The app is reasonably static. There is practically no interactivity with the scenery, and there is no animation in the reconstruction or even in navigation. Switching between present and past, for example, is an instantaneous transition and a little jarring. A simple transition-animation would have been possible and was even offered by the developing company, but for budgetary reasons it was never included. A remark must also be made concerning the 3D-reconstructions. These are of varying quality and technical errors in the rendering are visible (Figg. 3 and 4).

It should also be noted that this example already had a major revision. In the first version, the interface was much more cumbersome. It consisted of using small arrows on the side of the screen to navigate through the viewpoints and information screen. This functioned quite well on tablets, but on mobile phones it was fiddly at best. With the second version, which was rolled out to all similar apps, the navigation within the app has massively improved. Unfortunately, also in the new version there is not a simple menu or any other easy way to change the 360-degree viewpoint. Switching between the locations in a predetermined order can only be done via the information screen. Perhaps this is not too difficult, but it is something that has to be discovered on one's own first, as the onscreen instruction does work as described (Fig. 1). That, and still not allowing to select the viewpoint directly, is not very user-friendly.

4.2   Example 2. A content-package for a third-party app: The route app

A second example is the Route app. It is a competent and relatively simple app for which routes as content packages can be created. The content packages in this specific case are routes along the Roman border, the *limes*. These were created by a small foundation, subsidized by regional government, in collaboration with a local municipality that also provided some co-financing. The routes are part of a larger program; at the time of writing, 23 routes were available.
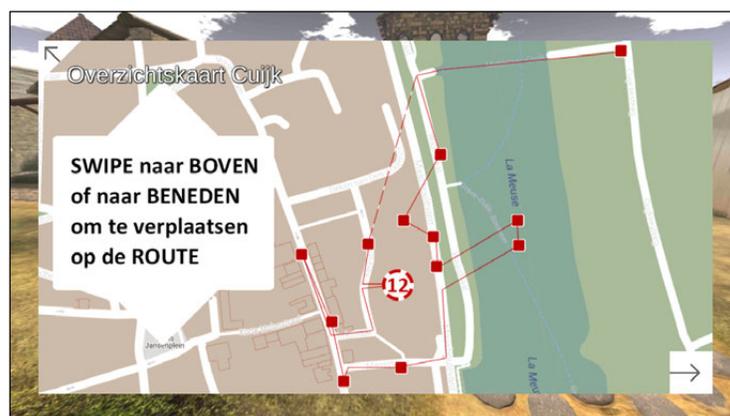

Figure 1. A screenshot of the viewpoints and routing from the Cuijk standalone app with an incomplete and non-functional explanation for navigation within the app. Translated, it says "swipe up or down to move along on the route."

A user can choose to obtain information and descriptions of points of interest by means of text or audio. Sometimes videos are also incorporated. If desired, the user can get a short or a long version of the text or the audio. This is mostly GPS-based. Information on the interest points is also accessible when the user is not on location, but it can be a bit fiddly to find it all. The routes themselves are advertised on the municipal website and on the website of the foundation.

Figure 2. An example of an information screen from the Bodegraven standalone app.

Figure 3. A view from inside the Roman fortress. Noticeable is the disconnect between the shade and the woman.

Figure 4. A static parade of Roman soldiers. Noticeable is the use of two different textures within this one reconstruction. Also, because of poor rendering, some of the stones of the road appear to float.

Figure 5. The figure shows one of the routes through Roman Bodegraven.

The routes are content packages that are part of a larger app-platform. For a user, this means that he/she first has to find or obtain information on where the app is to be found, and after that, he/she must find the content packages, e.g. the route. These steps require informing the public and perhaps even providing a little bit of guidance. For this app, the first version of the platform was quite cumbersome, which hindered the use of it and finding the routes. Installing the routes was a chore and not very user-friendly. Again, updates have massively improved this process. It should also be mentioned that at the launch, even the municipal website originally simply provided a link to the routes without mentioning the app which was needed. Later this was amended.
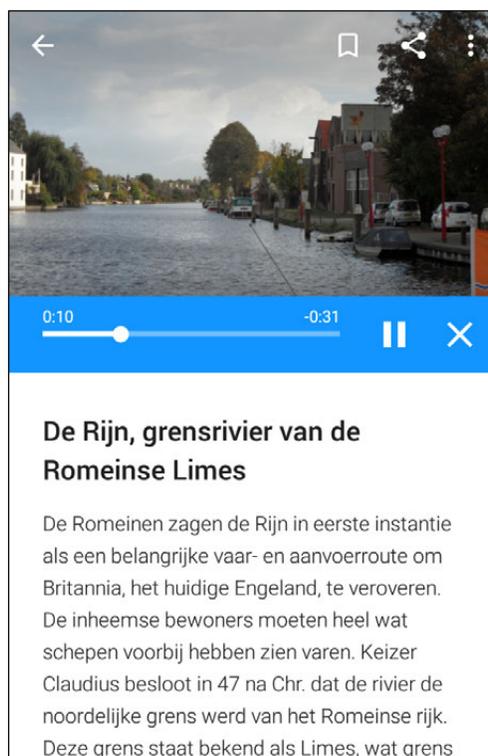

Fig 6. The Route app in action. The text onscreen is also available as a sound file that can be listened to at the same time.

5.   USERS, APP-USAGE AND COSTS

All of the above explains to some extent the results that can be seen in table 1. In this table, information about the download- or user-data is presented in relation to the approximate costs for development of the app (when known to the authors). Since not every development had the same budget, this has been translated to a cost-per-download. The goal is to clarify in a financial way the

success or failure of the app. The assumption is that the app is an investment in awareness of cultural heritage. An indicator for this can be the cost-per-download. The more an app is downloaded the lower the relative financial investment. A high cost-per-download can then be indicative that the app is not reaching its public. Since budgets for apps vary, this creates a level playing field to compare how successful a cheap app is in comparison to a more expensive one.

5.1   Archeologically themed apps

A total of nine specific archaeologically themed free/gratis apps were available for study: eight standalone apps from two different companies, and one route-app containing 23 routes. User statistics for three routes were made available. All three were in the same municipality. Because of this they have been mentioned as just one app in the table.[1] For reference purposes. four other apps with a broader cultural heritage subject (outside archaeology) were also taken into account. In this group, a purely archaeological museum is represented. It is in this reference group because it is a museum with a museum app and not an archaeological site with a dedicated app.

With collection of the data several problems were encountered, which originated from the fact that although the apps may have been commissioned by local or regional governments, they were developed by commercial companies. The companies hold the copyright and ownership of the apps, and only these companies have access to the download- and user-data. These are two distinct groups of data from which, for example, local or outside usage can - through ip-adresses - be determined by seeing how many times any user downloads (i.e. revisits) the app. Though the companies do want to share some data specifics with their client, it is only for their own specific app. Because of this, the authors have only been able to gather from a few apps precise download/user-data and were forced to use download-data that was publicly made available.

The companies are also (understandably) reluctant to share the development-costs/price of their apps. This has been partially resolved because the budget of one particular app in a subsidized program was known to the authors. All apps in this program are known to have had roughly the same budget. For two specific standalone apps, some download data and the price was made available. For the route app download-data and some user-statistics were made available, but not the price of the routes themselves. Download data from these three apps were from the launch until the period December 2016-January 2017.

A second problem is that there are two dominant platforms: Apple's IPhone and Google's Android. For one standalone app only the download numbers from Google were made available. For the route-app only the download numbers in total (Apple + Google) were made available.

Rough download numbers are available at the Google app-store. The Apple app-store does not show this kind of information to non-developers. Based on IPhone vs Android phone sales in the Netherlands, a correction has been made for the Apple platform. On average, this fluctuates between 20 and 30%. A correction of 25% has therefore been applied. The assumption is that a relatively

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[1] The download numbers have been averaged for the table. The three routes were downloaded respectively 250, 291 and 319 times.

identical percentage of IPhone users would download a cultural heritage app as would Android users. The Google app-store was consulted on January 25, 2017.

The Google app-store unfortunately works with number-brackets. A download in excess over 100 is presented as 100+. A complicating factor is that the intervals are not equal, but given in exponential steps: 10+; 50+, 100+, 500+, etc. It is not very accurate, but it does give a useful indication, as long as the number of downloads is not too high.

As a base number, the average between the low and high downloads has been taken. 50+ is anywhere between 50 and 99 downloads. For the table, this has been translated to 75 downloads. To compensate for the IPhone, an extra 25% has been added to the 75 downloads. That makes a total of 94 downloads. When this was compared with the apps for which the download numbers are known, it showed that this (the IPhone − Android comparison), at least for the lower range of download-brackets, is a reasonable assumption.[2] The available data also showed that the calculated estimates in absolute numbers were slightly too low. Therefore, in table 1 the numbers were rounded off upwards to the nearest quarter. In the example, this would be 100 downloads. At 1000 downloads or more this calculation method becomes questionable because of the exponential way the numbers are given in the public domain of the Google app-store.

Most of the free apps in the Netherlands mentioned here are subsidised by local or regional municipalities and government institutions. Even though this is just a small sample, it does show that the maximum number of downloads never seems to exceed 1000 installations by a large margin. This means that the return on the financial investment is relatively poor, even in comparison with the number of people living in the area, e.g. the local users. And it is certainly not very impressive, if visitors and interested groups are expected to use the app as well. Moreover, most downloads occur during a short time after the introduction period. Afterwards it is little more than a trickle. The download-numbers appear to stay relatively stable in the Google app-store. This is probably due to a lack of promotion. The app from Katwijk, for example, was better promoted and this is reflected in the number of downloads. Though relatively new, it is one of the most downloaded apps.

An interesting detail emerged from the user-data for the route-app. Approximately 19% of the downloads were from devices that were in and around the municipality of Bodegraven-Reeuwijk. That would imply that 81 percent of the downloads were by visitors from elsewhere. The data also showed that information about the interest points on the routes themselves were viewed 1021 times. With a total of 860 downloads that means that the routes were consulted or used multiple times.

Unfortunately, there were too few apps with precise download- and user-data available to come to any well-founded conclusions on usage or on the users themselves. The download numbers of the apps, however, do not show a pretty picture. When the costs of the apps is taken into account, it is questionable if the apps are to be considered a good investment as a means to reach the public. With these download numbers as an indication and averaged for the eight standalone apps, the costs per download for an app is approximately a staggering € 150.

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[2] The authors want to stress that there was only a very small dataset to work with. This is an area that needs to be improved on in the future.

Table 1. Number of downloads of apps with costs-per-download.

Type app	App/location	launch	subject	downloads	Cost-per-download
Stand-alone	Zwammerdam	spring '16	Roman era	100+	€ 300,-
Stand-alone	Katwijk	spring '16	Roman era	950+	€ 32,-
Stand-alone	Bokmeer Sterckwijk	winter '16	Post-medieval	100+	€ 300,-
Stand-alone	Dalfsen	autumn '15	Prehistoric era	950+	€ 32,-
Stand-alone	Bodegraven	summer '15	Roman era	325+	€ 92,-
Stand-alone	Boxmeer Steenstr.	spring '15	Post-medieval	100+	€ 300,-
Stand-alone	Cuijk	spring '15	Roman era	325+	€ 92,-
Stand-alone	Maastricht	winter '16	Roman era	500+	€46,-
Route-app	Bodegraven	winter '16	Roman era	285+	Unknown
Other Cultural Heritage apps					
Stand-alone	Anne Frank's Amsterdam	before '12	WW II	35000+?	Unknown
Stand-alone	Hieronimus Bosch (Exhibition)	winter '16	Late Medieval	25000+?	Unknown
Stand-alone	Rijksmuseum	spring '13	multiple subjects	350000+?	Unknown
Stand-alone	RMO (archaeology-museum)	before '15	multiple subjects	9000+?	Unknown

5.2 Other apps

In Table 1 at the bottom there are four apps more or less outside the field of archaeology. All examples were developed by or for museums. The first, called Anne Frank's Amsterdam, is published by the Anne Frank Museum. This is a standalone app with the same kind of elements of the archaeological apps mentioned in the examples. It contains a route, and a view of the past and the present, but it also contains some location-based game-mechanics and video content. It is also a reasonably old app. The last major update was in 2012. Even if the download number is impressive in comparison with the archaeology apps, it hardly reflects the number of visitors to the museum. With over 1 million visitors per year, the app only reaches a small fraction of them. [Anne Frank Huis 2017]

The Hieronymus Bosch Exhibition app was specially made for the duration of a four-month exhibition. It was not very fancy and it was more a digital version of the exhibition tour guide, with directions to the museum. More than 421,000 people visited the exhibition. Based on the download numbers, just around 6 % of them used the app.

The same can be seen with the two other apps, one from the Rijksmuseum and the other of the Rijks Museum van Oudheden (RMO = State museum of Antiquities), a museum dedicated to archaeology. When compared to visitor numbers, both apps, however well made, are only reaching a relatively small fraction of the visitors. It is especially noteworthy that the Rijksmuseum app, which was

developed to be used in the museum itself and receives regularly content updates, does a lot better in absolute numbers than the other apps. But it is still probably used by less than 7% of its visitors.[3]

6. POKÉMON GO

Interestingly enough, some of the issues mentioned with regard to public heritage apps are not exclusive to this sector. So perhaps lessons can be learned from other kinds of apps and subjects. An example of this is Pokémon Go. It is a game where a kind of creature (Pokémon) is collected and then used in battles at gyms, a kind of coliseum setting. It is hailed as one of the success stories for apps in 2016. And indeed, the launch was very successful, and was even followed by enormous hype. But after the hype dissipated, some problems became visible.

The first is that Pokémon Go soon lost a lot of its initial users. It was hoped that this could be stabilized with launches in other countries [Barret 2016]. Apparently, that has not happened (Fig. 7). Because of the former hype, the app did generate a lot of publicity and continues to do so. It can therefore be considered a success in that regard. Since then there have been several initiatives to draw players back to the game, such as specific events centered around holidays like Halloween, Thanksgiving and Christmas. Although the initiatives were all different, they mainly catered to current players, and failed to attract former or new users. Also, the initiatives felt more like experiments to test what would work best.

One of the tactics also being experimented with is adding new Pokémon, in effect new content, to the roster. However, if too small a number of Pokémon are added, this game could easily become boring again, because the new Pokémon can get lost or be swamped by the old ones. Then there is little sensation of progress or discovery of the new Pokémon.

Some remarks must also be made about the technical side of the app/game itself. The collecting, or catching as it's called, of the Pokémon can be done through Augmented Reality (AR). The Pokémon appear on the screen of a mobile device in the player's environment. With a minigame, the Pokémon can be caught. This perhaps looks nice, but it is nothing more than a gimmick; in fact, the game gets more tedious to play. Switching AR off is easier and makes the game more enjoyable. Parts of the sound effects used are terrible. Maybe they are reused from the original Pokémon games from the 90's as a kind of nostalgic value, but it gets annoying after a short while. When playing in public, as this game is supposed to be, it is best to switch off the sound [Games tm 2016]. At CHNT20 there were also apps that made use of augmented reality [Debenjak and Mäki-Petäjä 2016, Magnelli and Ventrella 2016]. These apps have not yet appeared, as far as the authors are aware, but it would be interesting to see if they can avoid some of these pitfalls.

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[3] Some 8.8 million people have visited the Rijksmuseum since its reopening in 2013. [Parool 2016]
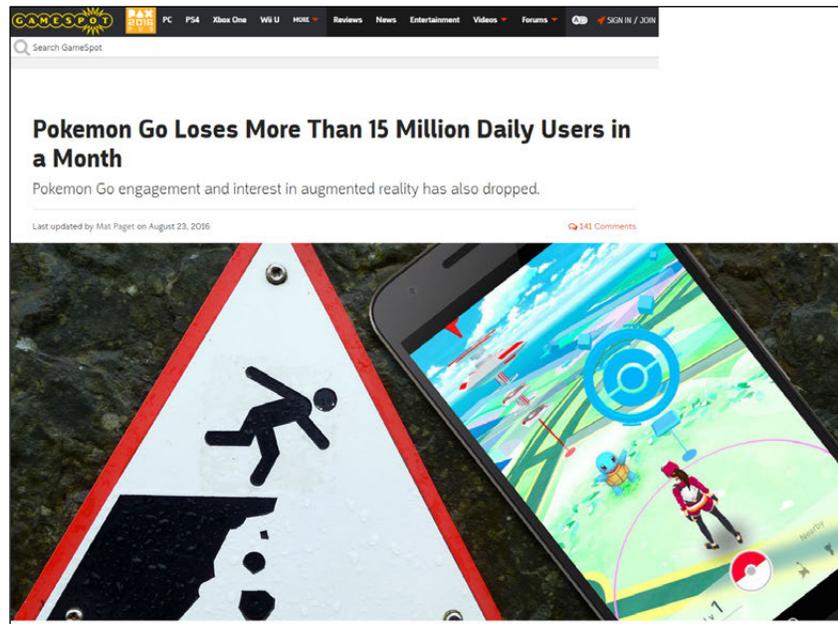
Figure 7. One of the headlines on the internet about the fall in players of Pokémon Go [Paget 2016, Baret 2016].

In comparison with the 20 year old original game another thing can be noticed. The battles in the original, even if they were only computer generated, were a lot better than what is currently being done in Pokémon Go. Simplification maybe a good thing, but it can go too far [Games tm 2016].

In conclusion, it can be said that Pokémon Go definitely did not get all things right. There are several parallels to be made with cultural heritage apps. It will be interesting to follow the developments surrounding Pokémon Go and the app itself and see what lessons can be learned from the use and perception of the game-mechanics and in continuously generating attention to an app.

7.   CONCLUSION AND SOLUTIONS

The authors in this paper have presented some observations about the decision-making process surrounding the creation of an app and have tried to illustrate some of the consequences. In general, it can be said that at this moment apps often lack basic goals and expectations from the beginning. Questions concerning the intended public, the goals, plans for promotion and so forth are at best not well formulated. This lack of preparation gives the app-builders a lot of freedom, which they use, and perhaps in some cases maybe even abuse, to sell their products. As a result, apps generally do not live up to their potential, which is also seen in the download numbers. Very often the question remains if the money was well spent. To resolve this, there needs to be a better understanding of what can be done with an app and how to reach the public with it. Fortunately, not all is lost when an app is developed; updates and maintenance can go a long way to rectify some of these problems.

From a wider perspective, both in the cultural heritage sector and possibly beyond, the underperforming of apps seems to be a common problem. Why this is the case is still unclear.

Perhaps the expectations are too high in general. It is also unclear if the app-builders or the initiators for the app really know what their public wants. A major common hurdle, however, seems to be in drawing attention to an app and then keeping it visible and getting the public to use it. Whenever there is a longer promotion campaign behind it, it does result in more downloads. Further study, unfortunately beyond the scope of this article, is required to better understand all of this.

A starting point for solving the problems with underachieving apps should be proper preparation. Questions that need to be answered beforehand are: what does one want to achieve with the app?; which public/audience must be reached and what does this audience expect?; what kind of follow-up program is necessary to keep the app relevant and to promote it?; what is needed content-wise for the app? The authors believe that whenever these questions are answered, an app stands a better chance to be successful and to get a good return on the investment that has been made.

To conclude, at this moment in the Netherlands the situation with apps for cultural heritage is similar to websites during the early days of the internet. At the time everyone wanted a website, but people did not understand its true potential. The website was there for the sole reason of having a website. Since then the internet has become a major cornerstone of present-day society and the main way of dispensing information. Imagine what apps could achieve with even a fraction of that development.

8. ACKNOWLEDGEMENTS

9. REFERENCES

Anne Frank Huis /Anne Frank Museum. 2017. *Bezoekcijfers museum* (2017) retrieved January 25 2017 from : http://www.annefrank.org/nl/Nieuws/Pers/Bezoekcijfers/

Barrett G., 2016. *Pokémon Go is doing just fine, with or without you* (2016). retrieved November 1 2016 from : https://www.wired.com/2016/09/pokemon-go-just-fine-without/

BBC. 2016. *Why Pokemon Go may have passed its peak* (2016) retrieved January 16. 2017 from http://www.bbc.com/news/technology-37176782

Bunt, A. van de, 2011, Nieuwe Media & Archeologie (rapportage stage-opdracht bij TGV Teksten en Presentatie). Leiden.

Nadja Debenjak and Kaisa Mäki-Petäjä, in: CHNT20, 2016, Revealing hidden histories with modern technology – Archaeological Information Systems and geolocalisation. Vienna.

Giulia Dionisio and Anna Margherita Jasink, in: CHNT20, 2016, *Teaching new technological methodologies applied to ancient history.* Vienna.

Eiman Elgewely, Egypt and Willeke Wendrich, in: CHNT20, 2016, Reviving Karanis (Egypt): From Mud Bricks to Urban and Social Fabric. Vienna.

Marino Jaén Espinosa, in: CHNT20, 2016, Digital Storytelling of the Perote, a Traditional Festivity Held in Panama. Vienna.

F. Gabellone, I. Ferrari, F. Giuri and M. Chiffi , in: CHNT20, 2016, What communication for museums? Experiences and reflections within the project for the virtualization of the Museo Egizio in Turin. Vienna.

Games tm , 2016: Games tm issue 180, September 2016. Pokemon Go. what! Mobile Gaming is evolving. Dorset.

Games tm, 2016: Games tm Issue 181, oktober 2016. How Pokemon Go Caught Us All. Dorset.

Google,. 2017. Google Play Store. (2017) retrieved January 29, 2017 from https://play.google.com/store

Dragoş Gheorghiu and Livia Ştefan, in: CHNT20, 2016, Augmenting Immersion: The Implementation of the Real World in Virtual Reality. Vienna.

Samanta Greggio and Giuseppe Salemi, in: CHNT20, 2016, A mobile Augmented Reality system integrating 3D model and radiance scaling to enhance epigraphical inscriptions. Vienna.

Adele Magnelli and Matteo Ventrella, in: CHNT20, 2016, How the AR can help to appreciate the hidden value of pictorial masterpiece: Venice's Gallerie dell'Accademia case history. Vienna.

Elisabeth Monamy, in: CHNT20, 2016, Experience archaeology or bringing archaeology to a wider public. Vienna.

Colleen Morgan, Robert Carter, Michal Michalski, in: CHNT20, 2016, The Origins of Doha Project – Online Digital Heritage Remediation and Public Outreach in a Vanishing Pearling Town in the Arabian Gulf . Vienna.

Matthias Pacher, in: CHNT20, 2016, The museum of prehistory MAMUZ as a cultural touristic impulse for a rural area in Lower Austria. Vienna.

Paget, M. 2016: Pokemon Go *Loses More Than 15 Million Daily Users in a Month. Pokemon Go engagement and interest in augmented reality has also dropped.* (2016) retrieved august 8, 2016 from: http://www.gamespot.com/articles/pokemon-go-loses-more-than-15-million-daily-users-/1100-6442938/

Het Parool. 2016. *Rijksmuseum ontvangt meer dan twee miljoen bezoekers in 2015* (2016). retrieved January 29, 2017 from http://www.parool.nl/kunst-en-media/rijksmuseum-ontvangt-meer-dan-twee-miljoen-bezoekers-in-2015~a4207435/

Davide Pantile and Valerio Rossi, in: CHNT20, 2016, Magna Carta Rediscovered: enhancing tourism through a travelling multimedia exhibition. Vienna.

Nevena Radojevic, in: CHNT20, 2016, Looking the Pazzi Chapel's umbrella vault from its oculus. Vienna.

Rijksmuseum. 2016. *Weer een topjaar voor Rijksmuseum* (2016), retrieved January 16, 2017 from https://www.rijksmuseum.nl/nl/nu-in-het-museum/nieuws/weer-topjaar-voor-rijksmuseum

Jochen Schmid, in: CHNT20, 2016, The palace facade of Tell Halaf as part of the reconception of the Museum of the Ancient Near East – Material monumentality or virtual multiplicity. Vienna.

Smith, G. 2017 *75+ Incredible Pokemon Go Statistics.* (2017) retrieved January 17, 2017 from http://expandedramblings.com/index.php/pokemon-go-statistics/

Claudiu Silvestru, in: CHNT20, 2016, Experiencing Medieval Vienna – New Approaches towards the Presentation and Interpretation of Invisible Cultural Heritage. Vienna.

Morten Valdorff Rasmussen, in: CHNT20, 2016, On-site communication, old bones and new audiences. Vienna.

Apps under the surface.   1:343

Various. 2017 Noordbrabantsmuseum. Boschjaar-2016 (2016) retrieved November 1 2016 from
    http://www.hetnoordbrabantsmuseum.nl/bezoek/tentoonstellingen-
    activiteiten/tentoonstellingen/boschjaar-2016/