Lower Ant Valley

Interpretation project

Evaluation Report

December 2010

Contents

1. Introduction

The Lower Ant Valley digital interpretation project ran for five months from June to December 2010 and was broken into three clear parts.

a. A research phase - during which we conducted site visits, interviewed staff and researched possible ideas and technology. The results of the research formed the basis of an interpretation plan.
b. An implementation phase - producing the interpretation materials outlined in the interpretation plan.
c. Evaluation and the final report – holding an evaluation day, writing up all of the findings from the whole project and sharing them with partners and other interested parties.

2. The aim of the project

The aim of the project was to produce a prototype/exemplar to demonstrate the application of new technology balanced with more traditional methods of on-site interpretation in a sensitive location.

3. The partners in the project

This project was a collaborative effort with each partner bringing their different areas of expertise to the table.

3.1. The Broads Authority

The Broads Authority were the commissioning partner and provided the wider context as well as access to their expert visitor and conservation staff based at How Hill. They also brought in involvement from the How Hill Study Centre educational staff. The Broads Authority is the public body that manages the Broads, a large wetland area in the east of England, which is part of the family of UK National Parks.
For more information see: http://www.broads-authority.gov.uk

3.2. Neontribe

Neontribe were the technology partners, providing technical research and production skills. Neontribe are a team of coders and technologist who build web applications, websites, Facebook apps, technology prototypes, mobile apps and also run technology workshops for clients such as: Channel 4, BBC, The Stationery Office, The Home Office and Paul Smith. They are also often subcontracted for innovative projects by a number of major London Digital Agencies.
For more information see: http://www.neontribe.co.uk/

3.3. Nicky Rowbottom

Nicky was involved in the research and writing of the interpretation content. Nicky is a freelance interpreter with a particular specialism in the wildlife and landscapes of East Anglia. As well as experience working with the Broads Authority she worked for Suffolk Wildlife Trust for nine years. She is an associate member of the Association for Heritage Interpretation and an expert adviser and mentor for Heritage Lottery Fund projects.

3.4. Ugly Studios

Ugly studios provided a link between the content and the technology and we responsible for the design and project management. Ugly Studios are a Norwich based design company specialising in interpretation and information for museums and heritage and wildlife sites. They work in all areas of interpretation from physical installations through to digital work. Their clients include: RSPB, National Trust, Norfolk Museums and Archaeological Services, Ipswich and Colchester Museums, Peterborough Museums Service, and many independent museums, heritage buildings and wildlife sites.
For more information see: http://www.uglystudios.com

4. The research phase

The research part of the project covered three main areas of investigation:

- Visitor research - any solutions would have to suit the profile of the Lower Ant Valley visitors
- Subject research - the possible stories that could be told about the site with suggestions as to areas of focus
- Technical research - looking at a range of potential technologies and their associated pros and cons

4.1. Visitor Research

The Lower Ant Valley

The Lower Ant River Valley runs from Barton Broads to the confluence of the River Ant and the River Bure below Ludham Bridge. In this area the meandering river is surrounded by grazing marsh, reed beds and shallow broads. Much of the route passes through the How Hill National Nature Reserve which is managed by the Broads Authority.

How Hill

The How Hill National Nature Reserve consists of many different Broads' habitats and is home to a wide variety of Broadland flora and fauna. The estate also contains some heritage buildings including: How Hill House, Toad Hole Cottage and three windpumps. In addition, Toad Hole Cottage is a small museum and visitors centre and How Hill House an independently run, residential study centre. There are also guided boat trips through the reed beds on the 'Electric Eel'.

How Hill House - © How Hill Study Centre

The existing interpretation at How Hill consisted of:

- Various leaflets and booklets
- Toad Hole Cottage Museum
- Some outdoor interpretation panels
- A paper and signage wildlife trail
- The expert knowledge of the guides on the Electric Eel and in Toad Hole Cottage

Buttle Marsh

In 2003, as part of a European Union LIFE project, the Broads Authority bought a large stretch of arable land next to the How Hill National Nature Reserve and have encouraged it to return to wildlife-rich wetland to attract bitterns and other rare, water-loving species. This area of marshland is known as Buttle Marsh after a local name for the bittern, a rare Broadland bird.

Several of the footpaths that lead to and from How Hill border Buttle Marsh. Previously there was no Buttle Marsh interpretation material available for visitors apart from a few guided tours, booked in advance.

4.1.1. An adult audience

On our site visits we questioned the How Hill, Toad Hole Visitor Centre and conservation staff to find out the exact visitor profile and the ways visitors interact with Buttle Marsh and The How Hill National Nature Reserve. We found the following:

How Hill Residential Study Centre host regular courses with primary school children which initially we thought might be a big part of the audience for this project. From talking to the How Hill Study Centre staff it we found that parties of school children

were not being taken, on foot, from How Hill to Buttle Marsh and back. It is roughly an hour's walk and the education officer informed us that, in their feedback, visiting young people say the part of their visit they enjoy least is the walk around the wildlife trail, a much shorter distance.

The staff at the Toad Hole Cottage gave us a good break-down of the profile of their visitors:

- Mostly adults, 50 plus, in couples or singles.
- Some families, in school holidays and at weekends
- Occasional home educating groups

They also informed us that there are in the process of updating their museum interpretation in response to this visitor profile. They felt that their current information was slightly condescending for the mainly adult audience.

From this we concluded that the audience to aim at was predominately adult.

4.1.2. There is no single entrance to the site

There is no gated and manned entrance to the How Hill Estate. There is one main car park, but there are several lanes and public footpaths which go through the estate. Many people arrive by foot or by boat.

4.1.3. The Visitor Centre is not always open

How Hill Car Park and Toad Hole Cottage are only open from Easter to the end of October whereas people are free to wander onto the estate during the winter months.

Toad Hole Cottage in winter - © Broads Authority

4.1.4. There is not one route around the estate

People can arrive by a number of routes and wander round in any order without visiting all of the site.

4.1.5. Conclusions

We concluded that:

- We should make interpretation for a predominantly adult audience
- We should not make interpretation that needed to be hired or lent out from How Hill or Toad Hole Cottage - it would be logistically impractical
- We would be interpreting the estate in a non linear way

4.2. Topic research

The topic research involved:

- Talking to the conservation and education staff
- Walking the site and making observations
- Evaluating the guided walks and boat trips
- Reading the existing print interpretation and literature
- Talking to the Ludham Archive – the local history society and historical photography resource

The research lead to the following conclusions about the most relevant topics to deal with in this interpretation.

4.2.1. Interpretation topics

A subtle landscape

The route from Toad Hole Cottage past Buttle Marsh takes the visitor through a microcosm of the Broads. But most people currently walk past it without realising just how unusual and valuable a place it is. This is an undemonstrative landscape. It does not shout its stories and much of its unusual wildlife is shy and hard to see.

The existing interpretation here – the guided walks - bring the place alive, but are very labour-intensive and reach only a few visitors. The task of the new interpretation package should focus on revealing hidden truths and trying to engage the visitors in what happens here in future. The plan was to do this through helping people to notice the habitats' peculiar characteristics; to see and understand some of the clues to the history and management of the landscape and to support positive action for its future.

A very human story

Although the Buttle Marsh Project has concentrated on recreating a wetland landscape for the benefit of wild plants and animals the story here is also intimately bound up with human history and activities. Every inch of this landscape shows the result of human hands and - more recently - machines.

The general topic to be covered here is the fact that the Broads habitats are a result of the continuing relationship between the natural geography of the region and human activity. The particular part of that story which Buttle Marsh demonstrates is complicated. It needed interpretation which would simplify but does not distort.

Below is a list of aspects of the story which we felt needed to be covered in greater or less detail:

1. The creation of habitats through historical land and water management
2. From arable farmland back to fen – how it was done
3. The ecology of Buttle Marsh and How Hill
4. The lives and adaptations of wetland wildlife
5. The place of wetlands in local culture – past, present and future
6. Different land uses and the economic decisions which affect them
7. The history and future of land drainage in the Broads
8. Wetland conservation – here and elsewhere in Europe - why and how
9. The conservation challenge

4.2.2. Tourist information

Aside from the topic interpretation it was also acknowledged that the interpretation needed to contain relevant information for tourists to help them make the most of the Broads Authority's facilities in the Lower Ant Valley. This would include:

Opening times and locations of the:

- Visitor centre
- Museum
- Boat trip
- Car park
- Toilets
- Wildlife walk

The Electric Eel boat trip - © Broads Authority

4.2.3. Points of Interest

This was an interpretation project of a large, outdoor space. Different features in the landscape: buildings, dykes, habitat examples, etc., are part of the bigger story of the wetland; its history, its wildlife and its people.

The range of technologies that we were looking at (see 4.3. below) used very specific physical locations defined by latitude and longitude.

This lead us towards thinking about the interpretation in terms of "Points of Interest" (POIs), each of which would have the following things:

- A title
- An exact latitude and longitude
- An associated image or icon
- A quick text description
- A more detailed text description containing photos or illustrations

It seemed that a natural expansion of that idea would be to use the same Points of Interest (POIs) across different levels of technology. For example a Point of Interest shown on a printed map could also be accessed by a GPS enabled device carried by someone in the physical location, such as an audio guide which might play a particular MP3 file when a visitor walked to a certain point on the landscape.

This approach tied in with the visitor research which told us that visitors experience the Lower Any Valley by a variety of routes.

We highlighted what we thought were the potential, relevant Points of Interest across the site and decided on the final list with the Broads Authority and How Hill Staff.

4.3. Technology research

4.3.1. Technology hardware research

Because the visitor research was telling us that it was not feasible to hire or lend visitors items of technology with interpretation on them we concentrated our efforts on technologies which might commonly be found in people's pockets or bags - devices which they would own and know how to operate.

These included:

- Smart phones
- Feature phones
- GPS devices
- eBook readers
- Mp3 players
- iPods
- iPads and other tablets

We also looked at solutions that would not need any digital technology at all:

- Leaflets
- Display boards

Below are assessments of the pros and cons of the different options that we evaluated.

4.3.1.1. Smart phones

Ever since the launch of the iPhone, consumer demand for a device which is both a phone and a powerful touch screen computer has been huge. There were smart phones before, but the iPhone captured public interest and has driven innovation in design and features.

An Android smart phone
© 3 Sverige / Erik Hörnfeld

Whilst Apple were the first to exploit the market, other platforms have been establishing themselves. The most notable is Google's Android platform. This can now be found on a huge range of very sophisticated handsets and has outstripped iPhone in sales due to its cheaper price and larger range of handsets. Blackberry, Windows Phone, Symbian OS and several others all have percentages of the market share. As of November 2010 smart phones represent 19.3 percent of total mobile phone sales.

Pros

- Smart phones now commonly include the following technical features:
  - Cameras
  - GPS to calucate the user's exact location
  - 3G connectivity for downloading data almost anywhere
  - Gyroscopes and accelerometers to detect phone position and movement
  - Large display touch screens
  - Powerful processors and graphics capabilities
- People generally carry their phones around with them
- They can run a range of complex applications
- More and more people now have smart phones

Cons

- People may arrive on site without a full charge in their batteries and not feel like using their remaining battery life looking at interpretation and information
- There are still many people who don't have smart phones
- There might be issues with GPS and 3G coverage in a remote location

4.3.1.2. Feature phones

A feature phone is a phone that is a little more capable than the much older, legacy mobiles in that it has a bigger screen, quite often a simple camera and can run small, mildly interactive, apps.

A feature phone - © yisris
http://www.flickr.com/people/yisris

Pros

- Many people still use this type of phone

Cons

- There are thousands of different handsets, with varying sizes of screen, different default fonts and a range of colour depths which makes writing apps difficult
- Apps have to be written in a version of java which works in slightly different ways on different phones meaning they have to be fairly simple and they take a lot of testing
- The apps are usually a lot less than compelling

4.3.1.3. GPS devices

GPS devices have become very popular with walkers and outdoor enthusiasts. They have many features which might have made them suitable for this purpose.

A GPS device - © aburt / Adam Burt
http://www.flickr.com/people/aburt/

Pros

- They are about the size of a modern mobile phone and usually more robust
- They use radio signals from satellites to show the user their exact position as a small arrow on a map shown on the screen
- The screens are designed to be clear to read in average daylight and still legible even in bright sunlight
- Some of them can hold and display custom maps
- POIs or "Points of Interest" can be loaded onto them in the open KML format – the same format used by Google Earth. These then show on the map. POIs appears as 'pins' on the map which, when clicked, can show extra information including text and an image
- Some of our target audience would own them

Cons

- There are many different devices with many different features and if we offered a KML file for download many users would not really know what to do with it
- Our KML file would be interpreted differently on different devices and we couldn't test them all
- The Device would not be able to download the KML file in the field, it would have to be preloaded by the user prior to the visit
- Users are not really used to using their GPS devices in this way

4.3.1.4. eBook readers

EBook readers or eReaders are devices made specifically for reading the printed word. All major publishers now make significant numbers of their books available for purchase as eBooks and some companies such as Bookboon.com, who last year delivered over 10 million downloads, exist purely in the free eBook market.

An eBook reader

Pros

- eBook readers are now becoming much more popular, the Amazon Kindle was their fastest selling product in the run up to Christmas 2010
- They get better with every release with more colours, features and faster screen refreshes
- eBook readers use eInk and ePaper technology so their screens are high contrast even in bright sunlight, great for outdoor reading in good weather
- The format of eBooks is very similar to html (the language of the web) and thus it is fairly straightforward to produce content for them
- eBooks can be distributed via a link from a webpage, so they could be a very cheap way of putting a whole guide book into a visitor's hands
- eBooks can also be read on smart phones and tablets

Cons

- They are not highly interactive, it is really just a flow of information
- They do not work with GPS
- People don't habitually carry their eReaders around with them as they do their phones
- eBook formatting is currently still fairly basic, so it might be hard to show 'brand' and design

4.3.1.5. MP3 players

MP3 players are ubiquitous. As the natural successor to the walkman and discman these small audio devices have sold in huge numbers. All of them will play the standard MP3 audio format and people who own them often carry them about. It would be possible to provide MP3 files of audio interpretation which people could download and listen too at the site.

An MP3 player - © timtak / Timothy Takemoto
http://www.flickr.com/people/nihonbunka/

Pros

- Many people have them
- People are used to downloading MP3 files from the web and putting them on their devices

Cons

- Producing the content would be expensive
- An audio guide would have no easy way of referencing specific sections of audio commentary to Points of Interest on the landscape without physically marking the landscape, for example with posts with numbers on them indicating which track to play
- How Hill/Toad Hole staff expressed concern that audio guides destroy the appreciation of the natural environment where the sounds are as important as the sights

4.3.1.6. IPod Touch, IPads and other tablets

The tablet market is another significant growth area in consumer technology. Apple again have lead the way in design with the very popular iPod Touch (iTouch) and iPad, but the Android and Windows versions are also selling well.

Pros

- They are similar to smart phones in terms of interface, computing power and screens
- The Apple, Android and Windows devices run many of the same applications as the Apple, Android and Windows phones
- People do carry the smaller versions of the devices with them, usually as music players or games devices

An iPad - © mauritsonline / Maurits Knook
www.flickr.com/people/mauritsonline/

- Some of them can be used in conjunction with 3G dongles or SIM cards enabling them to download content or use the web in the field
- They can have apps which read eBooks and PDFs

Cons

- Most currently do not have GPS or accelerometers
- They are more weather sensitive - you wouldn't take your iPad out in the snow

4.3.1.7. Printed leaflets

Whilst the thrust of this project was digital technology it was also important to consider how visitors without access to digital technology could learn about the nature reserve and in particular Buttle Marsh.

Pros

- No need for visitors to have any technology
- Could be distributed from Toad Hole Cottage
- Could be made available online as a PDF
- No impact on the landscape

Cons

- Once printed they are not updateable
- Only available on site whilst Toad Hole Cottage is open

4.3.1.8. Display Boards

Display boards are regularly used for interpreting wildlife and heritage sites and they are accessible to all visitors without the need for a technological device.

Pros

- No need for visitors to have any technology
- Available throughout the year
- There are other interpretation boards on the site, but nothing about Buttle Marsh
- There was a perfect spot for a board at a natural view point, on higher ground, overlooking an area of the marsh

Cons

- Conservation staff were keen not to have anything at all in the landscape
- Once printed they are not updateable

4.3.2. Technology software research

After looking at the different hardware there was still the question of what software platforms the content should be delivered in. There were many to consider, some of which would only work on one specific device and some of which would be portable across the whole range. There were also budgetary considerations, as some formats are much cheaper to produce than others.

Formats which were considered were:

- Apple or Android only apps
- Third party cross platform apps
- Google maps in webpages
- Google Earth and KML files
- eBooks in various formats

4.3.2.1. Apple or Android only apps

Smart phones can run applications (apps), programs which are downloaded onto the phone by the user from an online store of all of the avaliable programs. For iPhones this is the App Store, for Android phones it is the Android Marketplace.

A screenshot of the iPhone App Store

Like a preice of software on a PC, apps can be programmed to do a variety of different tasks. Given suffiecient budget we could write a custom app for iPhone or Android, or even both.

Pros

- Phone users are used to downloading and installing apps
- Apps can be coded to have exactly the functions that you want
- A custom app could be tightly branded
- Having your own app can give you qudos
- The general public know what an iPhone app is
- People might find the app whilst casually browsing the App Store or Market Place an thus it could help to build awareness of the site

Cons

- iPhone apps are expensive to develop, Android apps are slighly cheaper, but even so it would be a lot of budget to cover only a section of smart phone users

- Apple apps with only work on the Apple devices and Android apps will only work on the Android devices
- Once published the app would not be able to be updated without repackaging and releasing a whole new version
- iPhone apps need approval from Apple before becoming available on the App Store. It is perfectly possible to create apps which don't ever get released or later get withdrawn
- If we built an iPhone app which used the iPhone's GPS functions this would fall down on the non-GPS-enabled iPod Touchs or iPads, the only other places where these apps are supported

4.3.2.2. Google Earth

Google Earth is an interactive mapping program which is free to download from Google. It started off as a desktop computer program, but is also now available as an app on many mobile phones and devices.

This format would potentially work on all smart phone platforms, iPods, tablets and PCs that had the Google Earth app downloaded and installed.

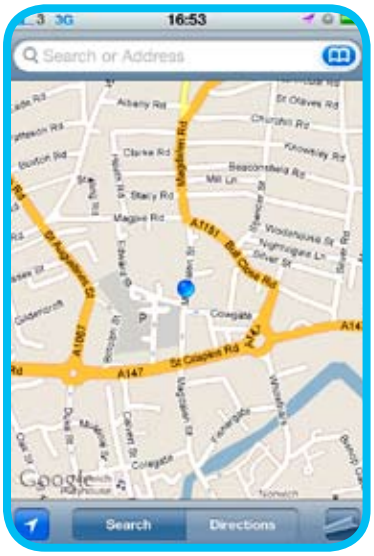
Pros

- We did some experiments and successfully added our test custom maps and Points of Interest into Google Earth
- We made a small, downloadable file, which, when double clicked, opened a user's Google Earth and displayed the custom map, in the correct location with the Points of Interest shown as pins
- We managed to associate additional text, images and html with a Point of Interest so it appeared when a pin was clicked
- It could be used to give interactive interpretation of Buttle Marsh both on and off site
- It would run on the visitor's own hardware

Cons

- A user would have to download and install Google Earth before being able to use this form of interpretation
- Currently most of the mobile phone versions do not allow the opening of the custom 'places of interest' files, though this may well change in the near future
- Google Earth does not show the user's location on the map via GPS so it is less interactive

4.3.2.3. Google Maps on smart phones, ipods, tablets and PCs



A screenshot of a Google Map on a smart phone

With further testing we found we could also export our test maps and Points of Interest to Google Maps.

Pros

- Google Maps can take custom maps and Points of Interest
- The visitor would not need to download a specific app to access the interpretation as Google Maps can be viewed through a web browser
- The content would be available to all web users, whether they are at home with their PCs or at How Hill with their mobiles
- Many new mobile phones can use GPS to show the user's location on the map in real time

Cons

- Only devices that were mobile internet connected would be able to view the content at How Hill itself

4.3.2.4. Third party augmented reality apps on smart phones

Rather than code a new app from scratch we looked at the possibility of using apps that had already been developed by a third party, but to which you can add custom content.

Pros

- The apps have already been coded and tested, saving production budget
- The apps are cross platform so cover more devices
- Some users may already have the apps on their phones
- Users are used to downloading new apps
- Adding content to a third party platform makes it available to that platforms existing network of users, giving it more exposure
- The makers of the apps have responsibility for updating and maintaining them to work on new hardware releases

Cons

- The apps might contain features that are not relevant to the site
- If the apps go wrong you have to rely on a third party to fix them
- A company that makes an app might stop supporting it
- The content might be harder to 'brand' in a third party app
- The features of the app can change over time, which might require changes to the content

We looked at a range of existing third party, cross platform apps for creating content for smart phones. The most common of these is the web browser, and our experiments with Google Maps would be using this approach as all smart phones come with web browsers.

There are, however, other, more innovative cross platform apps which can take data about Points of Interest and use more of the phone's features to display them. We decided to look at augmented reality apps as augmented reality has been used successfully in heritage interpretation, the most common example being the Musuem of London's *Street Museum* app http://itunes.apple.com/gb/app/museum-london-streetmuseum/id369684330?mt=8

The two cross platform apps that seemed best fit for purpose were Layar and Wikitude. Both of them are currently available on Apple and Android platforms, with more operating systems due to be supported in the future.

In the end, out of the two, we decided to settle on Layar as it had greater flexibility a large user base and more support. It also comes preloaded on some Android phones.

A description of Layar

The Layar reality browser is an application which can be downloaded and used, free of charge, on smart phones running Google's Android Operating System or on Apple's iPhone. (Since this project's completion Layar has also been launched on the Nokia Symbian OS.)

Once the application has been installed it can show different 'Layars' of geo-located information on the screen superimposed over the phone camera's view of the world.

By using the phone's GPS and accelerometer 'Points of Interest' (POIs) can be plotted on the screen with remarkable accuracy.

We experimented by Points of Interest located at How Hill and testing it in the field.

The Layar augmented reality browser

Pros

- The screen on our test Android phone proved clear enough in daylight
- There was sufficient network coverage on our test network (vodaphone) for the app to work
- It was very good at interpreting things that you can see from a distance or

as part of a wider view, but couldn't get close to
- The data is dynamic so can easily be updated without having to re-package and re-distribute the app
- It works across Android and iPhone
- The makers of Layar are responsible for updating it so it will continue to work on new versions for iPhone and Android and other platforms
- It runs on the visitor's own hardware
- As well as the augmented reality view the app has a useful map view which shows the user's GPS position on a map in amongst the locations of the Points of Interest
- It comes preinstalled on some phones

Cons

- People would have to download and install the Layar app before being able to access the interpretation
- If you get too close to a Point of Interest, or you are walking 'in and out' of it, it can have a tendency to jump around on the screen
- There might be network connection issues on some networks in more adverse weather conditions

4.3.2.5. eBook formats

We looked at the eBook formats which work on the most common devices.

Epub which is an open format for creating eBooks which can be read on a variety of devices. Most of the common eBook readers can read epub documents. Smart phones, iPod Touches and tablets (like the iPad) have also eBook software which will display them. http://en.wikipedia.org/wiki/EPUB.

Unfortunately the Amazon Kindle, currently the most popular eReader, does not read epub. The Kindle has it's own proprietary format, but it can also read the open **.mobi** format.

We found a piece of free software which could do translations from one format to another, so we could make one book and save it out as both epub and .mobi to cover all eReaders.

5. The Interpretation plan

We gave research and conclusions to the Broads Authority as an interpretation plan and they considered the visitor, interpretation and technology needs and balanced that against the available budget.

5.1. Chosen modes of interpretation

It was decided that the forms of interpretation which should go into production should be:

5.1.1. The Layar Augmented Reality browser on iPhones and Android phones.

This is a cross-platform, smart phone approach which offers a compelling experience and is a technology which will mature in the future. It would offer smart phone users a novel way of viewing the Points of Interest. It would work no matter where visitors entered the reserve and what routes they took. It was a much cheaper option than producing our own iPhone or Android only app and would be available to users on both platforms.

5.1.2. A website with a Google map

The website would be a focus for the project and provide pages to download different forms of interpretation. The Google Map would show the Points of Interest to web users whether they visited How Hill or not. The map could also be viewed on smart phones and other internet connected mobile devices whilst on the reserve.

5.1.3. An eBook

The Points of Interest information would be published in epub and .mobi formats to cover the widest possible range of devices including eReaders, iTouch, iPads, other tablets and PCs.

5.1.4. A leaflet for Buttle Marsh

We planned a print run of 3000, A4 leaflets showing a map and the text from the Points of Interest which relate to Buttle Marsh. This would provide a low-tech, low impact way of learning about the marsh. A PDF of the leaflet would be available from the website. The PDF would also be readable to people with PDF readers on their devices.

5.1.5. A small display board for Buttle Marsh.

A board would give interpretation about Buttle Marsh to visitors all year round, whether they had their own technology devices or not.

5.2. The final interpretation

The final interpretation can be accessed:

- On site at How Hill - the Augmented Reality, the leaflet and the interpretation board
- Via the project website at www.how-hill.info – the customised Google Map and the eBook

The eBook and a PDF of the leaflet can also be downloaded and loaded onto an eReader, smart phone, iTouch or tablet before a visit to How Hill.

The final interpretation board at Buttle Marsh

6. Issues arising during production

As this was very much a research and development project, trying out new ideas, it was inevitable that there would be some unforeseen consequences of the choices that we had made. Some of these consequences have altered some of our original conclusions and they are therefore worth mentioning.

6.1. Problems publishing POIs for multiple formats.

The original plan was that the Points of Interest data could be written, designed and inputted once and then rolled out programmatically across the selected interpretation formats.

This would have provided a powerful platform for creating visitor information which could be updated in one place and seamlessly shipped to the user in a format preferable to them, a seductive proposition.

Whilst creating the code is certainly possible, In reality there are several problems with the interpretation produced when actually implementing this.

6.1.1. Content Issues

6.1.1.1. Text

Different formats have different amounts of space for content. In the Layar app each POI has: an icon, a title, four very short lines of text and a 'more info' button leading to a scrolling page of text and images. Different formats lend themselves to different ways of reading. Whilst it feels fine to have very short lines of text within an augmented reality browser, these brief introductions did not feel right in the eBook, on the leaflet or on the Google map.

6.1.1.2. Images

Images needed to be sized and treated differently for the different screen sizes and formats. We could use the same source images, but we had to save out multiple versions to get them to look right across the range of interpretation.

6.1.1.3. Maps

The maps did not work well across all formats. We set out to make one map and use it: in the leaflet, on the Google map, in the eBook and in the augmented reality. When we actually came to do this there were several problems.

- The map could not be stylised to best show information as it had to very accurately match the actual landscape to get it to line up perfectly as an overlay in Google maps
- Because we ended up mapping the whole of the How Hill estate the map was very large and we struggled to get the detail in places where it was really needed, i.e. when a visitor needed to follow a specific path or landmark
- The detail on this large area map ended up looking very small when we came to print the map in the leaflet
- The 16 colour grey-scale screens of the eBook readers did not show enough detail without manipulating the colours and giving the map a lot more contrast, so specific re-workings of the map were done to make them legible in the eBook

The practical upshot of this was that we ended up producing many, slightly different version of the text, maps and images for different formats. It proved difficult to make one asset and produce multiple versions from it to use across a number of platforms.

6.1.2. Technical issues

6.1.2.1. Maps

The Google map looked great on smart phones when there was enough signal coverage. It worked well in the city, but out at How Hill, because of the size of the graphics, even when properly compressed, it was slow to load and respond.

Screenshot of the How Hill custom Google map on a smart phone. **Note**, the pop-up does not scroll.

We also had a problem creating a map in which positioning and scrolling the pop-ups worked on both smart phones and PCs.

For these two reasons we ended up making the Google map specifically for viewing on a PC. It does works up to a point on a phone, but in the time we had we could not find a way to successfully optimise for both platforms at the same time. This should be possible with more research, newer browsers and newer versions of Google's code.

Also, the How Hill Estate is a large area so the map image had a large file size as it had to be big enough to give reasonable zoom in detail over this larger area. On a smaller site this would probably be less of an issue, further testing would answer this.

6.1.2.2. Layar

The big issue was network coverage on different networks. Our original research had tested network coverage around Buttle Marsh. However, when we tested all over How Hill we found a significant 'blind spot' in the signal in the lee of the hill. This did not affect all networks, but on some, the Layar information could not be consistently received in all areas.

The Map view in Layar

Atmospheric conditions also affected the Layar. On some days the service was perfect on all networks no matter where you were, on other days the test phones dropped either: the GPS signal, the 3G signal, or both. This could potentially provide an inconsistent and frustrating experience for users.

Google Map within Layar

The map view within Layar used a standard Google map of the area. This does not show any of the paths on the reserve, which are the routes that people need to be able to navigate. It can show you the geographic spread of the Points of Interest

around you, and is useful for getting general bearings, but not for finding the paths to get to places. It may be possible to add a custom map in the future.

6.1.2.3. eBook formatting

We started trying to make the eBooks with the same graphic elements used in the other forms of interpretation. Whilst it is possible to format eBooks with specific fonts, design elements and graphics there are big differences to how these display on different devices. We ended up removing most of the formatting and having a very simple structure of headings, text and images as these worked consitently. People used to eReaders will be used to this simple formatting and future readers will no doubt support more layout features in the future.

7. The evaluation day

At the end of November 2010 we hosted an evaluation day at How Hill Ecology Centre where we invited people involved in wildlife and heritage interpretation to come and test the development work and give their feedback. The group consisted of representatives from: The Broads Authority, Norwich Heritage Economic and Regeneration Trust, Suffolk Wildlife Trust, RSPB, National Trust, University of East Anglia and Norfolk Coast Partnership.

We sent them out around the How Hill Wildlife trail in two groups after which they were asked to fill in evaluation forms and take part in open discussions. We had some very useful feedback some of which is summarised below. There is also a video of the evaluation day online at http://www.how-hill.info/documentation.html. This shows one of the groups going around the trail and extracts from both evaluation sessions.

7.1. Feedback

We asked people to comment on both the augmented reality, smart phone application and the eBook. We also had the Google map on computers in the Ecology Centre for people to browse. We also asked for feedback on the approach of using Points of Interest in a wildlife location that people could access using their own devices.

7.1.1. The Augmented Reality App

The app works on both iPhones and Android phones so we had both available for people to try and some people bought their own phones.

A summary of the feedback on the Layar app:

Pros

- The app highlighted interesting things in the landscape which I might have just walked past
- The technology to get to grips with
- There is a lot of potential for this kind of interpretation in a large, open site
- The information could highlight different wildlife depending on the season
- If people were using their own phones, which they were used to, they would find it intuitive
- The app could really bring a site alive – particularly for someone with little initial interest in it
- It might be good for engaging younger people with an interest in technology
- A good approach for sites where you don't want anything intrusive
- Could be used for interpreting things on a site that you can see but can't physically get to
- Could be used for a heritage trail
- It is interesting and will only improve
- Could be used as a nature trail guide
- Easy to dip in and out of so is much better than an audio guide which can be anti-social when you are in a group
- Brought a new dimension to the trip
- More fun than a guide book
- Learnt more than would with just a stroll
- It's nice to explore and not know what might pop up round the corner. I find that element quite exciting.
- Did not need a paper guidebook or map
- New and exciting

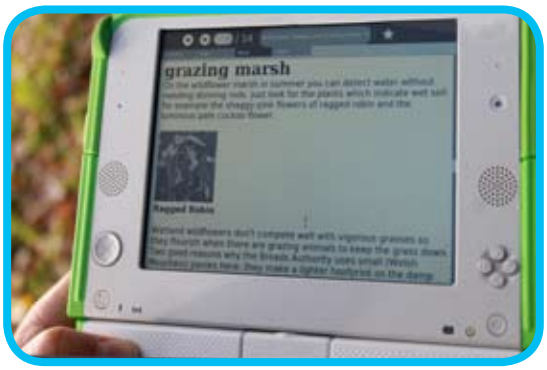
Cons

- Looking at a screen can detract from actually being in the environment
- Too many icons at one time and it was hard to know which ones were nearby
- A lack of colour image and audio or video which could make the experience richer
- There were no maps in the information about individual points of interest, they might be useful for getting bearings 'on the ground'

- The technology was not easy to get to grips with
- The loss of signal, when it happened, was frustrating/confusing
- Sluggishness in orientating
- Are smart phone users are part of the site's visitor demographic?

7.1.2. The eBook

We had the eBook available on eBook readers, iPod Touches and a childrens' educational laptop.



The eBook on a children's educational laptop

A summary of the feedback on the eBook

Pros

- It was really useful and the map was easy to read
- It was a good way of giving people a full guide book
- It felt like something to read before a visit
- Could be used as a room tour of buildings

Cons

- Getting back to the map was confusing
- It felt like something to read before a visit, not whilst walking round
- It would be nice if it located you on the map (GPS)
- It was less interesting (than the Layar app)
- Same information as a leaflet but without the colourful design

7.1.3. Feedback on the approach

In the group discussions there were also general comments about the Points of Interest, the concepts of using this technology and where people saw it being useful in the future.

7.1.3.1. Points of interest

It was clear from the group discussion that people felt it was not possible to create content for Points of Interest that can be used consistently across different media and applications.

They generally liked the content and thought the approach of breaking up the story into Points of Interest worked.

7.1.3.2. Creating specific content for different seasons

As wildlife sites change throughout the year with the changing seasons, having information about what can be seen at a specific location is only useful if it is 'in season'. We had a lively discussion around the idea that all three forms of interpretation could be season specific. This was something that members of both groups thought would be very useful.

7.1.3.3. Technological barriers

Although there were some technological barriers caused by people not being used to the devices, overall people felt more positive after using the technology. When asked how they felt about this technology at the beginning and then the end of the day people were generally more positive at the end of the day.

Response numbers	Very negative	Negative	Neither	Positive	Very positive	other
beginning of the day			4	6	1	worried
end of the day				11	2	

7.1.3.3.1. Smart phones

The users in our evaluation group who either had smart phones or were used to using new technology were at ease with the application. Others, however, found using the device confusing, and were not sure how to navigate menus, etc.

At the time of writing the proportion of the UK population with smart phones stands at around 30%. iPhone and Android phones are the biggest proportion of this market, but of that 30% there are still many with phones like those made by other manufacturers such as Blackberry and Nokia on which users do not habitually download and use applications.

We would expect this behaviour to change over time as familiarity with smart phones becomes more the norm.

7.1.3.3.2. EReaders

None of the people in our evaluation group were used to reading eBooks and could not intuitively browse the content that we had created. They did all manage it with a little instruction, but there was still a technological barrier between them and full engagement.

eReader take-up is on the increase, the market is growing. We could only expect people to download the eBook if they were used to reading eBooks on their eReaders, phones, tablets or computers. These visitors, with their own devices, should feel at home on them and thus have a greater engagement with the content.

7.1.3.4. Accessibility

People were generally very positive about the idea of using the augmented reality to show visitors things they could not directly see; for example, interior photographs of inaccessible buildings or historical photography.

It was also highlighted that this could be useful if buildings did not have disabled access as it would give users with accessibility issues at least some experience of those buildings.

8. Changes to the interpretation in response to the feedback

We assessed all of the feedback and looked to see what changes we could feasibly make before the project went live.

8.1. The Layar app

- We grouped the icons and made selections of them appear when the visitor is in different locations on the site so that they don't get overwhelmed with icons and are not sure which ones are local.
- We added colour images. Originally black and white, high contrast images had been used as they were quick to download and so we could use the same photos on the black and white eBook screens. The network was too slow to add audio and video as had also been suggested.
- We added maps to the 'more information' on some Points of Interest, in particular the ones in the wildlife trail.
- We put in alerts telling the user that their signal had been lost so that it didn't look as though everything had 'just gone wrong' or the user was doing something wrong.

8.2. The eBook

- Although we did not have direct comments about the contrast on the map, we felt that out in the field it was not as readable at it could have been. We thus gave the map even higher contrast.
- We added more general content so it felt even more like a 'guide book' than a trail leaflet as that seemed to be its strength.
- We improved the navigation to make it easier to jump from the map to information about specific POIs and back again.

9. Final findings and conclusions

The conclusions in this report are based upon:

1) The initial technology research
2) The lessons learnt when prototyping and producing the final interpretation
3) The feedback from the evaluation day
4) Testing the interpretation in the field on different days over a number of months

9.1. The Layar Application

Using the Layar application to provide an iPhone and Android augmented reality experience for visitors is generally a cost effective way of providing visitors with an engaging technology experience at an outdoor site.

Pros

- Users can use their own phones, which they are familiar with
- The experience is 'different' and engaging
- It has no visible impact on the natural environment
- There are only very small distribution costs
- It could be made to deliver seasonally specific information
- Layar is a third party application and so the company that makes it will maintain it and upgrade it for new handsets. Since the project's completion Layar has been launched on the Nokia Symbian OS so it is now available on even more phones without paying for any further development
- Generally very positive feedback from the evaluation group

Cons

- It is not available to people who haven't got the right phones
- On a remote, outdoor site there can be problems with losing the signal leading to user frustration
- It is not currently possible to add a custom map to the 'map view' within the app

9.2. eBooks

Providing eBooks for visitors is a cost effective way of making guide books, visitor information and interpretation available to those who have eBook readers.

Pros

- eBooks can be read on a variety of devices including: eReaders, smart phones, iTouches, computers and tablets
- Visitors can download them directly from a website so there is minimal distribution cost
- They can be updated easily with changing information
- They could be made to deliver seasonally specific information
- It can be a very cheap way of providing users with a large, free guide book
- If text is being prepared for other kinds of publications it is fairly straightforward to put that text into an eBook increasing the ways that information is distributed

Cons

- Currently the visual styling needs to be kept very simple to work across all devices
- Images appear at different sizes and colour depths on different devices
- eReader users may not be used to downloading eBooks from the web as they usually get them from the online shops that their readers link to
- It can be a bit frustrating referring back to a map which is in a different place in the book

9.3. Custom Google maps

Adding a custom Google map to a website is a good way of getting the information that you want on a map and providing a consistent look and feel with other material.

The How Hill Google Map on a smart phone

Pros

- It is a map interface that web users are used to
- Maps can contain only the information which you think is relevant to your site
- They can have custom graphics which tie in with all of the other branding for the site
- Points of Interest can be added using a reasonably standardised format
- Google update their own map code which should assure it continues to work in new browsers and devices
- If viewed on a device with GPS the users current location will be shown on the map helping with orientation

Cons

- For bigger sites with poor mobile coverage the maps may be too big to work efficiently
- We did not manage a consistent user experience on home PCs and mobile devices, but this should be solved with more development time, new browsers and newer version of the Google map code

9.4. Publishing information as Points of Interest

For larger sites, areas or regions publishing information as Points of Interest makes a lot of sense.

Pros

- These POIs have the potential to be used in all kinds of digital mediums including: phone apps, websites, eBooks, Google Earth, GPS devices, maps and digital listings
- If **you** publish them then **you** write the content, rather than waiting for a commercial third party or a member of the public to publish them. This allows you to take ownership of the information about your sites
- POIs can add detail and wider context to all kinds of network delivered digital interpretation
- They are part of the digital 'mapping' of the physical world which is growing apace
- Making your POI data free for other people to use is great, free advertising

Cons

- The POI data does need to be in slightly different formats for different systems
- It takes time to write and collate content
- There is a small, ongoing hosting cost
- POIs would need to be kept up to date

10. Suggestions for future research

10.1. Further evaluation

This project took place over the autumn and winter whilst How Hill was closed, this meant there were not visitor numbers on site with whom we could perform proper visitor evaluation. The interpretation is being officially launched in April 2011 and we recommend that it would be valuable to do public evaluation with visitors who have used the interpretation on their own devices. This does not mean, however, that we cannot draw valuable conclusions from the research and feedback that we do have.

10.2. Seasonal content

Many of the people involved in the evaluation day were responsible for running nature reserves. The area of future research which they thought would be most productive was the trialing of a system in which Points of Interest would deliver different wildlife information to the visitor depending on the time of year. For example, a wood at a particular geolocation would have certain nesting birds in spring or particular plants or invertebrates during other specific months.

It was discussed that, programmatically, it would be possible to create content that was different at different times of day at different time in the year, owls at dusk for example.

The main barrier to this is not technological, but rather a content creation issue. Getting together information about even a small number of Points of Interest, which might change month-on-month, would be a lot of work.

10.3. Customised maps on smart phones

A highly compelling way of showing the Points of Interest is to plot them onto a custom map, designed to show the paths and features of the site. When this map is viewed on a smart phone, which has a data connection and is GPS enabled. The visitor's location can be plotted on the map at the approximate place they are standing

We attempted to get this to work using a Google Map through a web page, and whilst it worked really well in the city with fast data rates, out at How Hill the maps got very sluggish as the phones struggled to load the content.

Within the Layar app there is a map view which shows the visitor a standard Google map, with their location and the Points of Interest plotted around them. This is

very useful for seeing a rough geographical spread, but the map does not have the detailed information which a visitor would need to find their way around, paths, landscape features , etc.

If this form of electronic interpretation could be perfected through:

- A browser using Google maps or a similar supported map interface
- A custom map feature being added to Layar
- Another, third party , cross platform mobile mapping app
- The creation of a custom cross platform app

This would be a very compelling way of giving users in-depth, informative and useful information and interpretation. This also gives them the ability to locate themselves on a map and see the paths and features necessary to navigate the site.

10.4. Sharing Points of Interest data

Sharing data is a really useful way of getting your information into other people's websites and applications.

There are many sources of data currently available for developers to use in their own innovative projects. A lot of UK Government data is free to use and Google encourages the use of their mapping data in third party projects.

With a small amount of work the Points of Interest data from this project could be made available through a web address so that they could be pulled into other third party web and mobile applications. This would give wide access to this visitor information.

Currently they are being delivered in three data formats:

- to a Google Map (as JSON)
- to Layar (in Layar's own format)
- as XML which we then format, by hand, into the eBook

This data could be made available for anyone to use. To make the Points of Interests as reusable as possible it would be important to consider best formats in which to publish them and what information it would be best to include.

Whilst it is true that the data would often have to be modified to work in different applications you could have a license which would stipulate how it could or couldn't be used and that logo and a credit should be included.

10.5. New or updated cross platform apps

New handsets have new features, new apps appear on the market all the time, existing apps get updated. The digital landscape is constantly changing and it would be worth assessing any new, third party, cross platform, phone apps which can take Points of Interest and display them in new and useful ways.

11. Links and references

The Project Website – http://www.how-hill.info

Augmented Reality and Layar

- Wikipedia on augmented reality - http://en.wikipedia.org/wiki/Augmented_reality
- The Layar website - http://www.layar.com

eBooks and eReaders

- Wikipedia on eBooks - http://en.wikipedia.org/wiki/E-book
- Cailbre, free eBook management software - http://calibre-ebook.com
- Sigil, free eBook creation software - http://code.google.com/p/sigil

Points of interest

- Wikipedia on Points of Interest - http://en.wikipedia.org/wiki/Point_of_interest
- A list of some freely available UK tourism POI data - http://poi.gps-data-team.com/united_kingdom/tourist_locations/

Custom Google maps

- The How Hill Custom Google map - http://www.how-hill.info/google_map2.html

Acknowledgments

We would like to thank:

The How Hill Study Centre
The Staff on the How Hill Estate
The Ludham Archive

The evaluation day

Appendix I
Full transcript of the evaluation day forms

These transcripts are in order of the questions on the forms, but within each question the answers are in no particular order. Not every person responded to every question.

1. At the start of the day the way I felt about this technology could be described as:

Response numbers	Very negative	Negative	Neither	Positive	Very positive	other
beginning of the day			4	6	1	worried

2. To help us learn from today's evaluation please summarize your opinions, observations and feelings.

- Layar preferred – signal loss annoying – trouble going back to the camera selecting more info

- eBook had good info, but if you didn't know where you were on the route then that info wasn't useful

- Confusion – but can see that it could be useful
- Frustration with being new to the technology

- Technology was new to me but I got to grips with it ok
- Liked the detailed information on the main points of interest
- Found the big blobs on the screen distracting on the Layar
- eBook good size and easy to read the map on this device
- Is the trail map needed, would be good to go off piste?

- Demonstrated good potential today
- Some frustrating aspects concerning the technology
- This won't be for everyone, but may enhance appeal of sites for some groups/ demographics

- May act as a barrier to engagement in some instances – e.g. viewing everything through the eye of a lens

- eBook had more limited appeal

- Needs map
- Make views better integrated into the landscape view like ability to select layers of info relevant to depth of interest
- Layer Icons, when lost, a little confusing, better way to represent distances of what first in landscape.

- Layar – phone signal cut out at times
- Screen reflection made it difficult
- Icons showing points of interest – useful
- Took time to go back
- Would be easier if more familiar with the technology
- Maps took time to load new location – apparently new versions of the app may do this more quickly
- eBook - can see that some people would like to download trail before arriving. Easy to use but less 'realistic' than the phone
- Needs to be more obvious how you would get back to the map

- Layar a good use of new technology but still lacked content. Directions to points of interest would have made experience easier
- Often confusing – hard to know if phones signal is working properly - could be taking people in wrong direction
- More info screens needed more content – audio/video? This could cause slow down but if content was optimised it would be great
- eBook good as it allows people to bring full guidebook rather than small leaflet – but surely only appeals to people with the tech who would buy a guidebook in the first place.

- Surprisingly simple to use once used to the handset
- eBook less exciting
- Lack of geo-referencing with eBook can be confusing – referring to map was a bit awkward
- Feel more positive about tech

- I think showing features too far in the distance is less useful/interesting than focusing on very local features re: within line of site.

- Massive potential for this technology in heritage, National Trust sites, etc.
- Needs to improve signal/reception as there were many blackspots in countryside areas.
- Fairly easy to navigate technology on smart phones.
- Didn't find the Kindle as user friendly.
- Would be great if people could use their own smart phones as you wouldn't need to 'learn' any features.

- eBook – I felt introduction was something I would read before my visit, not during when actually walking round, I want short pieces of information at regular intervals, not loads of pages to read through.
- Also from a technical point of view because the battery life was drained the screen went very dark (*iPod Touch*). Because the pages were mostly white text on black background it was all un-readable (*Specific to that eBook reader on iPod Touch*). If you make sure it was always black tect on white background you could avoid this problem. Generally speaking I think you could roll out the eBooks as something to read in a visitor centre (with visitors borrowing technology). It's just an interactive book so doesn't really require any knowledge whereas the Layar application would be better suited to smart phone users bringing their own devices, as you need to understand certain principles of using them.
- Layar – I really enjoyed using this and would choose to do so again if I was going for a walk and I know this was available. It was easy to dip in and out of, so was much better than something like an audio guide (which is very anti social when you are in a group). Losing signal wasn't a massive problem as I just put it away for a while and got it out later. I think this would work well across a very wide range of ages, it's quite intuitive so children would enjoy it.

- Layar has huge potential
- eBook also good, but not sure if the lack of location services will be a major limitation
- More thought needed as to what sort of content most valuable
- Better map layers would add considerably

- Obviously good for sites where you don't want anything intrusive
- Good for teaching young popele (not always easy for us) & children
- Good to introduce hard to reach groups to something unfamiliar via familiar technology
- Season/current info wold be good

- Really liked the flexibility
- Was good to see how both devices work as I've never tried either.
- Text & graphics & design still needs to be considered as they would be for other media.
- Could really bring a site alive – particularly for someone with little initial interest in it.
- Good to be able to have shorter or longer info as choice at the particular time – as with carried printed info or other media. Also for different users.
- Not ideal in rain or snow. Thin gloves good if could!

3. Which prototype did most to enhance your understanding of the site and it's features?

	Layar	Ebook
Response numbers	7	4

4. What did you enjoy most about this way of finding out about a place?

- Gave me more info about the key points on my route – by highlighting them as I approached. I would have otherwise walked past them.
- Did not need a paper guidebook or map
- Access to otherwise unavailable information
- Sucks your awareness into the landscape
- Enjoyed the phone app most. Flexibility – could select what you wanted to find out about
- Interactivity
- New and exciting tech. Novelty appeal
- Being able to scan area & pick out points of interest.

- It's nice to explore and not know what might pop up round the corner. I find that element quite exciting.
- It is not predictable and presents a great variety of information.
- Flexibility to take in as much info as you want, when you want and to have access to it later (*with eBook*).

5. What frustrations did you encounter whilst using it?

- Icons didn't always appear. Reflection sometimes made phone hard to read. eBook obviously seems like reading a computer screen rather than a colourful leaflet.
- Nothing of note.
- Lack of signal on Layar. Battery died on eBook so screen very dark (*iPod Touch*).
- Kept loosing signal.
- Learning to use handset. Getting lost with eBook.
- Had to stop and stay still for content to re-orientate, frustrating. Also felt I spent too much time looking at the device, not scenery.
- Touch sensitivity on phone didn't respond. Reflection.
- Layar didn't allow going back to visitor map. Not all function available – mouse, cursor, etc, in eBook.
- Reception. Sluggishness when it came to orientating.
- Rain – steamy phones.
- Snow made screen difficult to see on eBook. With Layar it seemed to take a long time to register info. With both I'd never used them before so needed time to get used to.

6. How would you improve it? (don't worry about the technicalities)

- eBook – colour screen would be better. Symbols around the trail that corresponded with symbols on the eBook map would be helpful. Layar – didn't really have time to appreciate capabilities.
- Provide plastic covers in wet.
- More responsive.
- Easy navigation between map, layar view and info about each feature. Don't just reduce the size of the icons in the distance in Layar, but make progressively lighter as would in painting.
- More content – perhaps images flashing up on the camera view rather than in 'more info'. Directions to the points of interest – More content – feels a bit empty.
- Simple map on Layar with route. Map on each eBook page to reference.
- Better signal and a waterproof casing.
- It might be worth ensuring there is a home page or some kind of critical explanation so they know what to expect.
- Need to focus on what information is being conveyed. Content at present is little more than can be gleaned from paper leaflet.

7. How did you feel about using these technologies in the field?

- I like to enjoy a site or walk, etc., and not spend so long on the interpretation as to miss the feeling of the place itself. These devices give you that flexibility.
- Kindle is too big, would be less inclined to carry it around.
- I felt fine about it and would feel even more comfortable if it was on my own phone and I knew how to use it.
- Fine.

- Pleasant surprise with ease of use.
- Comfortable, but I used my own device.
- Positive – if technicalities sorted. Hadn't used before but would be encouraged to do so.
- Once got used to each one was ok, though changed the experience.
- Fine – it worked, with drawbacks (reception, sluggishness in orientating).
- Can be distracting from enjoyment of the location and it's views – need to pocket it and enjoy the place too.
- Not very practical in all weather conditions.
- If I was more familiar with the phones it would add more enjoyment, giving me more info about places on my route.

8. Did using the technology affect your relationship with the place?

- Yes, didn't appreciate it as much as I normally would, but I think that is more because I wasn't familiar with the technology, that's what I spent my time focusing on.
- Tended to focus on looking at the technology to get used to using it rather than looking at the surroundings.
- Yes, as it was new – but would not if I used these devices for many similar experiences.
- You can spend more time concentrating on the technology rather than the place.
- Yes – I was taking what I wanted from it, it was not demanding attention from me.
- Spent more time trying out technology and realised that I didn't enjoy as much with surroundings.
- Hard to tell as I know nothing about the place originally – but it is more fun than a guidebook.

- No previous relationship but learnt more than would with just a stroll.
- Yes – brought a new dimension to the trip.
- Yes – I think it does make you feel more connected than if you just walk round without interacting with anything.
- It has the potential to - in positive and negative ways. Can provide valuable information when visiting for the first time, but must do so in a passive way.
- Not really, I'm already familiar with the place.

9. Did the technology help you to orientate yourself?

- Yes – but I atlready know the site well.
- Yes
- To a point. In some ways a little bit disorientating if you use it too much! I think if you just use it at certain points it would be fine.
- Yes
- It certainly did (specifically Layar)
- No – I felt I had to orientate the technology.
- No
- No - not if a map was unavailable. eBook was good for this but would be helped by showing the direction you were looking in.
- Yes, to a degree.
- Not really – sign posts were more natural for me.
- Found static eBook map more useful than Layar, but maybe because I needed more time to understand how to use it.
- Yes, not the eBook though.

10. What concerns do you have about these approaches to site interpretation?

- Length of time the Layar app took to work sometimes. Might lessen people's engagement with the actual environment.
- People falling into the river as they are distracted by their phones! No real concerns, can use it or not, there is a choice for the visitor.
- No concerns - I see it as potentially lowering adverse impacts e.g. reduced signage.
- Encourages anthropocentric attitude that runs counter to some strands in ecological education.
- Needs to be flexible and allow people to look at surroundings and engage with them more than just with technology itself.
- Possibly concentrate too much on tech, not enough on place. Also, it requires people have smart phones. Are smart phone owners the same demographic as visitors?
- My gran couldn't do it.
- Perhaps some people might spend too long concentrating around the technology and not just taking site in.
- Lack of signal for the Layar. Amount of people that visit our reserves and have a smart phone.
- Only as good as the quality of the content. Can distract from the more emotional response of being in an attractive natural environment.
- Important to do other things as well for those who don't have access or want access in this way or cannot use these devices. Also other forms of interpretation can catch the imagination too whereas this relies on a degree of interest or interest from someone else in a group.

11. How can you see yourself wanting to use this kind of technology in your own work/on your site?

- Could work at many country parks and nature reserves.
- Nature trail guides.
- The RSPB could use this technology in a similar way as a "trail guide" at our reserves.
- Incorporating 3D explanatory animation about key points of interest.
- I can see it in the future. Would have to lock users into a single trail, can give key info about forbidden areas.
- Yes – it really interests me and it will only improve.
- I can see that some of our National Trust sites would have a use for this technology. It would suit some audiences. Others may want to get away from technology if they spend a lot of time with it during their working day. Some sites do not have good mobile phone reception and this may be a problem. The eBook could be used indoors to enable people to download room tours of mansions.
- As an extension of our self-guided trail book, audio tours, etc. Also for landscape features visible if you can't get on site.
- Yes
- Could be used for heritage walks around Norwich as part of the HEART initiatives and Shaping 24.
- We are looking at using similar technology to interpret heritage around Norwich
- Think the Layar approach would work well for our external sites – e.g. Orford Ness and identifying building history and use as you walk past. The eBook would work well as room guide info in our houses.

12. At the end of the day the way I felt about this technology could be described as:

Response numbers	Very negative	Negative	Neither	Positive	Very positive	other
End of the day				11	2	