

3rd Australasian Engineering Heritage Conference 2009

Sydney's Birthplace Walk Podcast

Daniel Woo, PhD, School of Computer Science and Engineering, The University of New South Wales

SUMMARY: *The Sydney's Birthplace Walk is a heritage walking tour that is freely available as an enhanced podcast. It is based on an existing walking tour developed by Heritage Engineer, Michael Clarke, and describes the places, people and engineers that established modern Sydney. Set in the historic Rocks area, the two and a half hour tour provides listeners with just over an hour and a quarter of content, consisting of audio commentary, still photographs, navigation instructions, maps and background audio. User centred design strategies were adopted in the analysis phase to understand the context in which the original walking tour was presented. This paper discusses the design, development and production of an enhanced podcast highlighting the importance of the copyright issues surrounding the release. Availability via the iTunes Store podcast section will also be described. The paper further explores the future of personal mobile and location aware devices for advocacy and education in heritage engineering.*

1. INTRODUCTION

The widespread availability of mobile devices (i.e. phones, music players, navigation devices) with both audio and video media playback provides an increasing audience with the ability to download content and take that content with them on a journey. In the context of heritage, we would like people to be able to find historical content related to a place of interest, download the relevant information to their device and listen to it in-situ. In addition to audio, the user can view imagery to both assist in orienting themselves in the environment and to show what this place looked like in the past. From the institutional point of view the consumer ownership of mobile devices removes the need to provide equipment hire and headphone cleaning facilities.

The self-guided walking tour is a ubiquitous tourist instrument that allows the motivated traveller to discover a series of places in an unfamiliar part of a foreign city. In paper form, it is typically found in a guidebook or as a single- or double-sided paper fold out that reveals to the traveller a map embellished with a sequence of numbers that are optionally connected with a suggested route. Alongside the map is the legend that associates the numbers with named places of significance. Depending on the design layout, the traveller may need to cross reference the numbers or names with a separate detailed description of those places. Dexterity may also be required to flip page sides or fold and unfold. Simultaneously, the traveller locates and orients themselves in the real world, based on the map they have before them. Throughout the world there is a familiar sight of confused people rotating maps, and reading street signage to understand where they are and where they have to go.

The cognitive load imposed on the unfamiliar traveller is high. Attention is split [1] between different pieces of information such as the place on the map and the description located on the other side of the page (see [2] regarding cognitive load and map reading). There is also a great deal of excise ([3]) involved in trying to find the places of interest. The traveller's goal is really to explore places of interest, not spend time trying to interpret a map.

The guided walking tour allows the tourist to follow an expert who is familiar with the territory, thereby avoiding the sense of being lost. Places of interest are pointed out and described in more depth and interactivity than a paper guide or map. A one-to-many two-way conversation takes place during these tours, allowing visitors to ask questions.

With a mobile self-guided tour, the challenge is to make an informative experience that also removes having to deal with the physical paper map experience. The experience should embody "play and start walking" approach. The initial approach considered how to provide a linear sequenced tour in a more engaging manner that leverages off-the-shelf mobile media technologies (circa 2007-8), where possible, making the traveller feel like they are being guided by an experienced and knowledgeable guide.

2. LOCATIVE MEDIA - PAST EXPERIENCE

This project is influenced in part by our design and public presentation of several art+science research projects that have explored the use of sound media in location sensitive art pieces. In 2004, AudioNomad (Linkage Project LP0348394 2004-2007) was one of the first projects to be funded under the Australian Research Council and Australia Council for the Arts, Synapse Initiative [4].

The aim of the funding initiative was to bring artists and scientists (and engineers) together to explore new and novel research collaborations. Through this project AudioNomad deployed 2 major artistic pieces that used geographic location to trigger sound [5, 6]. A novel aspect of this work is the use of a 12.2 speaker circular speaker array, which provides an immersive listening experience, allowing sound to be virtually positioned 360 degrees around the listener. Both projects were presented on boats and provided listeners a composition of sounds augmented over the real landscape. Sounds could be virtually attached to places in the physical landscape and as the boat moved, the listener could hear those sounds coming from a fixed position in the environment (Figure 1).



Figure 1. Using a speaker array the AudioNomad projects could create the sense that a sound was coming from the island in the physical landscape.

The audio content (designed by Nigel Helyer) included acoustic examples of sonic art, recordings of nature, industrial sounds, historical narratives; the latter of which featured archival recordings. These examples were highly layered, presenting an acoustic environment far richer than what we normally experience.

These large-scale public surround sound artworks used gigabytes of audio data, multi-channel audio hardware and the processing power of a desktop computer.

3. THE CONCEPT

The Sydney's Birthplace Walk provided a new opportunity to reconsider location-based content but with reference to off-the-shelf consumer technology. A walking tour on a mobile device (circa 2007) for pedestrians has design limitations: limited storage space, finite battery life, limited location-awareness (if any) and stereo audio.

Michael Clarke, heritage engineer has been conducting guided walking tours and boat tours since 1994, producing a guide book [7] and has personally led around 2000 people on tours to places of Engineering significance in Sydney [8]. He is passionate about

heritage, drawing on his own experience as a civil engineer. Michael collaborated in the development of this podcast providing a wealth of experience, having researched this topic for more than a decade.

In previous AudioNomad projects, a researcher who did not have domain-specific, historical knowledge conducted content research. The outcome of that research uncovered archival imagery and texts that could be utilised as the script. Typically this process took 2-3 months [9]. In the development of this walking tour, Michael with his knowledge and experience produced a script within a couple of weeks specifically tailored to the podcast. His collection of imagery provided was an invaluable starting point. From this project, our experience demonstrated that working with an expert familiar with the content increases the efficiency of the pre-production process.

4. PROCESS

4.1 A User Centred Approach - Observing the Guide Process

Taking a user-centred design approach [3], the first step was not to build a system, but to actually go on the walking tour with the expert guide. The aim of this excursion was to understand both the experience of the listener in the actual setting and how the guide conveys the content. This was slightly less realistic since it was not conducted with a typical sized group. It was just the researcher/designer and the expert guide.

Audio recordings and some site photographs were recorded. The observation audio recording was carried out with a simple digital recording device (Griffin Microphone + iPod).

Recordings could be used to aid developing a script, but in our case the expert was part of the pre-production team so we did not need to refer to the recordings to develop the script process.

From the first walk, the observations indicated a need to provide both audio *and imagery*. Audio was obvious, but an A3 folder was used to show relevant pictures that complemented the commentary. As part of the commentary, the guide used hand gestures to point to things and described places to look at based on the listener's relative position.

Places visible in the environment were mentioned within the commentary (eg. "...the brick building over here with the chimney...") to both draw the listener's attention to a physical area in the landscape and to lead into the next part of the tour. Instructions to ask the listeners' to move around were spoken. With the guide, the physical gestures (i.e. pointing and walking in a particular direction) are clear clues for the listeners to follow. In a mobile device context, this isn't possible. So there is a need to orient the listener in a particular

direction and have them move to a specific place, using visible cues present along the route.

4.2 Script Development

Following the observation exercise, the next stages were to develop a script suitable for a studio recording and identify which imagery was relevant and where it should be included relative to the script material. The content expert developed scripts and the placement of images relative to the script.

The original script described the walking instructions between each point of interest but was refined to support a second narrator giving those directions. Specific visual cues were also mentioned in the navigation scripts.

Navigation was adjusted to ensure that pedestrians followed sign posted street crossings. For safety reasons, the script does not encourage the walker to be listening to commentary whilst walking. The idea is to have the person stop at a place and listen to the main commentary and then hear the cued walking instructions, press pause and walk to the next destination. When at the next point in the tour, the play button is pressed.

4.3 Navigation Media Content

Whilst maps give the user an aerial view, they do not provide an “on the ground” perspective. Photos were taken from the pedestrian point of view to help the user orient themselves in the environment (Figure 2). The photos are sequenced with animated map images. An additional visit was conducted to take photographs of the immediate surroundings to help the user orient themselves to visible landmarks.

The navigation photos assume that the user stays on the designated path and has not deviated off the planned route. Providing corrections would require a device that could support alternative pathways and know its position. In this instance, the devices used were not programmable, not location-aware and could only use a linear sequence of media.



Figure 2. Image sequence taken to assist people find the stairs at the north end of the Overseas Passenger Terminal. Taken from the pedestrian perspective.

4.4 Mapping Content

Mapping content is provided under licence from MapData Science Pty Ltd. The licence requires that the maps be provided as static images. The images are overlaid with a walking path that shows the starting point (green rounded), the stages to walk (blue path, with white highlight to show the current stage) and the destination (red rounded square) of the next leg of the tour (Figure 3). Interleaved between the map imagery are the photos taken from the walker's perspective (Figure 2).

Simple map illustrations rather than aerial photographs were used in all but one map given that most people would be unfamiliar with roof structures when standing on the ground (Figure 3).

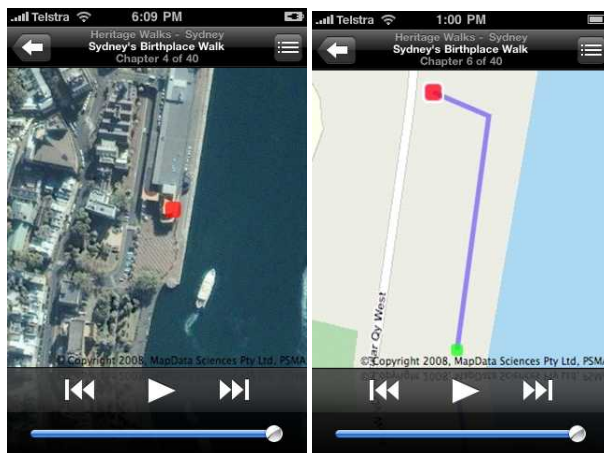


Figure 3. Aerial vs Illustrated map showing the Overseas Passenger Terminal

4.5 Podcast Development

Podcasts on the iPod platform were considered for this version because of the widespread availability of the devices, the ease of use in being able to download the content via the iTunes application (on both Mac and Windows platforms) and the ability to embed photographs using the enhanced podcast format. A movie-based format was considered as an alternative but the overall file size, potential compression artefacts and the fact that still imagery was the primary source of visual material, led to using the enhanced podcast.

MPEG3 audio files, a commonly used format available on a wide range of devices, would have been appropriate if the content consisted only of audio, without images. The script makes references to images, so in this version, removing the images and leaving the recorded audio would have created some confusion for the listener.

Tools such as Apple's GarageBand and Soundtrack Pro have functions that enable creating enhanced podcast content.

4.6 Audio Recording and Editing

Using a completed script, the narration was digitally recorded with a professional voice microphone in a quiet room. The domain expert was used as the narrator. The voice quality was consistent with the goal to provide a friendly guide whose voice gave the sense that they were there beside the listener showing them the places being described. The voice has been described by a trained voice professional as a warm, friendly voice, which is in keeping with the content.

A professional voice artist was used to record the navigation instructions. A female voice was chosen to contrast the main content giving the listener a cue when to listen and when to walk.

Editing the audio recordings was required to extract the most appropriate recording "takes". Sometimes the final take for that section was used, other times because of errors, multiple takes were appropriately spliced together. Editing of a professional voice artist compared to a non-professional is a significant cost/time consideration. A professional voice artist is more consistent and the way that errors are handled does help the editing process. For a non-professional, they may not realise that a mistake has been made or might repeat a subsequent take in a slightly different manner. Admittedly, the complexity of the navigation instructions is simpler than the narration, so the types of mistakes that are encountered are also simpler. In our case there is a trade off between a knowledgeable voice versus a professional voice.

4.7 Image Use, Rights and Copyright

A significant amount of time was devoted to managing the legal aspects of image use. Under copyright, the use of images in an electronic enhanced podcast is quite different from personal use, research purposes or use in print material. To redistribute the content in electronic form imposes different constraints and a specific licence agreement was required. In order to manage this process, a database of all images to be included was developed. From this database, reports were generated to provide the rights holder with a description of the images that were required. Many of the existing images were already available through on-line searchable catalogues. The resolution required for enhanced podcasts is not high (unlike print use) so the on-line version provided sufficient resolution and we did not require the rights holders to reproduce high quality imagery. Permission to reproduce all included images was obtained from the relevant institution.

4.8 Assembling

Once the audio content and image media were edited the process of assembling the experience took place. Audio was separated into different places of interest and

sectioned off on the script. Audio was placed and then imagery synchronised to the precise point where it was mentioned in the commentary. Several iterations were typically required to fine-tune the audio and images.

Chapter markers were used at the beginning of navigation instructions and at the beginning of each place. This provides the user with a quick method for skipping between different parts of media. On the iPhone and iPod touch interfaces the user can view the complete name of the chapter marker (Figure 4), so naming the chapters with something meaningful is important. In the field, the chapter markers allow the user to tap the back chapter button to start the current section again.

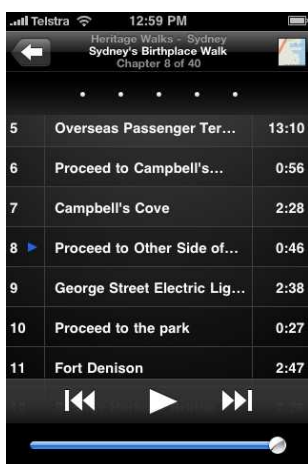


Figure 4. Chapter markers enable the listener to choose, based on the name of the place

In addition to the chapter markers, there are musical audio samples that correspond to the beginning and end of navigation instructions. These are consistent throughout the entire tour so the listener learns when navigation is about to commence and the female guide voice commences. There is an additional musical interlude to wait for the listener to press the pause button.

During the editing process, the script is read constantly, to confirm that the recorded audio has no errors in the dialogue and that any hesitations are removed or corrected. The synchronisation and duration of the images is also verified. Section by section, each is carefully reviewed, and then whole sections are confirmed and finalised against the script. As the content grows in duration, so too does the time to review.

4.9 Device Testing

The content can be tested within the authoring application or as a media file in a media player, like Quicktime Player (Figure 5). But it is also important to audition the content on a target device. Fortunately, the same files can be distributed and played on other

computers; so having other editors (and expert guides) listen to the content during the editing process is both possible and beneficial.



Figure 5. Podcast playback on iPhone 3G and Quicktime Player with chapter markers visible

4.10 Additional Audio

Following the near final layout of the commentary and images, audio effects can be added. In this case we enlisted AudioNomad collaborator and sound artist, Nigel Helyer, to provide the ambient audio layer. There are various background audio samples that have been added to create a more interesting sonic experience. As an example, there are footsteps heard when presenting navigation instructions.

Some additional original audio was composed and added and finally the audio mixed down to balance out varying audio levels.

4.11 Availability Via iTunes Podcast Store

Whilst the iTunes store is the leading on-line retailer of music [10, 11] it also provides links to freely available podcast content. Apple does not host the actual media files, instead it provides a library of approved links to

XML files [12] and, as the content provider, you are required to host the media and XML file. The user does not directly see the XML file, but after searching for content in iTunes sees a content page with each episode listed (Figure 6).

The XML file defines each episode in the podcast and the link to the media location. Currently, we have only one episode.

Content is not restricted to audio files. Other media files (including movies) could be defined as well as portable document format (PDF) files. In our case, we are required by the University (and licensors) to provide the terms and conditions of use in written PDF form.

The content developer submits the feed for approval to be included on the Apple podcast store. Once approved, the podcast section of the store will maintain a page for your podcast episodes.

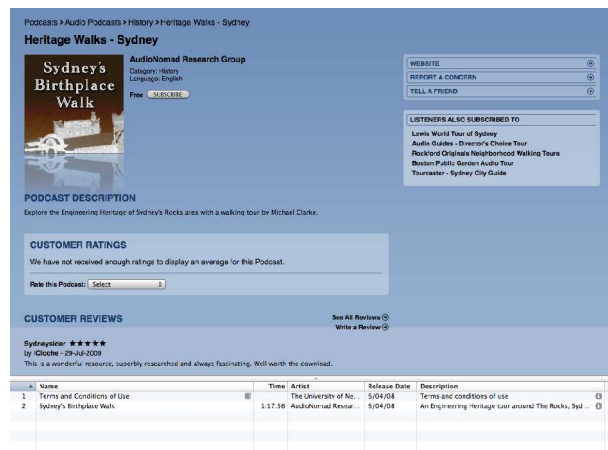


Figure 6. Sydney's Birthplace Walk podcast displayed with iTunes application

Potential users can find the content by searching the iTunes store for podcasts or using a specific URL, alternatively you can provide users with a web link that will open their local iTunes application with your content displayed on open. This greatly enhances the desktop user experience for users. This is now supported via the iTunes store on mobile devices.

5. TECHNICAL SPECIFICATIONS

Content Duration 1h 17m 56s
 Content File Size 71,659 KB
 File Format m4a

Number of Images 346
 includes photos, artwork, animated maps, logos and titles

6. WEB SITE

A web site was created for the tour [13]. This contains a basic introduction to the tour, a full list of image credits, terms and conditions and a link to download the content via iTunes.

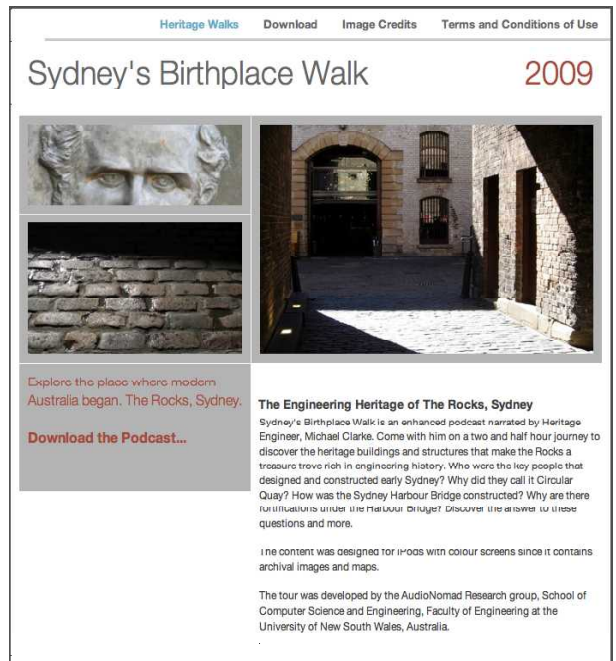


Figure 7. Web site to introduce and download the podcast content

7. MEASURING USE

7.1 Logs

The media file (m4a format) can be found via two different ways. Users can find the top-level page of the web site and navigate to the download page or the content can be found by searching the iTunes store podcast listings. Both end in iTunes downloading the file. The specific file is never directly loaded by the user (ie. The user does not see the file URL).

On the web download page, when the user clicks on the provided link, the iTunes application will open on their desktop and present them with the AudioNomad Research Group podcast page (Figure 6). We can therefore track visitors to the main web page and the download page, but cannot directly count the number of downloads.

On the iTunes store they can search for the podcast (using various search categories) or by seeing similar podcasts that they or others have subscribed to. Following an iTunes search, in order to display the episodes, the XML file hosted on our web server, will be accessed and downloaded to the user's computer. The XML file provides an opportunity to track those interested in the content. It does not however, directly count the number of actual downloads.

The media file is hosted on the University media server and unfortunately there are no publicly available log statistics. So tracking of the precise number of downloads is not possible with the current configuration. Unfortunately, Apple iTunes store does not provide download statistics.

Google Analytics [14] has recently been used to track some of the web pages. But web site visits represent only a fraction of the traffic.

Using web access to the XML file, we measured that there have been 3401 access to the file from 506 unique Internet addresses over a 60 day period from July 21 - September 21, 2009. The number of unique addresses should be slightly smaller since there are some contiguous addresses which are most likely from the same machine but have a different network assigned address. There are two addresses that are from our school domain range. Web spiders may also have accessed this file but we have not excluded those. Once subscribed, the iTunes application will periodically check the XML file for updates, so this explains why there are many more accesses than unique Internet addresses.

In the same period, Google Analytics reports 31 visits to the web site. 54.84% being from referring sites, 35.48% from direct traffic and 9.68% from search engines. Bounce rate is 22.58%, which describes whether initial users immediately go to a different site upon viewing one page. A low number is better. 2.9 pages are being viewed, and the download page is one click away from the point of download.

Based on this data it would appear that most of the interest is coming from iTunes users, not the web. We have not performed any search engine optimisation or broad distribution of the web site address. Given the baseline data that we have collected we are now in a good position to see the effect of specific campaigns to advertise the content.

iTunes does allow consumers to review podcasts. To date we have only had one (positive) review.

July 29, 2009

This is a wonderful resource, superbly researched and always fascinating. Well worth the download.

Five star rating.

7.2 Survey

A 29-question survey has been developed but has not yet been released. In this survey we aim to understand the experience gained by users when using the tour and their desire to download more heritage podcast content. We hope to deploy an electronic survey to assist in the

capture and analysis. A pilot test with a visiting engineer who took the walk was very encouraging.

8. OUTCOMES

Based on the informal feedback, the content provides an engaging experience that helps people discover places and understand facts about an area that is both informative and entertaining. Using an experienced guide, who has a high level of familiarity with both the place and content, has contributed to the efficiency in our production process.

Podcasts need not be limited to audio only experiences. With the enhanced podcast, archival images and photos can be included to improve the user experience. However, the image content should not be the focus of the media experience since we would prefer to see the visitor engage with the real environment than be focussed on a small screen throughout their tour.

Including animated maps, interleaved with pedestrian perspective images and relevant audio navigation instructions supports the process of way finding in the environment, alleviating the need for cumbersome paper maps.

Planning to devote a considerable amount of time to the legal aspects is important. Setting up systems to automate the cataloguing process helped reduce the manual tasks involved.

To date, our experience without engaging in web advertising or search optimisation strategies has indicated that the iTunes podcast store provides a mechanism that enables people to find heritage content.

Listening to some other commercial productions, the use of a professional voice talent can produce a media title that does not sound authentic. The voice, does not give the sense that they are knowledgeable about the topic; it is merely something that has been read, professionally. There are some good examples that give the sense that the narrator is very familiar with the place that they are presenting [15, 16].

9. THE FUTURE

9.1 Education

The high prevalence of the iPod media device family, especially in the high school demographic range, provides an opportunity to reach markets that would not typically be searching for heritage information. Students in this age group are very familiar with the consumption of media and podcasts, so presenting the content in this format may help engage this audience. A question that we are still to answer via the forthcoming survey is the acceptance level of the style of content and voice of the commentator against different demographics.

Since the content is not limited to being played on a mobile device, and can be played on a desktop computer, applications in education could support the student listening to the material before visiting a site, hearing the content in-situ and then reviewing the content as part of additional exercises following the visit. This could enhance learning outcomes through reinforcement. To extend this concept, variants of the content could be produced to support the before, during and after experience, avoiding mere repetition.

9.2 Devices

Programmability of newer devices provides a great opportunity to consider interaction beyond simply playing a linear media file in sequence. Since the release of the podcast, the device market has changed considerably. Devices such as iPhone and phones that run on Google's Android operating system [17] come equipped with cameras, GPS, accelerometers and compass capability. These features make it possible to consider different ways to initiate and interact with the basic tour content.

The devices are both phones and network capable devices, and they use both 3G GSM and WiFi network technologies. However, given the data charges for 3G, downloading a single 80MB piece of content may be cost prohibitive, especially for the mobile international roaming traveller. So the spontaneous download scenario is still a challenge, mostly due to economic constraints. Currently, we are geared towards the organised tourist who downloads before they leave a desktop internet-connected machine. In some cases, the user is probably listening to the entire content on their desktop computer prior to visiting.

9.3 Interaction

This style of media; a commentator guiding a visitor around with photos and maps, is only one form of interaction. Given the explosion in the mobile game market, there are different ways to engage with the audience. Geo-caching [18] and adventure style interactive mobile experiences [19, 20] are good examples of what is currently possible. The challenge is to design compelling user experiences that can reach a range of demographics. Where possible rapid re-purposing and reuse of media will assist in deploying to a variety of platforms and interaction experiences.

10. CONCLUSION

At the end of 2007, we began the process of producing a podcast media title for Sydney's historic Rocks area. The starting point was an existing walking tour conducted by heritage engineer, Michael Clarke. Over the next four months, we carried out an observation of the guided tour, developed scripts, recorded content, gathered and researched imagery, maintained records for copyright and legal clearances, negotiated mapping

licences, assembled the media content, distributed the content via a podcast and developed a web site to enable downloading. Managing the copyright aspect was a significant component of the project. The end product is an enhanced podcast that provides visitors to Sydney (and non-visitors on their desktop computers) with just over an hour and a quarter of commentary, imagery, mapping and navigation instructions that allows them to spend 2.5 informative hours exploring the engineering heritage of the Rocks area. Using the podcast format is a way to reach the music-savvy audiences who already download music to their devices, which in the longer term may help reach younger audiences. It also provides an opportunity for non-music-savvy heritage consumers to discover the benefits of mobile media players.

11. ACKNOWLEDGMENTS

Thanks to Michael Clarke in collaboration of this project. Thanks to Nigel Helyer (SonicObjects) for the background audio included in the podcast. Thanks to voice over talent, Gabrielle Rogers. This project was supported by a grant from the Faculty of Engineering, UNSW. We also acknowledge the support of the Heritage Branch of the Institute of Engineers, Australia. We gratefully acknowledge the support of the institutions that granted access to use the images and mapping data used in the podcast (State Library of NSW, State Records NSW, Sydney Harbour Foreshore Authority, Powerhouse Museum, Australian National Maritime Museum, UNSW Press, MapData Sciences Pty Ltd and Department of Lands NSW).

12. REFERENCES

1. van Merriënboer, J.J.G. and P. Ayres, *Research on Cognitive Load Theory and Its Design Implications for E-Learning*. Educational Technology, Research and Development, 2005. **53**(3): p. 5-13.
2. Bunch, R.L. and R.E. Lloyd, *The Cognitive Load of Geographic Information*. The Professional Geographer, 2006. **58**(2): p. 209 - 220.
3. Cooper, A., R. Reimann, and D. Cronin, *About face 3 : the essentials of interaction design*. 3rd. ed. 2007, Indianapolis, IN: Wiley Pub. xxxv, 610 p.
4. Australia Council. *What is the Synapse ARC Linkage Grant program?* [cited September 2009]; Available from: http://www.australiacouncil.gov.au/grants/grants/synapse_-_inter-arts.
5. Helyer, N., D. Woo, and F. Veronesi, *Artful Media: The Sonic Nomadic: Exploring Mobile Surround-Sound Interactions*, in *IEEE Multimedia*. 2009.
6. Woo, D., et al., *Syren - A Ship Based Location-Aware Audio Experience*. Journal of global positioning systems, 2005: p. 41-45.
7. Clarke, M., *Sydney's engineering heritage : and other sites : a walking guide*. 1999,

- Normanhurst, N.S.W.: Institution of Engineers, Australia.
8. Clarke, M., Personal Communication. 2009.
 9. Helyer, N., Personal Communication, Editor. 2009.
 10. Apple Inc. *iTunes Store Top Music Retailer in the US*. 2008 [cited September 22, 2009]; Available from: <http://www.apple.com/pr/library/2008/04/03itunes.html>.
 11. Apple Inc., *Apple Special Event September 2009*. 2009.
 12. Apple Inc. *Making a Podcast - An Example Feed*. [cited 2009]; Available from: <http://www.apple.com/itunes/podcasts/specs.html#example>.
 13. Woo, D. *Sydney's Birthplace Walk - Web Site*. 2008 [cited 2009]; Available from: <http://nomad.web.cse.unsw.edu.au/heritage>.
 14. *Google Analytics*. [cited 2009]; Available from: <http://www.google.com/analytics>.
 15. *The Bronx: Bronx River -Hip-Hop Walk*. 2004, Soundwalk.
 16. Acoustiguide, *Chicago Blues Enhanced Version*. 2007.
 17. *Android*. [cited 2009]; Available from: <http://www.android.com/>.
 18. *Geocaching*. [cited September 2009]; Available from: <http://en.wikipedia.org/wiki/Geocaching>.
 19. Fox, R. *Razorhurst*. 2009 [cited September 2009]; Available from: <http://www.razorhurst.com.au/>.
 20. Blast Theory. *Rider Spoke*. 2009 [cited September 2009]; Available from: http://www.blasttheory.co.uk/bt/work_rider_spoke.html.