



Experience Design Guidelines for Creating Situated Mediascapes

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Mediascapes are a new medium. We use the term mediascape to describe the user experience of walking through the physical world and triggering digital media which has been situated in that place for a particular reason by the mediascape designer. Forms of mediascape include tours, situated plays, games, augmented attractions and wearable applications. What the different forms of mediascape hold in common is that the user is always mobile, rather than at a desk and the interaction mechanisms are often through movement or gesture rather than using a mouse or keyboard.

Design for this new medium is still at a formative stage. It introduces a wide variety of issues for both the user and the spectator experience. This report provides an overview and practical design advice to anyone who is interested in understanding the new medium of locative media and in creating their own situated mediascape. The report is based on the collective experience of the Mobile Bristol group who have used the Mobile Bristol Authoring framework to develop a wide range of mediascapes for different purposes. The report describes both general guidelines as well as specific recommendations for designers who want to use the Mobile Bristol Authoring tools.

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Abstract.

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1 Introduction.

These guidelines aim to provide an overview and practical design advice to anyone who is interested in understanding the new medium of locative media and in creating their own situated mediascape. The report draws on the collective experience of the Mobile Bristol group; more than two years of developing and designing a range of mediascapes for different purposes.

The report fulfils two purposes

- It provides general design guidelines for anyone who would like to build a situated mediascape using their own authoring or programming tools
- It serves as a companion to the Mobile Bristol authoring tool, giving specific examples of how to create a number of different kinds of GPS triggered mediascapes [12:Hull,13:Hull,15:Website].

Structure of the report.

The report begins with a background to the area and a definition of the main concepts and terms that will be used. We then introduce the Mobile Bristol Experience design framework and describe how to use it to design and create a mediascape. Subsequent sections describe the design issues, recommendations and specifics of the tool for each quadrant in the Experience Design framework: User; Context; Content; Interaction design.

The mediascape applications developed during the Mobile Bristol project are used as illustrative examples of the design principles in this document and are described in Section 7: Case Studies. An overview of most of the applications can be found on www.mobilebristol.com, where it is possible to download the Mobile Bristol Authoring toolkit for evaluation and research use.

1.1 Defining mediascapes

The experimental applications in Mobile Bristol are part of a *digital landscape* in which digital content and applications overlay the physical landscape of our environment. This digital media is accessed when the user walks through the physical world, carrying a mobile client device such as a 3G phone or handheld computer (also known as a Personal Digital Assistant or PDA).

This layer of digital media may be described as being composed of one or more *mediascapes*, with each one containing a set of related media files that play on a user's device according to the user's location in the physical environment.¹ The geographical location of the different media files and thus the places at which they will trigger and play are defined by the mediascape author.

¹ This technology has been described by others working in this field as *audio augmented reality* [1: Bederson, 4: Reckimoto], *situated documentary* [11: Hollerer], *augmented reality* [22: Rozier] and *context-aware* [7: Burrell].

A *soundscape* is a particular kind of mediascape that uses audio files as content, rather than audio with images or video. A simple example of a soundscape would be an enhanced tourist guide, similar to the audio guides that are prevalent in museums and heritage sites. The difference with the Mobile Bristol applications is that the device has the ability to detect where you are or what you are near and automatically deliver the appropriate content to the device that you are carrying without the need to enter numbers or press buttons. More sophisticated examples of mediascapes that have been produced during the Mobile Bristol project are described in the case studies.

1.1.1 What do we mean by locative media?

Locative Media is a term used to describe media that has been situated in a geographical location. In the set of applications described in this document the context is defined by their geographical location.

We use the term **region** to mean a particular area of locative media that can be defined by the experience designer. Regions have boundaries that define the size and shape of the region as well as its geographical location. The boundaries also act as the trigger point for events that happen in the region.

1.2 The impetus for new locative media experiences.

Locative media as a new medium for creative expression and experience design has emerged through the combination of several trends:

- the development of personal mobile devices with excellent media capabilities
- pervasive computing infrastructure technologies like wifi, rfid and 3G networks being introduced
- the market availability of affordable gps equipment
- the adoption of these by new media artists to play with notions of location and artistic ‘intervention’
- the emerging experience economy in products, services and experience “stages”

The opportunity for the fusion of these trends is that every place can become a stage for a rich new experience. In the same way that mobile phone users have access to a wide range of services, consumers with smart, context-sensitive mobile devices will soon be able to choose to buy or subscribe to a diverse range of digital media. Games, interactive media, soundscapes and experiences created by artists and designers can together add different virtual dimensions that augment the ambiance of physical places, both public and private space. Mobile Bristol application development software enables the creation of context-sensitive applications, and has been used in a wide range of projects with a variety of collaborative partners, all investigating the potential application of this new medium.

1.3 Audience/user

The terms ‘audience’ and ‘user’ are both used when referring to the person or persons who are experiencing the application. User is a common term in the field of User studies

and Human Computer Interaction. Audience is easily understood in the 'Arts' as denoting someone who is watching, listening or experiencing a piece of theatre or music. The term consumer is used occasionally as well, implying payment for the experience and a seemingly passive relationship with the content.

1.4 Experience design

Experience Design is a holistic approach that incorporates both how the user interacts with the environment and their mobile computing appliances and where the experience takes you mentally, spiritually and physically. It shifts the focus of design from efficiency of execution to quality of experience. The aesthetics of interaction, the context, who you are with, your expectations and your mood all effect the experience.

Experience Design builds on the field of Human Computer Interaction (HCI) and can be viewed as an extension of Interaction design. Interaction design is defined as “designing interactive products to support people in their everyday and working lives” [16: Preece, Rogers, Sharp]. HCI has traditionally focussed on design practices and methods for the use of technologies in a work based setting. Goals for design have focussed on usability and efficiency and have metrics such as

Is the product

- efficient to use?
- effective to use?
- safe to use?
- of good utility?
- easy to learn?
- easy to remember how to use?

However these goals are not necessarily sufficient to the design of pleasurable products that people engage in out of the work context. Interaction design adds a set of user experience goals for designing products to be fun, enjoyable, pleasurable and aesthetically pleasing. Suggested metrics for user experience goals are

Is the product

- fun?
- emotionally fulfilling?
- rewarding?
- supportive of creativity?
- aesthetically pleasing?
- motivating?
- helpful?
- entertaining?
- enjoyable?
- satisfying?²

² Usability and user experience goals taken from Interaction Design: Beyond human-computer interaction. Preece, Rogers & Sharp

The experiences that we are describing in this document take place in the ‘real’ world so the environment itself becomes an intrinsic part of the experience as well as the other people in it. This makes the experience design process parallel that of architecture. Architects are concerned with people and their interaction with each other and within the structure being built. [28: Winograd]. Experience designers are likewise concerned with people and their interaction with each other and with the designated space and the mobile technologies within it.

1.5 Comparison of film and mediascape production.

The process of producing a rich mediascape requires a mix of skills and competencies which are similar to the range of skills and processes used in film production. A high level look at the roles and therefore the functions that happen in the production of a film is a useful template for considering the kind of skills and functions that are required for producing a situated mediascape using the Mobile Bristol toolkit. It is worth noting that a simple mediascape, just like a film, can be made by a single person who performs all of the different tasks. However it is useful to break out all of the different roles and skills that are needed as it is rare that one person is capable of all of them.

We will compare the roles of producer, director, sound engineer, camera operator, editor and actor in film to those of mediascape production.

Producer.

The **film producer** initiates, coordinates, supervises and controls, either on his own authority, or subject to the authority of an employer, all aspects of the motion-picture and/or television production process, including creative, financial, technological and administrative. A Producer is involved throughout all phases of production from inception to completion, including coordination, supervision and control of all other talents and crafts, subject to the provisions of their collective bargaining agreements and personal service contracts.

The **mediascape producer** is responsible for all aspects of project management and the production process, including creative, financial, technological and administrative aspects. On the technology side skills in software project management are needed to ensure that the mediascape is tested and debugged to a robust standard. Light weight software development processes for tracking changes and verifying that the mediascape works as planned are also useful.

Director = Experience or interaction designer

The **film director** is in charge of both the technical and artistic aspects of the film. They conduct the auditions, supervise the rehearsals, and approve locations, scenery, costumes, and even the music.

The **mediascape director** could also be called the experience designer or interaction designer. They are responsible for the interaction design, choice of location, media region design, overall specification of the program logic and content production. An important

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distinction between the medium of film and that of mediascapes is the user interaction in a mediascape. Films are normally consumption only medium, in public venues users cannot control the pace or direction of the film. Mediascapes are an interactive medium and the interaction designer chooses how, when and in what form the user can interact with the media.

Editor

Film editors assemble footage of films, shows, strips, and industrial videos into a seamless end product. They manipulate plot, score, sound and graphics to make the parts into a continuous and enjoyable whole.

Mediascape editors implement the mediascape in the authoring tool. They import media files produced by the sound and image editors and create the region map using the specification from the mediascape writer and experience designer. They implement all of the necessary code and test the mediascape in emulation mode. They publish the mediascape to the client device for everyone to test in the environment.

Writer.

The **film screen writer** creates the scripts and stage direction for the dialog and scenes in the film.

The **mediascape writer** creates the narrative scripts and specifies the location dependencies and logic for the interaction flow of the dialog. For example where scripts need to be located and any time dependencies or ordering rules for playing them.

Sound engineer.

A **film sound engineer** is responsible for the recording, editing and production of the film soundtrack.

A **mediascape sound engineer** is responsible for the recording, editing and production of all of the different sound files including dialog, sound effects and background loops.

Camera operator.

A **film camera operator** is responsible for all filming and use of the cameras.

If images are to be used in mediascapes then an **image editor** would be responsible for filming and producing any necessary video, animation or still images.

Actor

Actors act out the scenes of the film according to the director's wishes.

In mediascape production actors can be used to act out the scripts for sound recording, similar to a radio play.

Within the production team the different skills, roles and responsibilities can lead to creative tension. This tension can be positive or negative depending on the circumstances, management and team dynamics.

1.6 Creative Tension

In the design of any new experience there are factors that will extend and enrich the process and factors that will constrain it.

An abstract representation of the forces of creative tension and their role in moving ideas “out of the box” are illustrated in figure 1. The innermost square represents the known capabilities and previous experience of the designer or people involved on the project. The forces that act to restrict risk and creativity are budget, time and resource. These forces curb the amount of new ground that can be covered, for example with severely limited budget, time and resource one would need to come up with a well tried formula that is well within known capabilities.

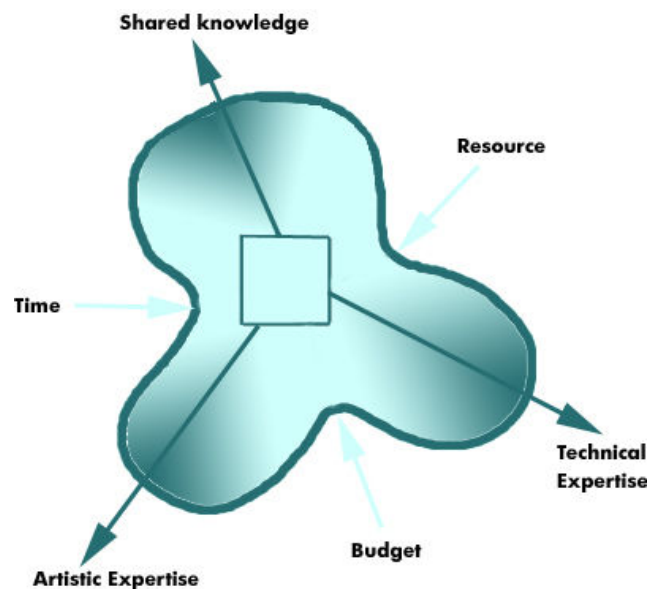


Figure 1. The Forces of Creative Tension

The forces that can move and stretch a design are technical expertise, artistic expertise and the sharing of knowledge amongst collaborators. Knowledge sharing amongst people who are from different disciplines, different organisations and have different aspirations requires the establishment of a common ground for discourse. The language, terms and meaning for terms will vary across organisations and disciplines and can cause misunderstanding.

For example the use of the term “content” can have different connotations. Technical experts may consider content to be all of the digital media that needs to be created for the mediascape including the logic, scripts and plan for the experience delivery. Writers may consider content to be just the scripts, much like a screenplay for film or a play for

theatre. Television producers may consider content to be the raw media footage that has been captured through camera. Discussion in meetings around abstract designs will not always highlight these fundamental differences in understanding for the meaning of a term. The medium of the Mediascape is so new that established roles, production processes and a common language has not yet been established. Prototyping workshops and demonstrations are essential to providing a common view and shared understanding in a cross-organisational team with diverse expertise.

Producing mediascapes today is akin to the early days of film. When film was first developed as a technology it was uncertain what it was good for, what people would value and what the new genres of interaction would be [2: Bellotti]. Most of the early mediascape designs are for research and evaluation purposes rather than immediate commercial application because the client technology is not yet widespread. This experimentation and combination of artistic creation and technical development may result in a whole new industry of mediascape production and consumption based around the new medium. For it to become widespread access and uptake of client devices will need to increase. Potential client devices that could be used to deliver mediascapes include PDA's, mobile telephones and games consoles such as Gizmondo [<http://www.gizmondo.com/>] or NGage [<http://www.ngage-user.com/>].

Design choices made by authors will depend on the purpose of the experience and the choice of the device or technology used to deliver it.

1.7 Purpose of the experience

We can consider the purpose of the experience in two ways. The first is the extrinsic motivation for developing a mediascape: it is the reason why we develop a mediascape at all and is the focus for the design issues and recommendations described later in the Experience Design framework sections. The second is the intrinsic motivation: what the designer wants the user to get out of the mediascape. Do they want to thrill, immerse or soothe users? The intrinsic purpose will drive the needs for the experience design. In this section we will consider the extrinsic purposes for creating mediascapes.

Mediascapes may be designed and deployed for the purpose of research, art, commercial venture or private use. Mediascapes that have been designed and deployed in Mobile Bristol have been for a variety of purposes

- Understanding the potential social impact of the technology
- Understanding the application of this technology in a particular domain such education, art or tourism
- Understanding the authoring needs for different groups of people such as school children or retirees
- Driving technical development.

1.7.1 Research.

Developing mediascapes for user trial and evaluation is a powerful way to understand the whole cycle of experience design and the potential for the new medium. All of the case studies that are included in this report are examples of experiences that were designed

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primarily for research purposes and so we have included a description of the evaluation methods used in each case along with their descriptions.

Conflicts can arise between the need to create a sustainable, robust, good quality public experience and the need to develop a rigorous experimental research framework. In a multi-disciplinary design team a balance needs to be found between satisfying the needs of the research experiment and satisfying the needs of the artists and designers. Unlike controlled experiments conducted in a laboratory, public space trials do not facilitate prediction of who will attend, what other activities are happening and how much time people will spend in the space. If the primary motivation behind the experience is research then design research methods need to be selected that are appropriate for the context and the intended users. An overview of some of the common design research methods is described in Design Research [14: Laurel].

1.7.2 Art / Exhibition

If the primary reason for the experience is an artistic ‘installation’ then the metrics for evaluation and design will be different to those of a research project. The artist or the sponsor of the exhibit will be interested in audience reaction but the main evaluation is likely to come through peer and critical reviews. In this case the design goal for the experience is often to create a novel compelling experience that may not have been done before. Artists are often extreme users of new technologies and will try to create new forms of experience while furthering their own creative practice and exploration of the boundaries of the technology.

1.7.3 Commercial

While art can intentionally try to make the audience uncomfortable and risk appealing to just a narrow demographic, commercial experiences often deliberately try to appeal to a mass market to have commercial viability. When designing an experience intended for commercial use the goals of the author are to create a compelling experience that minimises risks in unproven or untried capabilities and maximises the features that are known to work well. Some of the findings for what works well in mediascapes are summarized in [20: Reid].

1.7.4 Personal

An equally important category of experience is those that are intended for personal use or to be shared with friends. Our research has shown that content that is personal and interesting can be compelling even when the sound is not of a particularly high technical quality. It seems, therefore, that a lack of studio-quality audio capture and professional production facilities need not get in the way of creating personal and compelling experiences. It may also be that audience expectations are not so high if the mediascape is perceived as being produced by an individual rather than a ‘professional’ organisation.

2 The Experience Design Framework

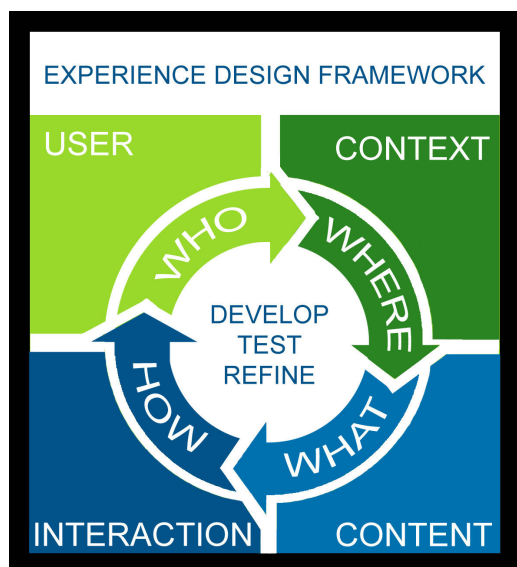


Figure 2. The Experience Design Framework

2.1 Introduction.

Figure 2 is an overview of the framework used for designing a mediascape experience. The framework is not a linear or cascade design model, it is meant to be cyclical and non-linear; each section interacts with and has impact on the others.

The inner circle is a prototype, test and refine loop. We strongly recommend that the design should evolve through continuous iterations of design prototypes especially because this is a new medium for which definitive designs have not yet been established. This enables the development to progress in parallel with a

deepening understanding of the end user, the context, the content and the interaction design.

For example rather than designing and producing all of the media content (complete with full sound effects and actors voices) a selection of the content should be produced as a rough cut, which can be played in the location to see if the interaction, subject matter and intended designs will actually work. These tests are essential because the environment has such a strong impact on any conceptual design and the phenomenon of listening to sound and seeing images triggered by GPS in the target environment should be experienced before starting a full conceptual design.

Novices should begin by adding a few sounds “out there” in the environment and testing them before doing anything else. The design should then be developed iteratively and ideas should be tested as early as possible. Many great concepts fail when they are actually tried out in the environment. It is through testing in situ that the failures can be discovered and refinements to the design can be made.

2.1.1 Design to suit the medium

Mediascape experiences are a new medium. They combine a dependence on external infrastructure such as GPS, wireless networks, GPRS and other sensors with the need to deliver media on a mobile computing platform. Within the next five years it is unlikely that the external infrastructure technologies will be one hundred per cent available, precise or uniform. For example GPS suffers from a number of problems such as drift, shadows and latency which are described later on in the report (see section 6.1). GPS is also not available in the indoors. We can characterise the realities of near term technical capabilities for the new medium as being

- Intermittent, for example a wireless connection can be broken by some environmental events or blocks,

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- Indeterminate, for example GPS can vary in accuracy depending on the time of day, the terrain and the number of satellites overhead
- Invisible, quite often the indicators for whether a capability is present and how strong it is are not easy to see and there are no external clues in the environment

We recommend that designers should develop designs that take these characteristics into account and design mediascapes that

- Do not depend on fine grain and very accurate positioning or location information
- Do not assume that a network connection is always available
- Provide as much feedback to the user as possible on the state of the system

Whilst technical enhancements will increase the reliability, accuracy and availability of all of these pervasive technologies we believe that there are many compelling mediascape designs that can work well because they work with the nuances of the new medium as it is.

2.1.2 The start point for a design

The user, context, content and application segments of the diagram are all different categories that need to be addressed in any design. Unlike classic HCI methods which start with an understanding of the user needs, the mediascape design can start from or be inspired by any of the quadrants in the framework.

Content led example.

As an example of a mediascape design process that started with the content we will give an overview of the design process for “a walk in the woods”. The inspiration for the mediascape was a set of photographs that had previously been displayed as an art exhibition. We commissioned the photographic artist, Liz Milner and a musician and sound engineer, Armin Elsaesser, to create a mediascape experience around the photographic artwork.

The environment, which was the atrium of HP Laboratories in Bristol, was assessed and the display space designed that would best display the pictures and allow people to walk through them. The interaction design goal to make it feel like “a walk in the woods” was agreed and then the kind of people who were likely to try out the experience was discussed and so the content, space and interaction design was developed iteratively. For example after early experimentation we augmented the environment with graphic floor tiles of a stream so that the tactile dimension of walking through a forest was represented. The Walk in the Woods mediascape is described fully in the case studies.

Context led example.

In contrast Riot! 1831 started with the context. We wanted to use Queens Square as a place in which to develop a mediascape because it was self contained, had a fenced off pedestrian area, had a fairly open skyline for GPS coverage and had a rich history. We commissioned Liz Crow, a writer and film producer, and Ralph Hoyte, a writer and poet, to create a mediascape based in the square. They researched the history of the square and chose the 1831 riots as a topic around which to develop a dramatised play. They wrote 140 small vignettes each based around the tales and characters of the people who were there during the riots. Early prototypes and design workshops were held in the square to

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decide the style and form of the application. Based on early prototypes it was decided to create a sound only experience, triggered purely by the user's movement without the need to look at a screen. The interaction design goal was to make the user feel as if they were walking through the actual riot. In terms of user understanding the intention was to create an experience that would be open to all members of the general public. Consideration was given to accessibility and the suitability of some of the materials for young children, for example because of the use of lewd language and graphic sound effects.

The design process continued around several iterations of user testing, debug and development until it was launched to the general public as an experimental trial that anyone could try free of charge. Even after the trial was launched we continued to monitor feedback and change the process and the way that the application worked based on early feedback. When the trial first started we did not think that people would stay in the square for much more than 20 minutes. The writers wanted everyone to hear a key event called the dragoon charge and so we implemented it to be played after fifteen minutes regardless of where you were. This is unlike any of the other sound files which are triggered by your position. As it turned out most people stayed in the square for up to an hour and they found the dragoon charge going off every fifteen minutes to be a major irritant. We therefore changed the program logic so that it only played once. This change had immediate positive effect and people started reporting different irritants!

The Riot! 1831 mediascape is described in the Case Studies.

Interaction led example.

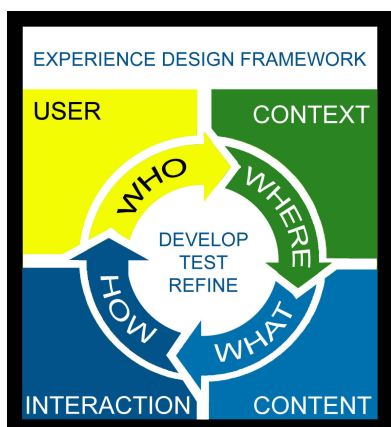
The Moulinex mediascape, described in the Case Studies, was arguably driven from an idea of how the application should feel. Sound artist Zoe Irvine was interested in the possibilities of adding a 'film soundtrack' to the experience of walking round Queen Square. She was inspired to mix the film tracks from the Matrix and Moulin Rouge which were both films that had been shown in the square in the past. The end experience felt like a wall of rich atmospheric sound that pulsed and changed depending on where you walked. The design was developed that dramatised and emphasised the sounds and clips from the films in the most powerful way possible.

User led example.

Mediascapes developed by children have been explored through a series of workshops in a project known as A New Sense of Place. [27: Williams]. These children tended to be more motivated to create personalised content for friends and to develop games and puzzles rather than to create information centric or generic mediascapes. They also saw the potential of mediascapes as a way of marking which spaces were friendly or unsafe and that their parents could also leave them messages using mediascapes.

We will now describe the particular questions and design choices that arise when considering each of the four segments in the outer loop of the Experience Design framework. For each segment we consider the general design issues, we describe our recommendations for what should be done and then we specify particular implications for using the Mobile Bristol toolkit.

3 User/Audience



This segment considers who the experience is for and what particular traits or characteristics will be influential on the design. We start the section with a discussion of general user based design issues, we then describe our recommendations and finally outline specific guidelines for use with the Mobile Bristol authoring tool. The general user design issues that we discuss are

- social protocols
- physical to virtual mapping
- system cognition
- user control.

3.1 Design Issues

3.1.1 Social protocols

With any experience there is a protocol of engagement. For example when you go to the cinema people know that they will be sitting in the dark with hundreds of other people watching a film largely in silence. The rules of the house are explained to the audience either through public announcement films, posters or messages. For example “No flash photography allowed” and “please switch-off your mobile phone”. The process of buying a ticket, perhaps buying drinks and snacks, waiting until the cinema doors are open, finding a seat and staying seated until the film ends is easily learnt from observing others and looking at the signs in the environment. Special user training is not required as so many people are already familiar with the process and have probably been to cinemas since an early age. Any new form of experience will benefit from user training on the social protocols and what to do. For example when McDonalds was first opened in Moscow during the first weeks of operation employees distributed leaflets to people standing in the queues telling them how to order and what to do after paying. They were also told that when staff smiled at them it did not mean that they were laughing at them [25:Watson].

Mediascapes are a new medium for which the social protocols and rules of engagement have not yet emerged. Some mediascapes may be deployed in private environments such as theme parks, national trust or heritage sites, in which case the rules for engagement will be defined and enforced by the site owners. Other mediascapes may be created for public spaces for which the social rules will emerge over time. Indeed there may be certain places where some kinds of mediascape are banned or prohibited just like ball games or the use of mobile phones. However, unlike ball games or mobile phones simple soundscapes do not need to intrude on the surrounding environment anymore than pedestrians do.

3.1.2 Physical to virtual mapping

Digital content is tied to position in a location-based mediascape. The design choice is how meaningful to make that linkage. It may be arbitrary or it might be closely tied to a particular location. The design issue is then to decide how to help the user understand the chosen mapping between the physical place and the virtual content. A common expectation that people have is for there to be a direct link between physical things in the environment and the associated audio. The problem for the designer is that the granularity of the objects that can be linked can range from an object, like a picture or a bench, to a building or a particular spot, like an area of ground, to being in a square or a town. With current state GPS technology it is not realistic to rely on very accurate, small scale regions to pinpoint an area of interest such as a bench. Standing right next to a large object such as a building or tree is also not the best view point if you want to look at it whilst listening to a sound file. The optimal viewing area may be some distance away from the object which makes the design challenge how to signify that the area is related and to draw the eye gaze of the user to the intended object.

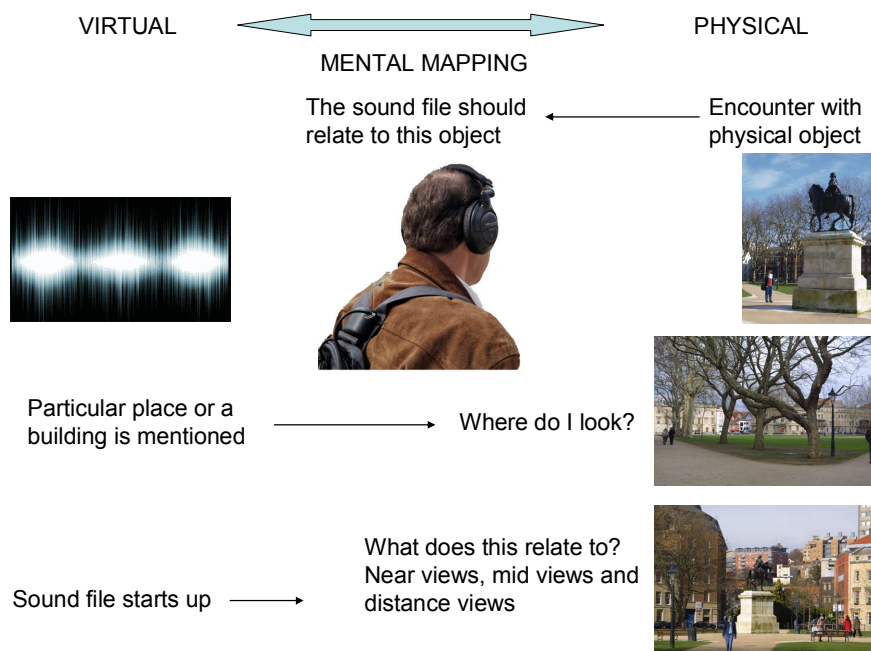


Figure 3. Mixed requirements for physical to virtual mental mapping

Figure 3 summarises the different requirements that users have when developing a mental model of how the virtual world relates to the physical one. When the user encounters a physical object in the environment they might expect to hear a sound file that is directly associated with it. When this happens they build up the mental model that physical things are linked to their virtual counterpart. It is an easy mental model which reassures users and gives them confidence. If the sound file does not appear to be linked then users are less sure of what the mapping is and feel less in control of the experience.

When a certain object, place or building gets mentioned in the sound file people have a strong desire to know where to look for it. Even if the original building no longer exists

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there is a strong desire to know where it was and to look in that direction. This is an interesting design challenge because for things such as trees or buildings the optimal listening and viewing area can be a long way from the structure itself. In Queens Square for example scenes associated with one of the buildings were triggered between 20 and 60 meters away. Directional audio is one possible technical solution for directing peoples gaze. However the current state of the technology would also require the user to wear a compass which leads to a different set of design challenges as the compass needs to be mounted on the head.

Mediascapes present a new design challenge in how to represent the digital information which overlays the physical world. Maps have been used for a very long time as a way to represent what is physically in the environment and they can be annotated to indicate virtual content. However an annotated map can become complicated if there are several mediascapes in the same location or if there are several different media files that can be triggered from the same spot. Content authors need to be prepared to create the informational view of the digital content to help users know what kind of content there is, where it is, how to consume it and why it is placed in that particular location.

Designing when in-situ allows the author to notice and incorporate views, vistas and landmarks in the distance which would not be so noticeable when designing using a map on screen. Gaze can be directed implicitly through the content describing a landmark so the user can turn towards it and then explicitly by saying for example “Look at the blue building”.

3.1.3 System cognition

With any form of human computer interaction users will try to develop a model of the system to understand how to interact with it. GPS triggered mediascapes are a relatively new form of interaction and users can take up to ten minutes to get used to the phenomenon of walking to trigger sounds and to stop sounds. During this familiarisation period the user will be concentrating on understanding how the system works, what they are supposed to do and to try to achieve mastery of the controls. Any content that is played during this time has less chance of receiving the user’s full attention because the attention will be on learning how to use the system

Consistency in the interface will help users achieve mastery of the interaction mechanisms. In a study of computer games three stages of immersion, engagement, engrossment and total immersion are identified [5 : Brown]. Total immersion is only reached when a player has become competent at the game interaction and has become engrossed in the game dynamics to the extent that they have some emotional investment in the game. Learning to become competent with the game interaction depends on how intuitive and consistent the interface is. Consistency in how regions are triggered and stopped helps to speed up this process and assure the user that they are in control of the application and to allow them to engage more with the content.

The process of understanding is a cycle that starts with awareness of the experience which builds up anticipation, then the engagement in the experience itself followed by reflection and telling others.

3.1.3.1 Anticipation

Wright and McCarthy [29] identify anticipation as one of the sense-making processes of experience, whereby people use relevant prior experience to bring expectations to a new experience.

We have found that the way that people hear about the mediascapes can affect their expectations and thus their enjoyment of the experience. For example in the Riot! trial there were statistically significant differences in how enjoyable visitors found the visit in how they became aware of Riot! The main ways that people heard about Riot! were Word of Mouth (35.9%) and TV (25.1%). The BBC local news item on Riot! featured footage of a reporter wearing the haversack and headset while she walked around the square. The sound track featured some of the files that visitors would actually hear here. This then was a very accurate portrayal of what someone visiting the square would encounter. Those that heard via word of mouth, on the other hand, had a lot less information. The enjoyment ratings for people who heard about the experience from the TV coverage were higher than those who heard via word of mouth. The medium is so new that some user education or awareness of what to expect seems to be beneficial to the overall enjoyment of the experience.

The name and genre of the experience will also lead people to expect different things. For example the genre of “historical drama” that people associated with the name Riot! 1831 led many people to anticipate that there would be a strong historical “educational” element to the content. This expectation is natural for the genre of period or historical drama where action is usually supplemented with strong historical evidence either through additional written materials, or as part of the play. When asked if the experience was anything like they had done before most people recounted their experiences of museum audio guide tours. For those with a strong interest in history who are used to audio guide tours the lack of factual information was a disappointment.

In contrast the “digital storytelling” genre has much less expectation for inclusion of background information or historical facts. With that genre there is a much stronger expectation that the stories will follow a classical narrative schema that can be fact or fiction.

3.1.3.2 Engagement

We have already mentioned the need for the user to learn the rules of engagement and be aware of the social protocols of the place. The mediascape designer needs to decide how much to expose these rules to the user and how much they expect the user to learn through experimentation and trial. For example the user needs to know how to begin, when they can stop and how and where they need to go. They also need to understand the context for the mediascape that they are experiencing and if it is a narrative based experience how the narrative unfolds and what the genre of the story is.

3.1.3.3 Reflection and telling others

When engagement with the mediascape is finished there is usually a period of reflection and discussion. This can happen immediately or over the course of a few days or even weeks. With established entertainment experiences like movies a set of established terms have evolved that make discussing them easy on a social level. Mediascapes are so new that the language and form of describing them has not matured and people that we interviewed found it hard to describe what they were like. We hope that a community of practice will arise around the use of the platform so that we can develop the language, design practice and insights gained through using the new medium. Our start point for this has been a series of workshops on developing descriptive language for situated mediascapes [9: Dovey & Fleuriot].

3.1.4 User Control.

The degree to which the pace of the experience can be controlled by the user is a design choice. In a theatre the audience is expected to watch the show from beginning to end. They can choose to leave, they can voice their approval or disapproval but they cannot directly control the pace or the flow of the show. On a guided tour the user can be told to go in a set direction and the application can be designed so that there is a prescribed route. On the other extreme the user could be given complete control over what they hear and have complete freedom on where they go. The benefit of restricting user choice and freedom is that the application becomes predictable and easy to learn. The benefit of opening up user control is that it gives greater interactivity and sense of engagement for users as well as novelty and true exploration of the opportunities for the new medium. An application aiming to offer complete user control should expect a longer user control learning curve as the rules of engagement must be experientially acquired in the application itself.

Mediascapes can be designed to give the user control over what they listen to, how much they listen to and in what order they listen to it. For example in the design of Riot! 1831 participants triggered sounds by walking into a region and stopped them by walking out of a region. They could choose to listen to an entire sound file by staying in a region but if it was not of interest to them they could move on and listen to something different. This offers the user control over how much of a sound file they listened to as they could select which scenes they would hear next. However as they had no information about the choices they were making their choices were made blind. Providing an overview of the mediascape content and form in order to enable the user to control a non-linear narrative in a meaningful way is a challenge for any designer or author. There is also no established visual language of representation for virtual layers overlaying the physical world that can be used to help provide a spatial or geographical overview of the mediascape.

Mediascapes can also be designed so that the user can stop whenever they want to. As a non linear medium it is possible to sample as much of the experience as you want to without having to wait until the end. Mechanisms that play opening and final sequences when the user starts and ends the experience can help form a sense of lead in and closure. The difficulty is in creating the non linear content so that it is still compelling and

meaningful regardless of the amount the user has heard or the order in which they have heard things. In Riot! 1831 each sound file was a short vignette that was intended be complete in itself.

3.2 Recommendations

Provide clear instructions on what to do. For general public installations we recommend that clear instruction on what the visitor needs to do should be given consistently to each person if possible. This helps the visitor build up an idea of what to expect and makes them feel more confident and in control. Ideally the facility to ask questions and be given guidance should also be provided.

Develop an understanding of the user. The following checklist of questions will help this process.

3.2.1 Understanding the user.

Who are they?

- Do they fall into a certain age demographic?
- Is gender a factor?
- What kind of “mode” will they be in, work or leisure?

Lifestyle

- What kind of things will they be used to?
- Who will they be with? Friends, family, work colleagues or on their own.
- How will they become aware of the experience? TV, radio, newspaper, email or word of mouth
- Would they normally be in this area or will they be visiting?

Values /Likes

- What kinds of things do they like to do? eg. theatre, sport, cinema
- Are they interested in and do they like technology? Eg do they use an MP3 player, mobile phone, PDA?
- Are they very fashion or self conscious? How would they feel about wearing headphones?
- Are they comfortable with experimentation and trying new things?
- Do they always need to feel in control?

Frustrations / stresses / needs

- Do they have a lot of time for enrichment activities? Or are they rushing this activity amidst many others?

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- Would they need to carry or use other technologies at the same time?
- Would they be responsible for other people or things, like children or pets?
- Do they need to be made secure from any threats in the environment?

Accessibility

- How will the design adapt to different languages?
- What provision can be made for blind people or people with poor sight?
- What provision can be made for deaf people or those hard of hearing?
- Can the design adapt for people who are less mobile?
- Is it wheelchair accessible?

3.2.2 Logistics

Design a process for equipment loan. In experimental trials, where kit is lent to visitors to try out the experience, the logistics for managing the equipment loan needs to be designed. For example, if audio is used then hygiene procedures for headphones need to be considered. If equipment is being loaned to visitors then procedures for registration needs to be designed that ensure the equipment will be returned after use. As an example, in the Riot! 1831 trial we asked people to fill in their name and address and bring proof that they were still living at their address before we loaned them the kit. The area for issuing and returning the equipment was quite conveniently located so that visitors did not need to walk out of their way to return equipment.

Design a process for group participation. If groups of people are likely to try the experience then the process needs to be flexible so that one person can be accountable for the group. If individual feedback from group members is needed then mechanisms to gather the data in an efficient manner either through pre-registration or via the group leader will help streamline the experience.

Specify guidance for adults with minors. Guidance for adults who are responsible for minors can also be helpful. For example if there is any rude language or gory sound effects in the experience parents might want to be warned so that they can decide on the suitability of the experience for small children. It is possible to use headphone splitters so that two people can share one device. This facility was frequently used by parents with young children and is one way of monitoring content.

Adhere to the social protocols of the setting. If the mediascape is in a public setting then the social protocols for that place will need to be observed. For example the Riot! 1831 trials were based in Queens Square in Bristol. This is a large public square and on sunny days can be filled with people sitting on the grass, playing Frisbee or football despite the notices that say ball games are not allowed. Although the mediascape covered the entire square social protocol would prevent users walking through the middle of groups of people or disrupting other activities that might be happening in the square.

Design soundscapes so that a screen is not necessary. We have found that for soundscapes users prefer the style of walking around without needing to look at the screen and just encountering sounds rather than controlling the interface through the screen. During the Riot! 1831 trial we asked ten people to participate in an experiment to compare the interaction style of clicking on the screen in the square to trigger the sounds versus walking around without the screen. In this experiment eight of the ten people preferred walking around versus looking at the screen which is an indicator that screen based interfaces for addressing issues of control and communication in mobile applications may not be the optimal solution for all people.

3.2.3 Direct eye gaze

Describe the field of vision. When designing the content a description of the physical vista which can be incorporated into the dialogue or sound file can help the user know what to look at. This needs to be designed by the writer so that it fits with the naturalness and style of the rest of the experience. In a straight forward tour it is easy to do as the style of the narrative is already informational. In a drama or play the characters will need to be given a reason to describe what they can see within the context of the play.

Don't use relative orientation terms. Descriptions that assume a particular orientation such as “on your left” or “on your right” should not be used because without the user wearing a compass the system does not know which way the user is facing. Even on linear routes users would have turned round to talk to each other in a group and so the content design should not assume the user is facing a particular way.

Design appropriate overview maps. Maps that show buildings and objects that are significant to a mediascape can be useful. However care should be taken to show on the map where the user is expected to walk and if possible how buildings or objects in the environment relate to the mediascape. Overview maps should indicate general regions of interest, any specific start and end points and help the user orient themselves.

Create a non essential prologue. A recommendation for narrative design is to introduce the user to the experience interaction through non-critical pieces of interaction and dialogue so that they become comfortable with the mechanisms, get a sense of the type of content, but not miss any of the critical scenes, characters or plot lines. Almost every Shakespeare play, for instance, begins with clowns or minor characters having relatively low key and unimportant conversations. This is to allow the audience to orient themselves to the stage, to settle in their seats as it were. Similar mechanisms for mediascapes could be useful.

3.2.4 Physical markers

Use physical markers to provide orientation information. In some environments it might be possible to use physical markers to help make the link between the physical and digital world easier. The physical markers should act as cues to help people know where to stand and to associate what they can hear with where they are. With careful region design to allow for drift this idea is feasible for areas dedicated to a particular experience. The benefit of a physical marker is that it can provide a tangible and consistent

presentation of the mapping between the physical world and the virtual content. However when the same physical area is used in a variety of ways and contains many different layers of digital content then the design of the physical marker could be complex.

Have a training zone. It is a particularly good idea to use as a form of “training” level to help users get used to the system interaction. Most computer based games have the concept of a training level where users can learn to use the different control and interaction mechanisms and to practice game play. A similar concept can be deployed in mediascapes to provide an introductory level or zone where physical markers help guide the user as to what is happening and how to move in and out of regions. If possible this zone could also help train the user how to avoid stopping on region boundaries.

3.2.5 Make the interaction design consistent.

Every mediascape designer can create different kinds of interaction behaviour in order to explore the new medium. This may lead to confusion and frustration to users who experience more than one mediascape but in these early days exploration of different forms of interaction for different kinds of mediascape is strongly encouraged. As the medium matures we expect a set of established conventions and interface metaphors to become established. Within a single mediascape there should be a consistent form of interaction because consistency is one of the key principles to making an application easy to use. In GPS triggered mediascapes the principles that have emerged so far are to

- Provide feedback to the user when they need to move on to trigger a different region. In the story mediascape a background loop of footsteps played between sound files. In Riot! A background sound of general rioting was used.
- Provide feedback when a region is entered. This can be a lead in sound or the main sound file starting up.
- Always trigger sounds in the same way. It is possible to program sounds to play regardless of movement. If this kind of technique is used in addition to movement based triggers it can confuse the user. Any different mode or change in interaction rules need to be made explicit to the user.

3.3 Working with the Mobile Bristol Authoring Toolkit

The authoring tool uses a map based interface on which regions are drawn. It relates the placement of a virtual media region with a physical location. The interface is intended to be used by mediascape authors to create and test region layouts, it is not meant to be used as the end user interface.

Figure 4 shows the editor interface of the regions in Queen Square.

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Figure 4. Region layout for Riot! 1831

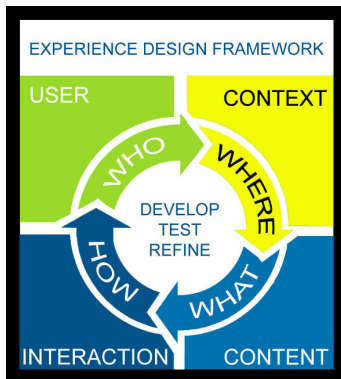
The Mobile Bristol client software provides this map view with a small dot on the screen that indicates your current position. It is possible to walk round looking at the screen and if it is attached to GPS to see your position move through the regions or if unplugged from the GPS to be able to click on the screen to simulate moving through the square. Whilst this view is very useful for the mediascape author it is of limited value to the end user and is not recommended. It is also not possible to show images on the screen whilst in map view.

Aspects that are useful to the end user and that should be designed into the end user interface are

- Knowing if they are on a region boundary or not. This can be done through audio either by using a subtle alert sound when you enter a region or by using “point source” regions which are quieter on the edge and louder in the middle. It can also be done through images or icons on the screen.
- Where the other regions are. Some kind of overview screen can be useful that shows a schematic version of the physical areas and the virtual region areas. This can also be very useful as a printed document in experiences that are designed for dedicated areas like a festival or tourist trail.
- What kind of content is in which region and how the region is related to nearby buildings or things in the environment.

In Riot! 1831 each region had up to four different sound files attached to them which in most cases would play randomly. This meant that if users returned to a region they would hear something new each time. However it also meant that a particular region might have some sound files that were associated with a building or physical object and some that were related to the square. A simple association between the region and the physical world could not be shown on the two dimensional map. The different layers of sounds and even alternative mediascapes that can all be associated with the same space need a new form of representation that users can learn to recognise.

4 Context



The context quartile in the experience design framework is concerned with the physical and social environment that you are working in. The disciplines of HCI and Interaction Design have established techniques for observing users that draw on ethnomethodological studies and participatory design. For a description of the theories and techniques please see [16 : Interaction design chapter 12] and [8: HCI, Model, theories and frameworks chapter 13]. Whilst most of these techniques have been applied to studies in the work space the principle of understanding the social context of an environment still applies to experience design for

mediascapes. Where the experience design framework differs is in the emphasis on the study of the actual physical environment itself. For example the kind of animals, weather and sounds that happen in the environment are important in mediascape design.

4.1 Design Issues

We have identified several factors and situations which lead to *magic moments*; those moments which are deemed to be both moving and memorable and thus are those that people really value. We have found that a magic moment occurs at those points of unexpected connection between physical and virtual worlds, for example when you hear a description of lovers on a bench and then you notice some in front of you, or you hear a seagull cry in the headphones and then one flies past. Knowledge of the environment enables a mediascape to be designed for the environment in which it will be experienced and to heighten the likelihood that these co-incidences will occur.

Ambient sounds and noise can be used effectively to provoke a form of synaesthetic confusion, the feeling of confusion caused when you do not know whether a sound is real or part of the mediascape. For example in the story telling soundscape [case study 3] there is a sequence where a dog barks and a person shouts which sounds as if it is coming from behind you. Nearly everyone who hears it turns around to look for the dog and then they realise it is in the mediascape. Although this kind of phenomenon is more disturbing and weird rather than pleasant and relaxing, the sensation is very memorable, is frequently recounted and therefore counts as a magic moment.

Many experiences, notably thrill rides or horror movies, rely on causing fear or discomfort in the audience. Mediascapes have a similar potential, their ability to challenge the senses so that you are not sure what is real and what is virtual is very powerful. For example in Riot! a boy recounted the time when he stood on a cannon which exploded and really scared him. Of course it was a virtual sound but the feeling was so vivid that the boy remembers it and recounted the experience several times to his friends and family as well as to his teacher and class mates in a school lesson.

Authenticity and resonance with the setting are also powerful causes of “magic moments”. The fact that the riots actually took place in that actual square was an

important factor in the enjoyment of Riot! 1831. It gave a sense of history coming alive and allowed people to see a familiar place in a new way.

Knowledge of where people naturally congregate and walk can help the designer choose how to lay out the media regions so that the content is appropriate to that particular place. Despite the need for users to wear headphones the mediascape experience can be quite social. Users will typically push the headphone off one ear to talk to each. When there is a common thing that users wear or hold, like headphones and a back pack, it forms a kind of identification by which participants will notice each other. Some described this as like being in a club because it forms a loose bond between people you might encounter who otherwise would be complete strangers. Groups of people who try out mediascapes will glance and smile at each other as they walk round and they will often swap tales of what they had each heard and talk about it afterwards. We have observed people swapping headphones, calling others over to a certain spot to hear a particular sound file and dancing.

4.1.1 Social meaning

Places are invested with understandings of behavioural appropriateness and cultural expectations. They frame appropriate behaviours and determine how one should act [10: Harrison & Dourish]. Understanding what a place means to people and externalising the inherent social protocols can also be part of the experience design process. In addition to passive observation of the environment an interview study of the people who use, work or are responsible for the area can be conducted to get more of this insider understanding. If the idea for the mediascape has already been chosen then the idea should be included as part of the interview to gather reaction and enthusiasm for the idea. If the mediascape is story based then these same people may well become content contributors or could feature in the mediascape itself.

There is also a choice of design goal between designing a mediascape that changes the practice of people who currently use a space to designing a mediascape to attract new people in to the area. In the former case the observational studies of the current place will be critical to assess how people use and feel about the space currently and then see how the mediascape changes those feelings or behaviours. When the intention of the mediascape is to bring new people into an area then more emphasis and research is needed on marketing the experience, making people aware of the mediascape so that they visit the place and try it out.

Mediascapes can also be designed to augment existing attractions or events. For example a bus tour, trip on the boat or existing walk can all be candidates for using mediascapes. Even existing audio museum and tour guides may benefit from using GPS as a trigger to avoid the need for button pressing or user selection.

Being aware of the social dynamics of a place can also help in designing “magic moments” that relate to those dynamics. For example if you know that people often sit on the bench and eat lunch and be pestered by seagulls looking for scraps to eat then the mediascape content can draw on that experience. If groups of people tend to walk around

together then the experience needs to be designed to be suitable for group dynamics. We have noticed a tendency with small groups then when one person has had enough or leaves the experience then others in the group often feel obliged to do the same.

4.1.2 Meaningfulness of the place

The other aspect of context is to decide how important the location will be to the mediascape. If it is simply a neutral stage for the experience then observation and social understanding of the environment can be used to design the process and overall flow of the experience. If the place is an integral part of the experience then the physical artefacts and objects in the environment will have significant meaning to the experience. There are three levels of significance to a place and how the mediascape can be mapped to it

1. **Arbitrary linkage.** Any place of a certain physical size (eg a football field or area of open grass). In this level the place is simply used as a physical area that could be anywhere geographically. It is analogous to a stage or a dance mat, simply an area or surface that is needed to control the mediascape.
2. **Physicality** : a place with certain characteristics, a tree, a bench a lamppost. In this level there are certain features of a place that are significant but the actual geography is not important. For example the mediascape could be remapped on to any geography that has a certain set of features like a river, tree or bench and the mediascape. For example a situated game may rely on users discovering or interacting with physical features in a landscape like needing to cross a river and fighting a troll on the bridge.
3. **A particular location.** In this level the actual location and physical artefacts in a place are significant and meaningful to the mediascape. For example a mediascape based around a ruined castle with dramatic scenes or tales of events that took place there will have authenticity and resonance when heard in the actual place that they happened. Riot! 1831 was significant in this way and whilst the content of the mediascape can in principle be played in any physical place it has far more meaning and impact when heard in Queens Square.

4.2 Recommendations

4.2.1 Observe the environment.

We recommend that the environment should be studied at different times of the day, and at weekdays and weekends so that a profile of the space, its uses and its inhabitants can be drawn up. If the mediascape will only be available at set times then observations at those times on a number of different days should be made. When observing the environment the role of the observer is as an outsider looking on. The observation process should not intrude on the environment or necessarily engage with activities or people in the observed space. A still camera and notes is the most practical form for recording observations. A sound recording device can be useful to record samples of the ambient sound or background noises but is not essential. A video recorder can be useful for recreating the environment visually and for detailed analysis of small interactions. It is not necessary for this phase of observing the environment and it can be too intrusive.

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Field notes and observations should comprise of

- the day and time of observation
- the area that is being observed (eg a square, courtyard, street or an area of park)
- the weather and conditions (eg grass wet, trees bare, flowers not in bloom)
- what kind of things are happening (eg games such as football, Frisbee or Petanque, people eating, walking through)
- where the things are happening (a sketch of the area with marked areas can be used)
- frequent activities (eg. People cycling through, people walking and listening to music on headphones)
- the kind of things people are wearing or carrying eg. Ruck sacks, hats, briefcases, phones
- animals and what they do (eg squirrels, gulls, dogs)
- where people tend to congregate, chat or sit
- any regular background events (eg train passing, cars hooting, tram ringing)
- the most frequently taken routes or paths

4.2.2 Conduct a technical investigation and survey of the intended location.

Ideally the area should be surveyed by walking around with a GPS unit which has the capability of showing the GPS readings and the number of satellites in view. A sketch map of the area can be used to annotate with the findings from this technical survey that should include landmarks, the kind of terrain, the strength of the GPS coverage any potential things that can change it. For example in the winter when there is not much foliage on the trees then areas under the trees will be less problematic than in the summer when the leaves can obscure the view of the sky and thus the GPS readings. This technical survey should be conducted at different times of the day. It can be combined with the observational survey described earlier.

4.2.3 Create an experimental mediascape to test the terrain.

The technical survey should have shown areas that are likely to be in GPS shadow, areas that should have very strong reliable signals and areas that might be effected by atmospheric or seasonal variations. An experimental mediascape should be created that consists of a number of regions which play a simple sound placed in each different kind of area identified in the technical survey. The designer should then walk around and try out this experimental mediascape to help identify possible region layout designs and to verify the results of the technical survey.

4.2.4 Use environmental knowledge to define the boundary.

The mediascape designer needs to decide the boundary for the mediascape. This can be a square, an identifiable area, a set of streets or a route. Knowledge of the environment will help the designer choose a suitable boundary and how that boundary can be described to the user. Roads or hazards that exist in the environment need careful consideration so that

users are not put at risk, for example by having to cross busy roads while wearing headphones.

4.2.5 Avoid time critical challenges in shared social spaces.

Generally we have observed that when people are absorbed in soundscapes their sense of environmental awareness becomes much lower. GPS based games that have time based challenges can lower the sensitivity to external surroundings even more and users have been seen trampling through bushes and flower beds in an effort to complete a game challenge. A thoughtful design should try to avoid encouragement of anti social behaviours in public spaces, perhaps by avoiding too many time based challenges and rewarding slow methodical actions rather than speed.

4.2.6 Allow the environment and others in.

If headphones are given out to users then choose models that do not completely shut out the outside sound.

4.2.7 Design for the environment.

Whyte [26] in his study of cities found that people will tend to chat the longest in the busiest areas, those areas where there is most visibility, light and people. Other people passing through will naturally create paths around them. If the goal of the mediascape is to encourage interactivity amongst participants and non-participants then regions with humorous or evocative content should be placed in the busiest throughput areas to instigate more conversations or reflection.

Place content that is closely related to physical artefacts as close as possible to the physical object or use strong contextual information to direct the user's eye gaze toward the object.

Include references to things that are very likely to be seen in the content of the mediascape to increase the likelihood of a co-incident magic moment.

4.3 Working with the Mobile Bristol Authoring toolkit

4.3.1 Create an annotated map to help with region placement and design.

The authoring tool map view is simply a "jpeg" image of the right dimensions to match the chosen mediascape boundaries. The background image can be a sketch map or a professionally produced map of the area that the designer has the right to use. The background image can be annotated or shaded in any PC image editor to highlight any hazardous areas or "no go" areas that were identified in the observation phase. The designer may also wish to add special items that are in the environment such as benches, trees, ponds and statues. These items are powerful visual cues that the designer is likely to want to position media files with. If the mediascape is intended to have a strong relationship to the place in which it is set then these cues may well lead the user to expect that there may be audio associated with them. Places where people naturally rest like

benches are particularly good for longer media files or content that is intended to provoke conversation or social interaction.

Good future designs should build up awareness of the virtual environment and create a state of receptiveness in the user so that the frightening or atmospheric sequences will have the most impact

4.3.2 Trace routes to spot patterns and refine designs accordingly.

It is possible to output a trace file of the regions people have entered when they walk around a mediascape. These output files can subsequently be analysed to spot common traversal patterns or regions that are being missed. The region design can then be altered in the light of the analysis results. We now describe analysis of the trace results from Queen Square as an example.

4.3.2.1 Queen Square trace file analysis.

Most people will tend to stick to paths and create their own route or plan for walking around a mediascape. Some people are quite systematic in how they cover an area. We have the facility to record which routes people take, what regions they enter and the sound files that they listen too. Analysis of the routes taken during Riot! showed four different patterns emerging. A random walk where no clear pattern or structure was evident and then three structured categories paths, circles and police march. Paths are structured from the physical layout whereas circles and police march were user-invented structures. Examples of each are shown below. It was noted that approximately 50% of the visitors traversed the square in a random manner whilst the other 50% showed some kind of structure to their traversal, mainly that of walking on the paths.

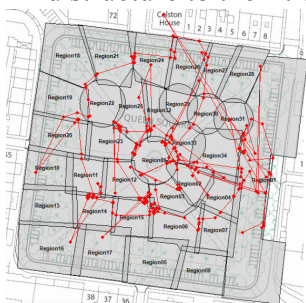


Figure 5. An example random traversal



Figure 6. An example path traversal

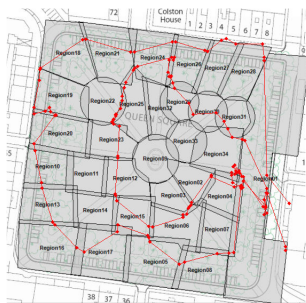


Figure 7. An example circular traversal

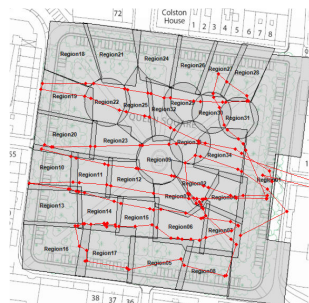
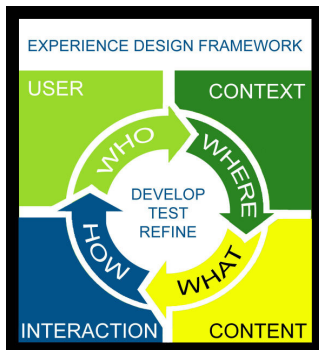


Figure 8. An example police march traversal.

Experience Design Guidelines for Situated Mediascapes

In a circular traversal usually the outer perimeter is circled and then the person spirals inside walking around in increasingly smaller circles. The police march traversal uses a criss-cross pattern that can be either horizontal or vertical from one side of the square to the other.

5 Content



The content quartile in the experience design framework is concerned with the media and any materials that you produce. It includes image files, sound files and video that may be played in the mediascape. It also includes marketing literature, supplementary information and the graphics, artwork and text that needs to appear on any posters or objects in the vicinity.

5.1 Design Issues

5.1.1 Non Linear Narrative

The medium of situated mediascapes is essentially non linear. If the design allows the user to walk wherever they want to then a pre-defined order or sequence for playing the media files cannot easily be implemented. This is a challenge for designing narrative. If a story needs to be told there are certain expectations that need to be met for the user to get a sense of closure or understanding. Typically they will expect a beginning, middle and end. People's knowledge of narrative structures allows them to make sense of the action of a story and generates for them certain expectations as to what might happen next [6: Bruner]. The word narrative should not be understood narrowly. There is a large body of literature on the term which is as complex and universal in human discourse as metaphor; narrative has been found in the discourse of professionals such as lawyers, historians, and psychiatrists. Narrative then may take the form of argument. One common schema of narrative is as follows:

- 1 Introduction of setting and characters
 - 2 Explanation of a state of affairs
 - 3 Initiating Event
 - 4 Emotional responses or statement of a goal by the protagonist
 - 5 Complicating actions
 - 6 Outcomes
 - 7 Reactions to the outcome
- [4: Branigan]

Ways in which the new medium can either break or conform to established narrative schema is an exciting and challenging design problem. Linearity should not be understood as chronology. The film, *Pulp Fiction*, for example does not tell its stories in chronological order, but each of its stories has a beginning, middle and end. Similarly, a detective story is not told chronologically, we work from the end (the murder) to find out whodunit (the start). Linear narratives then may compel the questions – what happens next or what happened before.

Our experience to date shows that non linear aspects of mediascapes can work extremely well, for example the background loops and discrete, self contained vignettes as sound files. However if aspects of linearity are introduced then these can raise expectations for closure, context setting or a familiar narrative schema that if they are not met can lead to user frustration or disappointment. For example in Riot! 1831 many of the events alluded to things that happened over a period of time and the vignettes themselves had a strong linear flow which tended to make some people want more of an overview of the whole event and a better setting of the context, history and overall story.

5.1.2 Sound design

Sound is probably the most effective and evocative media for situated mediascapes. Categories of sound can be sound effects, music, voice and alerts or alarms.

5.1.2.1 Sound effects

Sound effects are an excellent way of building up atmosphere, creating suspense and shocking the users. There are many resources available for obtaining pre-recorded sound effects that can be bought or freely downloaded from the web. These can be used as they are or scratched and mixed to create new ones. If new sounds need to be mixed or produced then a sound editing software package will be needed.

Some sound effects can be recorded in situ, that is recording sounds that occur in the environment itself. As we have noted earlier these kind of sounds can be used to great effect to cause a kind of synaesthetic confusion, that is not knowing whether the sound was real or not.

5.1.2.2 Music

If harmony is important to the mediascape then making sounds that can interweave if more than one plays is part of the sound design task. For example in Moulinex a bed of pulsating background sound was used to help build up and blend the effects of different musical pieces starting up. If the design intention is to separate the musical pieces then the designer should take care as to how the music fades in and out and cuts off to make the experience flow more smoothly.

5.1.2.3 Voice

Spoken narrative and text can also take on a number of different design styles. Narrative can be quite raw and spontaneous, if the style is intended to be natural and a snapshot of people's lives and opinions in a form of lifestyle documentary. Or the narrative can be completely pre-scripted and constructed in advance. For example all of the scripts for Riot! 1831 were written in advance and actors were hired to record them.

Editing of spoken words needs special care so that cuts do not change the meaning of the words or jar the flow of the dialogue. The blends and fades should match the intonation and inflexion of the peoples voices so that it does not jar the listener or be mistaken for a technology failure.

In general the most polished results for mixing voice and sound effects is to record the voices in isolation and then add the sound effects later. However for personal or

documentary style mediascapes recording people in the environment is very effective and need not require too much PC based sound editing.

5.1.2.4 Alerts / alarms

Sound can be used effectively to guide the user as to what they need to do, or help with user interface control. For example in straightforward “museum” style information mediascapes a sound effect can be used to alert the user that they have entered a media region or that they have left a media region. However care needs to be taken that the alert does not become repetitive and annoying to the user. In an early experiment for the Walk in the Woods mediascape an alert was tried and it was deemed too annoying to use in the final experience, it intruded with the more flowing style of music or voice gently starting up on entry and fading on exit of a region.

We have previously discussed the merits of using a background sound loop that can either play continuously or fade in when a sound file comes to an end and the user needs to walk on to trigger another sound file. As this becomes the soundtrack that the user hears most often care needs to be taken to ensure that it does not have any distinctive feature or sound, like a whistle or bark, that ends up being too intrusive and repetitive for the user. Ideally the background sound needs to be totally ambient so that the user only notices it if it is suddenly missing.

5.1.3 Images

Images can be used effectively to help guide and inform the user. For example if a distinctive landmark or building is being referred to then a picture of that object can help orient the user and enable them to locate it in the real world. Images can also be effective to show pictures of buildings or scenes that used to be there, for example in castle ruins or battlegrounds. In general, mediascapes should be designed so that the real world is the scene that you want the user to look at and screens and images are simply to supplement the visual. If the user is constantly having to stare at a screen, which can be hard to see in daylight and in bright sun, the experience is not as powerful. Images and text can also be used to provide supplemental information to a dramatic mediascape, for example facts and figures and help which are not critical to the drama can be delivered on the screen as a separate channel from the audio drama. This means that the flow of the audio need not be interrupted unless the user feels the need to know more about something.

5.2 Recommendations.

5.2.1 Use large regions.

To overcome the problem of GPS drift³ we recommend that the region size should be at least 20meters in diameter and a particular item of interest should be designed to be at the center of a region so that even if the GPS drifts the item will still fall within the region. This large scale granularity makes designing the experience so that it sets and matches expectations very difficult. Physical objects in the environment are natural cues but if

³ GPS Drift is described later in this section – see Figure 10

they are very large, like a building or tree then they can cast GPS shadows around their close vicinity.

5.2.2 Use a background loop.

A background loop should be designed so that it helps the user know the system is working and keeps the user in the context. Distinctive elements to the loop should be avoided so that they do not become irritants when repeated.

5.2.3 Use image sparingly.

Strong reliance on images to convey content will force the user to look more at their screens than at the environment. Images should be used to enhance the audio channel and aid navigation and orientation. Screens will tend to absorb the user in the device whereas audio will help the user become absorbed in the experience.

5.3 Working with the Mobile Bristol Authoring Tool

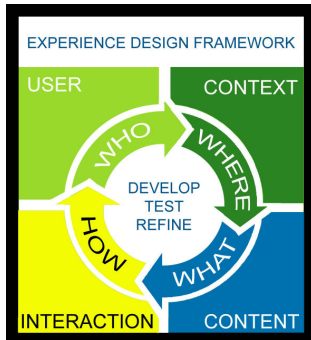
5.3.1 Region design

We know that the natural behaviour for users is to stop as soon as they hear a new sound start up which is typically on entry to a new region [3: Benford]. Region boundaries are the most vulnerable area for exposing GPS jitter which can result in a very choppy experience for the user. GPS jitter is when the GPS reading jumps spuriously when the user is not actually moving. Small jumps in the readings when standing on the boundary of two regions can keep triggering the different sound files associated with the two regions and in the worst case bounce the user between the two as they keep starting and stopping.

Overlap region boundaries and create buffers. Designing the mediascape to minimise the problems with region boundaries can help overcome the problem. For example each region could have a buffer zone or outer region so that files are not stopped unless the user leaves the outer region. Or the style of mediascape can change so that sounds always play through to completion. Although this prevents the user having as much control over what they hear as they cannot stop the sound file when they have heard enough. However, if sound files are very short this may be the most practical form of interaction design.

The toolkit provides the designer the choice of whether to pause a media file on exit from a region so that it can be restarted when the user walks back into a region or to stop it and start a different file. Pausing and resuming a media file can help stop the user being frustrated that something that they were listening was cut off inadvertently. They can try to walk back into a region to listen to the remainder. It is recommended for longer files that the designer feels are important to the experience.

6 Interaction Design



The interaction design quartile of the experience design framework is concerned with the interaction design for the mediascape. The basic interaction mechanism is that as a user moves to a location media content is automatically triggered. The design opportunity for this new medium is to try to understand the constraints and opportunities provided by the medium and to work with them rather than against them. For example we know that GPS is currently an imprecise technology and so content should reflect the nature of this variability. If reliable and precise location information is required then an alternative form of technology should be considered, such as an RFID or Bluetooth beacon. The design issues that we discuss are

- Application flow and immersion
- PDA based interfaces
- Networks
- Location technologies

6.1 Design Issues

6.1.1 Application flow and immersion

We have recognised that mediascapes can immerse and engage users and can involve deep periods of immersion which may only be fleeting or last for a few seconds [19: Reid]. Ideally the application needs to move the user smoothly in and out of periods of immersion so that they can reflect, make sense of and enjoy these powerful immersive moments without being taken too far out of the mediascape context. A model of the flow between immersed and non immersed states is shown in Figure 9.

When the user is not immersed they are conscious of their surroundings, the environment and what they are doing. In this not immersed state we have highlighted three different feelings that the mediascape may have evoked. Users may be receptive, waiting for a new sound file to start up or the next media event to happen or they might be making sense of something that just happened. They could even be relieved if they have had a frightening deeply immersive event. For example in Riot! one young boy felt as if he had stepped on an exploding cannon, it was of course simply a sound file being triggered but it felt so real that it completely terrified him for a few seconds. Afterwards he had a feeling of relief that he was actually ok and still alive! Terror as a design goal is perfectly valid; thrill rides and horror movies that work well are designed on this principle.

Experience Design Guidelines for Situated Mediascapes

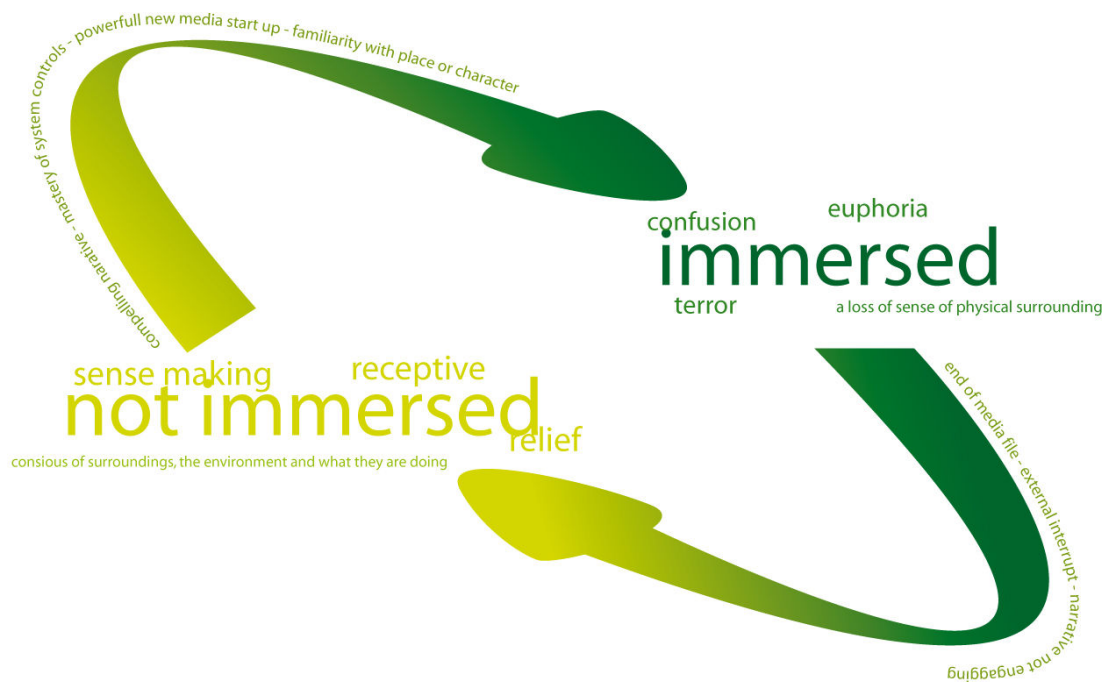


Figure 9. Immersion as a transient state

The model of immersion as a transient state shows the kind of events that will move users from not being immersed to being immersed and back again. When the user is receptive and not immersed a powerful new sound starts up, engages the user and can then make them happy, terrified or confused. Typically, beautiful music can lead to euphoria whereas the exploding canon or creepy sound effects can build up suspense and terror. Cryptic narrative or non identifiable sounds can lead to confusion. When this sound finishes the user will go back to relief or sense-making or be receptive for the next event. However, external interrupts, like a noise or event in the environment – a car passing by, someone shouting etc can prematurely jar the user out of their immersed state. Other things that can prevent the user from being immersed are if the narrative is not engaging then the user gets bored and will look for distractions in the environment. Some users also like to have a strong visual element to the experience; if they do not have anything specific to look at the sound alone may not hold their attention.

In order for users to become immersed they need to be comfortable with the system and have mastery of the system controls. If the user is consciously thinking about what is happening or how the technology is working then they are less able to listen to the content or the sounds and become engaged with the mediascape. Once they are comfortable with the trigger mechanisms and the way the system works they are able to become engaged and immersed in the content.

Other mechanisms that move the user into an immersed state are

Experience Design Guidelines for Situated Mediascapes

- a powerful new sound starting up which catches the attention and makes the user want to listen to what will happen next
- compelling narrative, so the user gets absorbed in the story and will be less aware of environmental interruptions;
- hearing a familiar place name which catches users attention and makes them more likely to pay attention and listen and become empathetic with the content

6.1.2 PDA based interfaces

All of the near term potential client devices that could be used to deliver mediascapes such as PDAs, mobile telephones and games consoles have a screen and buttons or keyboard as their primary form of interface. Design decisions for these kind of devices will concern how much the user should rely on a screen for feedback or interaction versus how much can be done through sound and movement alone. Typical needs for mediascape interaction are the ability to find out more about a certain location, story or image. One mechanism to do this is to present the different kinds of information as different layers that the user can switch between, each of these layers could be a different mediascape. So for example there may be a mediascape that provides factual information about where you are, what events happened and in what time period. There could also be a number of dramatic layers that allow people to experience events that have happened there in the past, in different years. In this case the user interface design needs to allow the user to switch between them or drill down to more information as an intuitive action.

New forms of interaction design are also necessary to navigate between different mediascapes which could all be available in a certain location on the device. How the user is made aware of available mediascapes and can choose or sample them is a future topic of design research.

6.1.3 Networks

Networks enable an application to communicate with other applications or with a server. Access to a network is essential if messaging or communication is required between devices. Many kinds of mediascape do not require network connectivity and can run on stand alone or non networked iPAQS. Version 1.60 of the toolkit editor and client provide this stand alone capability. All of the media can be stored locally on the client device (typically on a storage card) and the client code analyses user positions to execute the actions (eg. Play an audio file) that the author has specified for that location.

The case studies in this document are all non networked applications where the content is stored and read from a storage card in the iPAQ. This gives the advantage of being able to run research applications independent of wireless network coverage, and has allowed wider experimentation with the applications without having to wait for infrastructure development. It also allows the flexibility of working in a wide variety of locations both urban and non-urban.

A network is essential for messaging, synchronising events and recording state centrally on a server. If each user has their own device with locally stored content they will each have an individual experience. So if two people walk around together they will not hear

exactly the same thing at the same time. If the author wants events to be synchronised, for example to ensure that all people in the same place hear the same thing at the same time then they need to use a broadcast mechanism or an event synchronisation system to produce the desired behaviour. Both mechanisms will require a network to deliver either the broadcast media or the messaging data between devices.

Most multi-player game architectures require the game state and the game engine to be stored on a server which communicates over a network to client devices. Just as most of the content for the internet is stored on servers all around the world we can imagine that eventually the content for millions of mediascapes will be stored on servers and streamed to mobile devices over a network in the future.

Streaming media across wireless IP and 3G phone networks is an active area of technical research. We imagine sophisticated caching mechanisms and clever use of local context to stream and play media in a timely and reliable fashion. In the near term we expect that most of the content for mediascapes will be downloaded to the device and played from local storage, rather than streamed real time from a server. For example all of the media for the region that the user is in can be fetched in anticipation of future needs and stored on the device until the user leaves that region. Region size may be similar to the area of a mobile phone cell or wireless hot spot.

6.1.4 Location technologies

There are a variety of technologies and systems that can be used to provide information on where someone or something is. We briefly describe tags, ultrasound and GPS as some of the most common technologies used in computer systems to provide location information.⁴

Tags. A tag is some form of machine readable code like a barcode, ticket or RFID tag that can be attached to an object. For example RFID is commonly used in retail applications for tracking the whereabouts of parcels or inventory. An RFID tag can be attached to the item that is to be tracked and can be detected when the item is near an RFID reader. Indeed a tag of any kind that can be read by a system may be used to give either tracking information (if it is placed on a mobile object) or location information (if it is placed on a static object and the system knows where that object is).

Ultrasound. Whilst ultrasound can be used for a variety of purposes we have used it in an indoor location positioning system so that we can develop mediascapes indoors. See [17: Randell]. Using this system we can detect the location of movement to within one floor tile (approximately 12 inches). The Walk in the Woods soundscape described in the case studies used this indoor positioning system.

In terms of the implications for the author the biggest difference between mediascapes that use ultrasonics for location position compared to outdoor systems using GPS is the grain size of detecting movement. With GPS systems we do not recommend that the

⁴ WiFi locations systems that use triangulation from three different WiFi hotspots are also emerging but are not covered in this report.

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design assumes you can detect small movements, we recommend a region size of typically a few meters. With the Ultrasonic system it is capable to design mediascapes with much smaller regions.

We can draw on an analogy with painting. When designing outdoor mediascapes one can think of the outdoor space as being a huge canvass that needs to be painted with a very large brush. With indoor spaces the canvass is much smaller and it is possible to use a much finer brush size.

GPS. Developed in the 70s, and still controlled by the U.S department of defence, GPS (Global Positioning System) is provided by a network of 24-27 satellites moving in 6 orbital planes some 20000 km above the Earth (moving at 1.8 miles per second). The satellites are positioned such that a minimum of six will be hypothetically available for view by any person in any location on the planet. While originally developed with a predominantly military application, public access to the GPS service is now freely available, with no reduction in accuracy (since 2000, when the protocol of ‘selective availability’ where military use retained an accuracy advantage was abandoned). Each satellite continually broadcasts its position and time information via HF radio, thus in order to identify its location, a GPS receiver calculates its position relative in distance to the nearest three (or more) satellites through a process of triangulation. Co-ordinate location is typically returned as a 2D measurement of latitude and longitude, but with a four satellite ‘lock’, can also include information on elevation - allowing for an essentially 3D co-ordinate of the receiver’s location.

Accuracy of GPS

While augmented GPS technology such as D(differential)-GPS offer an improved accuracy level, publicly available standalone GPS receivers typically offer an accuracy range of 10 to 20 metres (though accuracy is generally higher if triangulation is performed while the receiver is static). However, the development of the European Space Agencies ‘Galileo’ project (due for completion by 2010) will, through the provision of an additional 30 satellites, provide an accuracy level of between one and five metres.

Technical Issues with GPS

Though technical efforts continue to improve the accuracy and effectiveness of GPS, it remains vulnerable to several variables:

- Atmospheric conditions. Variations in the ionosphere can incur location identification errors in the region of 10 metres. Rain and other poor weather conditions are thus commonly noted to cause accuracy issues.
- Signal Multipath – the reflection of radio signals from surrounding structures at ground level can often cause negative accuracy effects. This effect is particularly prevalent both inside buildings and outside whilst in urban areas.
- Timing errors. While the time keeping of the satellites are controlled by onboard atomic clocks, ground based receivers are not. While minor differences can be computationally compensated for, miscalculation of time remains a common factor in reduced accuracy.
- Latency and signal maintenance issues. The time required to search and establish a minimum three satellite ‘lock’ typically takes in the region of 12 seconds.

Experience Design Guidelines for Situated Mediascapes

Maintaining a stable signal for protracted lengths of time is difficult – particularly if the receiver is in motion.

- **GPS Drift.** The GPS satellites each have their own independent orbits and so they are not always visible at the same times. At certain times of the day there may be several satellites directly overhead which will give good accurate readings, whereas at other times of the day there may be few satellites directly overhead or just a few that are closer to the horizon. At these times the reading can seemingly drift several meters in accuracy. For example during the three weeks of the Queen Square every afternoon the content drifted 10 meters in the square. The problem is illustrated in Figure 10.

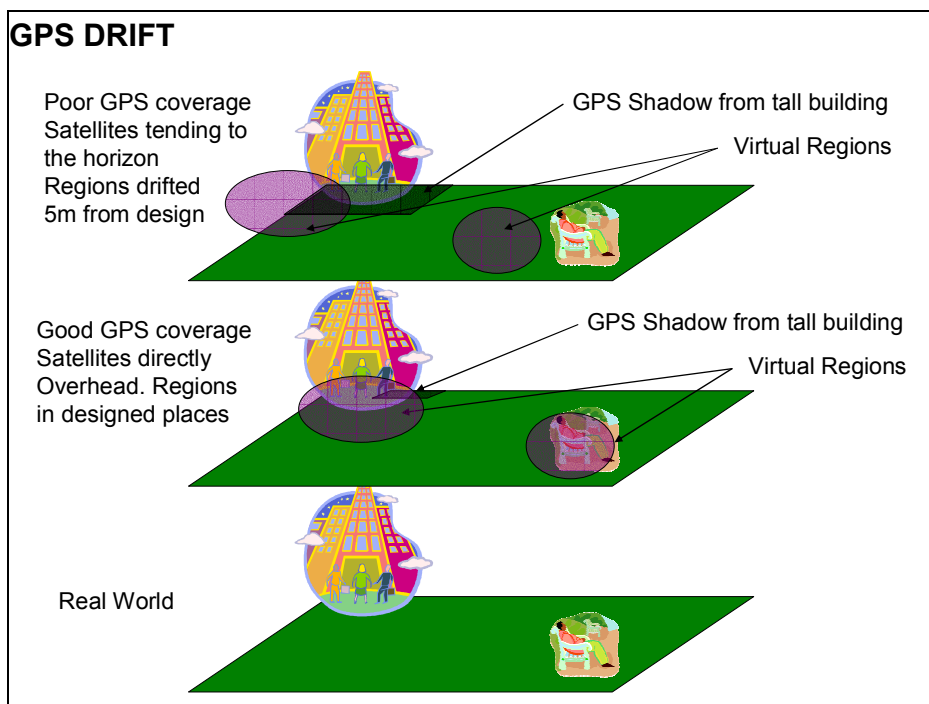


Figure 10. The problem of GPS Drift

6.2 Recommendations

6.2.1 Limit the need for screen based interaction.

If a PDA is used as the client device then the designer needs to decide on how and when to use the screen. For soundscapes we recommend limiting the use of the screen and to use movement as the primary form of interaction. This can be thought of as a “where you are is what you get” paradigm.

6.2.2 Adhere to the principles of good HCI design.

The interface needs to present the state of the system so that people know if the technology is working. It should also provide feedback to any user action, for example when a button is pressed the user needs to know that the action has been detected. Feedback is used to develop a mental model of the interaction and so it needs to be reliable and consistent.

6.2.3 Prevent ambiguous gaps between media regions.

The way that the regions are laid out, whether they overlap or are quite sparse will be have different effects. The designer can choose whether the experience needs to be continuous or have gaps. If there are gaps then it should be obvious in the interface that this is an intentional silence or gap so that the user does not worry that the system has failed. Visual indicators or a background sound can be used to signal that there is no primary media content in this region.

6.2.4 Keep outdoor GPS triggered regions large.

We recommend a minimum region size width of 20 meters diameter for outdoor mediascapes

6.2.5 Keep logic simple.

Specifying logic requires the kind of skills that most programmers and mathematicians possess and is difficult for people who do not think in this way. We recommend that unless you are happy with the notion of variables, conditionals and debugging that you keep logic to the most simple of forms.

Very complex logic is unlikely to be detected, for example in Riot! people did not realise that there was some complex logic in how some of the scenes were ordered, it was too subtle compared to the overall effect of random chaos.

Simple logic that controls order and sequence can be effective. For example in “walk in the woods” every time the user stepped on any one of six stepping stones they got the next segment of a linear story. It made the interaction dynamic but kept the narrative linear.

6.2.6 Design around environmental hazards.

We recommend that mediascapes designed to spread across cities should alert the user to roads and other hazards wherever possible and should only use deeply immersive media effects when in safe pedestrian areas.

6.2.7 Avoid the need for networking.

Messaging relies on the availability of a wireless network and in some environments this cannot be guaranteed. Dependency on the network also introduces another potential point of failure and so unless the application really needs it we try to avoid a reliance on messaging. Messaging is usually necessary for games, monitoring and communication.

6.3 Working with the Mobile Bristol Authoring Tool

6.3.1 Interface design

Screen based interfaces are created either using Flash or HTML.

HTML

On devices that support internet browsers it is possible to create screen based text and images in HTML. An HTML graphical user interface can display text and images that can behave as on screen buttons or links to other web pages.

Version 1.60 of the toolkit supports the use of HTML for creating user interfaces and is described in the Mobile Bristol Manual 1.60.

Flash

Macromedia Flash is a commonly used software package for creating graphical and animated PC user interfaces.

Version 1.60 of the toolkit supports the use of Macromedia Flash MX or above. It allows a Flash movie to act as the interface for a mobile application and is described in the Mobile Bristol Manual 1.60.

The design can also choose whether to show the regions, a map showing your location, or another interface that does not show your location. The status of system states such as whether GPS has a fix or not can also be extremely useful for debug and system testing. Whether the end user needs to be aware of these technical details is a design choice. As long as the user has good feedback that the system is working then the actual state of GPS may not be important as long as the interface copes for times when GPS cuts out or is unavailable.

6.3.2 Buttons

Soft buttons can be implemented on a touch screen using Flash or HTML. However in devices where screens are either not present or limited to text messages then buttons are a common device for selecting options and controlling parameters. For example volume

control is frequently a physical button or a slider. Most mobile phone handsets rely heavily on buttons and menus for their interface.

There are advantages to having a physical, well defined and ergonomically designed control in mobile situations so that the user can just use tactile senses without necessarily having to rely or use audio and visual senses. This means that the device can be worn or carried in a pocket and does not constantly need to be held or looked at. For example one solution to navigating between different layers of information might be to have a physical slider or dial that the user can turn to tune in to different virtual channels.

6.3.3 Region design

People tend to stop on entry of the boundary because media is usually started on crossing a region boundary. In GPS based systems this is the worst place to stop because if GPS readings jump slightly then the boundary conditions are frequently triggered causing media to start and stop frequently. Making the sound fade at the edge of a boundary and delays in triggering the media can help lead people more into the center of the region.

The author can choose whether to stop and start or pause and resume media when the region is crossed. Each behaviour will be dependent on the style of the content and the situation.

If the design goal is for a continuous experience then making the regions overlap is a good idea. When regions overlap the designer needs to think about how the media merges. If the media is sound files of conversations then a maximum of two simultaneous files is recommended. If the media is musical sounds then the way that the music interleaves can be important. A background bed of sound and up to two pieces of music is effective. Too many sounds can be a cacophony and will seem chaotic.

With visual media such as video or still images it is unwise to overlap them without careful screen design.

6.3.4 Media.

Audio.

Sound is a very powerful medium for the mobile, outdoor space. It has the benefit of allowing the user to be able to look around whilst listening, which is especially important if the mediascape assumes that the user will need to walk around and navigate the outdoor environment. Soundscapes can be designed so that your movement is detected by GPS and a certain location will trigger a sound pool. This allows your hands to be free from the need to hold or interact with a screen. It facilitates movement and peripheral awareness for things such as traffic, other people or hazards in the environment.

The Mobile Bristol toolkit works with sound files of type mp3 or wav.

Images.

Experience Design Guidelines for Situated Mediascapes

Images can be helpful to provide additional information that is not immediately available in the physical environment. They can help orient the user by display of a map with the users location superimposed, or by displaying a photo of a landmark for orientation. They can also show hidden or historic aspects that are no longer visible. The screen size of devices that are carried is usually quite small and so the images themselves may be restricted in their visual impact. Simple animated images can be effective in some circumstances.

Images displayed on a screen can suffer in bright sunlight and are very difficult to see on a small screen. They also force attention away from the environment and onto the device. The mediascapes in the case studies have all been designed for enclosed pedestrian areas. A mediascape that is effectively a walking trail across the city is a popular idea but the designer must be aware of the risk of situating content close to busy roads or other physical hazards.

The Mobile Bristol toolkit works with image files of type JPEG (.jpg)

A common requirement for mediascapes is to show a map of the area. The Mobile Bristol client software runs on an iPAQ and includes a Map view that can display your current position on a suitably created map of the region. For more details please see the Mobile Bristol Manual 1.60.

Video.

Client devices such as the iPAQ are capable of showing video but as with still images their use in an outdoor environment when viewed on a small screen should be carefully considered. We strongly advise experimentation with sample videos on small screens in a variety of natural lighting conditions before creating too much of this type of content.

Integration of video events in to the Mobile Bristol toolkit is provided through the flash interface and is described in the Mobile Bristol Manual 1.60, section 4.

6.3.5 Network

Version 1.60 of the toolkit editor produces a client application which runs on an iPAQ. The iPAQ is connected to a PC and the toolkit publishes the executable directly to the attached device. In the future we will allow a model whereby applications are published on to the network, accessible from the web, so that they can run on any device that has internet connection. The applications could run from the internet (if streaming and network bandwidth is sufficiently good) or they could be downloaded to the device to be stored locally.

6.3.6 Logic

Designing and specifying the desired behaviour, rules and consequences of events and actions is a logical process. The skills and methods that are needed are typical of those taught in computer science and other analytical processes. We have found that artists and writers typically struggle with this aspect of the design as some of the concepts and mechanism used are unfamiliar to them.

Experience Design Guidelines for Situated Mediascapes

With version 1.60 of the Mobile Bristol toolkit it is possible to create compelling mediascapes without the need to have any additional logic at all. The toolkit is designed to simply provide the capability for playing media when entering a region. The toolkit also allows the author a simple interface to specify what should happen when a user walks out of a region, for example you may want to stop playing audio or pause it. The toolkit provides an author the capability to specify more complex logic if they wish. Conditional, Variables, Chunking and Timelines are some of the mechanisms that are supported or planned for the toolkit.

Conditionals. The toolkit provides simple templates to create conditional logic of the form :-

if (condition)

then (action)

else (alternative action)

The conditions can be things such as

if a particular file has been played

if a different region has been entered

if a file is currently playing

There are several pre-defined actions and conditions available in the toolkit. However in most cases the conditions will depend on states that can be defined using variables.

6.3.7 Variables

Whilst some states like “is a file playing” or “has this region been entered” are provided as functions in the toolkit the author may wish to develop logic that requires keeping track of events or states that are not part of the toolkit interface. For example if the author wants to keep a count of the number of times a region is entered so that a particular action happens if the region has been entered 10 times then a variable is needed to store the count.

7 Case Studies

7.1 Case Study 1 – *Riot! 1831*

An Interactive Historical Play for Voices based in Queen Square, Bristol.

7.1.1 Description

You walk around in Queen Square, wearing a backpack and headphones, and it sounds as though you're walking through an invisible riot. You are tuning into history, eavesdropping on a magical parallel world. It's full of surprises. It's funny, poignant, moving. Being part of it brings history alive. You can do it on your own or with a friend, so you can share the same sounds at the same time or individually.

7.1.2 Keywords

Sound, walk, history, play, drama, riot

7.1.3 Background

This application was created and run by Mobile Bristol as a public research experience for three weeks, from the April 15th to May 4th 2004. Visitors to Queens Square were given an opportunity to immerse themselves in this dramatic experience in the very space where the Bristol Riots of 1831 took place over 170 years ago. It was a one off installation for a three week fixed period.



7.1.4 User

- Open to the general public, however there was guidance warning as it may not be suitable to young children due to containing some intense scenes and vivid sound effects.
- Visitors were given an opportunity at the start to share one backpack instead with two sets of headphones so that both participants could share exactly the same experience i.e. both heard the same sequence of sound files.
- Equipped with a backpack, GPS, iPAQ and a set of headphones users triggered the sounds and voices through their movement around the square.
- Users found out about the experience from TV, radio and newspaper/magazine coverage, by being in or traveling through Queens Square and seeing the equipment tent and also by word of mouth.

Experience Design Guidelines for Situated Mediascapes

7.1.5 Context

- The experience was designed specifically for Queens Square because that was where the riot had occurred.
- Files were written specifically about the buildings and reports that were filed about what happened in the riot.
- People were asked to stay within the confines of the square but were given complete freedom where in that square they could roam i.e. there was no predefined route.
- This experience made people aware of the square's bloody history which they may have not been aware of before, as today it is a nice looking pedestrian square.
- Other people use the square throughout the day from walkers passing through the square to people eating their lunch and on a sunny day there were groups of people playing football and Frisbee. This effected where users of our experience could walk on some days so again the square was densely packed with regions so that users would always get a wide experience of sound files.

7.1.6 Content

- Based on the Bristol Riots of 1831. The Political Reform Bill has been defeated in Parliament and the vote denied once more to ordinary people.
- Set at the time, when those people who would have been affected are rising up. Thousands of them filling Queen Square in the heart of the city to vent their fury.
- The experience lets the user hear the rioters' voices as they plunder the surrounding buildings, the flames as buildings burn, the merchants as they flee for their lives and the Dragoon Guards as they sabre-charge through the crowds cutting the rioters down, i.e. it was designed as if you were there at the time 'eavesdropping' on conversations that were happening.
- Audio only.
- Scripts written by the authors then recorded using with Bristol actors.
- Sound effects and post editing was done by a professional sound design editor.

7.1.7 Interaction

- The writers specified where the regions and sound files were to be placed.
- There were 34 different regions, as can be seen by Figure 11.
- There was a total of 101 different sound files.
- The square was completely covered in regions so that no matter where you walked you would trigger sound files.
- All regions played a file on entry to that region and stop (pause) that file on exit to that region.
 - onEvent (mbEnterRegionEvent)
 - onEvent (mbExitRegionEvent)
- Most regions had three different sound files that could be triggered for that specified area.
- If a sound file talked about a specific building then if it's location was known that file was located as close to it as possible.
- The choice of which of those three sound files was to be played to the user was written by logic;
 - Played in a specific order – Play file A then file B then file C
 - Played in a random order – Play randomly either file A, B or C. If file B had been played then only give random choice of A or C, if file C was then played file A would have to be played next.
 - Played in a random order with additional logic – Play randomly either file A, B or C unless in Region X file B had been heard then only randomly play file A or C.
 - Played in a specific order with additional logic – Play file A then file B then file C unless in Region X the user has heard 20seconds worth of file C in which case ignore file A and only play file B and then file C.

Experience Design Guidelines for Situated Mediascapes

- All regions triggered sources rather than playing the audio file directly – this meant the closer a user got to the centre of that region the louder the audio file played.
 - `onEvent (mbEnterRegionEvent)`
 - `playSource(sources$Region08, 100, false, 0, 1000, 0)`
- All files once triggered were played all the way through before the next file for that region could be triggered, i.e. if the user left that region before hearing that whole of that file then if the user returned to that region the file would resume from where it left off. This also prevented users from suffering from hearing the file stop and then start again from the beginning and then stop and start again due to GPS bouncing the user in and out of the region.
 - `playSource(sources$Region16C, 100, false, getSourcePosition(sources$Region16C), 1000, 0);`
- Each file when stopped and started/resumed had a fade of 1 second on it, this meant the user was often not aware that the GPS had bounced out and back into the region causing a stop and resume call in the media engine because the resume call would have been triggered before the file had had a chance to completely fade out. Thus all the user would hear would be the sound file getting quieter and then louder again.
 - `playSource(sources$Region16C, 100, false, getSourcePosition(sources$Region16C), 1000, 0);`

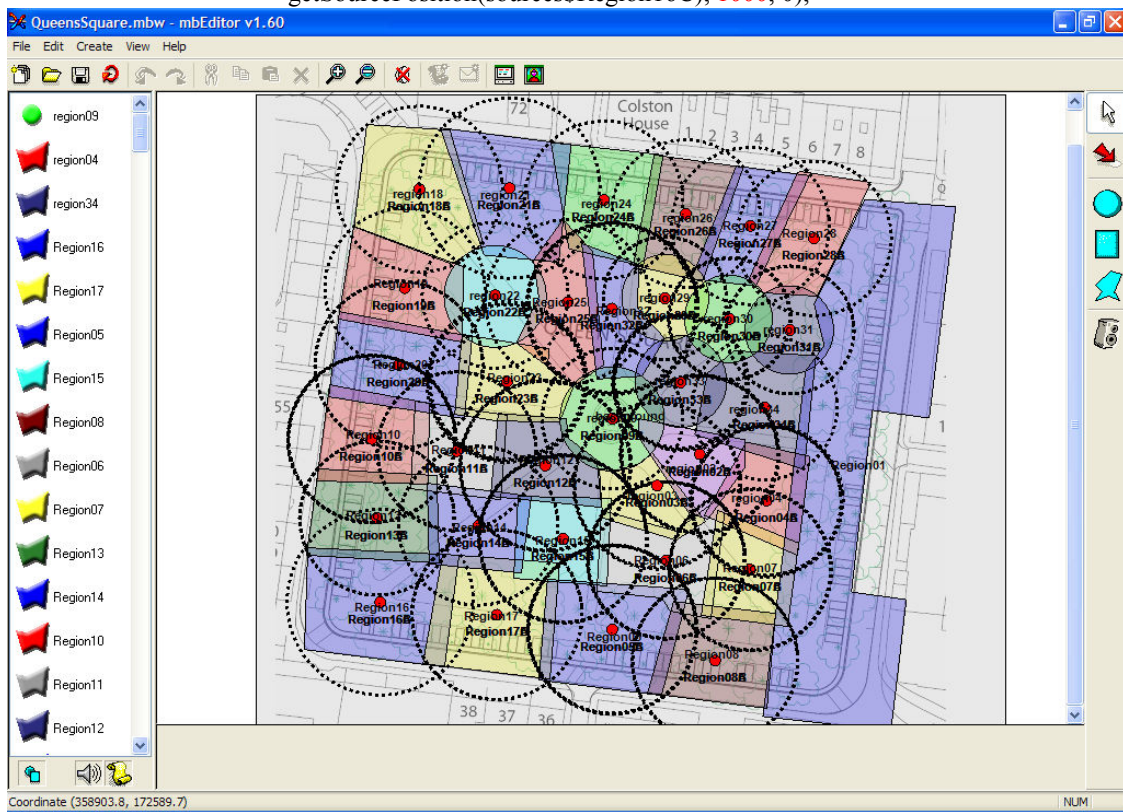


Figure 11. Screenshot of the Riot 1831! Application loaded in the Mobile Bristol Editor

- A background sound file of a general crowd murmur was triggered on upload of the application, and looped continuously in the background throughout the application – this allowed the users to know that whether or not the system was working. If this sound file stopped then the system had crashed.
 - `onEvent (mbEnterRegionEvent)`
 - `playMedia (media$GeneralRiot, 10, true, 0, 1000, 0)`
- Originally that background file had a dog barking in it but due to the looping people found this very annoying so it was removed from the sound file. Users then found this background file a help not a hindrance.

Experience Design Guidelines for Situated Mediascapes

- After 17 minutes opening the application a file called Dragoon Charge was triggered – any other files were prevented from being accessed whilst this was being file played. This audio file simulated the Dragoon entering the square, charging through it killing anyone in its way along with the aftermath of what was left behind.
 - onEvent (mbGotFocusEvent)
 - playMedia (media\$DragoonCharge, 100, false, 0, 0, 1020000)
- The Dragoon Charge was originally timed to be triggered every 17 minutes after the application had been opened, however it was found that this confused the participants to how the experience worked for it was the only file that wasn't located to a specific region. Therefore this was altered so the dragoon charge would only be triggered once after 17 minutes.
- Regions were specifically made to overlap so that there were areas where you could hear two conversations at once, users were then seen wandering around trying to 'follow' the conversation that interested them the most.
- Due to GPS shifting 10-15m throughout the day the regions around the edge of the square were made larger specifically covering area that users weren't meant to go so that the whole of Queens Square was completely covered no matter in which direction the GPS shift had occurred.
- All regions were made no smaller than 20m in diameter due to GPS error, any smaller than this then the GPS accuracy could make the region not actually located on the specific area of interest.
- Users were asked was to fill out a form and proof of an address for security of the loan of a set of equipment.
- It was a free outdoor event anyone could do with no time limits.

7.1.8 Evaluation Methods

Riot! 1831 was made available to the general public in the three week trial period. It was important to us to record the participants' experience of the application so that we could evaluate the trial. Thus we recorded the user's evaluation of Riot! 1831 by several different means, as follows.

1. When the participants returned to the tent to give back the equipment they were asked to fill in a short questionnaire. For each of the questions asked the user had to rate the question in a graphic rating scale format, i.e. make a mark on 10cm scale on what their agreement rating was from 0 (not at all) to 10 (very much). The questions were as follows:

- How much did you enjoy Riot!?
- How much did history come alive?
- How immersed in the experience did you feel?
- Did you wish there were pictures to go with the experience?
- How much of Queens Square did you explore?
- How much is the experience like listening to a radio play?

2. We logged people's movement around the square as they walked in and out of the regions so we could build up a trace image of where they had been and what sound files they had triggered, an example of which is shown in Figure 12.

Total Time spent = 0:45:06
Average time per region = 0:00:23

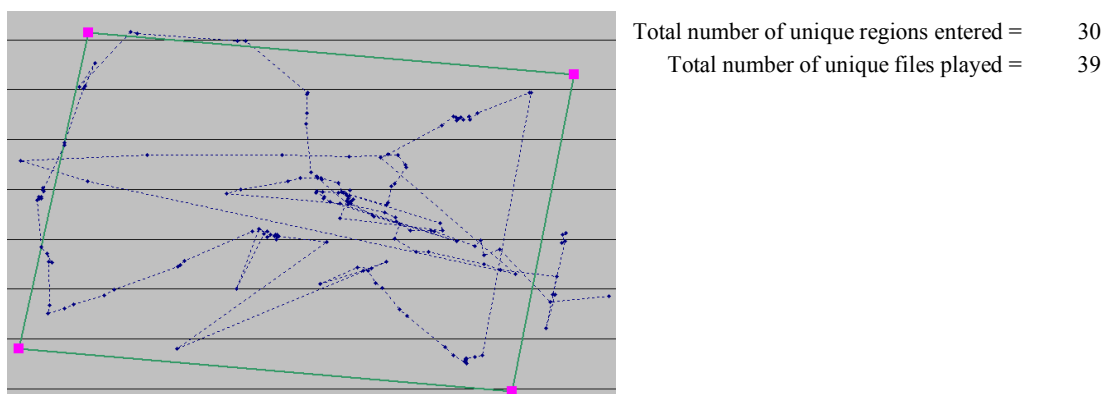


Figure 12. The path walked by a participant along with some of the data logged.

3. After completing the short questionnaire the users were asked if they had time for a more in-depth interview. The questions in the interview were loosely structured around five aims: to hear the language and associations people used to describe the experience; to elicit views on how in control they felt; to reflect on how being in the actual place affected the experience; and to discuss any social interaction. The interviews were transcribed and the data categorized into three broad themes; sensation and emotion, cognition and behaviour, and context.

7.1.9 Interview Aims and Questions

Aim 1: language and associations – how people describe the event

- How would you describe this experience to your friends?
- Is it like anything you have done before? (If yes – what are the similarities?)
- (Do you listen to radio plays?)

Aim 2: to gauge impact of mobility/physical presence & immersion/engagement (content)

- How long did you stay in the square?
- Did time pass quickly or slowly?
- Did other people in the square get in your way or did you not notice them?
- Did you move around a lot? Did you tend to stay still to listen or continuously move? What did you look at?
- How did you feel walking around the square?

Aim 3: Control – how important is it, how much did they feel?

- Did you hear as much as you wanted to?
- Did you feel in control?
- Is there anything you would like to change? (about how sounds are triggered, how much is there, knowing when it is over)

Aim 4: tying location to content (dissonance)

- How did being in the actual place affect the experience?
- What sense did you make of the play? Where there any characters that stood out?
- Did you use the map?

Experience Design Guidelines for Situated Mediascapes

- How much did you know about the Riots before? How much do you feel you know about it now?
- How different would it be if you did it in a different place? (Like a playing field or indoor space?)

Aim 5: social interaction

- Who did you come with today?
- Did you use a headphone splitter?
- Did you talk to them or other people before, during or after the event?
- How social did you find the experience?

4. We also carried out four in depth ethnographic case studies.

Over 700 people tried out the experience in the three week trial period from which we managed to get 563 usable questionnaires, 531 trace file recordings of their movements around the square, 30 semi-structured interviews and four in depth ethnographic case studies. Of the thirty interviews that were conducted with participants who had just completed the experience, fourteen of the interviewees were couples, five were men, eight were women and three were family groups.

People involved in the making of *1831 Riot!*

Writers and producers: Liz Crow and Ralph Hoyte

Sound Design: Armin Elsaesser

Original idea: Ralph Hoyte

Cast: Chris McCalphy, Tim Prior, Ben Tinniswood, Peter Townsend, Leona Walker, Christine West

Musicians: Stefan Hoyte, Simon Toomer

Mobile Bristol Team:

Project Manager: Jo Reid

Software Architect: Richard Hull

Authoring Tools: Ben Clayton

Logic Implementation: Kirsten Cater

Media Enhancements: Greg Jablonski

Poster and Graphics: Rachel Eardley

Trial support and testing: Tom Melamed, Paul Marsh, Stuart Martin, John Honniball, Hans Daanen

Contracts and legal: Detha Sanders

7.2 Case Study 2 – Moulinex

7.2.1 Description

It's a wall of rich atmospheric sound in the open air, like adding a film soundtrack, which changes as you walk through it and around the square. The sound makes the space dramatic. It is a slightly surreal experience. You can do it shared or individually.

7.2.2 Keywords

Sound, atmospheric, outdoor, walk, dramatic, experience, filmic

7.2.3 Background

Mobile Bristol and the Arnolfini commissioned two artists between October 2003 – January 2004, Zoe Irvine (this Case Study) and Dan Belasco Rogers (see Case Study 3), to create interactive work to explore some of the potential of Mobile Bristol software, appliances and infrastructure. The Research and Development commissions allowed the artists to begin to investigate this emerging and experimental technology and its relevance to their own practice, as well as feeding back into the design process of Mobile Bristol's pervasive technology.



Figure 13. Zoe Irvine demonstrating her piece.

This piece takes as its points of departure the filmic sensation of using a walkman and Queen Square's recent history as a venue for open air cinema screenings. The viewer of the work navigates the physical landscape in which there are lingering fragments of film soundtracks which have both been shown there; the Matrix and Moulin Rouge. As the viewer/listener first walks around the soundscape it takes the form of an auditory archaeological dig but as the viewer moves further the sounds begin to merge and transform taking on ideas of DJ culture and plunderphonics.

7.2.4 User

- Shown to an invited audience of 30 “arts people” in February 2004.

Experience Design Guidelines for Situated Mediascapes

- Used a backpack containing an iPAQ, headphones and a gps unit which enabled the user to access the located audio as they moved around the outdoor space.
- Guests were told to pair up due to lack of equipment i.e. to share one backpack with two sets of headphones. This also meant that both participants had exactly the same experience i.e. both heard the same sequence of sound files.

7.2.5 Context

- The resulting application was located in Queen Square, an area near Bristol's harbourside and the Arnolfini.
- People were asked to stay within the confines of the square but were given complete freedom where in that square they could roam i.e. there was no predefined route.
- This application gave people quite a jarring experience as it was so different from just being in a nice looking pedestrian square, i.e. it had no links to the actual square (unlike some of the other case studies).

7.2.6 Content

- This was an audio piece only.
- The artist originally wanted to use soundtracks from some films that were set in Bristol however due to difficulty of getting the soundtracks the artist ended up working with two films that had no connection with Bristol except that they had both been recently shown in Queens Square on a large screen in the open air.
- The piece took the soundtracks from the Moulin Rouge and Matrix, along with some sound effects.
- Each of the sound files were edited so that they would merge with other sound files as people moved around the square.
- The content was specifically chosen to create an unstructured yet atmospheric feeling for the user.

7.2.7 Interaction

- The artist created the application herself with the Mobile Bristol Editor.
- There were 18 regions & 21 sources, as can be seen by Figure 14.
- The square was pretty well covered in regions and sources so that no matter where you walked you would trigger sound files.
- There was a total of 114 different sound files.
- There was a background sound file on loop layered over the whole of the square.
- If the user left the square by any of the four corners then all the sound files would be stopped.
- Several of the regions called a script on entry to that region which then played one sound file on entry to the region a first time (i.e. variables\$mx1count = 1), another file on second entry to the region (i.e. variables\$mx1count = 2) and so on until the user had entered the region 7 times in which case the cycle would start again from the beginning.

- onEvent (mbEnterRegionEvent)

Experience Design Guidelines for Situated Mediascapes

mx1play()

- ```
<function params="" name="mx1play">
 if (variables$mx1count = "1")
 {
 trace("play Mx01intro");
 playMedia(media$Mx01intro, 100, false);
 }
 if (variables$mx1count = "2")
```

- Each of the sound files called to play in the regions were deliberately on average less than 30 seconds so that if you were on a boarder of a region and the GPS signal was bouncing you in and out of the region not all 7 sound files would be triggered to play at once, i.e. the first sound file would have finished by the time that the GPS had bounced the location in and out of the region several times.
- Each of the sound files however was specifically designed so that they would merge nicely i.e. that they would sound good even though several sound files were playing at once.
- Some of the regions played a file on entry the first time and then played the same file but in reverse the second time the person entered that region.
- There were 21 sources as well as the regions – these meant the closer a user got to the centre of that source the louder the audio file played. Each source played a specified sound file until the user exited.
- Each of the sound files played did not have fades and all were played at full volume.
- It was an outdoor event with no time limits.

## Experience Design Guidelines for Situated Mediascapes

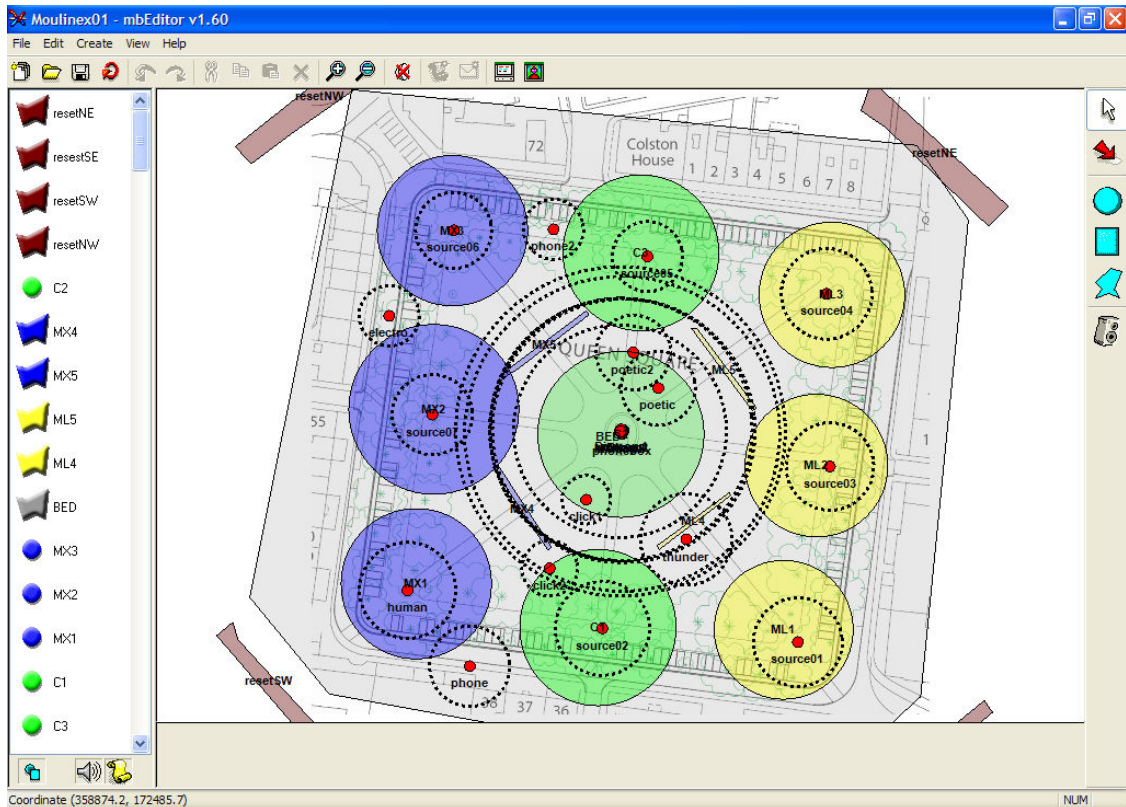


Figure 14. Screenshot of the Moulinex Application loaded in the Mobile Bristol Editor.

### 7.2.8 Evaluation Methods

To record the participants' experience of the application so that we could evaluate the trial we recorded the user's evaluation by several different means:

When the invited guests returned the equipment they were asked to fill in a short questionnaire. For each of the questions asked the user had to write a couple of sentences on their opinion. The questions were as follows:

- How long did you spend on it?
- How would you describe it?
- What would you compare it to?
- How/do you feel you influenced the piece?
- Were there occasions where you felt there were too many or too few sounds?
- Did you discuss it with you partner?
- What effect did the physical technology have on the experience?

A group discussion then took place.

### People involved in the making of *Moulinex*

Artist:

Zoe Irvine

## Experience Design Guidelines for Situated Mediascapes

**Arnolfini:**

Helen Cole, Tanuja Amarasuriya

**Mobile Bristol Team:**

Constance Fleuriot, Richard Hull, Phil Stenton, Kirsten Cater, Greg Jablonski, Paul Marsh, Hans Danaan, Stuart Martin

### **7.3 Case Study 3 – A description of this place as if you were someone else**

#### **7.3.1 Description**

This is a set of personal stories that refer to specific places in Queen Square. When you walk around there, alongside the stories, you get the real sounds that happened in that place. The small screen that you hold has pictures to help show you where to look and stand. You can't always tell if a sound you hear is real or virtual. Sometimes the virtual sound makes you look round. You get special "Magic Moments" where you hear someone talk about something and you see it at the same time, as if they're recording while you're there. Sometimes it's a bit spooky or scary, sometimes it is like eavesdropping on a real conversation. It's simple to use, easy to learn how to make it work, you just walk around.

#### **7.3.2 Key words**

Stories, eavesdropping, walk, sound, place.

#### **7.3.3 Background**

As you walk down a street, do you wonder if it can remember everything that happened on it? Can bricks and mortar really record sound vibrations from the past and if so would you be able to hear yourself? A description of this place as if you were someone else is an exploration into siting personal histories in geographical locations such as Queen Square, to form the tapestry of experience, and how the viewer can use the technology to peel back the city's layers, revealing those personal stories of first kisses and car crashes.



Figure 15. : Images from Dan Belasco Rogers' application.

#### **7.3.4 User**

- Shown to an invited audience of 30 "arts people" in February 2004.
- Used a backpack containing an iPAQ, headphones and a gps unit which enabled the user to access the located audio and images as they moved around the outdoor space.

## Experience Design Guidelines for Situated Mediascapes

- Guests were told to pair up due to lack of equipment i.e. to share one backpack & iPAQ with two sets of headphones. This also meant that both participants had exactly the same experience i.e. both heard the same sequence of sound files.

### 7.3.5 Context

- The resulting application was located in Queen Square, an area near Bristol's harbourside and the Arnolfini.
- The artist
- People were asked to stay within the confines of the square but were given complete freedom where in that square they could roam i.e. there was no predefined route.
- The square was pretty well covered in regions and sources so that no matter where you walked you would trigger sound files.
- This application gave people quite a structured experience with obvious links to the actual physical square.

### 7.3.6 Content

- This piece had both audio and images.
- The screen displayed images to draw the user's attention to a particular location.
- The audio was taken from interviews, of people reminiscing stories about Queens Square, which were recorded in the square.

### 7.3.7 Interaction

- The artist created the application himself with the Mobile Bristol Editor.
- There were 21 regions & 22 sources, as can be seen by Figure 16.
- There was a total of 22 different sound files.
- There was a background sound file of footsteps on loop layered over the two parts of the square, this gave the effect of someone following you when you entered these regions.
- Each of the sound files played did not have fades and all were played at full volume.
- It was an outdoor event with no time limits.

## Experience Design Guidelines for Situated Mediascapes

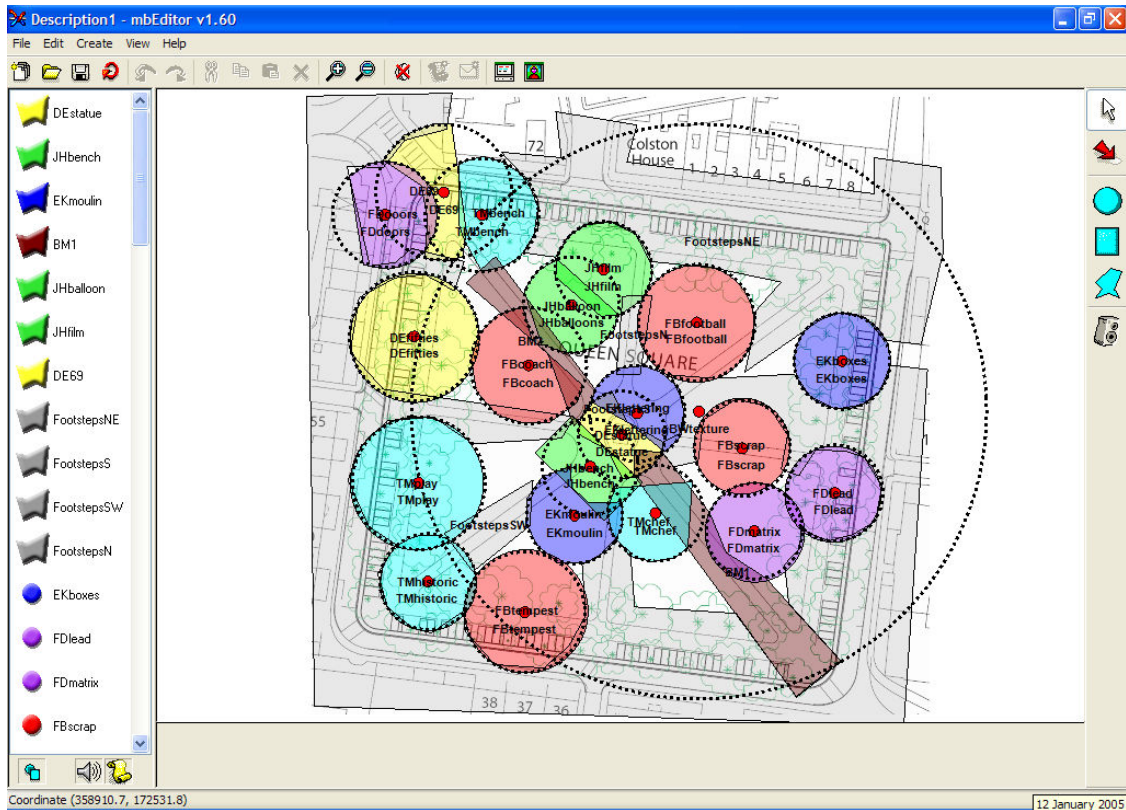


Figure 16. Screenshot of the Description Application loaded in the Mobile Bristol Editor.

### 7.3.8 Evaluation Methods

To record the participants' experience of the application so that we could evaluate the trial we recorded the user's evaluation by several different means:

When the invited guests returned the equipment they were asked to fill in a short questionnaire. For each of the questions asked the user had to write a couple of sentences on their opinion. The questions were as follows:

- How long did you spend on it?
- How would you describe it?
- What would you compare it to?
- How/do you feel you influenced the piece?
- Were there occasions where you felt there were too many or too few sounds?
- Did you discuss it with you partner?
- Did you look at the screen?
- What effect did the physical technology have on the experience?

A group discussion then took place.

**People involved in the making of *A description of this place as if you were someone else***

**Artist:**

Dan Belasco Rogers

## Experience Design Guidelines for Situated Mediascapes

**Arnolfini:**

Helen Cole, Tanuja Amarasuriya

**Mobile Bristol Team:**

Constance Fleuriot, Richard Hull, Phil Stenton, Kirsten Cater, Greg Jablonski, Paul Marsh, Hans Danaan, Stuart Martin

## **7.4 Case Study 4 – The BBC’s Bristol Mobile Nature Application**

### **7.4.1 Description**

You walk around any of the three areas, the Harbourside, College Green or Brandon Hill, wearing a backpack and headphones. As you walk you hear information from local experts on the nature, geology and history of those areas. It’s like having a personal BBC natural history guide walk with you.

### **7.4.2 Keywords**

Sound, Images, walk, documentary, nature, geology, history

### **7.4.3 Background**

The Bristol-based BBC Natural History Unit has produced a walk with a difference, enhanced by a mediascape created by local experts discover the nature, geology and history of central Bristol.



Figure 17. Images from the BBC’s Mobile Nature application

### **7.4.4 User**

- The experience was open to the general public.
- There was no charge for the event but participants were asked to bring two forms of identity - one containing a photograph and another with proof of your address. Acceptable ID was classified as a photo driving licence, passport, utility bill - (not mobile phone bill), council tax bill or book etc.
- Users were also asked to write down their credit card details as deposit for the equipment.
- After the experience participants were asked to fill in a short questionnaire to comment on the experience.
- Some of the participants were interviewed on video.

### **7.4.5 Context**

- The experience was run in conjunction with the city’s Festival of Nature.
- The experience started where the kit was being handed out, in the foyer of Wildwalk at the At-Bristol/IMAX complex on Bristol’s harbourside.



## Experience Design Guidelines for Situated Mediascapes

- Most of the route was accessible with a wheelchair or pushchair.
- There were three areas where there was media located, the Harbourside, College Green and Brandon Hill.

### 7.4.6 Content

- There was audio and images, the majority of the regions triggered audio only. Those regions where there were images mainly told the user who was speaking the audio commentary.
- All the commentary was provided by local experts.
- All the audio files were then edited by a BBC producer.

### 7.4.7 Interaction

- The experience ran for one week between 10am and 4pm on 9–15 October 2004.
- There was no time limit for the application however people were advised to allow approximately an hour for the experience.
- There was only one audio file per region.
- All files played on entry to the region and played all the way through till the end of that audio file. Unless you had entered a new region in which case the first file would be stopped and the new file for that new region was started. If you returned to a region where you had not heard all of that file then the file would be resumed from where you had last heard it to.
- All files faded in over half a second when they were called to play.
- `playMedia(media,volume,loop,0,500,0);`
- There were 97 regions in total; 28 regions around the harbourside, 17 regions around college green, 7 regions leading up to Brandon Hill and 45 regions in Brandon Hill itself.

## Experience Design Guidelines for Situated Mediascapes

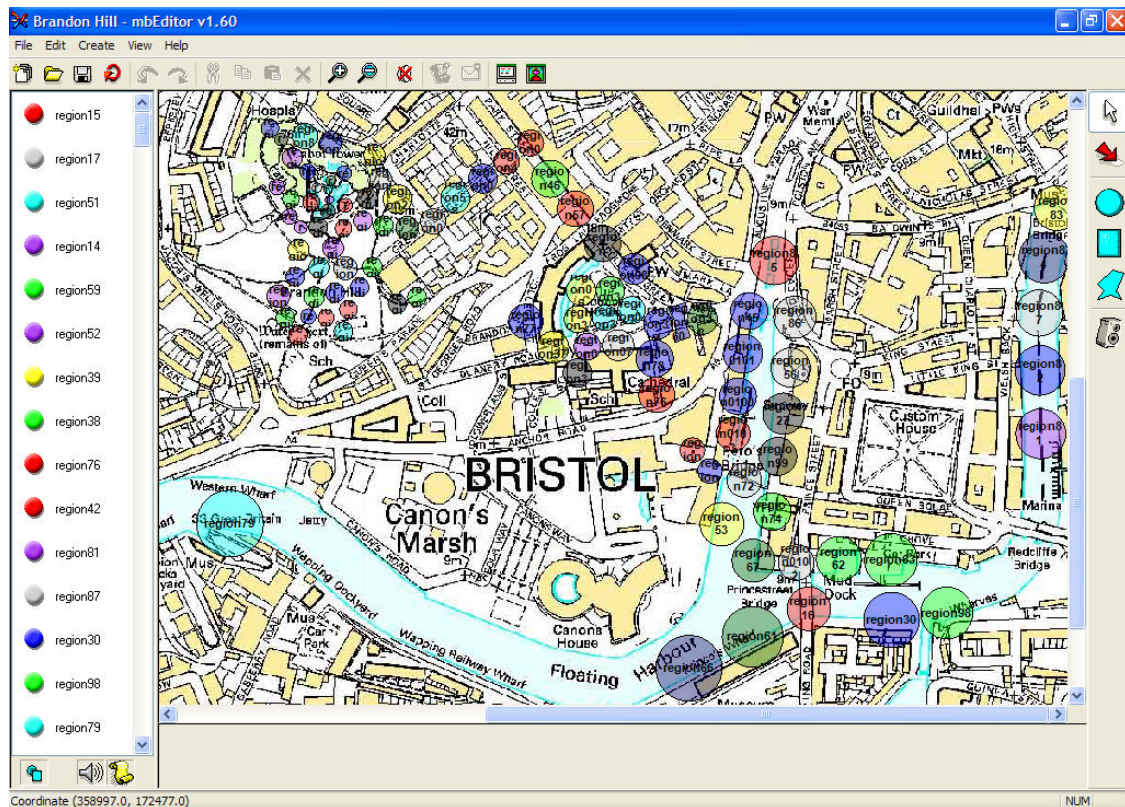


Figure 18. Screenshot of the BBC's Festival of Nature Mobile Application loaded in the Mobile Bristol Editor.

### 7.4.8 Evaluation Methods

To record the participants' experience of the application so that the BBC could evaluate the trial, they recorded the user's evaluation by means of a questionnaire.

#### People involved in the making of the BBC's Bristol Mobile Nature application

**Producer:** Yvonne Ellis, BBC

**Technical Producer:** Ian Parker, BBC

**Executive Producer:** Mark Jacobs, BBC

#### Contributors:

Richard Bland - Historian and Naturalist

Roger Clark – Geology Curator, Bristol City Museum & Art Gallery

Edward Drewitt – Museum Learning Officer, Bristol City Museum & Art Gallery

John Tully – Ornithologist, BTO Avon

Eileen Stonebridge – Geographer, Author

Helen Adshead – Education Officer, Avon Wildlife Trust

Mary Wood – Conservation Officer, Avon Wildlife Trust

Mike Dilger – BBC Natural History Unit

Andy King – Museum Learning Officer, Bristol Industrial Museum

#### Mobile Bristol Team:

Kirsten Cater, Richard Hull, Jo Reid, Phil Stenton

## 7.5 Case Study 5 – A Walk in the Woods

### 7.5.1 Description

You walk around the atrium of HP looking at the photographs of woods you hear music, poetry and sounds from the different months and seasons. The mediascape recreated a journey through a year in the life of a wood, with each picture being representative of a particular month, bluebells in April and clear frost covered branches in December. It feels like you are there taking a walk in the woods except the smell is missing.

### 7.5.2 Keywords

Photo installation, woods, sound, walk, indoor

### 7.5.3 Background

This was designed as an experiment in tying context-sensitive audio clips to the viewing user; the “A Walk in the Woods” exhibition featured 24 photographs by artist Liz Milner and put context-sensitive hardware and wearable technologies into action. In her background notes of the project, Milner writes of the 12 years in which she had visited the woods:

*“...I’d learnt how astonishingly different the woods could look, and feel, not just through the obvious changes from season to season, but even from day to day, and I decided I’d like to observe and record those changes more consciously. So on January 1st 1999 I began a project to photograph the woods for a year.”*

She wanted to create a piece which not only demonstrated this but also offered the users an electronic interface to the woods photos – i.e. an installation which combined photos and sound.

The application was designed to demonstrate the power of adding a context-sensitive soundscape to a photo installation to create an immersive user experience using ultrasonic and wireless technologies.



#### 7.5.4 User

- Exhibition viewers wear headphones, which contain an ultrasonic sensor, and carry a shoulder bag equipped with Jornada that handles each user's custom "walk" experience.
- Beyond wearing/carrying the requisite gear, the user doesn't have to *do anything* to make the environment work - other than walk around and view the photos.
- Over three hundred people went through the exhibition, and the anecdotal feedback was overwhelmingly positive.

#### 7.5.5 Context

- This application was carried out indoors in the atrium of HP.
- Milner's "woods" were taken from the woods in Failand, outside Bristol.
- They represent a natural space she has visited throughout her life - a place associated with memories of family and friends throughout time.

#### 7.5.6 Content

- The "A Walk in the Woods" exhibition features 24 photos by Liz Milner attached to a custom soundscape.
- The installation combined photos and sound.
- The photos selected for the installation included 12 pairs of photos - one larger and one smaller print for each month of the year.
- Restricting the digital media to audio-only meant that the rest of the user's faculties were not encumbered by the technology. Their hands, eyes and feet were free to move around the exhibit as they choose. It was hypothesized that this effect probably heightened the feeling of immersion because the user did not need to break their gaze from the artwork to fiddle with the technology.

#### 7.5.7 Interaction

- Unlike traditional gallery exhibitions where users simply 'look' at the artwork on display, which are usually instilled with a library-like 'hush', - *A Walk in the Woods* was designed not just to give viewers something to look at but to actually take the user *into* the woods, heightening their sense of being there and whilst creating an immersive experience that surpassed the level of involvement users experience when viewing a traditional installation.
- As users move throughout the area, they hear natural forest sounds, music and other audio clips associated with the different images. Forest sounds are linked to the larger prints, and music expressly written for the exhibit by musician Armin Elsaesser is tied to each smaller print.
- Ultrasonic sensors in their headsets constantly monitored their location within the "walk", the sounds being triggered seamlessly as the users moved throughout the space.
- The technology supporting the experience was relatively seamless; there were no controls to operate, no settings to tweak, no choices to make. Instead, the environment responded fluidly to the user's movements within the space.

## Experience Design Guidelines for Situated Mediascapes

- When users walked over one of a series of six “stepping stone” images printed on floor tiles that lined the center of the walk through the photographic woods participants heard a “splish splash” sound which then added to the natural aura evoked by the installation.
- The exhibition viewer wore headphones, which contained an ultrasonic sensor that detected “bursts” from ultrasonic transmitters positioned throughout the exhibition space. The ultrasonic positioning information was passed to a Jornada 568 housed in a shoulder bag the user carries. The Jornada was set up with 802.11b connectivity and an extension board that processes the user’s position and triggered the appropriate soundscape material from the forty-plus location-based audio “auras” as the user moved throughout the environment. The audio segments were then streamed over 802.11 to the Jornada and played back via the headphones.

### **7.5.8 Evaluation Methods.**

We asked people to rank order two lists of seven items each using a method called Youden Squares Design. The method involves presenting three items to rank at a time. In total, there are seven such blocks of three items to rank and each item appears three times. Each item is also compared with the other six once. Most people completed the task within five minutes.

The first list asked people about how they felt most, i.e. to rank order the following adjectives: Lonely, Amazed, Strange, Immersed, Frustrated, Inspired and Normal. The second list asked what this experience was most like: Museum tour, Concert, Radio program, Walk in the woods, TV program, Circus and Dive underwater.

Thirty six subjects completed the "I felt most" exercise and of which 34 people completed the "This felt most like" rank ordering. Subjects in this study mostly reported feelings of immersion and inspiration and of it being mostly like a walk in the woods.

### **People involved in the making of a walk in the woods**

**Artist:** Liz Milner

**Musician:** Armin Elsaesser

**Mobile Bristol Team:** Richard Hull, Jo Reid, Paul Marsh, Eric Geelhoed, Jerry Walton

**University of Bristol:** Cliff Randell

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