

Stories for Remote Place: Content, Structure, Device, Trials

Alison Wood, Glorianna Davenport, Brendan Donovan, Carol Strohecker
Media Lab Europe, Dublin, Ireland
(woodsyl | gid | bdonovan | stro)@medialabeurope.org

Wood, A., Davenport, G., Donovan, B., and Strohecker, C. 2004. Stories for remote place: Content, structure, device, trials. Proceedings of International Cultural Heritage Informatics.

Abstract (EN)

Multimedia story, when invested with mobile sensing technology, is a powerful medium for enhancing the experience of a place. We introduce a mobile computational story application that mediates and enhances the experience of an audience wandering in an outdoor physical space. The system provides a contextualized, place-based narrative, via media screened on a handheld computer, to an audience who is exploring a remote landscape on foot. We fully prototyped for a 'sample' wild setting, an island off the west Irish coast, in order to understand the issues involved in constructing audience experience, system architecture, and rich content for this scenario. We discuss each of the components of such a system, and the relationship between place, experience, and system design. Our results emerged from this specific prototype setting and scenario. However, we apply them throughout this paper to a generalized discussion of the expressive possibilities and issues of creating a mobile, location-based experience that uses multimedia to tell the story of a culture and place.

Keywords: mobile, context aware multimedia, distributed story, audience experience, physical navigation, augmenting place

Zusammenfassung (DE)

Multimedia-Stories sind ein leistungsfähiges Mittel, um ortsbezogene Erlebnisse zu verbessern, wenn sie mit Sensoren verknüpft werden. Wir stellen eine mobile, computergestützte Story-Anwendung vor, welche das Erlebnis von Nutzern bereichert, die sich im Freien bewegen. Dargestellt auf einem kleinen tragbaren Computer, stellt das System eine kontextualisierte, ortsverbundene Erzählung Nutzern zur Verfügung, die eine abgeschiedene Landschaft zu Fuß erkunden. Um die Konstruktion eines publikumswirksamen Erlebnisses, unsere Systemarchitektur und die Inhalte unseres Szenarios besser zu verstehen, haben wir einen Prototypen geplant, gebaut und in einer beispielhaften unberührten Umgebung getestet: einer Insel vor der westirischen Küste. Wir besprechen jede der Komponenten und das Verhältnis zwischen gewünschtem

Ort, Erfahrung und Systemdesign. Unsere Ergebnisse resultieren aus einem spezifischen Prototyp und Szenario. Dennoch führen wir anhand der Ergebnisse eine generelle Diskussion über die expressiven Möglichkeiten und Probleme in der Gestaltung einer mobilen, ortsverbundenen Erfahrung, die Multimedia einsetzt, um die Geschichte einer Kultur und eines Ortes zu vermitteln.

Schlüsselwörter: mobil, kontextualisiertes Multimedia, dezentralisiertes Storytelling, Publikumserlebnis, körperliche Navigation, Bereicherung von Orten

Résumé (FR)

Une narration multimédia, racontée à l'aide de senseurs mobiles, constitue un médium pércutant pour mettre en valeur l'expérience d'un lieu.

Nous introduisons une application portable pour narrations interactives, qui enrichit l'expérience de gens se baladant en extérieur.

En effet, le système permet à des visiteurs, explorant à pied des sites isolés, d'avoir accès à des histoires contextualisées au lieu, grâce à l'interface d'un ordinateur de poche.

De façon à comprendre les questions soulevées par ce scénario (l'élaboration de l'expérience d'utilisateurs, l'architecture d'un système, et un riche contenu), nous avons designé, construit et testé un prototype dans le cadre d'un lieu sauvage type, une île au large de la côte-ouest de l'Irlande.

Nous discutons ici chacun des aspects de ce prototype et la relation entre lieu, expérience, et les décisions portant sur le design du système.

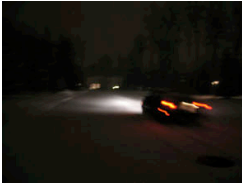
Nos résultats émergent de ce prototype particulier de cadre et de scénario. Pour autant, dans ce papier, nous souhaitons appliquer ceux-ci à une discussion plus générale sur les possibilités et les enjeux de créer une expérience mobile et basée sur un site qui utilise le multimédia pour raconter l'histoire d'une culture et d'un lieu.

Mots clés: mobile, multimédia contextualisé, narration distribuée, expérience de l'utilisateur, navigation spatiale, site isolé, réalité augmentée.

1. Introduction

Stories are a natural means for humans to articulate the quality of a culture. Every story has a place, if only the setting at which it is conceived. Likewise, every place has a story: or more accurately, an intricate collection of them spread across space and time.

Narrative accounts delivered through image, voice, and sound aesthetically transcribe the history and landscape of places. Each culture has different styles of story, and places can reflect this. Certain Irish place names inventory the body parts of a bull gored and rendered and scattered between Roscommon and Ulster (O hOgain, 1998); Australia's aboriginal society uses narrative song to communicate the history and physical lay of the land (Chatwin, 1987). For the foreigner and the resident alike, such stories provide access to the unexplainable personality of a place, and by default the human history and culture of the place.



Places have rhythm and power. Intelligence about the past is contained in the dynamic subtleties of a location. When story is told at the place where it is set, where its characters lives were shaped, impact increases. The pulse quickens as we stand in a cemetery beside a friend whose voice carries through the dark, telling about cult rituals held in the mausoleum she leans on (<http://www.uhls.org/ISpy/brun/brun-forest.html>). Our understanding of human history deepens as we are guided on a tour through the Tower of London, incorporating into our imagination a tour guide's narrations of a king's indiscretions; we understand better the atmosphere in a town through a chance conversation with a resident on a notorious strand. A placard hammered into the ground depicts ancient characters performing rituals at Drombeg, which to naked perception may seem a culturally irrelevant ring of stones. Immersion in a culture increases by reading books set locally, or by watching regional television. Absorbing site-relevant story during a physical experience in a place prescribes a prime scenario for pleasurable, high impact uptake of culture and heritage.

There are, as in the examples above, existing forms and venues for such experiences. Live anecdotes possess the expressive potential of human performers, but require a chance encounter or a performance agreement with particular individuals and are thus expensive or rare. Signs are informative, but can be dull and visually interrupt the landscape. Print and immersive audio-visual narratives have their place, but are largely experienced in a venue distinct from the experience of a particular setting. Multimedia can employ machines to portray human stories that mix with their site of presentation. Well-crafted interactive experiences live in multimedia kiosks at museums and historic monuments. Installations embed culturally-related content in public spaces, like the atmospheric characters projected on buildings along the Liffey for Bloomsday (<http://www.rejoycedublin2004.com/>).

Mobile handheld computers can also present multimedia stories, enabling portable scenes for a wandering audience. GPS can tell a mobile device where it is on Earth within an accuracy of meters. Handheld computer applications can thus play digital scenes automatically at key locations and entice travelers to particular sites. With mobile scene-collecting gadgets in hand, an audience who navigates a physical space can discover cultural content placed there by creators. A collection of digital scenes can know the mood of a traveler's setting as well as the landmarks. Mobile sensors can tell a handheld computer about the momentary state of an environment; a scene about a flood might only come to a lowland area if it's raining. Layers of potential stories can draw visitors back to the same site again for a new story.

In the following pages, we describe the motivation and design issues involved in crafting such a mobile experience. We break down the problem into components, addressing some of the decisions that creators will face, and the implications for audience experience. Through the breakdown and evaluation of our own case study, we analyze and present some critical values, potential pathways, and their implications for the designer and audience. We sum up with a discussion of where related projects can be found, and a brainstorm of alternate possibilities for this venue.

2. Our Remote Story Application: Overview

No media experience can reconstruct the power of being in a place, and we did not want to try. As Weiser (1991) notes, "virtual reality is... not a territory. It excludes... weather, grass, trees, walks, chance encounters and in general the infinite richness of the universe. Virtual reality focuses an enormous apparatus on simulating the world rather than on invisibly enhancing the world that already exists." There are plenty of multimedia applications that draw individuals away from their physical body and into the world of the glowing screen. Our prototype experience was designed to evaluate how digital story can suggest and augment audience travels in a wild landscape. At the core of this research we aim to use mobile sensing technology to integrate 'real life' and digital story in order for each to make the other more spiritual.



Fig. 1: Prototyping on Cape Clear- hiking with sensors.

In our chosen audience scenario, a participant wanders across a remote landscape with a handheld computer and lightweight weather sensors (Fig.1). Occasionally he or she stops to experience narrated story scenes that play automatically upon arrival at certain sites. The story scenes together introduce, climax and conclude a Celtic seal legend. The device requires minimal interaction between the computer screen and the user, but rather acts as an active, stow-able portal to multimedia scenes. The screen displays a map of the island, identifying locations where story scenes can be experienced. Enabled by the weather and GPS data, scenes are always set in the location where the audience stands, and character narrations reference the real-time skyscape. The audience navigates sites in any order they wish. In order to choose and screen a segment that will coherently move story forward, the system analyzes and interprets what the audience has already seen. An audience member generally receives only a fraction of the total available scenes in a given 'go' at the story, making the experience different each time. At home, an

application assembles a linear media-rich movie of an audience member's personal story experience in the field.

We researched authoring and story structure through production of content. Since the identity of place is critical to this end, we chose a specific location, Cape Clear Island in West Cork, Ireland for its landscape, size, weather variation and remoteness. We prototyped in a research laboratory setting, demonstrated functionality at workshops and open house settings to business and academic representatives, and evaluated the full experience with field trials on the island.

Our project was conducted at Media Lab Europe (<http://www.medialabeurope.org>), a research lab whose group-based working model includes prototyping, iterative design and evaluation, with periodic demonstration to partners and other select organizations. Research focuses on applying new technologies to human problems; projects tend to be driven by a merger of personal interests of the researchers and group directors. Our prototype distributed story was encoded, delivered and tested as part of the Nature Trailer context-aware exploration tool and multimedia delivery platform (Donovan, 2003), a collaboration between the Story Networks (SN) and Everyday Learning (EvLe) groups. The focus of SN was narrative content and structure. The focus of EvLe was Nature Trailer's dynamic interface as a tool for informing and aiding decision-making while hiking. Overall platform and experience design occurred across both groups; EvLe integrated the hardware and scripted the interface and sensor-to-Flash communication, and SN developed the content and scripted the story engine and sensor processing. Field trials differed for the two: SN tested for story experience feedback; in this case, the interface acted as a vehicle for the audience to locate dynamically appearing and disappearing story segments on a map. EvLe evaluated the interface as a dynamic, context-aware tool to aid and encourage exploration; the story icons acted as additional place-based information. This paper will focus primarily on the work of the Story Networks group but will also provide a discussion of the overall motivation and design of the platform.

3. Remote Story System Components and Design

A mobile context aware platform for delivering place-based story consists of several components. Our system embodies a hardware platform, an interface, a story engine, a suite of annotated movie scenes, and a post-experience application. We introduce these components by using our design as a case study, but specifications may vary for other groups interested in creating such a system. Design decisions should preserve the integrity of physical environment and normal usage of the place. They will be dictated by the resources available, the type of information or story that the system-creator wishes to portray or enhance and the type of audience activity the creator wishes to provoke.

3.1 Platform Specification

What type of device do you want to use to deliver the story? What kind of software language? What types of sensing? What form of media?

These decisions determine the experience of the audience in terms of their engagement with technology. Depending on which device chosen- be it a particular model of handheld computer or a mobile phone- it will be easier or more difficult to run certain kinds of software applications, interface with certain types of sensors, and play back certain types of multimedia. Streaming delivery is possible through a mobile phone network or wireless hub. Handheld computers can store media locally, but limited space constrains the amount and type. Software language influences robustness, cost of development, and ease of maintaining and supporting applications. The type of media (audio files, video files, still images, etc.) will constrain how much space is required for a story database, and will determine the complexity of content production. The overall design choices of the system platform depend on the budget available for the project for hardware, software, labor, and story production.



Fig. 2: Our prototype: map interface(left) is default; when story arrives, a character's face appears (right)

Our platform uses a GPS-enabled Compaq iPaq handheld computer that communicates wirelessly with backpack-mounted weather sensors. The iPaq runs interface and story engine software. We developed these applications with Macromedia Flash multimedia authorware, as it was well-supported and enabled quick and easy integration of scripting and dynamic audio visual content. Content scenes were composed with Flash as .swf movie files of about 100 kb each, labeled by name to enable search and selection for screening on the display and thru headphones in the iPaq audio channel. A dynamic interface is displayed on the iPaq screen, except when story plays (Fig.2). We stored all movie scenes on the iPaq for in-field story experience; we considered embedding servers through the landscape for online database storage and wireless media download, but this was invasive, expensive and required on-site maintenance: all unreasonable given our research context and chosen remote location.

We chose the medium of audio with still image for the mobile scenes. Video files are bulky in terms of disc space, and visibility on the iPaq screen outdoors was poor, not to mention that natural scenery is generally a hiker's desired visual focus: it made sense to de-emphasize attention to the screen. We produced supplementary videos that were hi resolution QuickTime, for later viewing "at home". In evaluation on Cape Clear, all participants indicated that they didn't mind hiking with a piece of technology which many were unfamiliar with- an indication to us that the platform design was a success.

3.2 Interaction

Will you use a graphical interface? What look and feel will it have? What level of participation in the device and story playback options will the audience be given?

To understand how to participate in a distributed story the audience will require briefing, instructions and/or a graphical interface on the mobile device. There is a range of possibilities. For example, a dense web of place-based stories can arrive as a surprise and require no device-enabled interface. It may be desirable to poll the audience about preferences in order to set certain story variables. If several content channels are available, as in television, there must be some way to represent and browse the options. If audiences are to choose consciously on the fly, information must be provided through an interface such as a map, a website, or a set of dynamic clues.

We wanted the potential for the audience to stow the device so that a hike needn't be frequently interrupted by technological interaction. We used a map interface with simple graphics and icons to represent story locations. Icons appeared and disappeared as the story progressed or the weather changed. Clicking on the graphics presented a graphical image of the site and a tiny audio snippet previewing the story narration that existed at that site. When the audience navigated to a story site, a still image of the narrator appeared automatically and audio began playing. There was potential for stopping, rewinding, replaying and dismissing the scene. Once the movie was dismissed, it was no longer accessible, to alleviate the audience of unnecessary content management in the field.

During evaluation, participants used the map to locate story. They made suggestions to aid navigation, such as displaying topographic relief and incorporating zoom functionality. The story structure was not transparent, we verbally explained the basic premises of story progression before and during the experience (i.e. scenes depend on weather, so if weather changes, a site that appeared to be "empty" could suddenly contain story) The appearance of a character's face (Fig. 2, right), indicating story arrival, sometimes took the audience by surprise, and sometimes did not appear exactly when expected. Better GPS reception, higher map resolution or landmark clues may have helped. Additionally, when this, or problems understanding how to dismiss the movie, arose, hikers expressed a desire for a 'help' option on the interface.

3.3 Sensing Context

What measurable environmental qualities should control story variation? How to interpret them as an effective dynamic aspect of a place? How will the content reflect these different states?

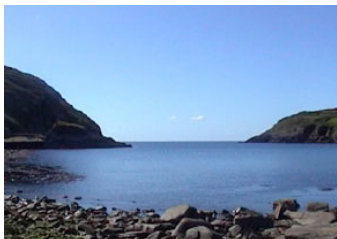


Fig. 3: Changing site over time: Cape Clear's south harbor in calm sun vs. cloud vs. windy sun

Sensing holds great potential for subtle environmental interpretation. A sensor-enabled story system can provide narrative scenes that are customized for a given condition. The decision of which conditions to measure can shape themes in content, and will shape (or be shaped by) the sensing hardware selected. It can determine the focus of audience attention. Possibilities range from biological variables such as audience heartbeat, to RFID tags on objects in a space, or 'invisible' qualities like atmospheric pressure or radiation, and so on. It is critical that the system 'guesses correctly' when using sensors to infer audience context; otherwise audience trust in the system will plummet.

After selecting our weather sensors there were further decisions to make. We considered focusing on wind gusts, wind direction changes, identification of large-scale weather fronts, or gradations of severity. In the interest of simplicity we ultimately interpreted the 'effective weather', using solar radiation, wetness and wind speed sensors to determine whether it was sunny, cloudy, raining or calm. This combined with location awareness enabled our content to emphasize features of landscape and sky. Our story was layered onto fixed sites: for each story 'hotspot' four different scenes could arrive to the audience (Fig. 4). There are other possibilities for structuring context-aware content; i.e. movies can be triggered when a critical weather state occurs regardless of audience location.

During initial content review we found that with too subtle a reference, the connection between changing content and changing weather was lost; it seemed random and confusing that the scenes for a particular place should vary. However, we were not interested in explicit narration like "Notice the big grey cloud above your head." In the end, our characters referenced the state of their environment in the context of the impact it had on the story; when the audience is in sun, the seal-woman talks about a day when she took off her fur and sunburned the shape of a shell into her abdomen. In retrospect, our focus on delivering a plot-based legend with coherence and climax across many scenes prevented the rigorous investigation of weather-content mapping. By predictably transforming audio, visuals or character facial expression according to environmental changes, without worrying about plot, multimedia might express changes dynamic variables clearly (Wood, 2002).

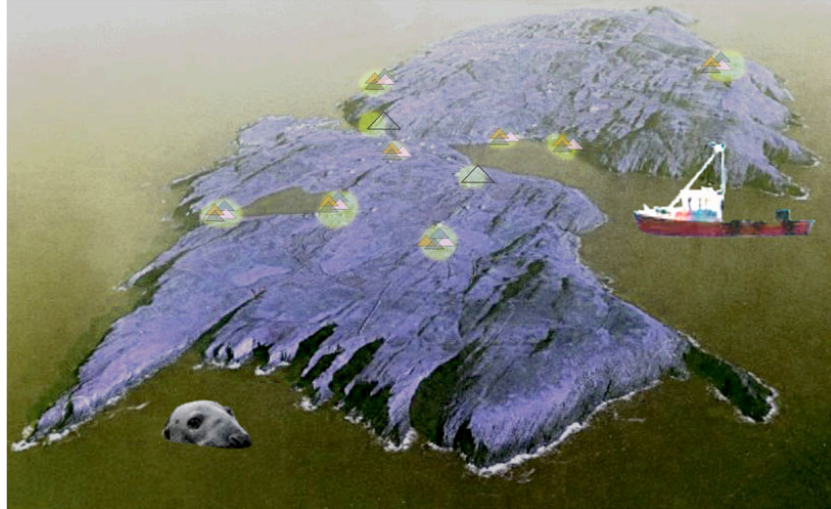


Fig. 4: Cape Clear Island, labeled with sites of layered stories in selkie narrative

3.4 Story: Experience, Structure, and Style

It is not easy to craft a narrative set of physically distributed fictional scenes which are to change according to a chaotic environment and are to be navigated in varied, unpredictable orders. Scene delivery must be guided by a meta-experience that provides overall coherence to the viewing of media in the space. Within a particular scene, certain features must be built-in to the narration so that every segment is guaranteed to both match audience environment and make sense given what has been heard already. These principles require three design tasks: defining an overall story experience, articulating a structure to technically enforce that experience, and developing a style to express context, theme, and plot.

3.4.1 Experience

What overall style of mission will be presented to the audience? How, experientially, will the accumulation of discrete scenes across a landscape add up to a meaningful cultural message?

Context-aware mobile scenes spread across a wild space could embody many types of cultural experiences. Depending on the place and the creator's goals, documentary, historical information, local anecdotes, or fiction set in the place are among the possibilities. Creators are challenged to craft themes across individual place-based stories to give the audience the feeling that they are building something by collecting more of them. We chose to embed a traditional story across the landscape to gain insight on how to structure and write a segmented, outdoor narrative that had traditional climax and resolution. The legend was broadly local, taken from west Irish and Scottish tales, and the scenes were inspired by particular sites on Cape Clear. In product-quality experiences, highly localized relevance will be ideal.

3.4.2 Structure

How, technically, will the accumulation of discrete scenes across a landscape add up to a meaningful cultural message? How is content categorized so that the computer knows at what moment to select and play which scene?

Writing distributed content is hard without a structure to categorize and link scenes. A structure is the way for author and computer to make sense of which scenes come at what time and place. We crafted an experience so audiences could wander, choosing their own path, but still work toward a conclusion. Our goals for overall audience experience guided the evolution of a framework; once it was articulated (Fig.5, left) we began to compose a narrative script. We used a weather-independent introduction to establish the premise and introduce characters (Appendix, scene 1). Our final structure design employed two advancing scenes besides the introduction- a transition and conclusion- and a collection of shorter 'lateral' scenes that could be sequenced in any order. These scenes fell within two categories- a collection that took place before the transition, and a collection that took place between the transition and conclusion events. This structure allowed the audience to experience the characters' stories in all different sequences, graduating to a later phase in the character's lives once they've had enough about character's pre-transition lives. This framework determined the narration style, as the lateral scenes ended up referencing conflict themes rather than actively driving plot.

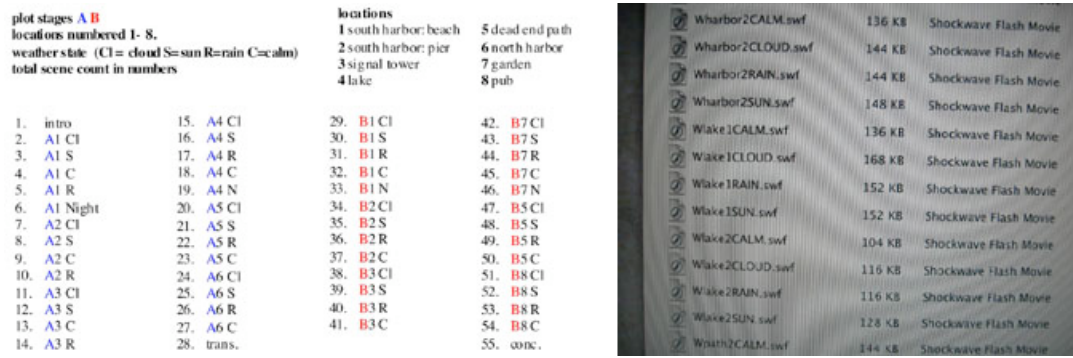


Fig. 5: Story structure, as table for authoring (left) and labeled scenes for story engine parsing (right)

During the field trials, participants sought a story climax, but were happy to experience several lateral scenes before advancing the plot. The participants sought to advance to the next plot stage as soon as possible, and felt it critical to persevere to the conclusion. Some participants browsed the full story arc in one three-hour outing, while others spent a day or two and took long breaks between hikes to story sites. This sort of decision was determined in part by the length of time participants could afford to spend visiting the island, as well as physical constitution (the eight-year-old got tired). The landscape constrained navigation sequence; a small number of paths were easier than any others. During post-hike discussions, participants indicated that they were engaged with the story world. Several participants commented, unprompted, that the distributed story gave the strong idea that the fictional character dwelled all over the island over a long time.

3.4.3 Style

What is the look and feel of the content? How should story express the connection with place or other context?

The style will establish the overall aesthetic of the experience. Cinema scenes, readings of poetic verse, radio car commercials, documentary or archival recordings, comics: each provide a different type of experience and can speak to different types of audiences. Each scene should exalt the unique character of a given place, to justify its presence. Each scene should be a reward in itself: a mini-story that has a rise and fall, so that audiences don't walk away empty from a given site. Connections should be threaded across scenes if creators wish the audience's accumulation to build a coherent whole.

We created a fictional web of first person narrations adapted from a selkie legend (Thomson, 1954; Sayles, 1994). The two protagonists- a seal who removes her skin to become a human woman and the fisherman who kidnapped and married her- recount their stories. These were scripted in text and performed as thirty-second to one-minute audio scenes. The seal narrates lateral scenes: day-to-day experiences of particular, often minor events in her life. We could not count on any one scene being heard, so we established key plot ideas, like the seal's desire to live on land, for each of the two plot stages. We featured and re-featured these, at least one per scene, throughout the lateral scenes, ensuring that a random sampling of a critical mass of scenes would always provide an idea of story themes, conflicts, and character personality. The anecdotes simultaneously reference landscape and weather as described in the 'context' section. (For examples of these script qualities, see Appendix.)

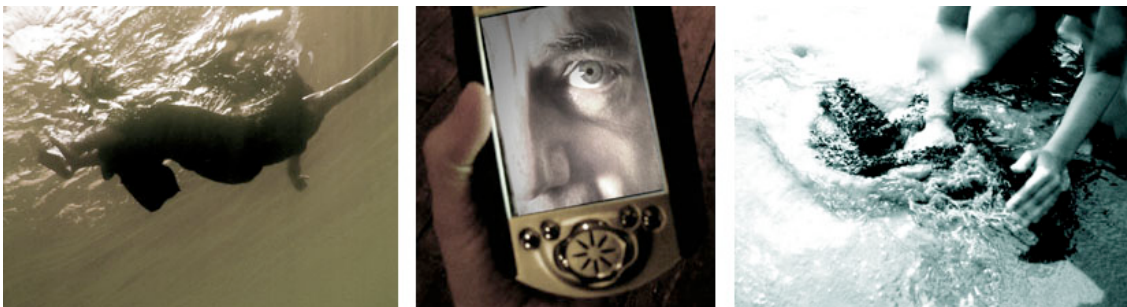


Fig. 6: Images of selkie scenes (left and right); fisherman narrates intro, transition, conclusion (middle)

3.5 Post-journey

What to send the audience home with, if anything? How to facilitate the capture, reconstruction and reflection of mobile experience?

After wandering to gather story, audiences can further explore through networked, media-rich follow up at a desktop, TV, kiosk, etc. Applications can use logged data to reconstruct the journey, visualize environmental data, or present additional place-based content (Stroecker, 2003). This tool or community can enable visitors to return to the themes of the place during day-to-day life. A tool can construct a post-experience, and/or enable the audience to themselves make something out of their in-field experience (Weal,

2003). Both are desirable, but it is a significant task to create tools for categorization, visualization, and aesthetic exploration of data.

We chose to replay an individual's journey as a linear story experience. We created a high resolution video version of each audio scene available in the field. These videos included character-featured plot-enacting scenes as well as ambient backdrops, shot on Cape Clear at the sites where the narrations were embedded (Fig. 6 & 8). As part of the mobile application, we recorded the GPS trail, weather data, and list of scenes experienced by the audience member. With this log as input, our 'reflect phase' application drew a line on a map of Cape Clear, dynamically tracing the audience's path in-field. Full-video scenes were screened as the path-line reached the appropriate site; these video illustrations could be assembled into a sequential linear film as a personalized takeaway.

Several field-trial participants desired access, before and after the mobile experience, to printed supplements to the story for added background and depth. One participant, an eight year old male, continuously borrowed the video camera we carried to document the trials. He shot footage at various sites on the island during his and his mother's journey, and then made a short film of the shots when we were back at the cabin, with no prompting and little guidance from the developers.

4. Resources

Other work exists which can illustrate possibilities for mobile storytelling. Some informed our design, and others can inform creators with different goals or production contexts than ours. This section is not an exhaustive bibliography of resources, but rather a suggestion of channels that can lead to more information about context aware distributed story construction and application.

Non-linear computational stories for a virtual desktop environment have been evolving for several decades and now exist in number. Early hypertext exploration games such as *Cosmic Osmo* (Miller, 1989), collaborative context-aware on-line stories that "interface with the real world" (Falk, 2002), and flexible cinematic structures (Davenport, 1997) can familiarize creators with branching, responsive and computer-assembled story frameworks. Mobile computational story crosses many domains, from university and research institutes to small multimedia design companies, as well as research and development legs of large production and communications corporations. The tourism industry, where cultural applications have great potential, is beginning to take interest in developing such platforms.

Given this range of venues, it follows that responsive mobile place-based media platforms have been developed for varied applications. Some are positioned as artistic experiments like *Uncle Roy All Around You* (Flintham, 2003) or commercial applications like *Nokia Game* (www.nokiagame.com). Learning applications include the *Ambient Wood* which enables children to explore a woodland with context-aware handheld computer and multimedia applications (Rogers, 2004). *Invisible Ideas* (http://www.macromedia.com/devnet/devices/articles/invisible_ideas.html) displays site-

specific audio-visual content on the Pocket PC to users strolling through parks, and uploads the GPS trail to a desktop Flash application later.

Other systems experiment, as our research does, with expressive content. Teri Reub's distributed poetry installation Trace uses location-sensing to embed audio through a hiking trail in the Canadian Rockies (<http://research.umbc.edu/~rueb/trace/paper.html>). CityPoems (www.centrifugalforces.co.uk/citypoems/pages/01_02.html) collects and distributes location-relevant poetry across London. Andrea Moed's Annotate Space (Moed, 2002) conceptualizes embedded place-based narrative across NYC, for mobile screening through a handheld device. Portrait of the Liberties (Nisi, 2004) embeds a place-based web of narrative video portraits to depict a Dublin community. The parent research of the selkie narrative is the MViews story platform and accompanying productions (Crow, 2003). The style of MViews in creating small fictional scenes which are set in the place the audience experiences them, which stand alone, yet which reference a greater plot, influenced our approach to the selkie narrative. Another parent project is HopStory: a location-based fictional narrative with threaded parallel plotlines that steps forward through time to a fixed conclusion (Nisi, 2004). Our work relates to these projects, and departs from it as well; we emphasize unique place aesthetics and non-linear enforcement of a narrative arc.

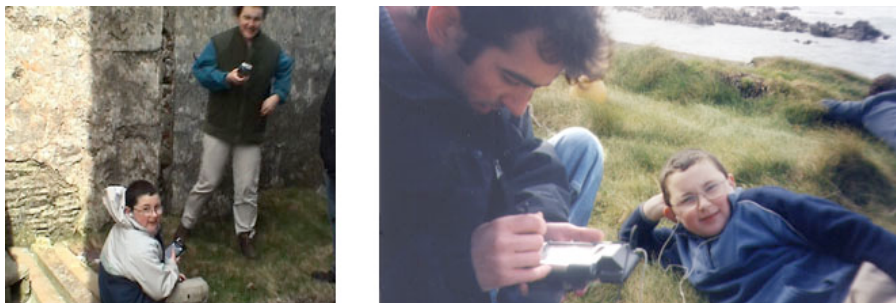


Fig. 7: Field trials on Cape Clear, April 2004

5. Potential

Construction and evaluation of a prototype was critical in order to identify the issues in planning such a system. When queried, our participants each had ideas about how they would apply such a platform. The richness of suggestions imply that the experience engaged our trial audience and illustrated the concept. We present the participants' and our own reflections as a brainstorm of applications that this type of platform might support. (The participants' comments are paraphrased.)

Storytelling officer, Scotland. She had an interest in recording the informally narrated stories that are currently told during analog tours of sites in the Scottish highlands, and structuring these into a mobile experience. Focus would be on preservation of Gaelic language, mature generations' cultural knowledge, and traditional telling styles. Integrated monuments like cairns may aesthetically demarcate sites with story.

Translator/interpreter, Italy. Provide potential to experience both character's perspectives at every site, rather than providing one or the other with no selection.

International business student, Dublin. Provide lots of different types of content, not just a fictional story, so that different types of content could be chosen depending on audience mood and preference. A linear printed supplement for after the mobile experience can provide more depth of story.

Agriculture, West Cork. Provide concrete, factual narration about sites, such as historical information.

Natural history programming, UK. Reveal place-based stories about local flora and fauna characters on a mobile journey. Potential to reuse libraries of old, perhaps in a post-journey experience.

History and English teacher, USA. Embed the story of historic accounts of battles, etc., in the landscape as an educational application.

Environmental Science, USA. Embed information at environmental sites, use sensors, character narration and physical scene distribution to facilitate learning and make it fun. For fictional applications, provide a traditional fictional print narrative to read in the hostel, on the train, as a preparation for to distributed character narrations.

Writer, USA. Record content, in Gaelic and English, by generations of residents who know the local stories of the sites and structures.

In hindsight we also imagine different approaches, some to improve our design, and others which represent alternate applications. Our scene collection was a useful starting place to analyze issues in authoring and made sense given this context. However, when on-site for testing it was impossible to ignore the fact that there are deeper stories to be heard about each particular site. The fictional form need not be discarded, but characters can reference details of the history, culture and physical environment to better portray the unique personality of the island.

We could reflect more dynamic aspect of place that are straightforward to process, such as seasonal changes, tidal effects, and differences in time of day. We could map opposites by depicting a site in a different state than the one being experienced by the audience: i.e., embedding a sound-recording of the bog in mid-winter for a July visitor to collect. We could improve the ability of our story engine to process weather sensor data. This might involve long-term observation of day-to-day weather trends on the chosen site or incorporation of additional sensors. Computational rigor could allow ever more subtle discernment of the look and feel of the skyscape. This implies content about the causal relationship between weather and day-to-day life, human emotional state, decision making, animals and plants, erosion, thermodynamics, chaotic systems, global energy transfer, etc.

Other possibilities for new content include the adaptation of print volumes containing non fictional anecdotes of place and culture, as Nisi (2004) uses to express a Dublin community in her mobile story research. Also interesting in her approach is to hold workshops so that a content structure could be built upon by local residents and eventually pass into the possession of the community. Non-narrative audio rather than direct character narration suggests another style of content: scenes could be ambient soundscapes that give the impression of eavesdropping on an immaterial scene. Game-

like applications could use artifacts found in particular locations as graphical clues in an environmental scavenger hunt.

Just as our research-driven prototype production had limits based on time, resource, and focus, any project is constrained by the same factors. The ideas listed above are concepts, as yet untested, and there are many more than we present here. The suggestions thus serve as a store of possibilities; it will be up to the organizations and creators of future such systems to decide what inspires.

6. Conclusion

Through multimedia story, mobile sensing technology can enable a rich experience of a place. This layered geographical metaphor for interpreting and experiencing culture encourages people to collect and document stories; create and interpret stories, experience stories and places, and build memories with post-experience supplements. The design of the experience will be based on the message that creators wish to communicate to the audience. Then, the technology platform must be assembled, sensors selected and interpreted, interface designed and implemented, and content structured and produced.

We present our methods and resolution, as well as a synopsis of some challenges in creating such a system. With our prototype we attempted to identify the fundamental issues in telling a coherent plot-based story while providing an audience with a level of navigational freedom. Our aesthetic goal was to use fiction to engage an audience in a place, and to use a place to engage an audience in fiction. Our principles requested the blending of digitally crafted scenes with existing physical landscape, and the design of appropriate experiences given the nature of the chosen place. Our process was influenced by innumerable factors, including the experience and preferences of researchers and participants, and the layout of our sample landscape. This is not a pure science- it is organic territory for structures to evolve from each creator's vision.

The framework that resulted from our experiment can lend intuition to creators in designing, structuring and scripting a deep place-based story experience for a mobile audience. Other frameworks- i.e. mobile applications that facilitate social dynamics between visitors or allow audience contributions to content- would look different from this, but may be able to draw upon our results. Mobile devices are ever more ubiquitous; bandwidth, memory and computing power is ever greater, and the population is increasingly proficient in constructing personal multimedia stories and documenting current culture. With this paper we position the mobile context-aware story form for further take off should the chaos of technological evolution continue to show it favor.

7. Acknowledgments

Thanks to our group mates in Story Networks and Everyday Learning, especially Valentina Nisi for story and for getting into that freezing water. Also thanks to David Reitter and Joelle Bitton for translation help, and to our field trial participants.

References

O hOgain, D. (1991). Ulster Cycle. In *Myth, Legend and Romance: An Encyclopaedia of the Irish Folk Tradition...* New York: Prentice Hall Press, 415-416.

Chatwin, B. (1987). The Songlines. London: Vintage, Random House.

Donovan, B.; (2003), Wood, A.; Davenport, G.; Strohecker, C. Nature Trailer: Physically Navigate Stories in the Wild. *Workshop : Design Methods for Ubiquitous Computing in the Wild, MUM*. Norrkoping, Sweden.

Weiser, M. (1991). The Computer for the 21st Century. *Scientific American*, vol 265 no. 3, 94-104.

Wood, A. (2002), Davenport, G.; Wood, V. Amplifying Physical Place with Science Stories. *Presentation, ArtSci 2002: New Dimensions in Collaboration*. NY, NY.

Thomson, D. (1954), The People of the Sea: Celtic Tales of the Seal-Folk. Edinburgh: Canongate Books, 1996 (first published 1954)

Sayles, John. (1994), director, film The Secret of Roan Inish.
Strohecker, C.; (2003), Ananny, M. Constructing Intermodal Literacies. *Proceedings of ACM Technology Enhanced Learning*. Milan.

Weal, M. (2003), Michaelides, D.; Thompson, M.; DeRoure, D. The Ambient Wood Journals- Replaying the Experience. *Proceedings, Hypertext '03*, Nottingham, UK.

Miller, R. (1989), Miller, R. Cosmic Osmo. for *Hypercard 2.1 Player*, Cyan, Inc.

Falk, J. (2002) The World as a Game Board- Tangible Computer Games. *Position statement, SIGCHI'02 Workshop on Funology: Designing Enjoyment*.

Davenport, G. (1997), Murtaugh, M. Automatist storyteller systems and the shifting sands of story. *IBM Systems Journal*, vol.36, no.3, 446-56. IBM, USA.

Rogers, Y. (2004),Randell,C.;Muller,H.;Price,S.;Fitzpatrick,G.;O'Malley,C.; Stanton,D.;Fleck,R.;Harris,E.;Thompson,M.;Smith,H.;Weal,M. Ambient Wood: Designing New Forms of Digital Augmentation for Learning Outdoors. ACM, College Park, Maryland.

Perry, Bill. (2002). The Invisible Ideas Project: Using Mobile Devices, Macromedia Flash, and Global Positioning Systems. *Macromedia Developer Center Article* SmartWorlds, Cambridge, MA. Site last visited June 16 2004.

Flintham, M. (2003), Anastasi, R., Benford, S., Drozd, A, Mathrick, J., Rowland, D., Tandavanitj, N., Adams, M., Row-Farr, J., Oldroyd, A., Sutton, J., Uncle Roy All Around

You: mixing Games and Theatre on the City Streets, *Proceedings of the Level Up: the First International Conference of the Digital Games Research Association (DIGRA)*, Utrecht.

Centrifugal Forces (2003). CityPoems. consulted June 13, 2004.

Rueb, Teri. (1996) Trace: a memorial environmental sound installation. Iceline Productions. consulted June 13 2004.

Moed, A. (2002). Annotate Space: Interpretation and Storytelling on Location. *Thesis*, Interactive Telecommunications Program, NYU.

Nisi, V. (2004), Davenport, G.; Haahr, M. Interactive Portrait of the Liberties. *Demo-Poster, to appear at ICHIM Digital Culture and Heritage*, Berlin.

Kruger, Chuck. Cape Clear Island photo credit; Fig 4.

Ross, C. South Harbor in wind; field trial close-up photo credits; Fig. 3 right, Fig .7 right.

Crow, D. (2003); Pan, P.; Kam, L.; Davenport, G. M-Views: A System for Location-Based Storytelling. *ACM UbiComp*, Seattle.

Nisi, V. (2004); Wood, A.; Davenport, G.; Oakley, I. HopStory: an Interactive Location Based Narrative Distributed in Space and Time. *Proceedings International Conference on Technologies for Interactive Digital Storytelling and Entertainment (TISDE)*, Darmstadt.

Appendix : Selected Scene Excerpts



Fig. 8: Taken from video scenes represented in appendix: shots of north beach, harbor aerial, west path.

1. Introduction

Fisherman: *I used to live on this island- I fished the sea around here. That was a while ago. The only voice I have left is what comes to you now through this little machine. This is your window to the stories on the island. Did you ever hear the legend of the seal people? Selkies, they were called. There are many of these stories, of seals who could*

talk, and turn into humans, and take their revenge for brothers and sisters killed by humans. I haven't seen anything like this. But I married a selkie woman!

...One night I saw her as I was resting on my oars in the South Harbor. That was the main harbor at that time, when there were 1,000 people on the island, instead of the 140 left here now...

2. North beach : : sun : : pre-transition

Selkie: *I'd bury my human self in the seaweed so I wouldn't burn in the sun. It was a novelty, my human skin. The crustaceans' claws tickled- with my thick seal skin I wouldn't have felt them at all. I'd lay there with only my eyes exposed and islanders would walk straight past me, inches away, to get shellfish for their soup.*

I told few other seals about this. Because the way it was told below, humans were beautiful but dangerous and unwilling to listen to reason. And getting trapped on land was as hopeless as being snared on a hook.

3. North beach : : cloud : : pre-transition

Selkie: *A woman with folds and ripples in her skin came across the stones on this beach. It was low tide. She climbed a jagged rock by the edge of the water. The wind wrapped her white hair around her face and the grey skies hid her features in shadow. I rose up from the seaweed and shouted into the wind, "How many years have you been here?". She looked up. She had heard me.*

"Seventy seven." She turned back to the sea. The oldest seal I had ever known had been thirty four. If I stayed on shore as a human, I could slow down time. I laid back into the mud and kelp and had a think about this.

4. Transition : : cliffs over south harbor

Fisherman: *I told you how I sneaked up and took her skin one day. But it didn't come out of pure luck. I had seen her all around the island. I knew her haul out places and I fished them. And she'd return to the same places as if she knew one day I'd catch her. Except, on the day I took her, the fright in those big dark eyes... She knew I had the skin. She stared out at the sea... then she climbed up to where I stood and she laughed out loud at her skin wrapped around my shoulders. Not a word out of her. But she took the blanket I held out and she followed me home, ten paces behind...*

5. West path : : rain : : after transition

Selkie: *It had been six years, and I was walking along this path with Joe , when the skies opened up. Our boy was back at the house, asleep on the floor by the fire on a blanket. The rain blurred my vision, and the island was suddenly underwater. Closer than the sound of the wind, into his ear I asked Joe if he'd show me where my skin was. The muscle in his cheek quivered beneath his tough, papery skin. He said nothing.*

I touched my nose to his beard and smiled at him with all my teeth, feeling the memory of his loneliness. In the privacy of my mind however I was not smiling, and decided if Joe wouldn't talk, I would find it myself.

6. West path : : calm air : : after transition

Selkie: *One still morning I walked, my head inside the previous night. I had told Joe a story. That he and I would go get my skin together, and it would hang with our coats, and I might take it out for a day -- just a day. And then I would come back, because how could I leave for good.*

That morning I went walking, leaving Joe sleeping against his pillow. It was silence that woke me -- there wasn't any wind. The same silence that Joe offered me the night before. There I went down the path at dawn, trying to decide whether I was lying when I said I wouldn't run away for good.

7. Conclusion : : North harbor

Fisherman: *The day she left I was fishing. When I got back there was no one. The sun was just down and the room was dark. Blue shadows. There was a stink of animal musk through the house. It was like a wild beast's cave. But I took off my coat and lit a fire. She wasn't the type to have dinner waiting in the pot.*

There were salt streaks on the floor. Out the window, I saw thatch from the roof in a pile on the ground. I had hid her skin away from her, in the roof, all those years ago. All the things I taught her -- but never to repair the roof. She had been asking about the skin, leading up to that day. Asking me where was it. "I'd only be gone for a heartbeat," she'd say...