

Authoring for a Distributed Digital Medium

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ABSTRACT

This paper presents our arrival at a method for authoring a responsive digital narrative that is fragmented and distributed for the audience in space and time. We framed a simple, generalizable framework for use by content creators. Our method emerged via exploration of one user scenario: an audience wandering across a remote outdoor landscape with a handheld computer and a few mobile environmental sensors, including GPS. We developed a prototype set of narrative bits and an application on the iPaq which allowed participants to physically navigate the story web, collecting and screening weather-based audio and images. With this narrative scenario we sought to provide media scenes that would be experienced in particular outdoor places in order to *amplify the setting* (rather than compete with it). We sought to provide a *coherent cumulative story experience*, ensuring character development, narrative climax, and a singular conclusion to everyone regardless of their strategy for navigating the story space. In this paper we expand on these goals in context of their inheritance and departure from existing work in the field. Then, we detail our challenges in developing a narrative which fulfilled these goals, including a description of the final story framework, which may be reused. We discuss the results of user trials and suggest future application possibilities. Our method of arrival at the framework, in addition to the framework itself, may be adapted to other creators of distributed, context-aware digital stories.

Keywords

place-based content, fragmented narrative, plot stages, climax, context-aware, story structure, physical navigation, audience experience, authoring challenges, weather sensing, gps

1. INTRODUCTION

Stories are a universally compelling way to communicate that 'unexplainable Something' about the life, history, culture of a place. With mobile media-screening devices, a person can receive digital story scenes on-the-spot, outdoors. With portable sensing technologies like GPS and environmental gauges like solar radiation, a collection of digital scenes can 'know' where and under what conditions a travelling individual is moving, and provide narration that matches real-time situation of the audience. All of this implies that fictional story scenes can be used to encourage and amplify exploration of a landscape. We saw an opportunity for technology to bring story into the wild. This offers something new and different to travellers, and offers a new platform for creators to capture the essence of a place in an expressive way.

Creating the technology platform is not the sum of the work. As early experience of one of the authors has shown [MViews ref, others?], it is not easy to craft a grounded and climaxing narrative across a set of physically distributed fictional scenes, when the scenes change along with a chaotic environment, and are navigated in varied, unpredictable orders. Certain features must be built-in to each scene so that it matches audience environment while moving the story onward. Scene delivery must be guided by rules that, based on what audiences have already heard, ensure that following scenes make sense and move the story onward.

Virtually distributed story structures for the desktop or TV screen can inform on this type of authoring. The mobile form we chose emerged from a long line of on-screen navigable stories starting with the likes of Hypercard [ref**] and Cosmic Osmo [ref], and getting ever more numerous and fancy [ref Myst] [ref. Sensor-driven? desktop based?]. However, carry story into a mobile context and demands on the author are different. New constraints and creative goals are suggested, such as putting a lens to the cultural, visual or unquantifiable of a physical place, or encouraging physical exploration of an audience (which is expensive in terms of energy and time compared to virtual navigation). Add extra environmental sensing to drive story along with the audience, and complexity increases. Every time an external sensed variable is added to the mix of 'intelligence' that a story scene carries, story threads multiply.

Thus, we did not find appropriate resources to understand how to create the type of story we sought. We thought the best way to obtain a guide for this type of authoring was to compose a story ourselves, which we refer to as the Selkie Narrative. An overview

of related art, and then description of our method and arrival at this story, is the offering of this paper.

1.1 Nature Trailer: Parallel Project

The Selkie Narrative was delivered and tested on the Nature Trailer context-aware exploration tool and multimedia delivery platform. Nature Trailer was created in collaboration with Brendan Donovan and Carol Strohecker of the Everyday Learning group at the Media Lab Europe.[ref MUM] Its development was interwoven with that of the Selkie Narrative, and so the two projects are closely linked. Nature Trailer used GPS, a dynamic map interface and wireless communication with weather sensing to allow hikers to experience a media-rich landscape that changed based on weather, and encouraged exploration. For a more detailed description of Nature Trailer, see the paper and web documentation detailed in reference [X].

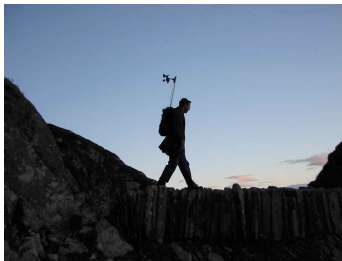


Figure 1. field trials

1.2 Related Work

It seems new physically navigable, location aware narrative projects emerge every time we look- all with at least the promise of a platform for creative multimedia content. They span various levels of development, from concept to commercial product, and come from all over: university departments, individual artists, digital art collectives, new media startups, and research and development groups of big companies. We ride with these groups on the back of the same animal in the development of our particular experiment.

Some of these take more of a task-oriented game form, like the annual Nokia challenge [**ref] and physically navigable mobile, multimedia games like [swedish ref?]. Others are informational narratives, such as audio tour cassettes in museums[ref Tate?]**] and city tour guide cassettes such as that rented out by Dublin Board of Tourism [ref**]. The Ambient Wood project is related in its use of digital multimedia on a mobile platform which senses the environmental state[ref**], but has more of a learning bent to its aims, as does the Virtual Savanna project by BBC Natural History [ref].

Different again from game, learning, and tour-guide applications are those more entertainment or arts based: those which have a priority to tell a location-based story which is narrative before it is directly informational or task-oriented. One example is Teri Rueb's distributed poetry installation Trace [ref**], which uses location-sensing to embed audio media across a hiking trail in the

Canadian Rockies. Another, CityPoems [ref**], distributes location-relevant poetry across locations in London. Andrea Moed's Annotate Space project describes embedded place-based narrative across NYC, for mobile delivery to a handheld device. No doubt these are not all. More related is Portrait of the Liberties [ref**], a place-based web of narrative video portraits illustrating an old Dublin community. Trace, CityPoems and Liberties all have a shared goal with the Selkie Narrative: location-relevant, aesthetic narrative content. The Liberties connects further in its goal of connecting narrative fragments for the audience in order to craft threads of coherence across scenes.

Also close to our project aims is the parent research of the Selkie narratives, the MViews story platform and accompanying productions [1]. 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 the goals of the Selkie narrative. MViews, however, guides audiences in sequence to specific locations as opposed to our approach of audience exploration: presenting many equally weighted location options which contain story. The MViews productions provided a narrative climax, but did not have additional environmental sensor input or lateral, non-plot-advancing scenes. The story-creation software does not help authors to construct plot progress across locations.***thinkrethis***

Another parent project conducted a few years earlier was Hopstory: a location based fictional narrative with threaded parallel plotlines that stepped forward through time to a fixed conclusion.[ref**] This style, however, did not guarantee coherence, as plot threads might be crossed numerable times, beyond audience control, rendering any one plot thread potentially unresolved. Our challenges begin to emerge.

Mobile narrative reports often frame development of technology, interface, or applications, but we haven't found much to guide a new-media author in intentionally crafting an audio visual story that will provide audiences with an overall coherent narrative experience across multiple scenes. This is possibly due in part to the newness of the medium: there is no standard; everyone can start from scratch with their own vision.

We prioritized the authoring of an experience- that of a traditional story with character development, a climax and a fixed conclusion- which preserved freedom of choice in audience movement through space and time. We speak to practical authoring issues after implementing and evaluating in-field a prototype story and mobile, context-aware platform. We noted the characteristics taken on by our context-aware story scenes, and the simple framework that emerged which visualizes a plot structure for a climaxing story that allows lateral movement through the story space. The method evolved organically during our exploration may be of use as a guide in future creative endeavors for as-yet unknown applicable applications.

2. Audience Context: Implications for Content

We suspected that the audience will expect a cumulative reward after being implicitly guided by the presence of icons to visit multiple locations across the landscape of Cape Clear Island, Co.

Cork, Ireland. Our field trials verified this, as we will discuss later. This context of an on-foot, outdoor audience in a hillwalking scenario, equipped with a particular kind of suggestive, location-based interface, prompted the first design constraints on the style and form of story scenes.



Figure 2. Story 'hotspots' on Cape Clear Island**

2.1 Outdoor Media

We used audio to narrate the story, rather than audio plus video narration. Video files are bulky in terms of disc space, and we carried in all our media on the iPaq. Visibility on the iPaq screen outdoors was poor- only high contrast, large and simple gestural images communicated well over the visual channel of our platform. That said, the most important deciding factor was audience context. A hiker's surroundings tend to be visually rich and aesthetic. Video had the potential to draw attention away from this setting- we wanted to provide story to enhance the land. Audio-only, in conjunction with context-awareness, allowed the authors the chance to write an aural script using the local landscape as visual and aural illustration. (though it should be noted that we developed full-video supplements for each scene, for a post-hike linear film which we won't discuss in detail in this paper.)

Each scene would be separated from the previous and next by anywhere from a few minutes (in the case of a change in weather at a given site) to several hours (in the case of walking to another site, and breaking in between). Also, each scene should exalt the unique character of a given place; otherwise why is it embedded there. These characteristics implied that each scene should be a reward in itself: a mini-story which has a roundness, a rise and fall of its own, so that audiences didn't walk away empty or disappointed from any one given site.

2.2 Scripting for Context

We sensed solar radiation, wetness and windspeed to determine whether it was sunny, cloudy, raining or calm. Using GPS, we determined within a few meters what the audience was physically surrounded by in terms of vistas and objects. With use of weather sensors, we imagined that we could have customized narrative scenes for each condition. This could draw audience attention to changes in the sky overhead, as well as giving an author more details about the visual illustration that would go along with the audio delivered to the audience. The narrative challenge then became, how exactly does a fictional story scene go about accomplishing these things?

After creating early scenes, we found it necessary to make weather connections in a scene quite transparent to the audience, in order to make the use of environmental sensors worthwhile. During initial content review by audiences in a laboratory setting we found that with too subtle a reference, the connection between changing scenes' content with weather was lost to the audience. In this case it was random and confusing that the scenes for a particular place should change over time. With too direct a reference, we risked losing aesthetic integrity and sounding like a primary school video where the raindrop talks.

In the end, the scenes addressed this by characters' references to the state of their environment, and the impact it had on the bit of story they were relaying. For example, 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. Similarly, the stories referenced fixed physical landscape features like a signal tower or a rocky beach.

3. CRAFTING STORY EXPERIENCE

3.1 Tir Na Nog and Early Experiments

Our story progressed through several phases to get to a final model which accomplished both the incorporation of context information into story, and the ensurance of a climaxing and concluding story that allowed audience flexibility of navigational order. The initial approach was to unfold a fictional legend scene by scene in the locations where plot events happened. We chose a legend and a place as a prototype: Valentia Island in County Kerry, the site where, according to legend, the goddess Niamh chose Oisín to elope with to the land of eternal youth, Tir na Nog.

Perhaps the story needn't be time-ordered [ref Pulp Fiction], and events could be sampled in any sequence by the audience. Provided the scenes were individually rich could any resulting experience of scenes be entertaining? Scripting began, at first using text and video, and quickly came to a halt. It was difficult to construct any one scene without having any knowledge of what scenes, in terms of plot events or character introduction, had been experienced already by the audience. Visualizing the constraints was too complex: in addition the author had in mind the importance of connecting each scene to place and weather.

First attempt: start writing a linear story. This was impossible since it must be quantized by location and weather conditions and so natural breaks must occur in authoring from the start. This knowledge that plot would be broken apart and randomly sequenced was not easily put to rest. A critical piece of authoring in our circumstances, was drawing on intuition in crafting rises, falls, subtle references to past and future events, and suspense. [**refs on this?] Without any idea what the audience knew about at any point in a potentially huge bed of content, this task seemed impossible.

The reason was unclear at the time and we set to simplifying the problem of conceptualizing the entire story space. The island we

had chosen, we replaced with a smaller space, Cape Clear. The legend about Tir na Nog we replaced with a simpler story that had a bare, archetypal plot progression (and also was more personally compelling to the authors- a critical aspect in even a prototype story). Perhaps an author with more experience in such stories would not have faced these difficulties; indeed, the authors of this paper have hindsight ideas for alternate authoring approaches (yet untried). However, this is exactly the issue: the medium is new so intuition is hard to come by. Our structure and experience can serve to inform those who are in a similar position to ours at the start: having never before crafted a story to be told in a variable distributed, context aware manner.

3.2 Selkie Story: Evolving the Strucutre

According to Irish and Scottish coastal legend, some seals- selkies- can remove their skin and take the form of a human. If a land-man takes the skin of a seal woman, she's obliged to marry him. She may love her human family but when she finds her skin again, she bolts back to the sea.

To author scenes, we thus needed assurance of some audience understanding of the story at any point. The next structural experiment was a collaboration with Valentina Nisi. To construct narrative experiences we would take a few critical character states in the plot and use them as hinges. We would divide the plot into finite sections based on a reversible, infinite progression: for a given location, weather states ie. windy, raining, sunny, would map to the selkie's changing emotions, which we would make predictably linked to her state in the story world. When agitated, she wants to be on land if in sea, in sea if on land. Wind calm- she's calm, domestic if on land, happy in sea if in sea. Will this structure, the play could occur in the location-based crafting of the scenes.

This plan suggested a granularity of scenes, within which our character lives in a perpetual state of emotional fluctuation. Two sets of story bits emerged: pre-land selkie cases, and post-land cases. As the writing began, scenes emerged more easily. However, in initial evaluations of the content in the lab, there was still a problem of providing narrative progression. The scenes together didn't build towards anything, but seemed more like a set of poems [figure 3]. The character needed to be taken through infinite purgatory into a resolution, thus giving audiences a cumulative story experience which is not flat. We had the concept of stages and context-based fluctuation, but what we needed was a meta-structure (which would be embodied in a software rule-set engine).

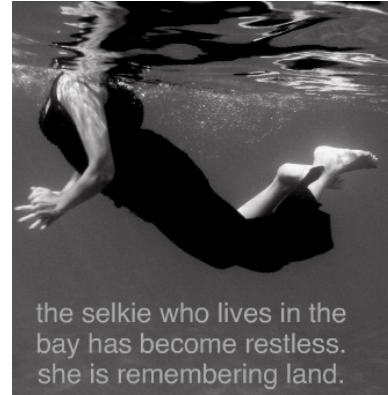


Figure 3. frame from early scene design

3.3 Improvising Lateral Scenes On-Site

While the structuring was going on, we worked on evolving the story characters and our plot interpretation. We travelled to sites on Cape Clear and decided that certain events in our version happened at certain places there: a harbor, a path, and so on. We improvisationally acted and filmed these scenes about the selkie's life, some which advanced the plot as the legend told, and some which we imagined on the spot to help us understand her as a character: scenes which told of her daily life as a seal-person. This improvisation, or at the very least site visits with story in mind, were imperative in the address of place- and weather-based scene construction, and ultimately informed the style of the first person narrations.

4. RESULTANT STRUCTURE

4.1 Framework

Before emmersing the audience in a navigable web of stories, it seemed necessary to provide an introductory scene to set up the story premise and characters, and to indicate to the audience that their handheld computer would be a probe to gather further stories. "Did you ever hear the legend of the seal people?" the fisherman narrates on the ferry-ride to the island. and then, "Through this box of yours, you'll see her life." In examining the navigable scenes that we had improvised, we realized they fell into one of two distinct plot categories: when selkie is a seal-form living in the sea, and when she has been brought onto land to live as a human. This allowed us to divide all our scenes into two time-stages. In between the two stages we composed a transition scene, which was weather independent and carried the audience into the next phase of the characters' lives, as the introduction had done. We embodied this structure as a table [fig 4] and began once again to write scenes, four per location to represent four possible weather states. With this table as a guide the final script took shape relatively quickly.

plot stages A B		locations	
locations numbered 1- 8.		1 south harbor: beach	5 dead end path
weather state (Cl= cloud S=sun R=rain C=calm)		2 south harbor: pier	6 north harbor
total scene count in numbers		3 signal tower	7 garden
		4 lake	8 pub

1. intro	15. A4 Cl	29. B1 Cl	42. B7 Cl
2. A1 Cl	16. A4 S	30. B1 S	43. B7 S
3. A1 S	17. A4 R	31. B1 R	44. B7 R
4. A1 C	18. A4 C	32. B1 C	45. B7 C
5. A1 R	19. A4 N	33. B1 N	46. B7 N
6. A1 Night	20. A5 Cl	34. B2 Cl	47. B5 Cl
7. A2 Cl	21. A5 S	35. B2 S	48. B5 S
8. A2 S	22. A5 R	36. B2 R	49. B5 R
9. A2 C	23. A5 C	37. B2 C	50. B5 C
10. A2 R	24. A6 Cl	38. B3 Cl	51. B8 Cl
11. A3 Cl	25. A6 S	39. B3 S	52. B8 S
12. A3 S	26. A6 R	40. B3 R	53. B8 R
13. A3 C	27. A6 C	41. B3 C	54. B8 C
14. A3 R	28. trans.		55. conc.

figure 4: table for script structure

4.2 Repeating Themes

Writing according to this structure, we predetermined a few key plot ideas for each of the two plot stages A and B. These were then featured and re-featured across the browsable scenes, ensuring that a random sampling of scenes would give all audiences an idea of story themes, conflicts, and character personality. For example each scene had to reference the desire to be on land, her tie to the sea, etc. This was achieved through first person audio narration of day-to-day experiences memories/accounts of particular, often minor events in the characters' lives, such as seeing the fisherman get out of his boat from her vantage in the water, and baiting him by leaving her skin visible in case he should return.

4.3 Advancing Plot

We established a critical mass in the story engine, estimating that after four from a given stage, the audience would be sufficiently invested in the plot and characters to gain access to the transition and 'graduate' to the second stage of the plot. This was indicated by the appearance of a 'special' story icon on the prototype interface, once the four have been seen. However, the audience could if desired, keep probing the first stage until ready to travel to the transition location and advance the plot. After transition, the first phase of story 'disappeared', and a new set of B-stage scenes were scattered across new locations on the map interface. After four of these, the audience could access the conclusion. The transparency of this structure on the interface is still an open design problem; in the field trials, the structural constraints were made verbally clear to the participants ahead of time.

5. TRIAL RESULTS

After recording and encoding the story engine, we brought eight people from ages 8 to 38 to Cape Clear Island (which is about 3 miles long at furthest opposing points) to give the story experience a try. In almost all cases, the participants sought to advance to the next plot stage as soon as it became available, and wanted to carry through to the conclusion. In most cases, the shortest paths between story locations were sought [location distribution: figure 2]. Some participants spent several hours and browsed the story to the conclusion in one (appx. three hour) pass; others spent a day or two and hiked to one place at a time, with long breaks in between. In an interview discussion directly following the experience, all participants indicated that they felt they were able to invest in the story. They expressed that it was

important to experience more than one scene before advancing to the next plot stage, in order to understand and care about what was happening. They expected a climax after a certain period, verifying the need for an overall plot-arc in this context. The scenes were sufficient rewards for navigating (it was worth the walk). The connection to weather conditions was not strong; however, the trial dates happened to be unfailingly fair (a rarity on Cape Clear).

Several participants commented that the distributed story gave the strong idea that the fictional character dwelled all over the island, across time. These participants expressed a desire to have access to printed supplements of the fictional story, to have more depth and background both before and after engaging in the mobile experience. Participants also expressed a desire for more deeply place related content, educational content (two participants were middle school teachers of history and science), a selection of story types akin to TV channels, and a choice to change character perspective for any given location. These desires indicate a few things: there is a hunger for yet more choice and flexibility in content, and the context we chose did engage our trial audience in both the characters and the place. All participants indicated that hiking in a remote place with a piece of technology which many were unfamiliar with was acceptable, and didn't cause the trekking experience to be negative- just different. It was commented that the non-invasive nature of the experience was positive given the context- no signposts or embedded technology is attractive in a wild natural space.

6. CONCLUSION

We are presenting our methods and resolution, as well as a synopsis of some of the challenges of writing for a system like this. Our process was influenced by innumerable factors, including the experience and preferences of the researchers, the participants who evaluated, and the layout of our sample landscape. This is not a pure science- it is organic territory for structures to evolve from individuals' and groups' desired story experiences and styles. With our trial story, we chose to address the fundamental structural issues of telling a coherent plot-based story through embedding scenes throughout a landscape, for collection by an audience with a level of navigational freedom. Our aesthetic goals, so to speak, were focused on using fiction to engage an audience in a place, and using a place to engage an audience in fiction.

Residents local to the Cape Clear region all had ideas for storytellers and content that would be more tightly connected to place than our somewhat artificial fictional characters. The fundamental strength of the mobile story medium is its ability to use digital media in combination with context awareness to closely connect story bits to audience. This is particularly compelling in relation to place, which carries emotion and personality that can be lost with advancing generations or hidden from the first-time visitor. Groups from the Scottish Highlands, for example, are eager to adapt this framework to preserve the culture and vitality of local islanders who informally tell location-based anecdotes in their communities. Other possibilities are the adaption of local transcribed stories about a place, such as [The Man from Cape Clear](#) [ref] as Nisi does in her portrait of a dublin community. [ref]

The framework that resulted in our experiment can enable groups to script, gather, and structure deep place-based content for a similar or further customized mobile audience. It can help such creators to develop intuition about authoring challenges. Other frameworks for mobile applications that include social dynamics and audience contributions would look different than this, but may be able to draw upon our method. The mobile, context-aware story form is immature, and contains rich ground for creators and place-documentarists given the technology available. Different sensors than weather can be adapted, such as audience heartbeat, RFID or radiation. The content style has breadth as well: abstract ambient audio landscapes and community-constructed poetry and onwards, can all draw from the strategies we have illustrated.

7. ACKNOWLEDGEMENTS

Thanks to our group mates in Story Networks, as well as Donnacha Crowley? and Oonagh Actress for reading the parts, Brendan Donovan and Carol Strohecker for full collaboration on the story delivery platform [ref], and Valentina Nisi for story, and for getting into that freezing water.

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