A Blended Space for Tourism: Genesee Village Country & Museum

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Abstract
Blended spaces are spaces where a physical space is deliberately integrated in a close-knit way with a digital space. In this paper we develop the concept of a blended space and use this to explore the design of a visitor experience in a nineteenth century living history village and museum in western New York. Blended spaces aim to produce a more harmonized user experience (UX) of a place, by considering the correspondences between physical and digital spaces and by considering the movement through these spaces. Reflecting on this enables us to provide general guidance and framework on the design of blended spaces for digital tourism.

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Design, Tourism, Blended Spaces, User Experience

ACM Classification Keywords
H.5.2 User Interfaces

Introduction
Blended spaces are spaces where the physical space is deliberately integrated in a close-knit way with a digital space. Blended spaces go beyond simple mixed reality [1, 15] and conceptually are much closer to tangible interactions [13] where the physical and digital are completely coupled.

The aim of this paper is to develop the concept of a blended space in the context of digital tourism. Tourism is ideally suited to linking physical spaces with digital content and there are many examples of tourist apps that provide information through augmented reality (AR), often making use the of the global positioning system (GPS) to provide context-specific information in museums [4, 16] or to tourists on phones or tablets [5, 6, 7, 8]. In these experiences there are various points of interest (POI) for tourists that are connected to, or anchored to, digital content. Such systems may provide other forms of context-aware interaction [14] such as personalization of information based on previous places visited by the tourists, or other attributes such as what content people are interested in [16, 17, 18].

All these user experiences for tourists, museums and so on face some common problems. The central issue for location-based information is that people need to be made aware that there is some digital content that they can access. Since people cannot see digital content without some display device, they will be unaware that any exists, or the extent or type of content until they are alerted to it. People need to be guided to the physical location where digital content can be consumed. This is no trivial task. In some situations there may be lots of digital content related to a small physical space and perhaps of interest to different people. In other circumstances there may be only a few pieces of content, but spread over a very large area. If the tourist is walking, then the content can be delivered at one pace, whereas if the tourist is driving, delivering the appropriate content at the appropriate location can be very difficult indeed. Another issue concerns the size of the physical location where the content is relevant and how to control the content delivery if the person walks outside the area. For example, Blythe, Reid, Wright and Geelhoed [3] note that people got quite annoyed when they walked out of the geo-tagged space and hence lost the content they were engaged with in their mixed-reality presentation of riots in Bristol, UK.

Our aim in this paper is to formalize the concept of blended spaces and to show how the concept can be used to design digital tourism experiences. We do this by applying blending theory to the problem. Blending theory comes from the work of Fauconnier and Turner on linguistics and cognition [9, 10]. It concerns how people come to understand new things by integrating known concepts into a novel structure, the blend. By applying blending theory to the creation of mixed reality experiences, we gain insight into the nature of blended spaces and how to design them. We illustrate this insight through a case study that applies the concept of a blended space, which leads us to some general principles of designing for digital tourism.

Blended Spaces

Fauconnier and Turner's book *The Way We Think* [10] introduced their ideas on a creative process that they called conceptual blending. They argued that cognition could be seen in terms of mental spaces, or domains. Cognition involves the projection of concepts from domains and their integration into new domains. There is now extensive work on blending theory applied to all manner of subjects that offer different insights into the way we think. Turner's site is a good starting place[1].

Imaz and Benyon [12] have applied the ideas of conceptual blending to analyze developments in HCI

[1] http://markturner.org/blending.html

and software engineering. They argue that in interaction design, designers need to reflect and think hard about the concepts that they are using and how these concepts affect their designs. They emphasize the physical grounding of thought by arguing that designers need to find solutions to problems that are 'at a human scale'.

Benyon brings blending theory together with the idea of physical and digital spaces for the purpose of designing mixed reality experiences [2, 12]. He argues that physical and digital space can be usefully conceptualized in terms of four key characteristics. The ontology of the spaces concerns the objects in the spaces. The topology of the spaces concerns how those objects are related to one another. The dynamics or volatility of the spaces concerns how elements in the spaces change over time. The agency in the spaces concerns the people in the spaces, the artificial agents and the opportunities for action in the spaces. By understanding these characteristics and looking at the correspondences between the physical and the digital spaces, designers will produce new blended spaces that have emergent properties. In these spaces, people will not be in a physical space with some digital content bolted on. People will be present in a blended space and this will give rise to new experiences and new ways of engaging with the world. Our case study at the Genesee Country Village and Museum showcases Blended Theory as a framework.

Genesee Country Village & Museum

This case study illustrates the use of the blended space framework — the ontology, topology, volatility and agency — to discuss the design of an enhanced visitor experience at the Genesee Village Country & Museum[2] (GVCM), a living history village in western New York. The physical space is a very large covering several hectares. GVCM creates opportunities for visitors to experience life in New York State in the Pioneer, Colonial and Victorian periods. Original buildings have been relocated to the museum, which provides hands-on and engaging experiences for visitors of all ages.

The Mobile Experiences for Tourism MS HCI class at Rochester Institute of Technology (RIT) designed a blended space by solving problems for key stakeholders, e.g. visitors and the village. The visitors were not being aware of historical content while roaming the village or they often became lost. See figure 1. The CEO of GVCM is searching for new ways to entice visitors to return, all the while, deliver historical content without infringing on the aesthetic 19th century quality of the village. Our designers made use of the smart phones now carried by many visitors. We knew we needed to create a contextual wrapper around the ontology, topology, agency and volatility of our blended UX. We relied primarily on storytelling for context to deliver solutions at a visitor and village scale.

Figure 1. We witnessed many lost and bewildered visitors.

[2] http://www.gcv.org

Ontology

Our design strategy began with looking at the ontology of GVCM, or the selection and specification of the main objects in a space [11]. GVCM is large with many different locations, buildings and attractions. There are three explicit areas of the museum: pioneer, colonial and Victorian villages. We used the physical ontology of the existing museum infrastructure as the model of our digital service. Our service allows the visitor to select their path or character at the entrance of the area villages (an 18th century tollbooth), see figure 2.

Figure 2. We designed a UI for selecting an ontological story.

Each path represents a unique digital story supported exclusively by the physical location of the visitor and his/her surroundings. For example, if the visitor selects Sam Turnhill, the visitor will be lead through the tale of a blacksmith creating nails for the construction of a small schoolhouse for the coming spring. If the visitor selects Jeremiah Turnhill (the grandson of Sam Turnhill) the visitor will be lead through the tale of an army recruit preparing for the War of 1812. When the visitor chooses a digital agent and the tale begins.

Agency

Currently, GVCM uses volunteer actors to take on the personas of eighteenth century living e.g. tinsmiths, brewer, seamstresses etc. However, actors are not always available and the CEO is searching for additional ways to interface with the visitors. While designing for agency, we do not intend to replace existing human actors with digital agents; this would detract from what GVCM does very well. However, our approach uses digital agents to create new experiences for the visitor when actors are not available. For example, if the visitor selects Clare Boughton, he/she is able to not only obtain information about a Victorian manor, but able to experiences all the nuances of a Victorian wedding, e.g., the gifts, the preparations, the unexpected bumps, the stress, and the joy of a blissful wedding day. When the visitor selects Clare, she informs the visitor that they need to get ready for the big day - her dear cousin, Jeremiah Turnhill Jr., is getting married. See figure 3. The visitor is thrust into a scenario where he/she needs to move about the Victorian village to prepare for the wedding.

Figure 3. Clare invites the visitor to the Victorian wedding.

Topology
How historical buildings related to one another through storytelling became our topological approach to designing blended spaces. The Victorian Village has estates, artisan shops, carriage houses, gardens, churches, and much more, however, visiting each building has its shortcomings, see figure 1. Our strategy is concerned with creating relationships between the visitor, the agency, the topology (the buildings) and the story (the context). Instead of meandering by the Tinsmith, the visitor is driven to that location because he/she needs a wedding present before going to the church. See figure 4. The visitor becomes apart of the town's story as if they were a part of a Victorian community.

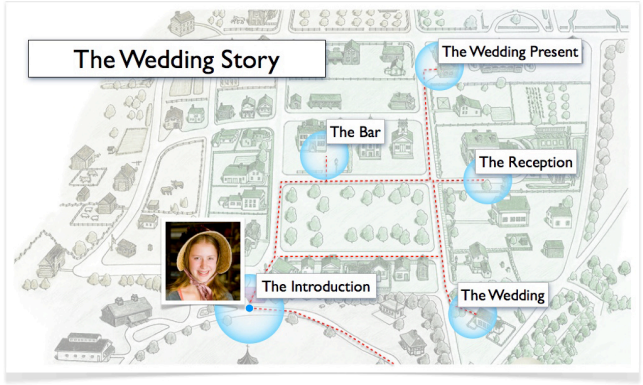

Figure 4. We look at building topology to create a story.

The blended experience encourages the visitor to the church only to find the groom is missing with gift in hand. Searching for the groom, the visitor finds himself/herself moving about the Victorian village in a frantic search for the groom, all the while, the visitor is learning about different Victorian buildings and social norms of the period. At the end of the story, the visitor finds the groom at the tavern. Everyone returns to the church to celebrate a Victorian wedding.

Volatility
The village has activities all year round to attract new and seasonal visitors. We created a host of time period storylines to coincide with New York State's seasonal volatility. If the visitor arrives in the summer and chooses Clare in the Victorian Village, the visitor will experience a Victorian Wedding. In contrast, if visitor arrives in December he/she would experience 19th century yuletide festivities of Christmas. With four seasons, the ontology of both physical and digital spaces creating three unique digital characters, the visitor has twelve unique reasons to return to GVCM.

Summary and Future Work
By understanding the four key characteristics of blended spaces we aim to create UX that uses geo-centered triggers to deliver historical information through storytelling. The key contribution to our work is to look for ways to create engaging stories between the digital and physical spaces by considering the careful balance of ontology, topology, volatility and agency.
RIT was awarded a 2013 New York State Finger Lakes Regional Economic Development Grant from the Council for the Arts, to deploy our prototypes in the GVCM. Our researchers and designers will be looking at Blended Theory as a tool for UX evaluations.

CONCLUSION
The concept of blended space offers a simple, but powerful way into developing the new swathe of mixed reality experiences that interaction designers will be developing. In this paper we have focused on blended

spaces in the context of digital tourism, solving problems for key stakeholders on 'a human scale' [12].

The blended spaces framework aided our designers at the GVCM to formalize the correspondences between physical and digital space and on where the anchor points between the two should be. Focusing on these will suggest unobtrusive ways in which the transition between physical and digital can be made. Taken with the principles of designing with blends in general [10] leads to an effective, reflective approach to producing a great UX for the spaces of the future.

REFERENCES

1. Benford, C. Greenhalgh, G. Reynard and B. Kolva Understanding and constructing shared spaces with mixed-reality boundaries. *Transactions on Computer-Human Interaction 5*, 3 (1998).
2. Benyon, D. Presence in Blended Spaces. *Interacting with Computers*, 24, 4 (2012), 219-226.
3. Blythe M., Reid, J., Wright, P. and Geelhoed, E. Interdisciplinary Criticism: Analysing the Experience of Riot! A Location-Sensitive Digital Narrative, *Behaviour and Information Technology 25*, 2 (2006), 127-139.
4. Cabrera, J. S., Frutos, H. M., Stoica, A. G., Avouris, N., Dimitriadis, Y., Fiotakis, G., and Liveri, K. D. Mystery in the museum: collaborative learning activities using handheld devices. In *Proc. MobileHCI 2005*, ACM Press (2005), 315-318.
5. Cheverst, K. Mitchell, K. & Davies, N. 2002. Exploring Context-aware Information Push. *Personal Ubiquitous Computing 6*, 4 (2002), 276-281.
6. Cheverst, K., Davies, N., Mitchell, K., Friday, A., & Efstratiou, C. Developing Context-Aware Electronic Tourist Guide: Some Issues and Experiences. In *Proc. CHI 2000,* ACM Press (200), 17-24.
7. De Carolis, B., Novielli, N., Plantamura, V. and Gentile, E. Generating comparative descriptions of places of interest in the tourism domain. In *Proc. RECSYS 2009,* ACM Press (2009), 277-280.
8. Durrant, A., Golembewski, M., Kirk, S., Benford, S., Rowland, D. and McAuley, D. Exploring a digital economy design space in theme parks. In *Proc. DESIRE 2011*, ACM Press (2011), 273-284.
9. Fauconnier, G. *Mappings in Thought and Language*. Cambridge University Press, MA, USA, 1997.
10. Fauconnier, G. and Turner, M. *The Way We Thin*k. Basic Books, NY, USA, 2002.
11. Gruber, T. Toward principles for the design of ontologies used for knowledge sharing. *International Journal of Human-Computer Studies 43*, 5-6 (1995), 907 – 928.
12. Imaz M. and Benyon, D. *Designing with Blends.* MIT Press, Cambridge, MA, USA, 2005.
13. Ishii, H. and Ulmer, Tangible Bits: towards seamless interfaces between people, bits and atoms. In *Proc. CHI 1997*, ACM Press (1997), 234-241.
14. Lieberman, H. and Selker, T. Out of Context: *IBM Systems Journal 39*, 3-4 (2000).
15. Milgram, P. and Kishino, F. A taxonomy of mixed reality visual displays. *IEICE Transactions on Information and Systems E77-D,* 12 (1994).
16. Rocchi, C., Stock O., Zancanaro, M., Kruppa, M., & Krüger, A. The museum visit: generating seamless personalized presentations on multiple devices. In *Proc. IUI 2004*, ACM Press (2004), 316-318.
17. Schering, A., Dueffer, M., Finger, A. and Bruder, I. A mobile tourist assistance and recommendation system based on complex networks. In *Proc. CNIKM 2009*. ACM Press (2009), 81-84.
18. Stenton, S. P., R. Hull, P. M. Goddi, J. E. Reid, B. J. Clayton, T. J. Melamed and S. Wee. Mediascapes: Context-Aware Multimedia Experiences. *IEEE Multimedia 14*, 3 (2007), 98 - 105.