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# WORKSHOP

## Intelligent Technologies for Cultural Heritage Exploitation

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# Documenting InStory – Mobile Storytelling in a Cultural Heritage Environment

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**Abstract.** This paper describes the process and problems that had to be faced during the elaboration of a digital interactive narrative for the Instory project (http://img.di.fct.unl.pt/InStory/) implanted in «Quinta da Regaleira», Sintra, Portugal, and classified as World Heritage by Unesco. It also explores some of the practical and theoretical issues in what regards the literary terminology and strategies involved.

**Keywords**. interactive narrative; mobile devices; cultural heritage; narratology;

## INTRODUCTION

The InStory project is being implemented in a real geographical space, the «Quinta da Regaleira» - a palace and gardens - in Sintra, Portugal, that has been classified as World Heritage by Unesco.

The project aims to define and implement a platform for mobile and cinematic storytelling, information access, and gaming activities [1]. This platform has a flexible computational architecture that integrates heterogeneous devices, different media formats and computation support for different narrative modes and gaming activities [2]. The system is driven and validated by a set of story threads and narratives that are centered on the exploration of physical spaces. This exploration is combined with the perspective of sharing information between users and providing cultural context. «Quinta da Regaleira» was built in the historical centre of the village of Sintra in the early nineteenth century, it embodies the Portuguese romantic ideal, and corresponds to the mytho-magical dreams of its deceased owner, António Augusto Carvalho Monteiro (1848-1920), made real by the art of the Italian architect and theatre scenographer Luigi Manini (1848-1936).

The initial purpose of this interactive format of mobile storytelling was to partially guide the user in his first visit to Regaleira, helping him to map out the vast and complex geographical area, and guide him through the most interesting historical or thematic spots. Several routes can be created.

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Each path can offer a particular perspective of this uncommon actual world representing the imaginary universe of Carvalho Monteiro / Luigi Manini, a quite operatic stage where the user can project his own beliefs and ideas.

This web of possible paths can also be considered as a basic structure for the creation of a future role-play interactive game, in a virtual environment (reproducing the existing Regaleira space), equally inhabited by avatars and or human

For the moment, the project intends to explore the social aspect of shared narratives and activities, with the idea that the technology can provide new innovative approaches to social participation in different types of events, being it artistic or cultural [3].

At this moment tests are being carried out by the participants of the project to verify, in each spot of the terrain, the performance of the narrative sequences and general structure.

## 1 MOBILE STORYTELLING

The practice of mobile storytelling was initially developed for documentaries [4]. This demanded the previous existence of an arranged web of events with which the user interacts, and by doing so, he also has a share the role of the author. Surfing through some particular geographical space, the user sends, receives or asks for any kind of media elements – video, images, games, music, or messages. These elements are directly related to the environment and, in some cases, can describe scenes occurring in that same exact locale [5].

The greatest difference between this kind of practice and the traditional narrative modes (oral, written, cinema, and theatre, hypertext, or even ergodic literature) results from the blending of the fictional with the real universes. The user is actually experiencing the story immersed in the real world, in real time. Under these circumstances, the plot development of any interactive narrative of this kind is naturally constrained by that very same environment, were the user (ideally) should be able to choose all the actions: his own, or the ones of the virtual characters, with the expected consequences for the final outcome.

## 2 PROBLEMS TO BE ADDRESSED IN IF

The so called interactive narrative, fiction or drama, are being substantially discussed as new forms of art related to AI-based interactive experiences. In practice, there has been a considerable technical progress in building elaborate plots and quite believable fictional characters. However, the theoretical framework guiding the exploration of the technological and design issues concerning these new forms of art is quite fuzzy, in particular in what concerns the use of the appropriate terminology, mainly borrowed from literary and cinema artistic practices. The great majority of the IF authors come from the world of information technology and game development, and very few of the literati know any thing at all about computers.

Being so, the main problem is that in their theoretical texts game developers use the terminology from the realm of literature (plot, character, perspective) in an imprecise way, without considering all the variants and «nuances» these terms have acquired in the last years, mainly after structuralism and post-structuralism – in particular with narratological studies. From this misuse results a multiplicity of terms and some misunderstandings in what concerns the theoretical speculations and approaches to digital fiction.

From this practical experience with the InStory project, it may be possible to begin to clarify the way in which some of the above literary terms can be employed. In particular having in mind the terms «narrative» and «interactive» in what regards the concrete and achievable user's agency within the limits and limitations of a mobile story of this kind using a device such as a PDA.

## 3 NARRATIVE

One of the first theoretical problems to be faced when talking about narrative is the ambiguity of the concept. As says Gerard Genette, in his pioneer study *Frontières du Récit* (1966): «Si l'on accepte, par convention, de s'en tenir au domaine de l'expression littéraire, on définira sans difficulté le récit comme la représentation d'un événement ou d'une suite d'événements, réels ou fictifs, par le moyen du langage, et plus particulièrement du langage écrit.» [6]. Most theoricists have adopted the above definition giving it a different weight and meaning. They are not aware that Genette was criticizing its simplicity, and that he assigns the remainder of his article to the development of the idea of what narrative is not.

Genette [6] considers that «récit» is the oral or written statement that undertakes to tell of an event or events – the narrative. He calls story/diegesis to the succession of real or ficticious events that are the subject of the discourse, with their varied relations. The act of narrating/storytelling is called narration. Genette's definitions were inspired by Emile Benveniste [7], the first to propose an opposition between story (content plane) and discourse (expression plane). And both were followed by Tzvetan Todorov [8] and Gerald Prince [9]. Due to their formal nature, these narratological definitions have been employed only as analytical tools but, for operational purposes, they can be used - and will be used here - with these specific meanings.

Narrative is composed of story – the facts to be told, the events as they occur in chronological order – and discourse – the way the elements are organized and presented to the user. This distinction is quite important because the alteration of the chronological order of events imposed by the discourse is one of the (literary) strategies to catch the user's interest, and is fundamental to the production of «suspense». It is also the «signature» of the storyteller, and the gap where creativity manifests itself in the making of a storyboard.

Concerning InStory, the order of the events is forcibly determined by the material route the user has to take. The events are allocated to some specific spots, because the story was built from, and has to respect, the architectural and cultural motives that the geographical space has to offer. In these circumstances, the discourse is partially created by the user himself, in the moment he chooses which way to go. The creativity lies in the route taken, and is a consequence of the several nodes the user has to cross. This route also determines the length of the story, the number and variety of the episodes experienced.

### 3.1 Space and time

The InStory project is implementing a platform for mobile storytelling, information access and game activities in a very particular geographical space – the gardens and palace of «Quinta da Regaleira», in Sintra, Portugal. The basic narrative content was naturally ordained by geographical and ornamental characteristics as well as by the media to be used, the PDA.

The two main constraints concerning the elaboration of the story were physical and in direct opposition to each other – the vastness of the geographical space and the amount of information available, versus the boundaries imposed by the PDA screen (640x480 pixels) and features.

Usually, in this kind of narratives, time is very important, as the user is given a task that he has to accomplish within a prearranged period. Here, it was not possible to consider time as a motivation element, so the tasks given to the user could not be timed. Regaleiras' terrain is very irregular and the visibility between the spots is very bad. Other strategies were necessary to make the user to go from one place to the other.

The physical space in «Quinta da Regaleira» is very rich and complex. It has a palace-museum, a chapel, and gardens full of artistic, mythical and symbolic elements – wells, caves, lakes, towers, sculptures, paintings, tiles, etc. This vast scenario had to be used as a necessary map in which the events of the story would have to take place.

The user has to be guided through this physical space. He is sent from one spot to the other, while being fed with information items. He has access to his location in the map, as well as the most important historical and documental data about each site, among other things. In this geographical map, every element was considered as a potential anchorage point for supporting the narrative.

Out of the geographical map emerged a web of possible virtual paths. Within this web was selected a number of specific points/nodes where some of the paths meet or intersect. In these nodes the user is allowed to change his course and, at the same time, the type of game or narrative. For that, a multiplicity of routes has been anticipated allowing the potential multiplication of different stories. Having this is mind, a basic structure was created, one that could be reproduced in several nodes – as the embryo of a future and more complex fractal structure [10].

# 4 NARRATIVE STRUCTURE

The current formal models for interactive storytelling, mainly for PC users, are built for reasoning upon actions. So are the models for planning systems – as DINPS, in *Liquid Narrative* [11], which might not keep up with more elaborated narrative structures. Also, some of the narratologists cognitive models are user oriented, and not story oriented. And the problems of immersion [12] and particularly of suspense are not only a question of viewer experience [13] but, as before mentioned, can primarily be a question of narrative structure strategies. The solution could be the creation of an AI algorithm for each story function as proposed below.

## 4.1 The making of a story

Considering all the problems here exposed, and that InStory is also a mobile cinema project, it was decided to use the most obvious elements offered by the physical space. After a close examination of the surroundings, the most relevant way to go was to develop a hunting story. The deceased owner that had rebuilt «Quinta da Regaleira» was called Carvalho Monteiro (Oak - Huntsman) and the elements of his name are all around in the architectural ornaments (oak leaves, hunting scenes and wild animals); there exists a «hunting room» in the palace with birds, boars and stags; there is a renaissance hunting scene in a tile panel adorning the main entrance gate, and another medieval one on a stained glass window in the chapel.

Due to the relevance of the hunting theme, the option was easy and promising. It could include all the potential courses. It sanctioned a modest beginning and allowed a future expansion into other levels of complexity. It could even include other types of motives: treasure hunting, ghost hunting, or even a detective story.

# 5 CHARACTER AND PLOT

The study of character in literary theory began by dividing itself between total concern with exteriority – as is the case with the classical rhetoric, which defines it as a gender or a figure; and absolute concern with its interiority. This last position, inherited from the romantic tradition, is supported by Flaubert's provocation: «Madame Bovary c'est moi», and comprehends the character as a continuity of the author, a manifestation of his respective obsessions and pathologies. Between one perspective and the other a discrepancy installs itself, which the structuralist studies intended to resolve – and actually did not [14]. However, some distinctions were made, and one of them vital: the difference between human being and character is absolute. Also, it shouldn't be forgotten that character is an «open concept».

This also applies to the digital, where the problem of character «consciousness» and «emotions» is similar to the literary one. The potential human resemblance is a result from description strategies that entail verisimilitude, and inspire the reader some kind of empathy. In digital narrative characters are mainly depicted through an image, more or less realistic. It is not possible anymore to rely only on the reader's imagination – the user has to identify and recognize the exterior signs – the character's mask – as «symptoms» of the «feeling» intended at each moment. Digital characters are evaluated as if they were theatre or cinema actors.

So, first of all, character is defined by its physique – it needs a body to move in space, to make gestures; and by its actions: (1) a behaviour in space and time that will give it «personality»; (2) a discourse/language/jargon to give it «subjectivity» (reaching its climax with the use of «I»).

Each character is built in direct relation with the context in which it is situated – in harmony or in conflict – that allows it, or forces it, to act, and take decisions.

Character is also built against the images it invokes in the user's mind. Being so, the problem of verisimilitude in what concerns character implies the use of social rules and cultural norms specific to each time and space it has to inhabit [15]. The studies about character and avatars have not properly considered these problems, mainly because they bring into play ready-made characters as an example, or use characters specifically created for their purposes.

Interactive stories and games that stage characters and role-play (*Façade*, *Sims*) use general software to develop narrative situations as a whole. Also, the relationship between character and plot is not symbiotic as has been proposed [16]. In fact, plot needs agents for its action, but agents are interchangeable inside a plot.

## 5.1 Character

For the InStory project there were created several virtual characters, very simple, but that can become more complex if coupled with AI decision models [17] and preference revision [18].

For the moment, they can function autonomously as narrators, or as avatars of the user (male or female). There is a Hunter (Jorge) and an Amazon (Diana); the White Lady (Dama Branca), an Eco-Vegan animal protecting figure, and the Greyhound (Galgo). The later have both a double role, of adjuvant and/or opponent to the hunters; and the Wild Boar (Javali) representing all the other kill (stag, lion, and birds).

## 5.2 Plot

Having in mind the structuralist and post-structuralist narrative studies of V. Propp [19], R. Barthes [20], A. J. Greimas [21], and some aesthetic proposals for virtual space [10], it was adopted a basic narrative sequence that could be reproduced in each different context, that could be transformed by each environment, and multiplied in secondary levels. For the moment, the choice belongs to the user, but this generic plot can also be transformed by future

recourse to AI genetic algorithms. This would decrease the decision power of the user, reducing his authoring capacities, but this loss would be compensated with the element of surprise when in the terrain – which is one of the properties of linear/traditional storytelling that the audience misses the most. Also, it could be wildly explored when all the processes would be converted into a virtual game.

Following Greimas [21], each of the present sequences is composed by 3 "functions": F.1-beginning of an action; F.2-execution/non execution of the action (bifurcation); F.3-end (success/failure) of the action. When a bifurcation presents itself, the user can ask for help from another character, or improve his chances of winning by answering a Quiz.

Also, following Propp's theory concerning the Russian folk tales [19], the first incentive for action is a misdeed, or a need to be satisfied – here for the plot was used the most basic one, the human need for food.

Hunter/Amazon are hungry. They have to go hunting in order to get something to eat. For that, they need to find a weapon, some ammunition, and decide which animal they want to chase (wild boar, stag, or birds). If they answer correctly the first Quiz, they will get three bullets. They can also look for floral elements (acorns, i.e.) to swap for apples. They can ask the Dog for help.

The White Lady is an eco-Vegan. She will try to stop the hunters, either offering fruits (apples) in exchange for bullets, or helping the boar to hide/escape. In the unlikely event of her losing, she will have to eat a wild boar pie in the end.

The Boar knows it is going to be chased, and has to escape and hide.

The Dog is friends with the hunters, and with the wild boar. It will have to decide which one to help. If the hunter kills, it will have some boar meat. If the wild boar escapes, it can have some apples as reward, and exchange them for bones.

In the end there is a Virtual Banquet of apple pies, or boar stew, where points and or ammunition are exchanged for food.

# 6 LINEARITY AND USER'S AGENCY

As referred, this first narrative is built upon one basic sequence that is replicated and keeps changing according to the surroundings. The places of the first (#0 Reception, #1 Palace) and the last sequences (#4 Gate, #5 Banquet) are necessarily pre-established for logistic purposes. However, the order of the intermediate sequences is random.

It is at this point – Sequences #2, #3, #n… - that the user's agency can be put into effect. In practical terms there is no way to escape the linearity of narrative, as each event has to occur in time, one after the other. Even when there is an «open» narrative, or one with multiple endings, the last one will always be «the end».

In theoretical terms, the situation above raises quite an amount of problems regarding the normal structure of plot and the technical artifices to create suspense. In traditional narrative, the climax of each action occurs in F.2 – the bifurcation. It is here that the editors open a new chapter, and the «soap operas» are «to be continued». In this type of interactive narrative, each sequence has to complete itself – open and end – at the same place.

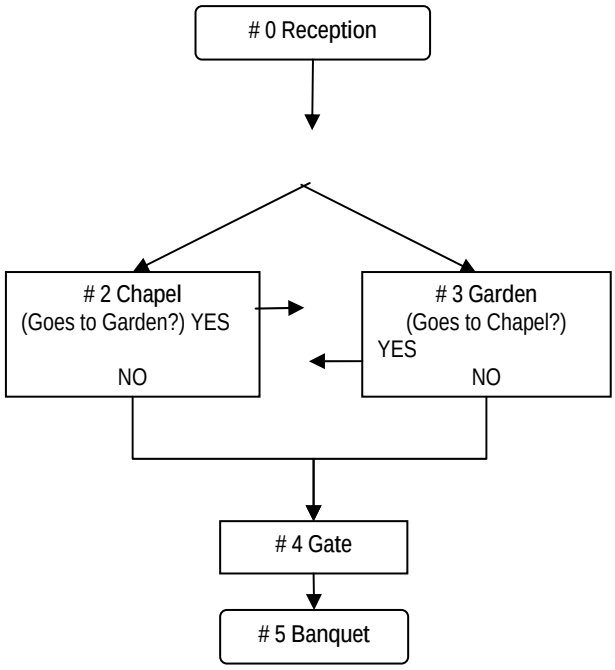


**Figure 1.** Model of the basic sequence organization

This also means that all the sequences have to be independent, sufficiently interesting and, at the same time, comply with the general coherence of the story. They have to respect the narrative logic independently of its chronology - the moment in which they will be called to existence by the user.

## 6.1 Continuity and control

Several purposes were considered: to integrate the possible discontinuity of the fictional sequences and, at the same time, maintain the illusion of narrative continuity; try to advance the user's agency, truly allowing him to play a part in the story development and its conclusion; have in mind that the user could abandon the story at any moment; consider the possibility that the user might return to an already visited spot.

The user's progress is instigated by several approaches: a direct instruction via message (text, audio or image); tests, games or competitions – allowing him to accumulate or loose objects, to continue or change his course, to go up one level in the story/game /gain points; partake a quiz with multiple choice questions. Solve puzzles/enigmas that the user has to decode retrieving information from the geographical spot where he is at each moment.

## 6.2 Levels of Interactivity

Following the systematization of Marie-Laure Ryan [12], in InStory there can be found «purely selective interactivity» as the user can determine part of the plot, can swift perspectives by changing of avatar, can explore (with time) all the alternatives in

the terrain gaining a global view of Regaleiras' gardens and palace (as a borgesian «garden of forking paths»); he can also retrieve documents/information from the server. He can play games and solve problems.

There exists some «productive interactivity», as the user participates in the «writing» of the narrative by choosing its path. Also, as the intermediate sequences are non-mandatory, the length of the story and the number of episodes experienced depend exclusively on the user's interest and resolve.

In a future phase the user will have the capacity to send texts or images, or even engage in dialogue/play with other users in the terrain. He will partake actively by creating new elements for the story enriching it with his own experiences rather than only choosing between given routes.

# 7 CONCLUSION

Initially, the implementation of the InStory project platform demanded an apparently very simple story, game wise, to organize the routes of the visitors to «Quinta da Regaleira». However, this simple tale started to raise a lot of speculative issues concerning the development of interactive narrative, and became a theoretical challenge. It became also a practical challenge due to the fact that the story had to be told through the technical limitations of a PDA device, for people moving around in an irregular geographical space.

The originality of its development emerges also from the inversion of the usual process of story/game creation. It departs from a real geographical stage, which can be used as a model for a virtual world. This future virtual reality application – which is also a conservation process of Regaleiras' cultural scenario – could, as a basis for a game plot, include reactive plans controlling individual actors, or be inhabited by artificial intelligent characters interacting with humans in role-play situations.

The narrative structure imposed by the space, suggesting the possibilities of a fractal multiplication, showed a new possible way to include AI processes and programming, namely the use of genetic algorithms, rule preferences and revision, which surely will have an impact in the definition of narrative related strategies and terminology.

# REFERENCES


[1] Nuno Correia, L. Alves, et. al., "InStory: A System for Mobile Information Access, Storytelling and Gaming Activities in Physical Spaces", ACE2005-ACM SIGCHI International Conference on Advances in Computer Entertainment Technology, U. Politecnica de Valencia, Spain 15 - 17 June 2005. <http://img.di.fct.unl.pt/InStory/publications/paper-ace2005.pdf>

[2] Tiago Martins, N. Correia, et al., "InStory Client – a Browser for Spatial Narratives and Gaming Activities", 13º Encontro Português de Computação Gráfica, U. Trás-os-Montes e Alto Douro, Vila Real, Portugal 12-14 Oct. 2005. <http://img.di.fct.unl.pt/InStory/publications/instory-clientev2-13epcg-camera-ready.pdf>

[3] Nuno Correia, L. Alves, et. al., "Narrativas Interactivas em Dispositivos Móveis", *Nas Fronteiras do Imaginário, Livro de Actas da Artech 2005 – 2º. Workshop Luso-Galaico de Artes Digitais*, XIII Bienal de Cerveira, V.N. de Cerveira, Aug., 2005.

[4] Glorianna Davenport, "1001 Electronic Story Nights: Interactivity and the "Desire Versus Destiny: The Question of Payoff in Narrative", Caixa Forum MetaNarrative[s]? Conference, Barcelona, Spain, Jan., 2005.

--- "Your Own Virtual Storyworld", *Scientific American*, Nov. 2000, 79-82.

--- A. Mazalek, "Dynamics of Creativity and Technological Innovation", *Digital Creativity*, MIT Media Lab and Media Lab Europe, USA/Ireland, Vol.15, nº.1, 2003, 21-31.

--- et al. "Media Fabric - a Process-Oriented Approach to Media Creation and Exchange", *BT Technology Journal*, Oct., Vol 22 No 4, 160-70.

--- M. Murtaugh, "Automatist Storyteller Systems and the Shifting Sands of Story", *IBM-Systems Journal*, Vol.36, No.3, 1997.

[5] Pengkai Pan, *Mobile Cinema*, Diss. M.I.T, Mass., 2004.

[6] Gérard Genette, «Fontières du Récit», *Communications 8*, Paris, 1966, 159-63.

[7] Emile Benveniste, *O Homem na Linguagem*, Vega, Lisbon, 1992.

[8] Tzvetan Todorov, *Introduction to Poetics*, Harvester, Brighton, 1981.

[9] Gerald Prince, *A Dictionary of Narratology*, Scholar Press, Aldershot, 1988, 21;

[10] Steven Holtzman, *Digital Mosaics: The Aesthetics of Cyberspace*, Simon & Schuster, N. York, 1997.

[11] Joe Winegarden, R. Michael Young, "Distributed Interactive Narrative Planning System", to appear in the AAAI Spring Symposium on Distributed Intelligence, 2006, < http://liquidnarrative.csc.ncsu.edu/pubs/sss06.pdf>

[12] Marie-Laure Ryan, *Narrative as Virtual Reality*, The John Hopkins U.P., Baltimore, 2001.

[13] P. Ohler, G. Nieding, "Cognitive modeling of suspense-inducing structures in narrative films", *Suspense. Conceptualizations, theoretical analyses and empirical explorations* Hillsdale: Lawrence Erlbaum, NJ 1996. (pp. 129-147).

[14] Helena Barbas, "On Character – out of a critical Fallacy?" Jan. 2003. <http://www.fcsh.unl.pt/docentes/hbarbas/OnCharactHBarbas.htm>

[15] Mei Si, S. Marcella et al., "Social Norm Models in Thespian: Using Decision Theoretical Framework for Interactive Dramas", *Proceedings AISB'06*, SSAISA, Bristol, 3rd. vol., Ap.2006, 70-77.

[16] R. Michael Young, "Creating Interactive Narrative Structures: The Potential for AI Approaches", *The Working Notes of the AAAI Spring Symposium on Artificial Intelligence and Interactive Entertainment*, Stanford, CA, Mar. 2000. <http://liquidnarrative.csc.ncsu.edu/pubs/potential.pdf>

[17] Pierangelo Dell'Acqua, A. Lombardi, L. Moniz Pereira, "A Logic-Based Approach to Model Supervisory Control Systems", to be presented at The 16th International Symposium on Methodologies for Intelligent Systems, Bari, 2006.

[18] P. Dell'Acqua, L. M. Pereira, "Prefering and Updating in Logic-based Agents", *Web-Knowledge Management and Decision Support*, 14th Int.Conf. on Applications of Prolog (INAP'01), 69-71, Springer-Verlag, LNAI 2543, 2003. <http://centria.di.fct.unl.pt/~lmp/publications/online-papers/inaplnai03.ps.gz>

[19] Vladimir Propp, *Morphology of the Folktale*, U. Texas, Austin, 1968.

[20] Roland Barthes, «Une Introduction à L'Analyse Structurelle du Récit», *Communications 8*, Paris, 1966.

[21] A. J. Greimas, *Sémantique structurale. Recherche de méthode*. Larousse, Paris, 1966.