CrossTale: Shared Narratives as a New Interactive Medium

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Abstract—Through ages, storytelling has been used as one of the main ways for transferring knowledge and learning. We envision the use of shared narratives as a new kind of social media that empowers the collaborative creation of vast narrative worlds. For this reason, we identified existing information systems related to storytelling, and evaluated how they support multi-authored non-linear narratives. Then, we conducted a pilot experiment to understand the user interaction model with shared narratives more profoundly. This model was consequently used as a premise for designing a prototypical narrative system called CrossTale, which was evaluated to assess the generated user experience. We discuss how the results of these experiments show that shared narratives have the potential of becoming a distinct type of interactive medium supporting a new genre of user experience.

Keywords-shared narratives; information systems; user experience.

I. INTRODUCTION

Traditionally, storytelling (from mythological parables through literature classics to modern literary fiction best-sellers) has been associated with the oral and written media, the first two channels of information transmission to appear in human history. Since then, different models of cultural expression had appeared, and those modalities had taken profit of technical advances giving birth to the main contemporary narrative vehicles such as novels, cinema, TV series or comic-books. All those kinds of narrative mediums share the trait of linearity, which suits the temporal causality of classic narratives. In spite of that, several experiments about experiencing narratives in a non-linear way were done (e.g., Moholy-Nagy "total theater" [1] and Borges' tales [2]). With the apparition of digital media, new opportunities arise for creating and experiencing narratives in new ways.

Many comtemporary works focus on understanding and modeling storytelling as an interactive experience. Mehan's Talespin [3] is a pioneering approach for automatically generating stories from atomic parts, and is an instigator of a larger body of research focusing on computer-generated narratives. On the other hand, other works studied narrartives from an HCI perspective, placing user interaction at the center: Brenda Laurel's work on interactive fictions, impacting HCI as a discipline by underscoring the properties human interaction with information [4]; and Chris Crawford's work on interactive storytelling [5], which addresses aspects of game design. A wide range of actual works focus on models for creating non-linear narratives [6] [7], but to the extent of our knowledge they don't adress this task from the perspective of user experience and the study of the user's understanding of non-linearity.

We define a shared narrative space as a set of units or scenes each representing a step in a given direction of developments, and connected organically to form a non-linear story. It is a ludic and cultural medium of expression and communication, created, developed, and maintained through the collaboration of multiple users. It is composed of a story and a discourse (storytelling). The story consists of a setting in time and space, characters, and events (or plots). It is usually thematically unified and logically coherent. Its elements are connected through cause and effect relations, thus temporal order is meaningful [8].

This non-linear medium is comparable to the real development of events: multiple stories are happening at the same time, and each can be told from different viewpoints. This points towards the suitability of non-linear narratives not only in developing fiction, but also as a way of sharing information like in online networks (e.g., forums, chats, and communities of creators). Theoretically, the content of social networks could be considered a narrative based on the sequential groupings of threads as scenes. Each forum thread could be regarded as one linear development inside a bigger story, and parts of the thread could belong to different ones as a cause of this inter-relation. However, the relations between threads are usually vague or inexistent, and there is a need for a global connection between them to provide thematic unification and overall coherence.

Our purpose is to define the adequate system concepts and design to represent and interact with non-linear narratives. Therefore, we developed two empirical experiments with paper-based and implemented digital prototypes to extract and understand the user's mental model of interaction with a narrative space, as a basis for the development of modern interactive systems for narratives.

This paper is structured as follows. First, we present six major types of information systems related to storytelling, and evaluate their support for shared narratives as a medium of social interaction and communication. Then, we illustrate a pilot experiment conducted to extract the user model of interacting with a shared narrative space, transduced into requirements for informing the design of supporting systems. Following, we discuss the development of CrossTale, a prototype based on these requirements, and its user evaluation showing the feasibility of supporting new elaborated user experiences with shared narratives. We then discuss how our results deepen our understanding of the characteristics of shared narratives, and argue in support of

their potential as new media for social interaction and communication. Finally, we conclude by summarizing our work and discussing its limitations, and then address their implications on future works.

II. Contemporary Interactive Systems for Storytelling and Narratives

In [2], Ryan proposed a classification of interactive narrative types based on the nature of the user participation: users can either experience the narrative acting as an internal character of the story, or as an external agent; they can either alter the ontology of the narrative through interaction, ontologically alter the narrative world through interaction, or explore the narrative without inducing any change. This classification provides a framework to analyze and characterize contemporary systems for interacting with narrative by reflecting on how the user experience is contributing to the narrative, and how the narrative is influencing the user experience.

We have identified six major types of information systems directly related to interactive narratives: The first type are adventure books, which comprise a tale where the reader follows a character and makes choices that lead the story towards distinct developments; the second is tabletop role-playing games (or RPGs), in which the player creates a character and its story, and then devises the character's actions according to a set of rules; adventure videogames are the third type, and they put the player in the role of a character that resolves puzzles in order to advance in the story; the fourth type is role-playing videogames, where the player makes navigation decisions to reach one of several possible endings; the fifth type is Forum or chat-based RPGs, where players collaboratively create a story (usually with a few rules of engagement); the sixth and last type is web communities of fiction writers (fan-fiction), that create stories in the same fiction world, but not always collaboratively. A high number of fan-made wikis can be found on the web, compiling formation about events, characters, and places concerning those worlds. Harrigan gives a wide overview of the complications of maintaining these vast narrative spaces, and how the different fan-fiction communities address them [9]. These systems are described in Table 1 according to Ryan's framework.

TABLE I.   Contemporary Systems of Interactive Narratives

System	Example	Author /reader role	Main role	Author interaction	Reader interaction
Adventure Book	Choose your own adventure	Separated	Reader	-	External Ontological
Tabletop RPG	Dungeons & Dragons	Mixed	Author	Internal, Ontological	-
Adventure videogame	Monkey Island	Separated	Reader	-	Internal Exploratory
RPG-Videogame	Baldur's Gate	Separated	Reader	-	Internal Ontological
Forum / chat RPG	Aelyria.com	Mixed	Author	Internal, Ontological	External Exploratory
Fan-Fiction community	Fanfiction.net	Mixed	-	External, Ontological	External Exploratory

Seeing the particularities of the informative structure of narratives, we point at differences between existing systems and interactive storytelling. In particular, none of these types of systems entirely supports shared narratives as a medium of social interaction. Three of them (books, adventure videogames and RPG videogames) are unidirectional mediums, created by authors and consumed by other people as readers. They support a varied degree of interaction with the content, but they do not allow users to contribute. Tabletop RPGs and forum or chat RPGs, allows user-generated content to be added to ongoing discussions, which together do not constitute a coherent story that can later be consumed as part of the user experience. Only fan-fiction Internet communities fully support both the addition of user-generated content and its consumption as part of the user experience. But the lack of collaboration and cooperation between contributors tends to divide the narrative space into distinct and incoherent flows of events, which only share the original work as a point of reference, resulting in independent narratives [9].

The case of fan-fiction communities is the major exponent of a multi-authored narrative system where usually no one acts as both reader and author to the same shared narrative, but each participant is only the author of his narrative sub-space and reader of others. A similar handicap exists in forum RPGs, where each contribution is by force situated directly after the previous one, and is the only possible type of contributions.

In conclusion, none of these systems helps participants to contribute efficiently to the shared narrative space, nor to collaboratively organize and maintain its overall structure. Therefore, there is still a need for supporting the users' ability to understand and navigate the space, allowing the narrative to grow in an organic way, and extending its contents from any desired point in the narrative flow. This will dissociate the story content of the impositions coming from the way the users elaborate the narrative discourse.

III. Understanding Design Requirements

The first experiment (Fig. 1) was designed to allow users to freely create a narrative and the rules that operate it. 20 subjects (university students) were provided with paper sheets as a frame to draw and write scenes and a set of elements (fairytale characters and objects) that they could paste in the sheets. The narrative was developed on a large glass wall where the story was created in the form of paper scenes connected by arrows. The subjects proceeded one by one to read the story on the glass, and then modify or expand it by creating new scenes, posting them in the wall, and drawing the connections. Observations were made during this process, and the subjects were later asked to fill a questionnaire of 18 questions. The questionnaire evaluated the story comprehension and congruence as perceived by the subjects, and inquired about the reading or navigation paradigm that they used (narrative elements and concepts they followed throughout the story). It also asked about their contributions (number, content, location, etc...), and if they added scenes to the narratives or contended in modifying existing ones.

Figure 1.   The settings of the first experiment.

Observations show that the kind of interaction performed is external, as the users do not assume the role of any particular character. It is also ontological during the creation, and exploratory during the reading. The analysis of the resulting story and the questionnaire answers revealed several aspects about the nature of the user comprehension and interaction with the shared narrative space. These results were traduced as a set of requirements (Table II) for the design of information systems that support interacting with narratives. They are also detailed in the following.

A.   Using storylines and characters to navigate a narrative

The results revealed that subjects project a "time-space-development" logic on the narrative. The story is mentally situated on a space with a temporal and causal logic, represented in two axes: a temporal relationship between the scenes, and places where these scenes take place. All subjects followed linear sequences (storylines) for reading, being a linear/temporal sequence of connected scenes that track the development of a specific character or plot. 14 out of 20 followed those storylines throughout the narrative space, from the first scene to a finishing one before backtracking. In addition, 12 of them followed character developments, and 10 plot relationships.

Understanding how users navigate the narrative space leads us to consider a visualization that copes with this "time-space-development" logic to facilitate the finding of storylines, and consequently the user interaction.

TABLE II.   DESIGN REQUIREMENTS EXTRACTED FROM THE INTERACTION MODEL

Observations	Design requirements
Projection of a logic based on time, space and developments.	Organization of the informative space based on time and space axis.
Reading by following linear sequences about a character or a plot.	Navigation through suggested plot and character storylines.
Unitary and coherent narratives.	Mechanisms for preserving congruence.
Global viewpoint for comprehending the whole story.	One interface mode for a global view of the informative space.
Reading a storyline through a zoom-in viewpoint.	One interface mode for following storylines.
Focusing on a single scene for creating and editing.	Independent interface mode for scene edition.

B.   Preservation of literary consistency

The results also show that the generated narrative space is unitary, coherent, and with a limited divergence. It is unitary in the sense that all the scenes are interrelated and are part of the same story. In fact, the divergence of the narrative space away from the central topic is limited: subjects found it easier and socially proactive to expand existing storylines instead of creating new ones. This notion of unity is directly derived from the fact that the entire story is predefined and all the storylines are happening simultaneously in the same time stream. This raises consistency issues in the literary fabrics of the narrative, which users thrive to treat by re-ordering scenes or inserting new ones. The literary consistency of the narrative is considered fundamental for understanding the story, and it is one of the main concerns when modifying/ adding scenes to the narrative space: 5 subjects used their contribution only for correcting consistency issues, and in the end of the experiment, only 5% of the scenes were considered inconsistent with the rest of the narrative. For this reason, the system should implement mechanisms for helping to preserve literary consistency without restricting the non-linearity of the narrative. This issue remains outside the scope of this paper.

C.   Three interface modes for three types of interaction

The subjects' interaction with the narrative space shows that at least three different views for three different purposes are needed for a multi-modal interaction with narratives: a global view of the space is used to approach and comprehend the whole narrative space and its structure, as well as when selecting a point in time and place to add a new scene; a "zoom-in" view for viewing a scene inside a storyline and understanding the other storylines related to it; and a composition view that allows users to create and edit scenes. These views are illustrated in Fig. 2.
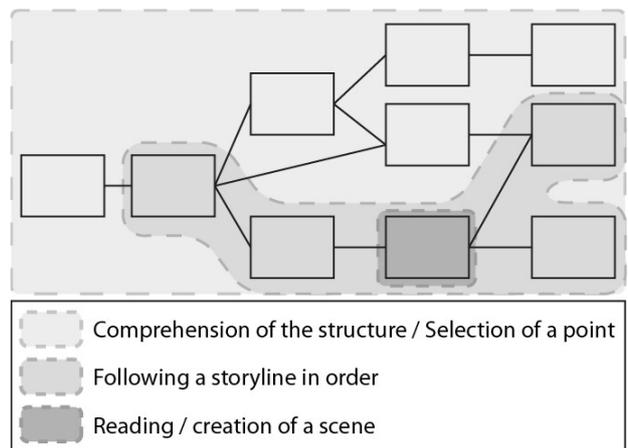

Figure 2.   Viewpoints related to the interactions with the narrative space

IV.   PROTOTYPING SHARED NARRATIVE SPACES

We developed a prototype named CrossTale based on the design requirements extracted from the first experiment to reproduce the user experience according to them. CrossTale

implements three interface modes defined previously (Fig. 3 a, b and c). The global view lets users explore the whole narrative space, visualized as a grid with the axes of time and places, and select characters and storylines. Selecting a scene/storyline changes the interface into the reading view in which the scene is maximized for reading. In this view the user can also navigate back and forward by the current storyline. Finally, by selecting an empty frame, the user access the creation view where s/he can create a scene by arranging characters and objects, and introducing text, and indicate the related plotline/s.

(a) The global view
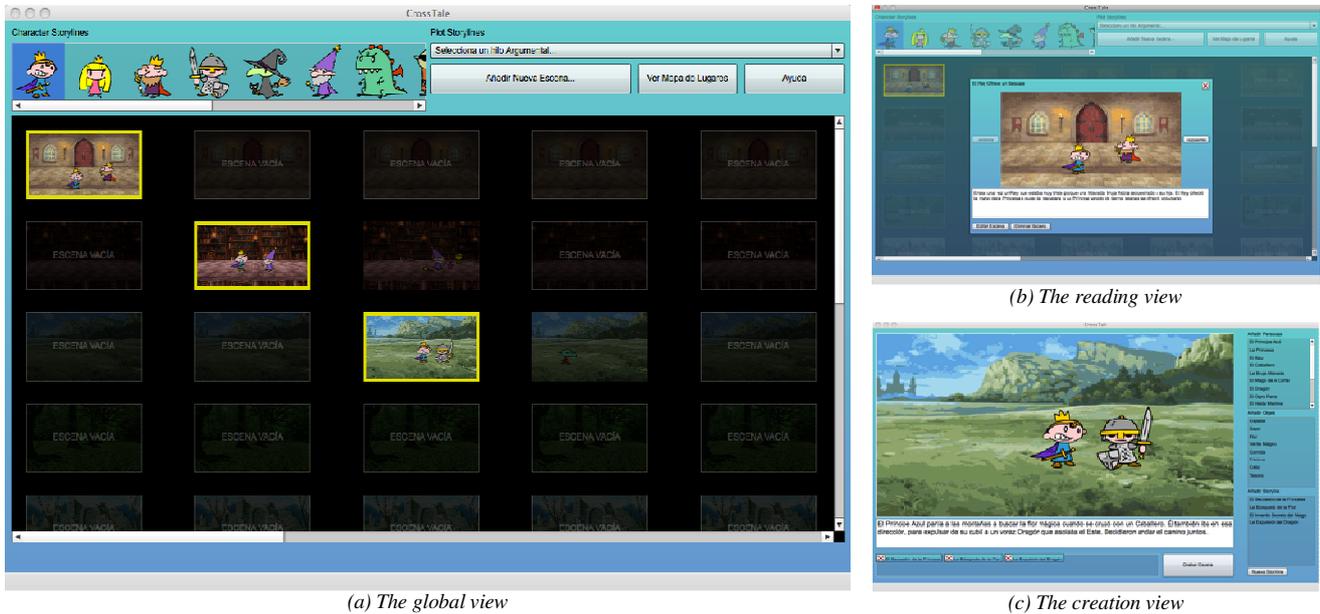

(b) The reading view

(c) The creation view

Figure 3.   Three interface modes of the CrossTale prototype

The experiment with the prototype consisted of creating a narrative in a similar way to the pilot experiment. A total of 15 subjects (undergraduate students in media studies) were enlisted, and asked to freely use the interface to read and create a shared narrative with their own contributions. Each subject was briefly introduced to the interface controls, and then given an unlimited time to interact and the freedom to add as many scenes as wanted. Then, the subject executed eight interaction tasks provided by the evaluation team, and observations were made. Afterwards, each subject answered a questionnaire to rate the rate the experience on Likert scale, and evaluate the suitability of the design for reading and contributing and the overall user experience.

The results of the task-driven evaluation are summarized in Table III. It describes how many subjects employed each interface view for each task. The results show that 11 out of 15 subjects performed all tasks easily, and the remaining 4 subjects successfully performed 6 out of 8 tasks. The subjects used the global view and/or the reading view to identify and comprehend the narrative elements. Similarly to the first experiment, some subjects concentrated on characters while others on plots, but everyone used one of these two paradigms for finding storylines and navigating the narrative space. During the contribution task all the contributors also used the creation view to compose new scenes, but this view was never accessed for performing the identification tasks. These results indicate that the design supports the modes of interaction identified in the first experiment, and that these modes dispose of adequate functionalities. However, most subjects prefer having more information about the context of scenes while reading them. This means that the dissociation between the global and reading views could be revisited.

TABLE III.   RESULTS OF THE DESIGN ADEQUACY EVALUATION

Task NB	Task	Correctly executed	Global View	Reading View	Both Views	Navigating with Storylines
1	Identify the beginning scenes	15	13	13	11	11
2	Identify story end scenes	15	13	9	7	7
3	Identify main characters	15	15	15	15	15
4	Identify important places	15	14	14	13	13
5	Identify simultaneous scenes	11	13	4	4	4
6	Identify scenes in the same location	12	14	2	2	2
7	Approximate the duration	15	13	13	11	10
8	Find any inconsistency	15	8	12	7	8
9	Contribute (optional)	13	13	6	6	5

Table IV shows the evaluation results of the user experience. All subjects appreciated the experience of interacting with narratives through CrossTale. In particular, they found that CrossTale supports reading a non-linear narrative (4.33/5), contributing to it (4.77/5), and finding and correcting inconsistencies (3.92/5).

TABLE IV.   RESULTS OF THE USER EXPERIENCE EVALUTION

Question	Average Score
Overall experience	3,93 / 5
Found the system entertaining	4,33 / 5
Design makes reading easy	3,93 / 5
Design helps to maintaining consistency	3,92 / 5
Design facilitates contributing	4,77 / 5

The results of this experiments show that the concepts and design of CrossTale, as a prototype for interacting with narratives, are highly appreciated by the subjects. However, they also point out several issues that need to be addressed in future versions. In particular, it was found that users spend considerable amount of effort (estimated to 20% of the overall activities) to preserve the consistency of the narrative, which is important for understanding and interacting with it. Future versions could provide means to facilitate further the preservation of literary consistency. In addition, social interaction between different authors remains indirect: users cannot communicate directly and the authors' profiles and their contributions are not discernible in the current design. Future versions can include more support for this aspect and study its effects on the user experience and collaboration.

Using Ryan's framework for the classification of interactivity with narrative systems, we can say that the users of CrossTale performed an external interaction during the whole experience, as they took on the role of agents external to the story, and read and contributed in it from outside the fiction world. This interaction is exploratory during reading, in the sense that the readers choose between storylines to follow but the reading itself does not change nor affect the structure of the narrative space. Finally an ontological participation is detected while the user takes the role of author and expands or alters the narrative world.

V. DISCUSSION

The nature of shared narratives presents several challenges over how the inherent information is constructed, presented, and accessed. In a sense, non-linear interactive storytelling has always faced challenges for having to reconcile the sequential nature of narratives with the user ability to choose between different threads of reading (the paradox of coping "storytelling" with the "non-linear"). In this work we provided a first grounding basis for addressing these challenges and developing shared narratives as new social media. Our research is a first step for consolidating a standardized system for sharing and collaboratively constructing narratives, given we extracted, understood, and evaluated the user mental model associated with this interaction.

We can illustrate our vision of shared narratives as new social media through an example such as the October 2011 global protest movements in Europe and North America. Social networks have proven to be an important infrastructure of support for these movements, where participants behaved as authors, actors, and divulgators of the actual events. These participants leave digital imprints of their experiences [10]: many sources of scattered information can be found on Facebook or Twitter as collections of narrations, opinions and images taken. These events can be understood on a high-level by following one single storyline (e.g., watching the news bulletin), but it is more interesting to explore them from the different points of view of participants whom witness interrelated events taking part simultaneously within the movements, starring thousands of different people.

By using tools for shared narratives similar to CrossTale, the participants could collaboratively draw a detailed narrative world around their movements. In other words, what if these participants could compose collaboratively the stories behind these events by describing and positioning their individual experiences in concrete time and place, and relating them with the experiences of others? The resulting structure would suit better the nature of the associated information, and it would provide a new closer way for interacting with it, which virtually could amount to participating in the physical events themselves.

VI. CONCLUSIONS

In modern literature and fiction worlds, it is common to have multiple stories set in a complex chronology inside a common setting, such as in fiction franchises where narratives are constructed through the contributions of multiple professional authors. Tools based on the CrossTale interaction model would be capable of organizing all this encyclopedic knowledge in a structured narrative space that suits better the temporal, causal, and multi-lineal nature of a narrative, empowering the authors to contribute easily to expand the vast fiction worlds and empowering the readers to explore them naturally. With such tools, narrative spaces grow organically and collaboratively; the proactive role of participants consequently diffuses the mono-directionality of the author/audience relation. In that sense, non-linear interactive narratives can become a new kind of media of its own, suitable for collaboration, information sharing, and learning.

By experimentation, we learnt how users perceive and procreate the narrative space into a unitary and congruent way and how they mentally structure the informative space in terms of time and place and navigate it following structured sequences of character and plot-related scenes. This model was used as the basis for designing a functional prototype, CrossTale, which was subsequently evaluated with users. These evaluations show the success of the adopted approach in supporting complex interactions with narrative spaces, which assimilate its non-linearity. It

provides a validation for further investigations on the potential of shared narratives as new media.

This work also has several limitations. In our experiments, the literary traits of the narrative space were somewhat pre-defined, especially the main characters (prince, pricess, witch…) and places (tower, castle, woods…). This discouraged users to think about expanding the literary reach of the narrative space with few exceptions. In online social role-playing games, some people perform the role of content generators, creating more story elements (characters, objects, places…) to the space rather than adding scenes. Such behaviour should be studied further in the future.

There are also some limitations inherent to the nature of the prototype and the experimental settings: the visualizations used have functional limitations (e.g., visualizing all related scenes to a selected one), and several improvable design issues, mostly usability-related, were identified during the evaluation (e.g., the composition view is not user friendly). Finally, the development of the experiment in a controlled environment does not reflect intimately interactions with shared narratives, nor the collaboration phenomenon (performed in an indirect way through te experiment), as ought to take place online and during a greater amount of time.

VII. FUTURE WORK

With this model and prototype as a starting point, our future step consist of shifting the system deployment from our isolated environment to the web. In addition, we will develop features for adding user-generated story elements (as characters and places). Expanding and deploying the system in a network environment would allow us to study how the narrative space grows when users share a common social network, and study the nature of the resulting interaction and narrative structure under those conditions, as well as the potential of shared narrative spaces to empower long-term collaboration.

A complementary part of this research, concerning the mechanisms of consistency preservation, remained outside this study. Our experiments pointed that consistency between all the story elements and scenes is the main conception that readers use to understand the narrative space, and one of the main concerns when expanding the space by adding new scenes. We will explore how a support for the preservation of consistency can be provided through the introduction of rules (e.g. not allowing the same character to be used in two scenes happening at the same time). Currently, several steps have been taken in this direction, and a complete strategy for managing the consistency of shared narratives will be included and evaluated in future prototypes.

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