Authoring Tools: Saving Effort in the Authoring Process for Interactive Digital Storytelling Experiences

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Abstract. This paper works on the question 'When, why, and do we actually need authoring tools?' within the scope of location-based Interactive Digital Storytelling with augmented reality content. Authoring tools in this paper are considered specially designed tools for Interactive Digital Storytelling systems. This work is based on data of our ended research project SPIRIT (2014-2017) [1]. In SPIRIT we developed a location-based augmented reality Interactive Digital Storytelling system and produced a location-based augmented reality Interactive Digital Storytelling story for the outdoor space of the roman fort museum Saalburg in Germany. Based on our experience of the authoring process we describe and identify authoring tasks and authoring efforts. Then we discuss which authoring tasks can be substituted by authoring tools, and how authoring tools support the authoring process without substituting authoring tasks, like lowering learning efforts, and lowering technical hurdles for creative authors.

Keywords: Authoring, Authoring Process, Authoring Tool, Interactive Digital Storytelling.

1 Introduction

In our ended research project SPIRIT (2014-2017) an interdisciplinary team of programmers, media designers and historians developed a location-based Interactive Digital Storytelling (IDS) system with augmented reality video and produced a fully functional IDS story, placed in the outdoor space of the roman fort museum Saalburg in Germany [1]. In this work the story production process is called authoring or authoring process. Authoring for Interactive Digital Storytelling (IDS) includes the process of creating and providing content for an existing IDS system in order to act out an interesting storytelling experience to an audience, while taking input from that experiencing audience, which can alter the story to some degree [2]. The authoring process consists of various authoring tasks, for which Interdisciplinary skills are needed. Technical borders between these tasks, and experiencing of resulting IDS story and developing associated storytelling engine are blurry as the story idea might not fit the functionality of the IDS system [5]. With this, communicational hurdles emerge for creative authors, who want to create an IDS story as well as for programmers, who want to develop an IDS system while enabling authoring for that system.

Communication and knowledge transfer in such interdisciplinary teams is crucial for success. This work proposes that both can be supported by authoring tools.

On technical grounds we consider two ways to approach the creation of an IDS story for creative authors. One is, the author must know or learn programming skills to develop a new IDS system, implementing all features needed for the creative IDS story idea and its user interaction concepts, and then creating all necessary content for this system to be played. This 'from scratch approach' requires massive efforts for a single person to fulfill. The second 'authoring approach' is to create a story for an existing IDS system, which user interactions fit the given story idea. This way knowledge of provided user interactions and the authoring process for that IDS system is necessary. The second approach saves time and effort in software development compared to the first 'from scratch approach', but has the downside of limited user interactions offered by the IDS system. Both approaches can be undertaken by interdisciplinary teams. In this work we follow the second 'authoring approach', with the goal to ease technical and knowledge hurdles in the IDS authoring process by providing specially designed authoring tools. Authoring tools might enable creative authors to create an IDS story without programming by substituting highly technical authoring tasks like writing STAML, an XML dialect, story structures. Common editors for XML and HTML are also tools fit for creating IDS stories, but in this work we discuss authoring tools specially designed for a certain IDS system only.

2 Related Work

In our ended research project SPIRIT [1] we developed several authoring tools substituting one or more authoring tasks on the same device as the IDS system. Inform7 [6], IDTension [12], Versu [13], and Storytron [14] provide a programming language and design system for interactive storytelling structures. Twine [7], Fluid Writer [9], Touchstory [10], ASAPS [11] and Storyspace [8] provide a graphical user interface for implementing HTML based IDS stories. Both systems are authoring tools as well as IDS systems executing IDS stories, which enable creative authors to implement their own ideas. Various storytelling systems provide separate authoring tools for content creation: Scenejo provides the Scenejo Authoring Tool (S.A.T.) for implementing dialogue structures executed by different A.L.I.C.E. chat bots talking to each other [3]. CHESS provides the CHESS Authoring Tool (C.A.T.) with several editors in shape of a graphical user interface providing also a graphical representation of created story structure [4]. These and many more storytelling systems provide authoring tools as an graphical user interface based alternative to code story structures for the underlying IDS system.

3 Our Authoring Process and its Diverse Authoring Efforts

Based on our experienced authoring process, the IDS authoring process consists of several 'authoring tasks' or 'authoring activities'. In the recent research project SPIRIT [1], an interdisciplinary team of three creative authors and two technical au-

thors created the location-based IDS system SPIRIT using augmented reality media presentation on a mobile tablet computer. Later on we developed the Saalburg IDS story, placed in the outdoor museum Saalburg, a former roman fort defending the *'limes'* border. We use our data and experiences from the making of this IDS story to derive general assumptions from it. Our authoring process contained fifteen authoring tasks, which we classify into three categories: creative, technical and scientific. Our scientific task is research historical facts. Our four technical tasks are writing the story concept with its user interactions into STARML, an XML dialect, structure, writing subtitles for existing videos, writing HTML pages for mobile graphical user interface, organize data on the mobile tablet so the SPIRIT application can execute it. Our nine Creative tasks are: find interesting locations for the story, take pictures of a detail of found locations, create a location-based story concept, and write a film script for augmented reality video, video production, video postproduction, design a graphical user interface (GUI), draw a map for locations of the story, and take pictures of story characters for HTML pages in GUI. We consider the authoring task of testing and debugging a part of all authoring tasks as well as the whole authoring process, which makes it an iterative process. These activities are distributed among several disciplines: computer science, history and the creative field. Figure 1 visualizes the amount of stated above authoring tasks during the authoring process. Researching historical facts we consider preliminary work. The nine creative tasks we divided into two categories the 'creation of the story' and the 'creation of media files suited to the story' including the technical task of making subtitles for the videos. We include all remaining technical authoring tasks into 'technical implementation of the story' as well as testing and debugging.

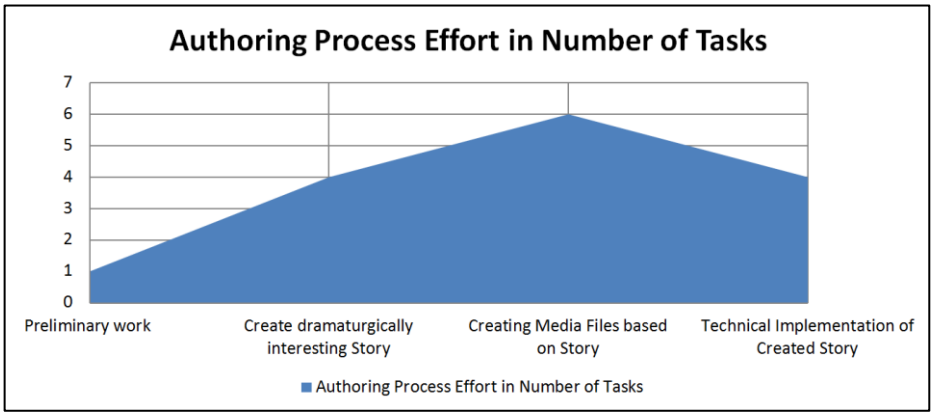

Fig. 1. Amount of authoring tasks in components of our authoring process: 'preliminary work', 'create dramaturgically interesting story', 'create media files' and 'technical implementation'.

Figure one displays most authoring effort goes into creative tasks. But how do we define effort in this work? So far we merely counted the tasks with the result that any technical task 'weights' as much as any creative task in our metric so far. Based on

our experience the most working hours went into the video postproduction, which makes this the most labour intense authoring task but in our understanding not more valuable than the creation of the story concept. With this working hours are no good measurement concept in this work. Therefore we consider all authoring activities to be of same value to the authoring process if it cannot be omitted without diminishing the end IDS story experience. For testing purposes we omitted authoring tasks as used prototypical media, but in the end all stated authoring tasks were passed to create our location-based IDS 'Saalburg' story.

As shown in figure1 most authoring effort went into 'creating media files based on the story concept', especially into shooting videos and even more into their postproduction. If the underlying story concept and film script is not well tested and debugged, later changes of videos are costly, because shooting video and postproduction must be carried out again. We assume that saving those costs by developing authoring tools is worthwhile.

4 Authoring Tools and the Efforts They Reduce

Apart from stated authoring tasks location-based contents are taken best on location, while writing STARML, an XML dialect, code, shooting green screen video, and video postproduction are best done in more adequate locations. But then testing is best done on location, while debugging again is better done in the office. Therefore authoring location-based IDS stories include traveling time as additional effort of authoring tasks, which were not measured in this work. In our case the office was 45 minutes by car away from the outdoor museum, and debugging reference images triggering augmented reality media demanded continuous change of locations. Therefore we count this traveling time into the overall authoring effort. For saving this traveling time we developed several authoring tools enabling us to take reference images and GPS data and feed them into our IDS story on the same tablet computer as the IDS system runs on. With this we reduced traveling time and we were able to test very early in our authoring process.

We developed an authoring tool, see figure 2, for producing prototypical augmented reality video content. That tool enabled testing of early story ideas and debugging them on location. Therefore traveling time was reduced as well as technical hurdles for creative authors enabling tinkering with story ideas.

In our project creative staff and programmers had to work together on user interactions for developed IDS system. This gives the impression, that programmers implement all user interactions our designers and story creators imagined. After receiving applications that did not met expectations, we found that communication between programmers and designers was difficult as the same word painted different images in their thoughts. Using mock-ups eased those communication problems, but mock-ups for unimagined user interactions did not exist. Therefore we developed a mock-up tool for user interactions on mobile tablet computer using transparent images and their file names only for faking augmented reality media. Now the programmers could see the imagined user interactions and could implement accordingly. This authoring tool

does not support any authoring task in our authoring process, but unburdened our development process by offering more technical details of creative ideas to our programmers. This mock-up tool can also be used for visualizing story concepts to programmers, who implement the IDS story using our XML dialect STARML. Therefore we mention our mock-up tool in this work.

Fig. 2. This authoring tool provides prototypical augmented reality content and audio recording functionality for creating a story element from scratch, and testing it in the same location.

5 Conclusion and Future Work

We described the authoring process we experienced in our ended project SPIRIT [1] and derived authoring tasks from it, which take effort to pass. We described three different kinds of effort: working on an authoring task, communication between creative workers and programmers, and traveling effort as commuting between workplaces like the office and story location. Our authoring tools described above lower technical hurdles for creative workers, or help visualizing creative ideas in a detailed technical environment for programmers, or help reduce travel time. Therefore we conclude that our authoring tools reduce authoring effort in authoring location-based augmented reality Interactive Digital Storytelling (IDS) SPIRIT stories. Therefore authoring tools specially made for IDS systems can reduce authoring effort for those IDS systems. ‘When, why, and do we actually need authoring tools?’ In this work we come to the conclusion that we need authoring tools, not only to substitute technical work tasks or make working conditions more convenient, but also to reduce work effort and enable authoring for only one person.

From the view of a computer scientist the goal of content creation for IDS systems eventually is automating the IDS authoring process as far as possible. Today computers are suited to substitute some technical authoring tasks, but no creative tasks. As

authoring tools can lower technical efforts in authoring significantly we assume, that authoring tools may be used for single person authoring projects, instead of employing an interdisciplinary team. Therefore costs can be cut and authoring IDS stories can be undertaken by a larger target group compared to an interdisciplinary team authoring an IDS story by hand. One step further in computer scientist imagination the authoring process may be automated completely so that the human in an end user only. But here the question is what kind of stories a machine can tell and why would it be worth for a human to experience it?

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