Multi-Screen Director: a New Role in the TV Production Workflow?

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ABSTRACT

Multi-screen applications have been a research topic for the last 10 years. Recent technical advances make authoring and broadcasting of interactive multi-platform experiences possible. However, most of the efforts have been dedicated to the delivery and transmission technology (e.g., HbbTV2.0), but not to the production process. The hypothesis of this paper is that studio and outside broadcast production requires radical changes in the production workflow, in order to allow for an efficient management of interactive multi-platform experiences. This paper explores such changes, investigating workflows and roles, and identifying key requirements for supporting these. The final objective is to create a new set of tools, which are extending current processes, that allow broadcasters to curate new types of experiences. We conducted a set of interviews with broadcast producers and directors that allowed us to identify two major (sub-)workflows, one for pre-recorded and one for live experiences. We could then assign roles to the different stages of the workflows and derive a number of requirements for the next generation of production tools.

ACM Classification Keywords

H.5.2. Information Interfaces and Presentation (e.g. HCI): User interfaces; H.5.4. Information Interfaces and Presentation (e.g. HCI): Hypertext/Hypermedia

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Interaction; Multi-platform Experience; Multi Screen; Authoring; Companion Screens; TV Broadcast; Workflows

INTRODUCTION

Secondary and multi-screen television have been a topic in research for over 10 years [10, 12]. Media consumption is not any longer restricted to one device, the television, but involves a dense ecosystem of connected devices and people. Commercial end-user devices and streaming technologies make immersion into events possible, allowing people to jointly watch them. We can observe a change in media consumption and user expectations. Nevertheless, current broadcast media authoring processes do not reflect the radical paradigm shift from passive lean back TV viewing where groups are locally isolated from each other to a more interactive and immersive viewing experience. The work reported in this paper offers a new look at current problems faced by media producers: the lack of tools for crafting interactive productions that can span across several screens. Currently, each broadcast service (media + application) is created in an ad-hoc manner, for specific requirements, and without offering sufficient control over the overall experience to the creative director. Our intention is to provide the adequate authoring tools for multi-screen experiences that can reshape the existing workflow to accommodate to the new watching reality. Our work happens within the H2020-funded EU collaborative 2-IMMERSE project that involves broadcasters, network specialists, and research institutions. The 2-IMMERSE project is an EU-funded collaboration within the Horizon 2020 program. It focuses on experiences which are conceived as multi-screen in production. Flexible delivery across single- and multi-screen environments and responsiveness to preferences of individual audience members are supported. Unlike existing services, in 2-IMMERSE multi-screen experiences, the content layout and compositions are orchestrated across the available screens and created using an object-based production approach. This enables efficient delivery of responsive and personalized experiences. A more detailed description of the project and its software environment can be found in [15].

Figure 1. Exemplary studio setup with workspaces for the team involved in the production of a broadcast.

This paper describes results from the human-centered process of identifying workflows and requirements for the new media experience production suite in the 2-IMMERSE project. Take for instance an exemplary broadcast studio (see Figure 1), where a number of specialists craft the experience for the viewers. While spatial organization and roles (and their hierarchy) are not the same in all studio- and outside broadcast production contexts, they all show common roles which are spatially grouped by task or function. In our example, we can see three well-differentiated rows:

- Front row: including the technical manager, the producer, the director, and the vision mixer; with light and vision being controlled from the far right.
- Back row: including the autocue controller, the deputy producer, and the social media manager/journalist
- Island: the sound manager, in charge of audio.

However, current setup, roles, and workflow do not adequately reflect the requirements for more interactive and multi-platform experiences lacking standardized workflows and processes to create appealing experiences. A similar situation occurs with the pre-production tools, which hardly take more than one screen (the TV) as the intended platform into account, making each production a unique process.

This paper explores a new generation of production tools, particularly intended for interactive multi-platform experiences, identifying particular workflows (and roles) and requirements. The tools are intended for broadcasters and cover both pre-recorded and live selection of content. In order to gather data to explore requirements in depth, we conducted and analyzed interviews with twelve professionals with technical or creative background in this area. Our goals were (a) the identification of necessary changes in the existing production workflow in order to accommodate the curation of multi-platform experiences, and (b) the identification of new requirements regarding multi-platform production tools. The contributions of this paper are thus twofold:

1. We identify workflows and roles in the production process of interactive multi-platform (live) experiences.
2. We propose a set of requirements for interactive multi-platform experience authoring tools.

The remainder of this work is structured as follows: First, we give an overview of related work. After that, we describe our methodology and the results and insights we gained from our interviews. We end the paper with a discussion of our findings and a conclusion giving an outlook on future work.

RELATED WORK
Traditional workflows include the following production steps: idea, development, pre-production, production, post-production, distribution, and exhibition [21]. There, the following roles are involved, some of them may be combined for smaller productions: technical manager, producer, director, vision mixer, light and vision, audio, autocue controller, deputy producer, social media journalist, and editor [18]. A second group of people is needed to collect and format materials/content before the live program begins. They work with the live production team: camera/sound, directors/editors (to edit audio & video footage), program editor (checks editorial standards and compliance), script writers & editors, and content producers who have an overview of all the content being used in the program, and make sure its correctly formatted [18]. However, this workflow and set of roles is not suitable for producing interactive multi-platform live experiences. Steps and roles are missing to take care of everything that is not shown in the main broadcast (on TV). Taking a look at related work in the area of video editing and authoring, it can be noted, that several tools exist, but the authoring process is rarely considered. Software for professional high-end editing can be found in the Adobe Creative Suite [3, 4, 5], using Final Cut Pro X [6], and Vizrt [2]. Tools and paradigms that are capable of creating multimedia presentations are described in [9]. Klynt [13] and the SIVA Suite [17] allow the design of interactive multimedia presentations using current web technologies. These tools

output single-screen content, without taking different devices or synchronization issues into account.

However, some tools for interactive second/multiscreen applications exist and consumers of TV broadcasts are interested in using them [11]. Videonations [20] provide immersive concepts for video conferencing like interactive displays or video walls using a variety of devices. Barkhuus et al. [7] combine watching a live event at the same time on a tablet allowing them to pan and zoom into the content. Synchronized content for TV shows can be authored and played in an application described by Basapur et al. [8]. A model and a corresponding architecture for an enhanced TV experience (compared to traditional television services) is proposed by Cesar et al. [10]. Recommendations and insights are described by Geerts et al., which show "how to design companion apps related to ease of use, timing, social interaction, attention and added value" [12]. However, they focus more on presented content and not on workflows and roles around the production. The role of social media is studied by Lochrie and Coulton. They analyze tweets to use them as a facilitator of a second screen for TV [16]. This is implemented as an automated process. Ursu et al. [19] propose solutions on how to realize interactive screen-media narratives. They define a language which controls the flow of the narrative. ImmersiaTV proposes a solution which provides 360°videos for scenes in a broadcast. The viewer can explore the surroundings that are currently not in the view of the camera [1]. However, none of the works for interactive multi-screen applications proposes general requirements for such apps or workflows and roles in case of large-scale TV productions.

FINDING WORKFLOWS, ROLES AND REQUIREMENTS
Roles, workflows, and requirements for traditional broadcast productions are clear and well established. However, it is not clear how multi-platform experiences will be produced and authored, as there are only few experiences available so far, which are usually treated as independent projects and thus are implemented on demand for a specific setting. Our goal is to identify workflows and roles in the overall process and find requirements for reusable production tools that help individuals to create experiences without having to start over for each project.

Methodology
We conducted semi-structured interviews [14] with seven technical and five non-technical participants. Thereby, we followed the following steps: First, we defined 46 interview questions and categorized them into six groups. Therefrom, we got interview guidelines to ensure that the same topics were covered in each interview. The interviews were conducted in the second week of January 2017 in the BBC usability labs. Participants were asked individually or in groups of two, depending on their time availability. Notes were taken by the interviewers during the interviews to be able to ask follow-up questions. The interviews were recorded and transcribed to be able to check on answers.

When all interviews were finished, the answers were analyzed in two different ways to ensure that no information was left out
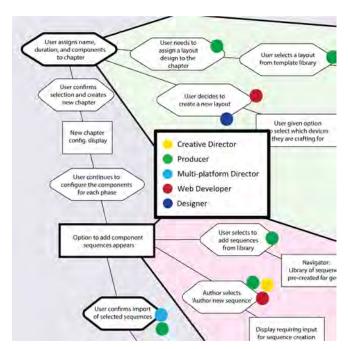

Figure 2. Part of the process tree with roles for the different tasks.

in the initial set of requirements. On the one hand, the notes were written down on post-its and arranged on a whiteboard following the production process. On the other hand, the transcriptions were analyzed and transformed into a process tree (for a small part of the process tree see Figure 2), gathering all information about specific topics and involved roles. Both were then analyzed to derive workflows and requirements.

Further analysis of the gathered information also allowed us to identify workflows that became apparent between the different interviewees and certain (new) roles that may be necessary to transform a traditional TV broadcast into an interactive multi-platform (live) experience.

Interview Guidelines
The interview guidelines covered several sections. The first section tried to identify current knowledge, current challenges when creating interactive multi-platform experiences, to learn about how past experiences were authored, and to find a common ground between interviewer and interviewee(s). The second section tried to find out who will use the system in the future and for which purpose with questions like:

- Who will be users of the system?
- What level of education or training do users have?
- What technical platforms do they use today? What tools do they use to produce (immersive) experiences?
- What other IT systems does the organization use today that the new system will need to link to?
- What training needs and documentation do you expect for the future system?

Then functional and non-functional requirements were gathered. Exemplary questions for functional requirements were:

- What does the production process for live experiences look like?
- Is spatial and temporal authoring desired?
- Is the spatial design based on templates or can elements be arranged freely? How should layout support be realized, if at all?
- Should the application be able to preview the presentation. If so, then to which degree of detail?
- Which data formats do you use for video/audio/images that have to be processed by the authoring environment?

Exemplary questions for non-functional requirements were:

- What are your expectations for system performance?
- Are there any legal requirements or other regulatory requirements that need to be met?

In the concluding part, project related questions and questions regarding future collaborations were asked.

Selection of Interviewees

Interviewees were selected who had knowledge about the creation of interactive multi-platform experiences. They were categorized into two groups: technical members of the project team who had already created at least one previous multi-screen experience, and creative directors who had knowledge of the overall process for creating interactive (but not necessarily multi-platform) experiences. The technical group consisted of seven members, the other group included five creative directors. All of them worked in the field for a long time and had knowledge of traditional broadcasting as well as accompanying applications for broadcasts.

RESULTS

The results we got from our interviews are on the one hand a workflow with roles that is used to create interactive multi-platform experiences. On the other hand, we found a set of requirements for an authoring environment. We will describe both findings hereafter.

Workflow and Roles

An analysis of existing workflows from the interviews and of the production setup showed that the person in charge of social media (secondary screen content) is far away from the core team of the production being currently isolated and remote. For each production, live or pre-recorded, several settings have to be made in order to provide content for and place content on other screens than the TV. A configurable and stylable spatial template has to be chosen which defines where additional contents will be displayed to the viewer. This may be on additional TV screens, smartphones, tablets, or other devices which all require a distribution of the screen in case more than one content is shown. After defining the spatial settings, contents can be added and previewed, either by working on a timeline or by triggering events for live playout. This will be an extension in the production workflow that will require new tools and skills.

In a second step, we analyzed this coarse grained workflow and tried to find a more fine grained description of the individual sub-tasks and steps and who is in charge for executing

Figure 3. Collection of all requirements from the interviews (yellow = functional requirements, orange = non-functional requirements)

them. The roles from the standard production process for multi-camera studio and outside broadcast production, namely technical manager, producer, director, vision mixer, light and vision, audio, autocue controller, deputy producer, and social media journalist, were analyzed and assigned to the different tasks (see Figure 2). This analysis showed that the task-sets of traditional roles have to be extended in order to generate contents for the additional screens. We also found out, that a coordination of the process as well as content based decisions for the additional screens are required which are not covered by the traditional roles. For that reason we suggest a new role: the multi-screen director. This person is in charge of coordinating all contents that are shown aside from the main TV broadcast. This may be information that is displayed in an app or additional streams that are displayed in multi-screen environments. Besides content selection, decisions on content placement have to be made. Thereby, collaboration with the director and team of the main TV broadcast is necessary. The new role has to be fully and meaningfully integrated into the production process.

Set of Requirements

After conducting the interviews, the transcripts were analyzed, and user characteristics, general and environmental constraints, assumptions and dependencies related to live broadcasts, and open questions (green post-its in Figure 4) and issues (pink post-its in Figure 4) were identified and noted. We furthermore differentiated between functional requirements (yellow post-its in Figure 4), and non-functional, i.e. technical and user requirements (also orange post-its in Figure 4). Figure 3 shows a subset of the initial collection of requirements, open questions, and issues. These were then rearranged according to phases of the production process, see Figure 4. Especially for the planning phase, a large number of open questions were

Figure 4. Requirements sorted by phases in the production process (planning, pre-production, production, post-production, distribution, consumption)

identified. Production, distribution, and consumption phase revealed some technical issues that need to be solved.

Hereafter, we show only the most relevant requirements, focusing on those that are different from a standard production workflow for multi-camera studio and outside broadcast production. These are:

- R_01: The layout should be testable without a real/live video stream (LIVE)
- R_02: Reaction to live events should be possible; timing should be done by events instead of timelines, events change the experience; cause triggers effect (LIVE)
- R_03: Statistics and graphics should be generated on demand; click on button creates component from predefined settings that can be shown on screen or in companion app
- R_04: Predefined templates and styles for spatial layouts can be changed according to rules (font sizes, space constrictions, etc.), it should be possible to define safe zones where no content can be; a pool of templates from initial ones is built over time
- R_05: It should be possible to create templates for temporal events (for example goal is scored - then show slow replay left camera, show slow replay right camera, show player profile picture. etc.); timing is set per program, sequences are created for content-types
- R_06: Set which elements (chat, social sites, etc.) are available to the user at which priority (lower priority elements may not be visible on small screens for example); define importance of components (priorities)

We furthermore identified a data format for import and export, security requirements, and so on. All participants agreed that

the production tools need some kind of preview, the opinions on how it should look, however, differed significantly. It is not clear which level of detail is desired, we are trying to find that out in the next round of interviews.

CONCLUSION

In this paper we presented the results of our first round of interviews about the production process for interactive multi-platform experiences. From the answers of the interviews with twelve professionals, we could draw conclusions on workflows and roles for the extended process of crafting such experiences, when compared to the more traditional broadcasting workflow. We propose a new role, the multi-screen director, who should be fully integrated in the production process. In addition, we found a first set of requirements that the production tools should meet.

Our future work includes the design and development of such tools. Thereby, we will first generate different versions of screen prototypes representing different production paradigms. These prototypes are then presented to a group of creative directors who might work with the tools in the future, to find out which paradigm fits their needs best. After finding an agreement on a paradigm, we finalize the prototypes and create a software architecture that implements the authoring tool. After implementing the tool, we plan to conduct user tests to find flaws in the workflow. Then, we test the tool in two real world live scenarios, a soccer game and a motorcycle race.

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