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Supporting community building at corporate hybrid events

A Double-Diamond process

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Abstract

This research explores how the design of corporate hybrid events can support community building between online and in-person attendees. Due to the COVID-19 pandemic, the prevalence of hybrid formats has increased. Ensuring the success of these events depends on the ability to foster connectivity among all attendees, regardless whether they participate online or in-person. FX Agency, a digital experience company based in the Netherlands, is exposed to these same difficulties and is looking for new ways to facilitate connectivity. Therefore, this research aims to explore and address these emerging challenges by developing an innovative solution that supports attendee community building during corporate hybrid events.

Employing a qualitative research approach, a Proof of Concept (PoC) is developed following the Double Diamond Design process. The PoC is based on a 'Virtual DJ' concept, designed to engage and connect attendees during 'waiting' moments of corporate hybrid events. Within the Virtual DJ, attendees can vote for songs played in the event environment and can upload songs to a battle to become the next DJ themselves. A clickable prototype of the PoC is created using Figma and used for evaluating its effect on community building.

The evaluation sessions of the PoC included usability testing, in-depth interviews and the user experience questionnaire. Findings that reveal the Virtual DJ's potential to support community building between online and in-person attendees are the shared focus, the reciprocal awareness and the interactivity of the Virtual DJ. Nevertheless, identified shortcomings in UX design and navigation underscore the need for further refinement. Therefore, FX Agency is encouraged to utilize these findings to enhance the PoC through an interative process.

Overall, this research underscores the importance of addressing community building issues in hybrid events and highlights the potential of innovative solutions, such as the virtual DJ, in enhancing attendee experience and fostering a sense of togetherness.

Preface

This thesis marks the end of my studies of the Human-Computer Interaction and Design track at the EIT Digital Master School. It signifies the completion of my academic journey, encompassing studies at both the University of Twente (NL) for the master of 'Interaction Technology' and the University of Trento (IT) for the master of 'Human-Computer Interaction'. As I wrap up my studies, I can not help but reflect on the support and encouragement I have received from so many amazing people and organizations.

First and foremost, I would like to thank my supervisors Massimo Zancanaro and Lorenzo Gatti for their support and guidance throughout my graduation journey. From assisting with research planning to navigating the pitfalls of qualitative research, your expertise proved invaluable. You were available to answer small doubts and provided relevant insights into crafting an effective evaluation strategy. Your insightful feedback not only enhanced the quality of my work, but also broadened my understanding of the HCI field.
Secondly, I can not forget to mention my daily supervisor from FX Agency; Daan Ekkelenkamp. I want to thank you for your time, feedback and genuine interest during these six months. Your willingness to challenge my ideas helped me see things from different perspectives and ultimately resulted in stronger solutions. I truly value our collaborative exchanges and the insights they brought to this research.
Furthermore, I would like express gratitude to FX Agency for providing me this graduation internship opportunity. Since my first day, every colleague has welcomed me warmly, making me feel part of the team. A special acknowledgment goes to the innovation team for their collaborative efforts throughout the co-creation, co-exploration, and co-validation phases of this research. Their enthusiasm and willingness to explore new ideas were inspiring and contributed significantly to the success of my research.
I am thankful to all the research participants who generously contributed their time, feedback, and insights to this research. Your perspectives have provided valuable feedback to my work, offering the direction for improvement and refinement.
Last but certainly not least, I extend my appreciation to my family and friends for their support, encouragement, and valuable feedback on this thesis. Your belief in me has been a source of motivation and I am very grateful for your presence throughout this journey.

Simone Luiten
Utrecht, 08-03-2024

Contents

Acronyms

AI Artificial intelligence

AR Augmented reality

CD Creative Director

HCI Human computer interaction

NUF New useful feasibility

PoC Proof of Concept

RQ Research question

SQ Sub question

UEQ User experience questionnaire

UX User experience

VR Virtual reality

Chapter 1

Introduction

Since the beginning of 2020, individuals witnessed a shift in their routines as COVID spread around the world. With the closure of almost all public spaces and the onset of widespread remote work and social distancing measures, numerous scheduled events and gatherings were canceled. These disrupting changes left individuals without ways to experience meaningful interactions and maintain vital connections with others. Consequently, a need emerged for innovative solutions to navigate the challenges of a socially distanced world.

The event industry responded to the challenges posed by embracing digitalization, shifting from traditional in-person gatherings to the realm of virtual events. This transition offered several compelling advantages. Firstly, it contributed to a reduction in travel, resulting in lower carbon emissions and reduced economic costs. Consequently, individuals facing environmental or logistical constraints could still participate, fostering inclusivity and accessibility [1],[2]. Moreover, virtual events encouraged greater diversity among participants by offering a more accommodating platform for individuals struggling with stress or shyness, as noted by Medina and Shrum [3].

Nevertheless, the adoption of virtual events was not without drawbacks. Notably, the phenomenon of 'zoom fatigue' emerged, characterized by exhaustion from longer screen time and online interactions [2]. Furthermore, the virtual format limited opportunities for spontaneous discussions, interpersonal engagement and community building, often encountering technical challenges, as highlighted by both Punicelli et al. [2] and Medina and Shrum [3].

Consequently, as the world gradually reopened, there was a growing desire to return to in-person events while preserving the advantages gained from the virtual format. To bridge this gap and provide attendees with the best of both worlds, the concept of hybrid events emerged as a promising solution. However, to ensure the success of hybrid events and deliver a truly exceptional experience, it is needed to address the shortcomings that arose from the virtual event landscape. Additionally, another challenge is to make all attendees, whether online or in-person, feel connected and equally included [4]. Lastly, even though

the digitalisation of events gets more and more attention within literature, Estanyol [4] states that academia should place an even greater emphasis on understanding technology and its role on the attendee experience during events.

FX Agency, a company based in The Netherlands, experiences these same difficulties during the hybrid events they organize. FX Agency operates as a digital experience agency with expertise in crafting virtual, hybrid, and in-person corporate events. They have noted a challenge in fostering meaningful interactions between online and in-person attendees during events where both groups coexist. This arises from the necessity to design distinct event journeys for these two groups, as the experience needs and wishes of online attendees differ from the in-person attendees.

As this research is done in cooperation with FX Agency, this research aims to explore and address these emerging issues, delving into the technologies that can enable individuals to connect and create communities during hybrid events. To explore these difficulties with focus, a Research question (RQ) and multiple sub-questions (SQ) are created.

RQ: In what ways can the design of corporate hybrid events contribute to the cultivation of a community atmosphere among attendees, whether they are participating online or in person?

SQ1: What are the needs, thoughts and opinions of online and in-person attendees during corporate hybrid events?

SQ2: Which user problems can lead to an actionable and impactful design challenge within the scope of this research?

SQ3: Which identified concept could improve community building between online and in-person attendees during corporate hybrid events?

SQ4: To what extent does the Proof of Concept support community building during corporate hybrid events?

These research questions are answered by following the Double-Diamond design process. This process involves a first diamond; the 'problem space', and a second diamond; the 'solution space'. The problem space consist of a 'discover' and a 'define' phase which are mostly focused on exploration of the problem at hand. Methods that are used within this diamond are desk-research, in-depth interviews, body-storming, and empathy mapping. The problem space ends with the creation of a design challenge.

The solution space also consist of two distinct phases; the 'develop' and the 'deliver' phase. These phases aim to find the best solution answering the design challenge developed in the problem space. Methods that are used within the solution space are; co-creation, co-exploration, co-validation, rapid-prototyping which results in the creation of a Proof of Concept (PoC). Sequentially, this PoC is evaluated by doing usability tests, semi-structured

interviews and user-experience-questionnaires. The findings will guide future research and could lead to the development of a new prototype. The entire Double-Diamond process is iterative and thereby provides flexible and adaptable steps within the different phases.

This research adds upon current research as it combines different in-person, virtual and hybrid event experience insights into a new designed event experience for corporate hybrid events. Additionally, it starts filling the knowledge gap on the role of innovative technologies used during hybrid events to enhance the attendees experience by supporting community building. At the same time, this research adds practical relevance for FX Agency as results regarding the needs and wishes of attending participants can be used to improve other previously created concepts by FX Agency. Therefore, this research discovers opportunities to improve the overall experience of corporate hybrid events, such as the events organised by FX Agency.

The time-span of this research is limited to the graduation period at FX Agency which is 6 months. As FX Agency mainly organizes events for companies which have a head-quarters in the Netherlands, this research primarily focuses on this scope as well.

This research is structured into the following eight chapters:

Chapter 1 - Introduction Explaining the relevance of this research and presenting the research questions.

Chapter 2 - Background Providing context information about the internship company FX Agency, their developed platform and their competitors.

Chapter 3 - Related work Exploring earlier research in the field of event digitalisation, experience design and event experience design.

Chapter 4 - Methodology Explaining the qualitative nature of this research while following the double diamond design method.

Chapter 5 - Problem space Discovering and defining the main problem within this research by literature research and user-understanding methods such as in-depth interviews, body-storming and empathy mapping. This chapter answers SQ1 and SQ2.

Chapter 6 - Solution space Developing and delivering a PoC by co-creation, co-exploration and co-validation methods. This chapter provides an answer to SQ3.

Chapter 7 - Evaluation Evaluating the potential of the PoC and stating the results, thereby providing an answer to SQ4.

Chapter 8 - Conclusion and Discussion Answering the main research question and providing recommendations for future application of the findings in practice and further development.

Chapter 2

Background

The foundation of this research rests on the background information outlined in this chapter. First of all, the initial research direction is given. Furthermore, since this research is conveyed in cooperation with FX Agency, an introduction to their relevant products and field of work is given. Lastly, a competitor analysis is done to assess FX Agency's position in the market.

2.1 Initial research direction

FX Agency's event platform, Reply.live, is designed to seamlessly cater to both online and in-person events. In the context of in-person gatherings, Reply.live is employed for tasks such as ticket scanning, program verification, and the facilitation of interactive modules like polls. For online events, Reply.live offers an integrated streaming feature, enabling attendees to easily join and participate. Additionally, all interactive modules such as poll, quiz and knock-out game can be used. Despite these functionalities, FX Agency has noted a challenge in fostering meaningful interactions between online and in-person attendees during events where both groups coexist. This arises from the necessity to design distinct event journeys for these two groups, as the experience needs and wishes of online attendees differ from the in-person attendees. Accordingly, this leads to little interaction and a small feeling of communion between the two groups.

FX Agency has been actively brainstorming ideas to enhance engagement and connection between these two distinct audiences throughout hybrid events. However, no specific solution has been identified yet. Therefore, the primary focus of this research is to develop an innovative solution that promotes increased interaction and ensures a cohesive event experience for all participants in corporate hybrid events.

2.2 FX Agency

To gain deeper insight into the research's context, it is crucial to grasp the nature of FX Agency and the capabilities of its platform Reply.live. FX Agency, situated in the Netherlands, operates as a digital experience agency with expertise in crafting virtual, hybrid, and in-person corporate events. Established 14 years ago, the company currently has a staff of approximately 40 employees. The events orchestrated by FX Agency revolve around three primary objectives: fostering employee engagement, facilitating leadership communication, and advancing relationship marketing. In essence, FX Agency translates intricate client messages into immersive digital experiences for diverse audiences.

At FX Agency, events are a journey of connection and interaction with the (virtual) audience. For each event, FX Agency creates a diverse program filled with creative and visually appealing content that keeps the audience engaged from start to finish. With a dynamic event flow, they incorporate gamification, breakouts, polls, brainstorming sessions, games, competitions, networking opportunities, and even virtual coffee breaks to create an interactive experience.

2.2.1 Reply.live

FX Agency has developed an event platform called Reply.live. The objective of this platform is to streamline the attendees experience by consolidating all event-related information in one accessible space. Hence, Reply.live manages user interactions and provides information throughout the entire event experience, encompassing pre-event, during the event, and post-event stages. Additionally, it delivers specifics like the event program, presentations, and interactive elements. Nowadays, Reply.live is mostly employed for hosting online and hybrid events, webcasts, and traineeship programs. On the other hand, in-person events can also employ Reply.live to support real-time interactions. Notably, the platform can align with clients' branding, delivering a consistent and personalized visual identity. Operating entirely in the cloud, Reply.live eliminates the necessity for any downloads, enhancing accessibility and convenience for users.

Within Reply.live, either a conventional event website or a uniquely crafted basecamp can be created. A conventional event website can be filled with content blocks including information about the event, the event program and frequently asked questions. A conventional event website often looks like figure 2.1. On the other hand, a basecamp is more extensive in nature. It serves as an interactive virtual environment where attendees can actively engage and interact with various features. One of these features is for instance the 'Social wall', a module that permits participants to share messages, videos, or photos on the basecamp. Another example of a feature on the basecamp is the 'Photo booth', which encourages attendees to upload photos.

Features

Reply.live presents an extensive range of features designed for during the event. These features are classified into three main groups: practical features, interaction features, and

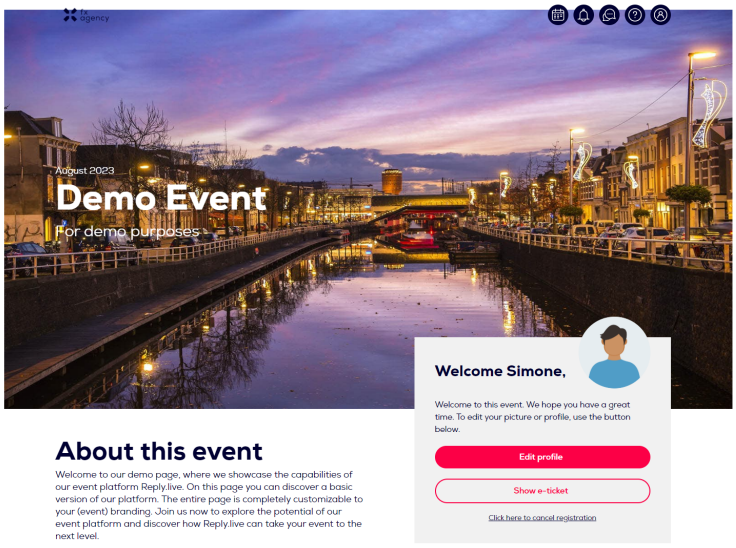


Figure 2.1: A conventional event website using platform Reply.live

gamification features. First of all, practical features revolve around live-streaming and attendee access. For instance, the 'stream' module, equipped with a timeline, ensures live streaming for attendees, and the 'E-Ticket' module generates unique QR codes for easy access. Additionally, the 'registration' module streamlines guest sign-ups via the event website, while 'pre-read/post-content' keeps participants well-informed. Lastly, the 'survey' module facilitates post-event evaluations, providing valuable insights.

The utilization of interaction features primarily occurs during the event itself, situated in the right panel of the Reply.live streaming page. These interactive elements are designed to meet the needs of attendees, enabling them to engage with the event environment and fellow participants. In addition to poll and chat functions, these features encompass a 'where are you' module that identifies attendees' global locations.

Additionally, the gamification elements enhance the event experience, turning it into a game show. This transformation is achieved through the 'quiz' module, showcasing quizzes, attendee responses, and a leaderboard competition. Furthermore, the 'knockout' module introduces an element of excitement through a quiz-style competition, while the 'word cloud' module extracts keywords from audience input, presenting them in a visual word cloud.

Virtual studio

During online and hybrid events, FX Agency utilizes a product known as a virtual studio. This virtual studio is designed to mirror a real in-person studio experience. Powered by Unreal Engine, a 3D software program, these virtual studios are constructed within dynamic 3D environments, featuring live hosts, real-time audiences and a director overseeing the production. Every participant joining the streaming page of Reply.live is seamlessly

integrated into the 3D audience of the studio (with their profile picture). When attendees express themselves with emojis, these visual cues manifest in 3D, attributed to the respective audience member. Furthermore, Q&A sessions can be held in which questions of participants can be highlighted and showed within the studio. Lastly, real-time poll results from Reply.live can be displayed within this virtual studio setting. Importantly, these studios are customizable to align with the client's branding, goals, and specific needs. Refer to Figure 2.2 for an illustration of a virtual studio.

Figure 2.2: Screenshot of a virtual studio

2.2.2 User journey mapping

In a typical hybrid event orchestrated by FX Agency, a defined user flow is adhered to. By understanding the current user experience during these hybrid events, a user journey map is carefully crafted. This map includes the various steps taken by both online and in-person attendees throughout a typical hybrid event, see Figure 2.3 for the complete overview. As can be seen, the steps before and after the event are equal for online and in-person attendees. However, during the event, the steps taken by the two groups vary a lot.

2.3 Competitor analysis

Competitor analysis involves evaluating FX Agency in relation to competitors. Objectives include assessing whether FX Agency matches competitors' performance, staying ahead in introducing new products, and understanding the capabilities of the competition. Conducting a competitor analysis is interesting for several reasons. Firstly, it enables to identify opportunities to enhance the experiences of their events by learning from the successes and shortcomings of competitors. Additionally, such analysis provides insights into areas where FX Agency can outperform competitors, thereby retaining and capturing customer attention. Ultimately, this understanding translates into a tangible competitive edge, which could position FX Agency favorably within the sector.

The competitor analysis involved a comprehensive exploration of features offered by other companies in the digital event industry. This examination specifically focused on businesses providing similar services, namely organizing virtual, hybrid, and in-person events

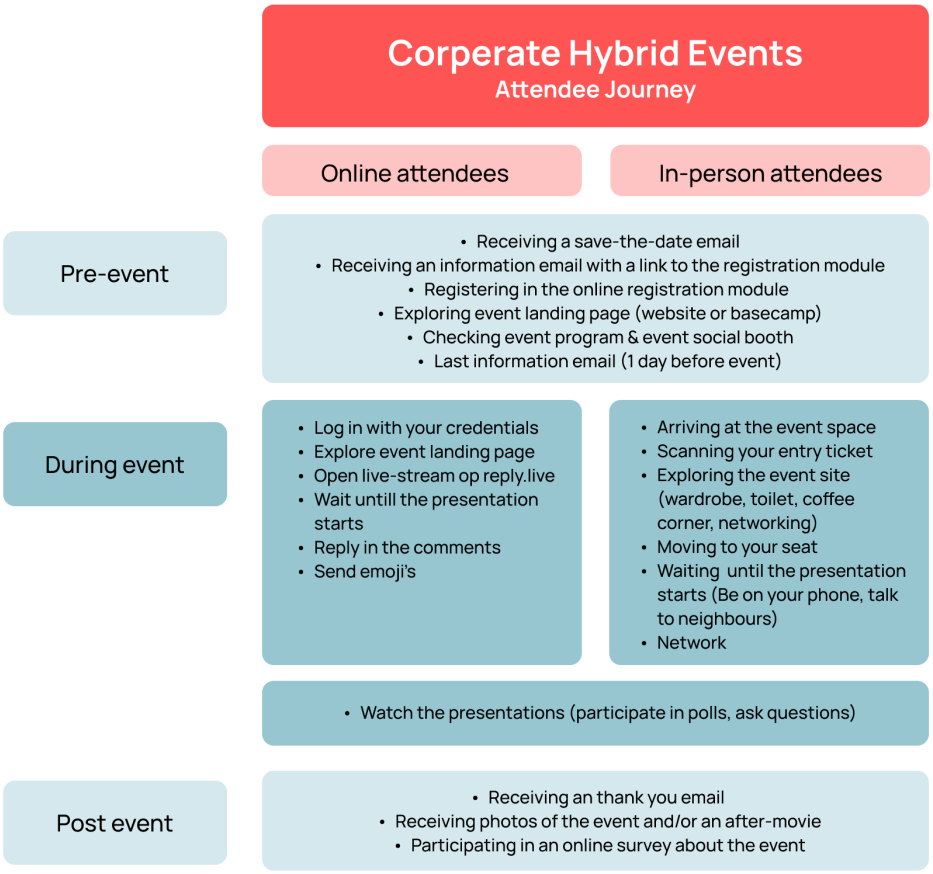


Figure 2.3: An outline of the event journeys of online and in-person attendees during hybrid corporate event organized by FX Agency

for corporations. Despite geographical variations, with some competitors based outside the Netherlands, the primary goal is to extract as much insight and inspiration as possible.

The selection of competitors is based on HubSpot's [5] and G2's [6] compilation of the top 10 virtual event platforms. Hubspot and G2 are independent websites reporting on new technologies in different sectors. All companies that not only specialize in virtual events but also extend their services to in-person events and showcase original features are included in this analysis. By broadening the scope beyond borders and relying on reputable sources for selection, the analysis seeks to tap into the innovation and inspiration provided by larger competitors during the design phase.

The examination of competitors includes a diverse set of eight companies, with two hailing from the Netherlands and the remaining six based in the United States. Each of these companies specializes in organizing both in-person and virtual events, and notably, six of them extend their services to include hybrid events as well. The competitors are; Kaltura, Vfairs, Hopin, InEvent, Remo, Zuddl, Appendee, and Let's Get Digital. This diverse group represents a comprehensive exploration of companies engaged in the dynamic landscape of event organization, providing insights into different approaches and offerings within the industry. For an overview table of the competitors with their features and a link to their websites, see figure 2.4.

Interaction and connectivity

A common trend among the explored competitors is the importance they place on fostering engagement, interaction, and connectedness in their events, mirroring the principles upheld by FX Agency. First of all, Hopin, guided by the slogan 'Plan one experience, reach multiple audiences,' employs one-to-one and group networking strategies to cultivate meaningful connections among both online and in-person attendees. Secondly, Remo distinguishes itself by concentrating on the simulation of authentic human relationships within their event experiences. Meanwhile, Zuddl takes a proactive approach by incorporating embedded call-to-action buttons directly into their webinars, aimed at steering high-intent conversations and further enhancing participant engagement. This shared commitment to elevating the experiential aspects aligns with the core philosophy of FX Agency in designing events that prioritize interaction and connectivity.

Basecamps

The examination of basecamps reveals a varied landscape among competitors. Out of the eight companies explored, five incorporate a basecamp into their event offerings, while two do not, and one's status remains unknown, potentially indicating its absence. The majority of basecamps align with the presentation style of FX Agency, featuring a blend of animations and static elements with navigation through different stages. Notably, some competitors stand out with distinctive features; VFairs allows users to personalize their basecamp experience by choosing between a linear layout or a consolidated view. InEvent introduces a dynamic element by showcasing numerous avatars traversing the virtual environment. Remo introduces versatility with two modes; an interactive networking option where users

Company	Virtual events	Hybrid events	Basecamp	Original features	Comments
Kaltura https://corp.kaltura.com/	Yes	No	No	Standing ovations of the attendees, live reactions, personal agenda with content recommendations (AI)	The event organizer can create the virtual event himself via customizable templates.
VFairs https://www.vfairs.com/event-management-platform/hybrid-event/	Yes	Yes	Yes, they even present different ways of showing the exhibit hall (basecamp) → overhead and horizontal view. They also have a virtual auditorium for live webinars	Smart matchmaking, mobile event app, 3D graphics, interactive avatars, Cross channel networking, scavenger hunt, vote for favorite photo booth, multilingual webinars and captioning, reserve meetings with people you want to talk to	3D animation to fly inside the event.Virtual lobby and virtual helpdesk.
Hopin https://hopin.com/	Yes	Yes	?	One on one networking. Personalized event calendar (AI)	Slogan: 'Plan one experience, reach multiple audiences'. They use the one to one and group networking to foster meaningful connections between online and in-person attendees.
InEvent https://inevent.com/en/go-beyond-virtual-hybrid-vh-events.php	Yes	Yes	Yes. Looks a lot like basecamps from FX. Many people walk through the screen. They also have a live studio.	Check in badges, they have many analytics during and after the event (budget tracking, customizable booking system, live analytics and data management live updates in the mobile app)	Slogan: 'Discover how InEvent platform can deploy engaging and customizable experiences at scale'
Remo https://remo.co/	Yes	Yes	Yes. As an attendees you can move from table to table and network. They have two modes, one for better conversations and one for more immersive webinar style.	Interactive whiteboard! Virtual business card! The tables have shuffle mode, locks and assigned seating options.	They focus on simulating authentic human relationships.
Zuddl https://www.zuddl.com/features/video-production	Yes	Yes. They even have network zones to call with online attendees	Yes	Pinned content, leaderboards, widgets for event engagements (interactive content like videos, links and forms to prompt action)	They have embedded call to action buttons within the webinar to drive high intent conversations.
Appendee https://appendee.com/nl/	Yes	No	Yes, but completely static	Users get a personal badge when entering the program which looks cool!	A little boring platform
Lets get digital https://letsgetdigital.com/en/hybrid-events/ideas/	Yes	Yes	No basecamp, only virtual event websites	Top-notch partner booths, push notifications,	They provide many tips for hybrid events. Are proud of organizing hybrid events.

Figure 2.4: Competitor analysis overview

can move between tables, and a webinar style offering immersive webinar experiences. However, Appendee's basecamp, while present, is static and lacks notable innovation compared to the dynamic features of FX Agency.

Innovative features

Competitors in the event organization space have introduced unique and innovative features that set them apart from FX Agency. Kaltura, for instance, stands out by providing a personalized event agenda that leverages Artificial intelligence (AI) to offer content recommendations based on attendees' prior information. Similarly, Hopin enhances networking experiences with one-on-one functions and personalized event calendars. VFairs incorporates smart matchmaking for networking sessions, interactive avatars, voting systems, and intelligent multilingual webinars with captioning. Furthermore, InEvent and Appendeee have added an extra layer to event commencement with online badge check-ins, while Remo introduces virtual business cards and emphasizes interaction with interactive whiteboards. Let's Get Digital offers distinctive top-notch partner booths and engages visitors through push notifications.

Conclusion competitor analysis

While FX Agency and its platform remain a solid and representative presence in the digital event market, the exploration of competitors has revealed a spectrum of original features. FX Agency's adherence to the industry's standard practices ensures a comprehensive understanding of the market and its challenges. Nonetheless, the distinctive offerings described by competitors, such as personalized event agendas, smart matchmaking, and interactive whiteboards, highlight the evolving landscape of digital events. As the industry continues to innovate, the identified features serve as valuable insights, indicating potential areas for FX Agency to consider enhancing its platform and staying competitive in the dynamic market.

Chapter 3

Related work

Exploring related literature is essential as it offers a thorough insights into the current knowledge and progress within a specific field. This exploration establishes a groundwork for this research by pinpointing gaps and potential areas for innovation. By examining previous studies, the present research can leverage established theories, prevent duplicate efforts, and actively contribute to the ongoing accumulation of knowledge in this domain.

This chapter presents related work in three sections. The first section (3.1) focuses on event digitization and technologies used during virtual and hybrid events. Secondly, section 3.2 describes different factors that influence human experiences. Furthermore, section 3.3 presents multiple frameworks explaining event experience design. This section dives deeper into different elements responsible for the creation of immersive and memorable event experiences. Among other things, these elements encompass active attendee participation, emotional energy and storytelling. Lastly, section 3.4 provides a conclusion of the main insights found within this chapter.

3.1 Event digitalization

Events have long been central in facilitating human interaction, knowledge sharing and networking. However, there are several different opinions on what an event exactly entails. First of all, Geus et al. [7] state that events are infrequently occurring events of limited duration that provide the user with leisure and social opportunity beyond the everyday experience. Secondly, Berridge et al. [8] add that an event can be seen as a simulated stage managed environment which creates authentic moments of experiences.

The landscape of events has evolved significantly, giving rise to the concept of virtual event design. Estanyol [4] states that next to COVID being the catalyst for event digitalisation, also the increase in digital literacy among new generations have a huge impact on the digitalisation of events. Additionally, the demands made by society for greater sustainability

within events and the advances in mobile technology, accelerate the digitalisation of events [4]. Therefore, more and more events take a virtual format.

Nevertheless, it has become clear that virtual events also present a set of disadvantages that are worth considering. First of all, the concept of 'zoom fatigue' has gained prominence, reflecting the increased exhaustion resulting from prolonged screen time and online interactions [2],[3]. The current virtual formats can also limit opportunities for spontaneous discussions, interpersonal engagement, and community building [2],[3]. Lastly, virtual event formats often involve technical challenges, whether at the organisational side or at the participant side at home. These challenges can influence the attendee experience in a negative way.

To offer attendees the best of both worlds, the concept of hybrid events has emerged as a promising solution. However, to ensure the success of hybrid events and provide a truly exceptional experience, it is crucial to address the shortcomings that originated from the virtual event landscape. Additionally, a key challenge is to ensure that all attendees, whether participating online or in-person, feel connected and equally included [4]. Ultimately, the aim of hybrid events is to seamlessly combine the advantages of both virtual and in-person gatherings, granting participants the flexibility to choose their preferred mode of attendance.

3.1.1 Technologies

In the realm of hybrid events, the integration of various technologies has emerged as a central factor in enhancing the overall attendee experience. Notably, Neuhofer et al. [9] underscore that the event industry has been pioneering in the arena of digital technologies for many years. Presently, attendees not only anticipate but also expect the use of incorporated technology to support, co-create, and personalize their event experiences [9].

Building on this evolution, Solaris [10] traces the progression of technology's role in events. This trajectory started with online registration and mobile event applications, mostly serving a practical and functional role. Subsequently, engagement modules such as polls and live chat functionalities were introduced. These modules were designed to increase the interactivity among attendees, whether participating online or at the site itself [10].

More recently, technologies such as Virtual reality (VR), Augmented reality (AR), and AI all have found their application within the realm of event design [10]. However, it is worth noting that these innovative technologies are not without their challenges. For instance, VR experiences can be perceived as disconnected and isolating, lacking a sense of communal engagement [11]. Consequently, their incorporation may not necessarily enhance the overall event experience. Moreover, the efficacy of these innovative technologies is intrinsically linked to attendees' willingness to embrace and accept them. If attendees are resistant or unreceptive to these technologies, their potential to augment the event experience may be limited [9].

Another technological advancement reshaping event design is the integration of social me-

dia. Social media platforms offer a dynamic avenue for event organizers to connect with participants more intimately, extending communication and engagement beyond the event itself, as highlighted by Estanyol [4]. It is exemplified by practices like creating event-specific hashtags and updating social media profiles. These technologies are integral in offering attendees a more personalized, unique, and memorable experience [4]. Furthermore, social media plays a central role in event promotion and establishing two-way communication channels. This encompasses live streaming and the development of event-specific apps.

To evaluate the digital maturity of a virtual or hybrid event, Ryan et al. [12] have developed a comprehensive framework. This framework delineates four distinct states in which an event can exist, with the highest level, referred to as "Event 4.0," characterized by integrated and dedicated technology engagement. For a visual representation of this framework, please refer to Figure 3.1. This framework serves as a valuable tool for assessing the extent to which technology is seamlessly integrated into an event, thereby contributing to the realization of an enhanced attendee experience [12].

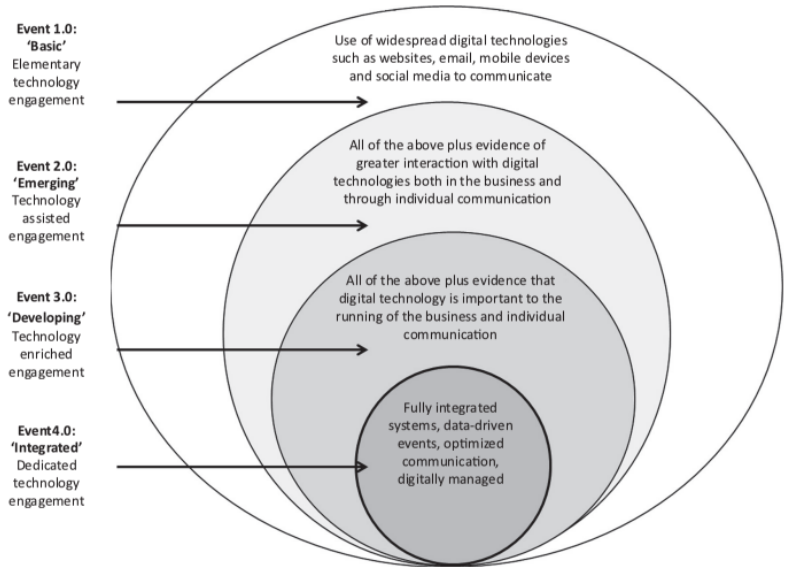


Figure 3.1: Event digitalisation framework by Ryan et al. [12]

3.2 Experience design

To be able to create unforgettable event experiences, it is important to fully understand human experiences and how these are formed. Berridge et al. [8] and Richards [13] emphasize the dynamic nature of human experiences, highlighting their tendency to evolve continually under the influence of emotional sensations. These dynamic shifts in emotions play a central role in shaping the contours of an individual's experience.

Within the realm of experiential understanding, Mannel and Kleiber [14] have identified

three fundamental dimensions. They emphasize the cognitive, conative, and affective dimensions, stating how thinking, intent, and emotions intertwine to create rich and nuanced experiences [14]. Moreover, Geus [7] concurs, underlining the role of cognition, reflective thinking, and intellectual impressions in the formation of experiences. Therefore, the acquisition of knowledge and the process of learning are essential components woven into the fabric of human experiences.

O'Sullivan and Spangles [15], offer a comprehensive viewpoint, contending that an experience involves a multifaceted interplay that engages multiple facets. This interplay encompasses physical, mental, social, spiritual, and emotional dimensions. They also state that an experience can be divided into three distinct stages. The first stage is the pre-experience phase, encompassing all that transpires prior to active participation in the experience itself. The second is the participation stage, denoting the actual involvement in the experience. Finally, the post-experience phase signifies the impact of the experience, capturing its enduring impact and resonance. [15]

On the other hand, Knutson et al. [16] introduce a contextual dimension to our understanding, contending that experiences are profoundly influenced by the environment in which they unfold. Factors such as personalisation, accessibility, and utility play central roles in shaping the nature and impact of an experience. Co-creation is the development of experience environments in which individuals can co-construct their own experience [17]. For example designing the program, voting for dress-codes or online interactions before the event [17].

Lastly, it is essential to acknowledge the inherent elusiveness of experience design, as Patterson and Getz [18] point out. A essential aspect is the transformation an experience brings about, which could be in memory, skill or emotion. Berridge [8] states that an experience should engage, inspire, educate of entertain. Thus, a substantial portion of the experience remains intertwined with the personal realm of emotions and individual connections, defying complete standardization of design.

3.3 Event experience design

Designing (hybrid) events involves a multitude of decisions, both broad and nuanced. The more evident factors include choices related to the event's theme, layout, decor, technical prerequisites, entertainment, and catering, all of which play central roles in shaping the event's character [18]. However, it is not just these apparent elements that matter. Specific design considerations aimed at elevating the overall attendee experience are equally crucial. These considerations revolve around themes such as evoking emotions, fostering uniqueness, incorporating novelty, encouraging active participation, weaving captivating narratives, and tailoring experiences for personalisation. When examining the creative and non-creative aspects of event design, it is worth noting the insights offered by Berridge [8], who underscores that design should be considered the foundational framework for successfully crafting event experiences. In the subsequent paragraphs, a deeper exploration of these elements is conducted to show their importance.

However, as the realm of event design is explored, it is important to acknowledge the perspective shared by Patterson and Getz [18]. They emphasize that experiences cannot be entirely engineered, given their inherently personal nature and their susceptibility to the influence of social and cultural constructs. Getz and Page [19] concur with this viewpoint. They assert that an event experience is intricately linked to an individual's state of mind and specific circumstances rather than solely determined by the event's theme, program, or setting. Consequently, while design elements can be explored, it remains important to recognize that an event experience cannot be entirely predetermined.

Several frameworks are created to explore the different elements for hybrid event design. First of all, Geus et al. [7] have introduced a comprehensive framework for designing event experiences, incorporating many of these different design elements. Within this framework, the design elements are subdivided into three main groups; conditions, core and outcomes. Relations between these groups are displayed using arrows. Refer to Figure 3.2 for an illustrative representation of this framework. Another framework that incorporates many event experience design elements and can be used during the event design phase to design for optimal engagement is developed by Olya et al. [20] and can be seen in Figure 3.3. Again, relations between event design elements are displayed in arrows. The different design elements provided within these two frameworks are further explored in the following subsections.

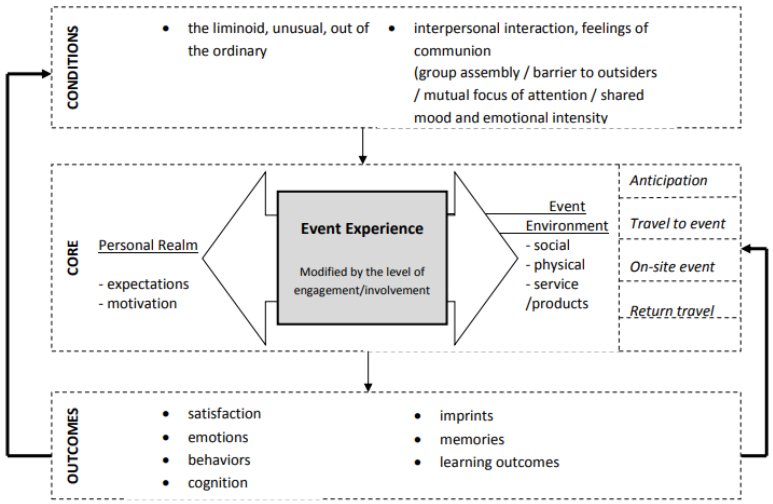
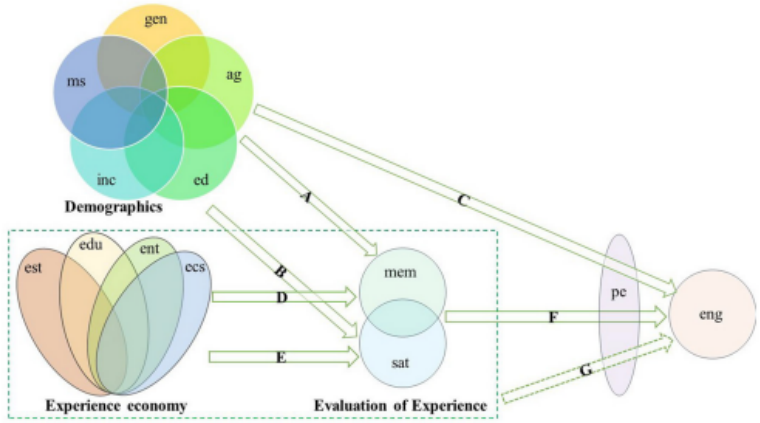


Figure 3.2: Event experience design framework by Geus et al. [7]



Notes: Gen: gender; ag: age, ed: education level; inc: income level; ms: marital status; est: esthetics; edu: education; ent: entertainment; ecs: escapism; mem: memories; sat: satisfaction; pe: past experience; eng: visitor engagement

Figure 3.3: Event engagement framework by Olya et al. [20]

3.3.1 Emotional energy

To begin, as highlighted in section 3.2, it is essential to recognize the central role of emotions in shaping an unforgettable event. As Palmer [21] points out, emotions act as a crucial bridge between the event itself and the resulting experience. Furthermore, Simons [22] and Nelson [23] concur, emphasizing that a high level of emotional energy and emotional connection significantly enhance the quality of event experiences. Additionally, it is worth noting that the event environment plays a substantial role in shaping the user's experience and emotional connection to it, as emphasized by Nelson [23]. Thus, in the context of events, effectively harnessing these emotions requires a thoughtful and comprehensive design approach comprising various elements.

3.3.2 Out-of-the-ordinary and novelty

Event experiences are formed due to the 'out-of-ordinary' design elements of an event. Event experiences should be happening outside the context of normal life, with a sharp contrast to everyday life [7]. Simons agrees with this view and adds that out-of-ordinary events create a temporary sense of togetherness and one-ness amongst participants [22]. A factor that helps creating an 'out-of-the-ordinary' experience is the novelty factor. Novelty assumes particular significance, introducing attendees to something novel, unfamiliar, unique and special [24],[22]. Implementing these design elements can provide attendees with a new experience which stands out. Therefore, it can provide an improving attendee engagement and experience during events.

3.3.3 Storytelling and personalisation

On the other hand, the significance of storytelling and personalisation cannot be overstated [13],[12]. Participants should remain immersed in a continuous narrative flow, encountering progressively more scenarios that aligns with their motivation and skill levels, thus maintaining an optimal level of engagement [21]. Additionally, Neuhofer et al. [9] underscore the significance of personalized event experiences, suggesting that one way to achieve this is by offering attendees personalized content derived from pre-existing information. This perspective aligns with the views of Ryan et al. [12] , who also emphasize the role of data in enhancing personalisation. They not only acknowledge its capacity to improve personalisation but also highlight its potential to confer a competitive advantage and foster connections among various stakeholders [12].

3.3.4 Active attendee participation

When delving into the realm of attendee engagement and its central role in shaping event experiences, it is crucial to consider the insights of Geus et al. [7] and Estanyol [4]. These authors underscore the significance of active attendee involvement and heightened participation, not only for fostering connections among attendees but also for granting individuals the ability to customize content and unleash their creative potential [7],[4]. While active attendee involvement can manifest in various forms within (hybrid) events, interactions stand out as a crucial component. The interactions among attendees and between attendees and the event environment, as highlighted by Patterson and Getz [18] and Berridge [8], significantly shape attendees' experiences. Therefore, it is important to design an environment where attendees can freely interact throughout all stages of the event, enabling them to forge their own connections with others.

Similarly, Collins, as described in [25], has developed an interaction ritual framework (figure 3.4). This framework can be employed when designing for interactions within event environments. It presents four elements that foster community building, group solidarity and emotional energy among attendees. These elements are; group assembly (bodily co-presence), barriers to outsiders, mutual focus of attention and a shared mood [25]. Especially the first element, group assembly (bodily co-presence), is hard to achieve in a virtual event environment as there is no real bodily co-presence present (yet).

3.3.5 Community building

Event experiences should be a rich tapestry of interactions, connections, and shared moments. Arai and Pedlar [25] emphasize that these experiences are fundamentally rooted in community building, a process reliant on various interactions among attendees. This underscores the importance of community building within event design.

Osler's work has introduced four fundamental factors that contribute to the establishment of community bonds. This is done by emphasizing a collective 'we-feeling' within groups, drawing from Walter's foundational principles [26]. The first of these factors, known as 'common intentionality,' posits that individuals must share a commonality, whether it be a

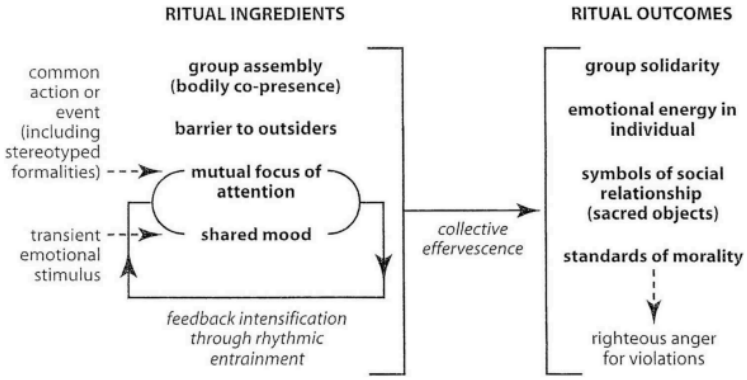


Figure 3.4: Interaction ritual framework presented by Collins as cited in [25]

shared space, intentional objects, content, or focus. The second factor, 'reciprocal awareness', underlines the importance of mutual awareness among individuals. This concept can pose unique challenges in online and virtual settings as attendees can often not see others joining the event as well. The third factor, 'interdependency,' implies a state of integration where one's own experience becomes intertwined with that of others, resulting in a mutual enrichment of experiences. For example, in a physical gathering, a humorous moment may become even more enjoyable when shared with a visibly amused neighbor [26]. Again, this concept is much harder to achieve within a virtual environment, as it is difficult to express emotions via a screen. The last factor, referred to as 'affective requirement,' underscores the necessity for a true 'we-experience' where every participant shares the experience of feeling a bond or unification with others. This unification should be affective, not only based on cognitive judgement and should preferably be experienced by all members involved [26]. To achieve this, both parties should be open to form an emotional connection. [26]

Next to Osler's fundamental factors [26], Temkin and Zdatny [27] have also formulated five design principles aimed at fostering community building and a sense of belonging within groups. Their first principle, 'self-image,' posits that individuals are inclined to engage with organizations whose organizational identity aligns with their own, reflecting a parallel to Osler's 'common intentionality' factor. The second design principle, 'connection,' highlights users' desire to interact with their surroundings in ways similar to how they interact with other individuals. This involves personalizing communications and celebrating shared interests to humanize the user experience [27]. The third principle, 'acceptance,' recognizes the inherent human need to feel like a welcomed and valued member of a larger group, emphasizing the importance of fostering a sense of belonging. The fourth principle, 'community,' seeks to bring users closer to each other by facilitating connections among individuals who share common interests and experiences. This approach aims to cultivate deeper emotional ties among community members. The fifth and final principle, 'reputation,' is centered on enabling users to showcase their skills and influence, acknowledging the emotional significance of how individuals are perceived within their respective communities [27].

3.3.6 Digital nudges

In a broader perspective, an event can be perceived as the result of a discrepancy between expectations and reality. As proposed by Richards [13], events possess the potential to serve as agents of change within social structures, ushering in new realities. However, the way it does so is heavily dependant on previous experiences and expectations of the attendee. A way to minimize this dependency in virtual settings is by using digital nudges. Mirsch et al. [28] affirm that events offer a carefully designed choice environment, capable of influencing participants' beliefs or actions while preserving their freedom of choice. Leveraging digital nudges, these authors suggest that the inherent imperfections in human decision-making can be addressed to guide individuals toward specific directions and thereby improve the attendee's experience of the event.

3.4 Conclusion related work

In conclusion, this chapter has undertaken a comprehensive exploration of related work in three main sub-sections. First of all, section 3.1 delved into the realm of event digitalisation, highlighting the evolution from traditional to virtual and hybrid events. The integration of various technologies, such as VR, AR, and AI, emerged as crucial in enhancing the overall attendee experience. However, challenges like 'zoom fatigue' and technical issues associated with virtual events were also acknowledged.

Secondly, section 3.2 focused on understanding human experiences, emphasizing the dynamic nature of emotions and the multifaceted dimensions involved. Recognizing the role of cognition, emotions, and personalisation, it underscored the nature of experience design and its inherent connection to individual state of mind.

Thirdly, section 3.3 delved into event experience design, exploring elements such as emotional energy, out-of-the-ordinary experiences, storytelling, personalisation, active attendee participation, and community building. Frameworks by Patterson and Getz [18] and Olya et al. [20] were presented to guide these elements of hybrid event design. Furthermore, in navigating the landscape of event design, it is crucial to acknowledge the viewpoints presented by Patterson and Getz [18], emphasizing that experiences cannot be entirely engineered, given their inherently personal nature. Thus, despite the advancements in technology and design, an event experience remains intricately linked to an individual's state of mind and specific circumstances.

As the chapter concludes, it sets the stage for the subsequent chapters, providing a foundational understanding of the existing literature and insights that will inform the discover and ideation phase of this research.

Chapter 4

Methodology

This research employs a qualitative research method with the goal of answering the main research question by a user evaluation of a PoC. This is done by following the Double Diamond Design process from start to finish. The first section explains the decision of choosing a qualitative research approach instead of a quantitative research approach (section 4.1). In section 4.2, the Double Diamond Design process is explained and illustrated. After that, the four different stages of the Double Diamond process are explained, including the different methods used inside each stage. This chapter ends with a section about the methods used within the evaluation the PoC (section 4.7).

4.1 Qualitative research approach

In the realm of scientific exploration, the reliance on quantitative and experimental methodologies is unquestionable. However, the field of Human computer interaction (HCI) unveils a challenge: the existence of complex, socially rooted phenomena that defy facile quantification and ethical analysis through conventional experiments [29]. This ensures that quantitative research is difficult to perform within the field of HCI. Next to that, it is a common problem in HCI research that the true nature of HCI issues often remains elusive at the start of a study. According to Adams et al., this makes it very difficult, if not actually impossible, to define the variables necessary to do quantitative research [29].

Additionally, within the domain of HCI research, it is necessary to comprehend the varied perceptions of usability issues across diverse user groups. This involves identifying users' emotional and social motivations, perspectives, expectations, trust, identity, and conformity to social norms [29]. As a response to these evolving needs, HCI research is actively gravitating towards qualitative methodologies as the means to provide the requisite insights [29].

Therefore, the methodology within this research is qualitative in nature. This entails the

collection and analysis of non-numerical data to gain insights into concepts, opinions, and experiences. The qualitative data serves as a powerful tool for developing profound understanding of the defined problem and for fostering the generation and evolution of innovative solutions [29],[30]. Another benefit of qualitative research is its flexibility [30]. This means that the data collection and analysis process can be adjusted as new ideas or patterns emerge, rather than being rigidly predetermined.

Nonetheless, engaging in qualitative research comes with its disadvantages, with the most prominent being the inherent subjectivity of the method. Given that the researcher takes the central role in data analysis and interpretation, the reproducibility of qualitative research is limited [30]. The interpretation of the same data can vary because it is the researcher who determines which data is relevant during the data analysis. However, as stated by [31], subjectivity does not always mean a bad thing, as long as the researcher is aware of the threats (potential biases), and uses subjectivity to fulfill the research objectives [31].

4.2 Design process

The methodology employed in this research is structured around the Double Diamond method, a relatively new and widely recognized design process. Originating from the Design Council in 2005 [32], this method comprises four distinct phases: discover, define, develop, and deliver (figure 4.1).

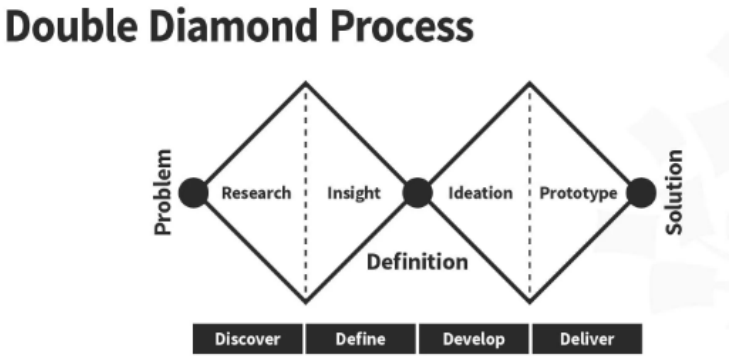


Figure 4.1: Double diamond process design by the Design Council [32]

The first diamond, which comprises the discover and define phase, is known as the 'problem space'. This phase primarily focuses on gaining a comprehensive understanding of the problem at hand. The final step within this initial diamond involves the formulation of a design challenge, which then serves as the starting point for the second diamond, known as the 'solution space'.

The 'solution space' encompasses the development and delivery stage. During these stages, solutions to address the design challenge are generated, evaluated, constructed, and tested. It is important to note that this is an iterative process, signifying that once an idea is chosen and implemented, the insights obtained can lead to adjustments to the idea. Ultimately,

this iterative cycle results in the selection of an optimized idea, which is then used to create a PoC.

In recognition of the central role played by PoC evaluation within this research, an additional 'evaluation' phase is incorporated following the 'deliver' phase. This supplementary phase draws inspiration from the final stage of the Design Thinking methodology [32]. Just as the Double Diamond Design process, Design Thinking is an iterative, human-centered approach dedicated to comprehending user needs, redefining problem statements, and creating and evaluating prototypes [32]. Thus, a combination of these methods is used to ensure a full cycle of product development and thereby an answer to the main research question. A complete overview of the methodology and the customized sub-activities can be seen in figure 4.2.

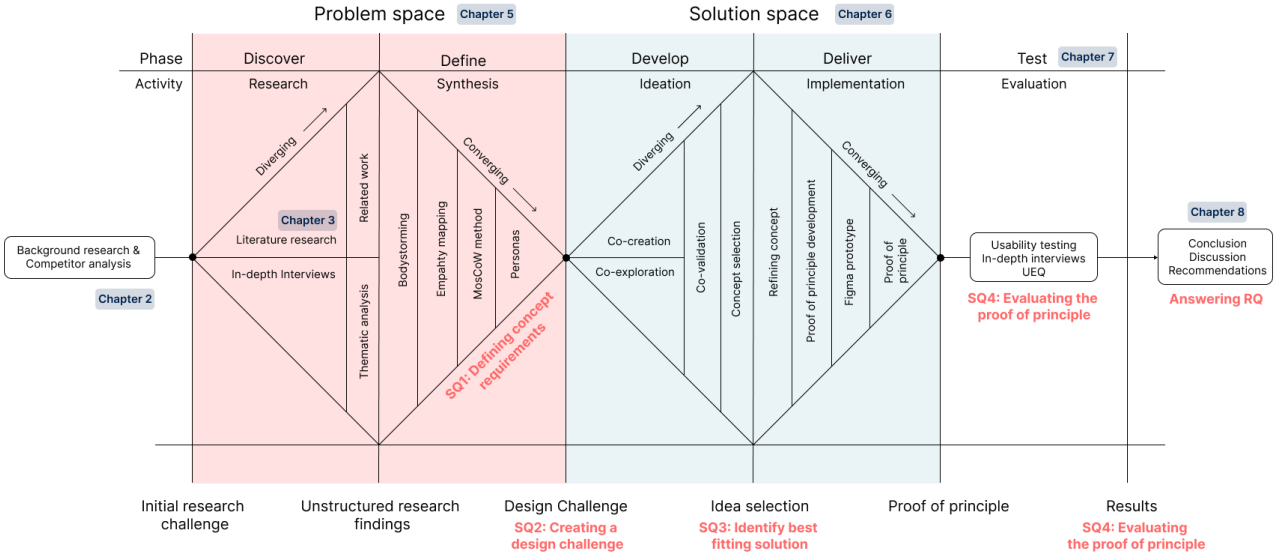


Figure 4.2: A schematic overview of the research methodology: a customized double diamond followed by an extra 'test' phase. This figure includes the sub-activities performed inside the different phases. Additionally, the activities in which a (sub) research question is answered is indicated on the schematic.

4.3 Discover

The first step within the created framework is the discovery phase. The goal of this phase is to understand the nature of the problem and to identify the specific target group that encounters this problem. Two distinct methods are used to obtain information; Desk research and in–depth expert interviews. Thereafter, thematic analysis is used to translate the interview findings into insights for this research.

4.3.1 Desk research

An important method within this study is desk research. Desk research is needed to provide a baseline in understanding experience design frameworks, current (hybrid) event trends, and technological possibilities. This entails the exploration of prior research obtained via Google Scholar, Scopus and ScienceDirect.

Moreover, a comprehensive competitor analysis is done to find competitors' strengths and weaknesses relative to FX Agency, pinpointing potential market gaps. This analysis is needed to identify opportunities to enhance the user's event experience by learning from the successes and shortcomings of competitors. The identification of competitors is accomplished through an extensive search on Google.

To conclude, the objective of desk research is to foster a deep understanding of event experience design, allowing to empathize with end-users and provide valuable insights for optimizing their event experiences.

4.3.2 In-depth interviews

The second method within this phase is conducting in-depth interviews. These interviews are structured dialogues between the researcher and interviewee, with a specific goal directed by the researcher. These interviews center on understanding the needs, experiences, and thoughts of interviewees, primarily achieved through discussions with experts in the corporate hybrid event field. Conducting these interviews with field experts is essential, as they can provide a comprehensive overview of the research area, offering insights into recent innovations, successes, and failures [33].

These in-depth interviews are of a semi-structured nature, signifying that the researcher initiates the conversation with a predefined set of questions, but is allowed to deviate from this script. Thus, when the conversation leads towards another (more interesting) direction, the interview may continue towards that direction. This allows for follow-up questions and thereby developing a deeper understanding of the topic. The in-depth interviews are structured using the idealized interview flow of [34], as this provides a clear framework which ensures all important aspects are addressed. The framework can be found in appendix A.

4.3.3 Thematic analysis

A reflective thematic analysis is conducted to uncover and identify themes and patterns within the interview data. The approach employed in this research is known as 'theoretical' thematic analysis. This method is guided by the researchers' specific interest in the topic under investigation. Consequently, it yields a more focused and in-depth analysis of the desired aspects of the data, however it may provide a less comprehensive overview of the entire dataset [35].

In the context of this research, a theme is defined as 'an abstraction that captures something important within the data in relation to the research question'. It signifies a level

of patterned response or meaning that is visible within the dataset [35]. Ideally, a theme should consist of multiple instances across the dataset. However it is important to note that the frequency of instances does not necessarily correlate with the theme's significance. Given the qualitative nature of this analysis, there is no fixed threshold specifying what proportion of the dataset must exhibit evidence of a theme for it to be deemed a theme [35],[36]. Ultimately, personal judgment plays a central role in determining whether a particular abstraction qualifies as a theme. Therefore, before assigning a code or theme, the researcher must consider whether it captures something of significance in the context of the entire research [36].

The process of theoretical thematic analysis is characterized by six flexible steps, as outlined by [35],[37]. These steps serve as a guide rather than strict rules and include: (1) familiarizing yourself with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and lastly, (6) producing the research report. These steps provide a structured framework for conducting the analysis and serve as a systematic approach to identify, analyze, and report on the themes and patterns within the data.

4.4 Define

The goal of the 'define' phase is to answer SQ1 and SQ2 by formulating a design challenge fitting the insights of the discover phase and the initial activities of the define stage. To realize this, several methods are used. First of all, bodystorming and empathy mapping are used to create additional solution requirements from a user perspective. These requirements, together with the findings from the discovery phase, are ranked according to the MoSCoW method, which answers SQ1. Thereafter, personas are created to represent the problem space. With these insights in mind, the design challenge is formulated. This design challenge answers SQ2 and thereby closes the problem space.

4.4.1 Bodystorming

To gain a deeper understanding of the experience of end-users and thereby better define the design challenge, the bodystorming technique is employed. Bodystorming involves immersing a researcher's own body in a physical situation to enhance understanding and ideation. In this research phase, it is specifically used to foster empathy with the end-users, allowing the researcher to observe their activities, actively participate in their experiences, and gain insights from the user's perspective. Therefore, this approach aids in comprehending the users' needs and behaviors within their specific context.

As stated by [38], bodystorming is categorized as an 'experience prototyping' tool and is a crucial component in understanding and developing interactive systems. It also plays a central role in fostering innovation. Furthermore, according to [39], bodystorming can enhance idea generation by considering entire scenarios rather than focusing solely on individual experiences. In this way, bodystorming transforms abstract concepts into tangible experiences and provides valuable observational data [38].

Finally, as asserted by [40], bodystorming directs attention towards the behavioral and emotional aspects of an experience or solution, rather than fixating solely on the technology involved. They argue that many designers tend to prioritize creating technology that sustains the overall experience, instead of developing a solution where technology serves as a means to an end [40]. Therefore, bodystorming is a valued activity within the define phase of this research.

4.4.2 Empathy mapping

Empathy involves stepping into the shoes of others, comprehending their lives, and initiating problem-solving from their perspectives. HCI is built on the foundation of empathy, operating on the premise that designing for individuals serves as the roadmap to innovative solutions [33]. Therefore, empathy mapping serves as a valuable visualization tool for designers, enabling them to gain deeper insights into their target audience. By offering a set of prompts, this tool facilitates the exploration of a target group's thoughts, emotions, motivations, desires, and needs [41]. Its primary aim is to redirect the designer's attention towards the specific requirements of the target group, rather than their own preconceptions. Therefore, it encourages a shift towards a focus on emotional aspects and experiences, rather than solely concentrating on behavioral patterns [41]. Other advantages of an empathy map are; larger understanding of the target audience, more organized information in an easy understandable format, a fast and inexpensive method and it allows for easy customization.

4.4.3 MoSCoW method

The MoSCoW method is a prioritization tool that can be used to prioritize project requirements. It categorizes these requirements into four groups: Must-haves, Should-haves, Could-haves, and Won't-haves. 'Must' features represent the non-negotiable essentials, without which the project's viability is compromised. 'should' features, while important, are not vital; their omission may cause some inconvenience but does not render the solution non-viable, often allowing for workarounds [42]. 'could' features, on the other hand, are desirable but not as critical as 'should' features and can be pursued if there is extra time and resources available. Lastly, 'won't' features fall into the category of nice-to-haves but are excluded due to constraints, such as time or budget limitations, as they do not significantly impact the overall experience [42].

This method is especially useful when there are many competing demands and it is not possible to do everything at once [43]. Next to providing clear prioritization, other advantages are facilitating effective communication among project stakeholders, and allowing flexibility across different industries. It helps to focus on high-value features early in a project, improving time-to-market and risk management.

However, it has its downsides, including subjectivity in the prioritization process, potential for overlooking valuable features, and difficulty in assigning categories. Additionally, it may not handle changing priorities well and can sometimes result in the omission of critical elements in the 'won't-have' category. Therefore, it is important to use the MoSCoW

method thoughtfully, with an awareness of its limitations and in a collaborative manner with the project team and stakeholders [43].

4.4.4 Personas

Personas serve as fictional characters crafted to embody various user types potentially interacting with the system. Their purpose is to represent the problem space and to foster empathy with the intended users by shifting attention towards their perspectives [44]. Moreover, when formulating the design challenge with the assistance of these personas, it guarantees a human-centered approach, keeping the focus on the genuine requirements of diverse end-users. Ultimately, these personas play a central role in guiding the ideation process, steering it towards the objective of delivering a good user experience tailored to the target audience [44],[45].

The personas developed adhere to the principles of 'Lean UX', embracing the concept that 20% of the effort can yield 80% of the results, a phenomenon often associated with the Pareto Principle [45]. These personas are designed to provide just enough detail to comprehensively understand the users' mindset, desires, and tasks. Referred to as 'proto-personas,' they typically include key information such as the user's name, a photo for visual reference, their job title, overarching goals and needs, as well as their behavior and beliefs, and a snapshot of their characteristics. By focusing on these essential aspects, lean UX personas streamline the process while ensuring that the researcher gains valuable insights into the user base, enabling more efficient and effective design decisions [45].

4.4.5 Design challenge

A design challenge functions as a bridge, highlighting the gap between the current problem state and the desired state of the system. It illuminates the path for effective problem-solving and innovation [46]. In the realm of Design Thinking, a well-crafted design challenge possesses several critical characteristics. First of all, it should be concise, actionable, and expressing the challenge at hand [33]. Furthermore, the design challenge plays a central role in not only defining the purpose and direction of the user experience but also in cultivating a sharp focus, ensuring that the user remains at the forefront throughout the design process [33],[46]. Within the design challenge, it is important to keep room for imagination, experimentation and changes [33],[46]. To craft a well-defined design challenge, the 'Frame your design challenge' worksheet is utilized, following the four steps outlined in [33].

4.5 Develop

With the 'develop' phase, the second diamond has started. Its objective is to identify concepts that could answer the formed design challenge (section 4.4.5). One of the best ways to quickly generate many concepts is brainstorming. Therefore, a co-creation brainstorming session is done. After that, these ideas are explored further in a co-exploration session and a co-validation session is done to select the best fitted idea. The best fitted idea answers SQ3 and serves as a basis for the 'deliver' phase.

4.5.1 Co-creation

The rationale for conducting a co-creation brainstorming session is to harness the collective creative potential of a group, typically consisting of 5 to 10 participants. This approach, as suggested by [41], facilitates the rapid generation of a multitude of ideas within a short time frame. It not only offers an engaging experience for participants but also caters to their social interaction needs, as emphasized by [47]. The primary objective is to prioritize the quantity of ideas over their quality, giving precedence to emotions and intuition over rational thinking, as highlighted by [41].

To ensure the effectiveness of a brainstorming session, it is essential to adhere to specific principles initially outlined by Osborn in 1957, as noted by [48]. These principles include: 1) valuing idea quantity over quality, 2) eliminating criticism, 3) encouraging freewheeling and outlandish ideas, and 4) seeking opportunities for combining and enhancing concepts. Among these, the emphasis on idea quantity is paramount, a viewpoint shared by [47], [48] [49].

Within the co-creation session, a range of brainstorming techniques are employed to stimulate idea generation; such as rapid ideation, brainwriting, NUF prioritizing and idea analysis. These technologies are further explained in the corresponding section 6.1.

4.5.2 Co-exploration

The rationale for conducting a co-exploration session is to further explore the best solutions of the co-creation session. Therefore, these co-exploration sessions transform the best ideas found in the previous stage (4.5.1) into developed concepts. Amongst other things, small user journeys are crafted, changes are made in interaction possibilities and use-case scenarios are explored.

4.5.3 Co-validation

As the co-exploration session still explores multiple concepts, this phase is focused on finding the best fitted concept within this research. This is based on three main aspects; requirements, value and costs. Within the requirement check, the concepts are compared to the requirements found in the problem space (section 5.5). The more requirements it checks, the better suited the concept. Secondly, the value of the concepts is explored. Lastly, the costs of each concept are estimated and displayed in the form of coins ranking from one to five. This co-validation session should be done with several professionals involved, as they can provide their experienced and professional opinion on the matter.

4.6 Deliver

The goal of this fourth phase is to create a PoC which can be tested and evaluated in the following phase. The development of the PoC is done in several stages with small evaluations and iterations in between. No sub-research question is answered in this phase, as the developed PoC is used to answer SQ4 in the next phase.

4.6.1 Paper prototyping

The creation of a paper prototype serves a crucial purpose in the design process, facilitating the realisation of a concept and the testing of various design decisions. The use of low fidelity in a paper prototype makes it easy to implement changes swiftly, allowing for rapid iteration [50]. Furthermore, given that this activity is intended to convey an idea rather than achieve perfection, one can efficiently navigate through iterations, as recommended in [33]. This approach not only guides the design process but also helps in mapping out the information architecture and visualizing the ultimate user flow. By employing a paper prototype, designers gain a tangible tool to assess and refine their ideas, fostering a more efficient and effective development process [33],[50].

4.6.2 Heuristic evaluation

A heuristic evaluation is a formative evaluation method. This means it can be applied early in the product development life cycle to discover insights and shape the design direction [34],[51],[52]. Therefore, heuristic evaluation accommodates both low and high fidelity prototypes and finds its utility during both the prototype development and testing phases.

The inception of the heuristic evaluation method can be attributed to Nielsen and Molich in 1990, as cited in [34]. They introduced this method as an economical and time-efficient alternative in comparison to other usability research methods. Their pioneering work identified ten essential heuristics that a product ought to adhere to in order to ensure a good user experience. It is worth noting, however, that the complete satisfaction of these ten heuristics does not inherently guarantee alignment with users' specific requirements. Additionally, major problems have a higher probability than minor problems to be found [51]. Nevertheless, adherence to these heuristics significantly reduces the likelihood of encountering poor design decisions [34].

4.6.3 Proof of Concept (PoC)

To unlock the potential of the concept, one can simplify the concept while preserving its crucial elements. The objective is to discover the most basic and efficient version by closely examining and removing unnecessary complexities or hindrances that may slow down the progress. The goal is to achieve a clear prototype outlining the core idea and its interactions without unnecessary details. This streamlining not only speeds up the testing process but also exposes essential aspects for future development and improvement.

4.7 Evaluate

The goal of this evaluation phase is to test and evaluate the PoC developed in the previous phase. The main objective is to explore in what ways the PoC achieves to reach the set requirements and thereby contributes to a community building environment within hybrid events. This evaluation is user-centered and is done in multiple steps. Within the first step, participants interact with the PoC while they think-aloud. The second step is conducting a semi-structured interview in which the previous concept experiences are explored. Last

of all, the short version of the User experience questionnaire (UEQ) is completed by the participant.

4.7.1 Usability testing while thinking aloud

This initial step relies on participant engagement with the PoC. In this stage, the participant reads a scenario describing the eventual application of the concept and is then presented with the PoC itself. Following this, the participant engages with the PoC using a task list. This list is designed based on the anticipated final use of the solution, mirroring the exact interactions expected from participants in a real hybrid event.

During this step, participants are prompted to think-aloud, wherein they articulate their thoughts while navigating the PoC. This cost-effective and adaptable approach yields valuable insights for enhancing the design [53]. Notably, it allows the identification of participant misconceptions, which can then be transformed into practical recommendations for redesigning the system.

Nevertheless, this approach has its drawbacks. Speaking one's thoughts directly can feel unnatural, posing a challenge for participants to sustain the necessary monologue [53]. Moreover, individuals may hesitate to speak without careful consideration, fearing the perception of appearing unintelligent. Consequently, participants may offer filtered statements rather than freely expressing their spontaneous thoughts. Hence, researchers must actively prompt participants to ensure continuous engagement in the conversation.

While the participant engages with the PoC, the researcher conducts observations utilizing an observation table. Furthermore, voice recordings are employed to gather supplementary insights and provide a comprehensive understanding of the participant's interaction.

4.7.2 Semi-structured interview

Another method in this evaluation entails conducting semi-structured interviews with the participant. These interviews serve the purpose of understanding the rationale behind participants' actions. Therefore, this interview seeks to explore participants' thoughts, opinions, and frustrations about the PoC. Additionally, questions are asked about the future use of the solution. Again, the semi-structured approach is based on the methodology described in [34], as detailed in appendix A.

Deductive thematic analysis

The interview data is examined with the help of two methods. The first method is inductive thematic analysis and it is explained in section 4.3.3. This method is used as it provides new insights which could improve the user experience of the concept. The second thematic analysis method is called code-book thematic analysis and uses a deductive approach. This means that the codes are know beforehand and they are based upon earlier done research. This aims to produce reliable and consistent findings, used to answer SQ4.

4.7.3 User Experience Questionnaire (UEQ)

The last step within this evaluation involves participants completing the short version of the user experience questionnaire (UEQ). The UEQ provides the opportunity to evaluate the user experience fast and efficiently [54]. The UEQ measures both classical usability aspects such as efficiency, perspicuity and dependability and user experience aspects such as originality and stimulation [55]. Maintaining a brief questionnaire is essential to ensure participants maintain their attention span. Especially as the participants already participated in a usability test and a semi-structured interview before. Therefore, it is chosen to do the shorter version of the UEQ instead of the entire UEQ.

All questions within the UEQ utilize a 'likert scale'. According to[34], the likert scale is one of the most commonly employed rating scales [34]. In this study, a bipolar construct is employed, featuring a midpoint and two extremes on a 7-point scale. Labels will be applied, and numerical values are deliberately omitted to avoid visual clutter without contributing to improved interpretation [34]. When employing a Likert scale, it is crucial to be mindful of various biases [54],[55] . The 'central tendency bias' involves the inclination to avoid extreme response categories. Additionally, the 'acquiescence bias' suggests that participants may be inclined to agree with statements as they are presented. Finally, the 'social desirability bias' refers to the tendency of participants to present themselves or their organization in a more favorable light [55]. It is important to recognize these biases when interpreting the results.

Chapter 5

Problem Space

The primary objective of the problem space is to gain a comprehensive understanding of the problem and the user target group. At the end of this phase, these understandings are used to establish a central design challenge which acts as a starting point for the second diamond 'solution space'.

This chapter presents the results from different methods utilized within the problem space. For each method, the gathered insights are reformed into actionable solution requirements. Starting with background research and related work, already presented in section 5.1. Subsequently, a thematic analysis is performed to analyse the results from the in-depth expert interviews (section 5.2.2). These themes take a central position in forming the fitted solution requirements.

Furthermore, a bodystorming session is performed to experience the user's perspective and add extra solution requirements to the list (section 5.3). Subsequently, this understanding is enhanced by employing empathy mapping, placing a stronger emphasis on the user's emotional experience, in addition to behavioral aspects (section 5.4). Again, these insights are transformed into solution requirements. Finally, the MoSCoW method is utilized to prioritize the requirements formed by the methods described above (section 5.5). The results of the MoSCoW method answer the first Sub question (SQ).

Thereafter, personas are created representing the problem space by translating the most important requirements into persona personalities, core needs and frustrations (section 5.6). Ultimately, by combining insights from both the 'discover' and 'define' stages, a comprehensive design challenge is formed which answers SQ2 and serves as the cornerstone for the rest of the research.

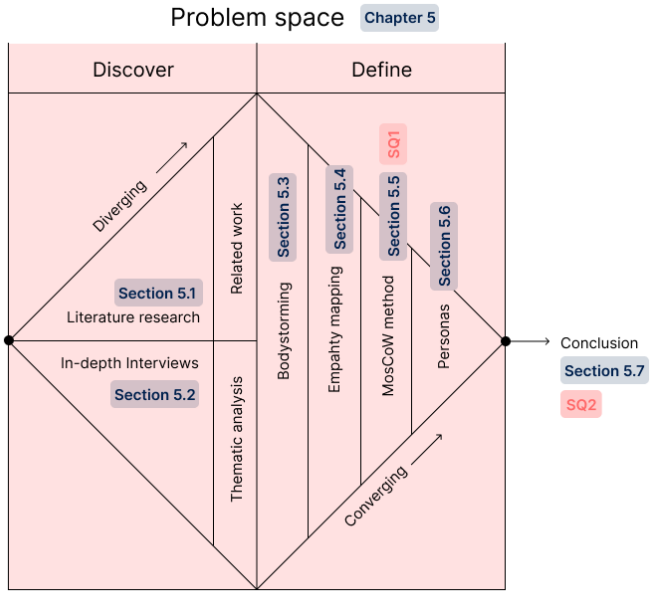


Figure 5.1: Methodology overview problem space

5.1 Desk-research

Desk-research requirements play a central role in shaping effective solutions. They are born from thorough background research and serve as guiding principles, ensuring solutions are well-informed and tailored to address specific needs. The subsequent sections explore these research-derived requirements, enlightening key factors guiding successful solution design and implementation.

5.1.1 Company requirements

FX Agency further specified their needs and wishes for this research in the form of requirements. First of all, to ensure that the solution can improve many experiences, FX Agency is in search of a solution that can be applied across multiple events and is not tied to any specific topic. Another requirement is that the solution should be connected to their platform Reply.live and should be able to update real-time. Furthermore, it should be accessible by multiple users at the same time, both online and in-person. Additionally, users with low-technical knowledge should be able to interact with the solution and it should be comfortable to use for introverted attendees. It does not matter if the solution is a physical or virtual installation, or when in the event time-line the solution is used.

A summary of these solution requirements:

- Versatility: The solution should be adaptable for a wide range of events with the ability to make minor adjustments to accommodate event-specific needs.

- Platform compatibility: It must integrate seamlessly with the hybrid event platform, teply-live, designed by FX Agency.

- Accessibility: The solution should be user-friendly and accessible to both online and in-person attendees.

- Real-time updates: It must have the capability to provide real-time updates and information.

- User-friendliness: The solution should be designed to be easily accessible for individuals with limited technical expertise, from anywhere in the world.

- Flexibility: It can be deployable in physical or virtual installations/modules.

5.1.2 Related work requirements

Related work research is crucial as it provides a comprehensive understanding of existing knowledge and advancements in this particular field, laying the foundation for new research by identifying gaps and areas for innovation. By reviewing prior work, this research can build upon established theories, avoid redundant efforts, and contribute to the cumulative growth of knowledge within their domain. The insights derived from the related work research (chapter 3) can be transformed into the following requirements:

- Ensure that all participants, regardless of whether they are joining online or in person, experience a strong sense of connection and equal inclusion [4].

- The solution must align with the willingness of the target group to embrace innovative technologies [9].

- The solution should not restrict the opportunities for spontaneous discussions [2],[3].

- It should generate a high level of emotional energy [21],[22],[23].

- The event should offer an extraordinary experience, taking place outside the usual context of daily life [7].

- Incorporate novelty factors into the event, creating a unique and special experience [22],[24].

- The event design must promote a 'we-feeling,' guided by the four fundamental factors established by [26].

- Foster community building and a sense of belonging through the application of the five design principles outlined by [27].

- Provide opportunities for interaction among attendees and between attendees and the event environment [8],[18].
- Ensure an active and engaging attendee experience [4],[7].
- Employ digital nudges [28]

5.2 In-depth interviews

To dive deeper into the world of hybrid event design, six in-depth interviews are done with experts in the hybrid event field. These interviews provide a first-hand view on the design of hybrid events as they are concentrated on identifying the pain points and task-related requirements of attendees. Furthermore, they were aimed to uncover the various design stages and decisions involved in creating a hybrid event from inception to completion. Thus, the objective was to gain insights into which experience elements require enhancement to optimize the attendee experience and identify any unmet attendee needs in current hybrid event designs.

5.2.1 Participants

Six comprehensive interviews have been conducted with experts specializing in corporate event design. These experts are affiliated with three Dutch companies: FX Agency, Channable, and D&B Eventmarketing. Given the diversity of roles within the design of hybrid events held by these participants, the interview questions vary slightly from one individual to another. Nevertheless, the overarching objective remains consistent, which is to pinpoint the challenges and specific needs of attendees during hybrid events. The following paragraphs delve into each participant's background and the tailored interview questions designed for them. Table 5.1 provides a concise overview of the participants.

Table 5.1: Overview in-depth interview participants

	Company	Position
Participant 1	FX Agency	Project Manager
Participant 2	FX Agency	Lead Creative
Participant 3	FX Agency	Creative Director
Participant 4	Channable	Event organizer
Participant 5	D&B eventmarketing	Account & project manager
Participant 6	FX Agency	Lead Creative

Participant 1

The first participant is an experienced project manager at FX Agency, boasting six years of service at FX Agency. These years have equipped her with a comprehensive understanding of her role, event design and client wishes. As a project manager at FX Agency, her responsibilities encompass overseeing the entire event spectrum, which includes event planning,

program development, and client interactions. Moreover, her role extends to managing various teams within FX Agency, collaborating closely with both the development and design teams to realize the event experience. This interview primarily aims to delve into the complete process, from inception to conclusion, where FX Agency collaborates with clients to design hybrid events. It also seeks to gain insights from both the client's perspective and the project manager's standpoint regarding hybrid event experiences.

Participant 2

The second participant, who works at FX Agency for 2.5 years, plays a distinct role in the event design process. In contrast to the project manager, this participant is a lead creative, specializing in creating the imaginative aspects of an event. Their responsibilities encompass shaping the event's creative elements, such as its flow, storytelling, interaction design, and thereby ensuring the delivery of the intended message. Therefore, this interview is primarily focused on exploring the decision-making process that content creators undertake when designing an event. Furthermore, it delves into the factors that captivate and engage event attendees, unravels the emotions they experience, and examines the success and shortcomings of past design concepts, along with the underlying reasons for their efficacy or lack thereof.

Participant 3

The third participant holds the role of Creative Director at FX Agency and is one of the agency's co-founders. Therefore, he is well involved in all of FX Agency's projects spanning over 15 years. He bears ultimate responsibility for overseeing and shaping all creative facets within FX Agency. This interview centers on his perspective regarding hybrid events and the pain-points he experienced during hybrid events FX Agency has organized. Furthermore, he has a deep-seated interest in innovation. Therefore, this interview also delves into his fascination with cutting-edge technologies and innovative ideas for hybrid event design, probing for insights and perspectives in these domains.

Participant 4

The next participant is an event organizer at Channable, a Dutch company that has maintained a fruitful collaboration with FX Agency for over three years. This partnership has yielded several event experiences, encompassing both virtual and hybrid formats. This interview seeks to illuminate the decision-making process that guided their event designs, unraveling the rationale behind opting for virtual or hybrid events and the underlying objectives. It delves into the transitions from virtual to hybrid and back to virtual events, seeking to understand the motivations behind these shifts. Moreover, it aims to capture the experiences of both the organizers and the attendees, highlighting differences between virtual and hybrid event experiences, identifying pain points encountered during hybrid events, and uncovering suggestions for refining elements and features to enhance future events.

Participant 5

The fifth participant, an experienced account and project manager at D&B Eventmarketing, brings three years of valuable experience. D&B Eventmarketing is a company which specializes in corporate events. Given the participant's dual role as an account and project manager, the interview explores the needs and preferences of corporate clients. It seeks to discern the motivations behind a company's preference for in-person, virtual or hybrid events, shedding light on the specific reasons for their choices in event formats. Additionally, this interview delves into attendees' needs during these events, uncovering the nature of their experiences and the factors influencing their emotional responses.

Participant 6

The final participant is a lead creative at FX Agency, bringing over a year of experience to the role. In this capacity, he is charged with creating creative concepts that find application in both virtual and hybrid events. This interview centers on several key areas, including the strategies employed for tailoring event designs to cater to diverse user groups and the factors that can either enhance or detract from the success of a hybrid event experience (and their underlying reasons). Furthermore, the identification of specific features or elements that could be incorporated to elevate the design of hybrid events is explored.

5.2.2 Thematic analysis

The six interview transcripts were coded manually by writing notes on the transcripts and by using highlighters to indicate potential patterns. These potential patterns were coded and the frequency of occurrence was counted. See appendix B for an overview of the created codes, with their frequency and some example quotes from the dataset. From this data, thematic mapping is used to display relations between different codes. The first thematic map, displaying the relations between the created codes, can be seen in figure 5.2. After reviewing these created codes and their relations, two themes are defined to create a clear overview of the data, see figure 5.3.

Hybrid event design

The first main theme uncovered during data analysis revolves around 'hybrid event design', encompassing various aspects aimed at enhancing attendee experiences. Participants highlighted the challenge of ensuring equal experiences for both online and in-person attendees throughout the event journey. They emphasized the necessity of providing a comprehensive event experience, from pre-event engagement to post-event interactions, across all event formats. Specifically, participants emphasized the difficulty in replicating the full event experience for online attendees, citing challenges such as limited opportunities for interaction and networking (P1, P3).

P3: "It is important to look at the entire attendee's event journey when designing an event; from before the event, to the entrance, until the end of the event, both in online, hybrid and in-person events."

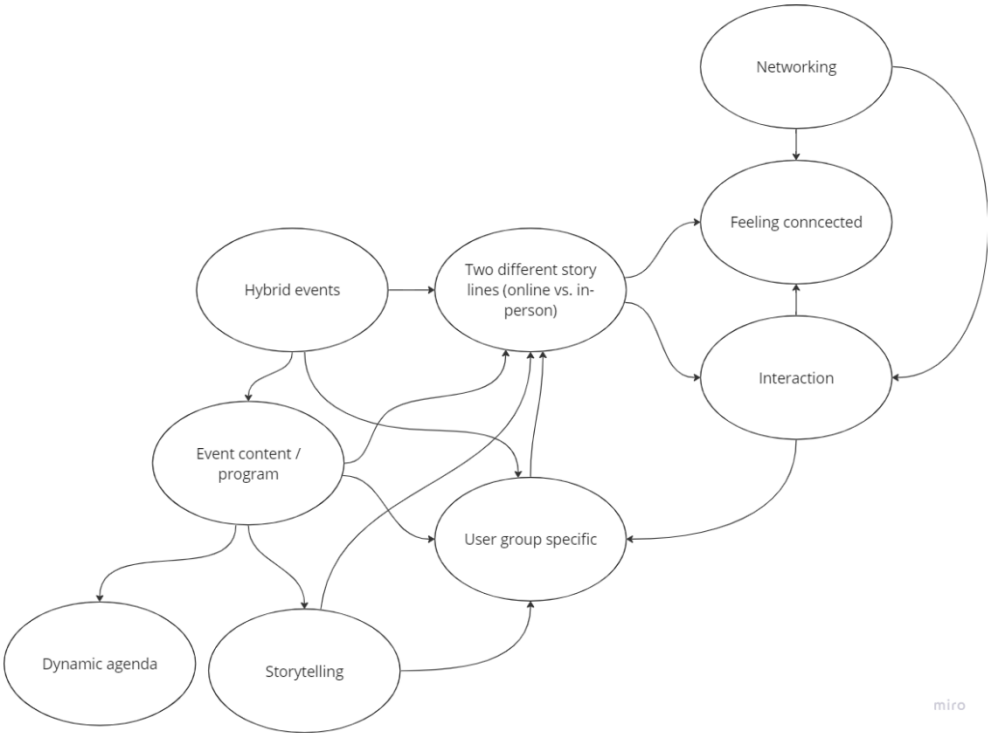


Figure 5.2: First version of the thematic map, displaying the created codes and their interrelations

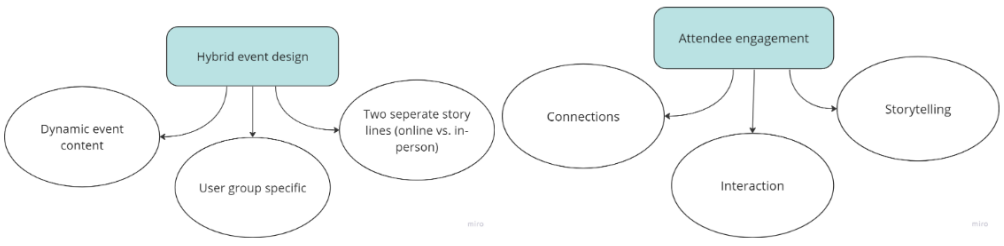


Figure 5.3: Final version of the thematic map, displaying two main themes; *Hybrid event design and Attendee engagement*

Within this theme, the first sub-theme delves into 'event program design', where participants stressed the importance of dynamic and fast-paced programming to maintain attendee engagement. Drawing parallels with fast-paced content consumption on platforms like TikTok and Instagram, participants emphasized the need for events to adapt to changing audience preferences and expectations. They emphasized the importance of keeping the event experience dynamic and engaging, particularly for online participants (P2, P4, P5, P6).

P4: "People are spoiled with fast content, think of TikTok and Instagram. Events should also provide this, events should provide dynamic experiences."

The second sub-theme focuses on 'content design', with participants emphasizing the importance of tailoring content to the specific needs and preferences of the target audience. Acknowledging the diverse digital abilities of attendees, participants highlighted the importance of understanding the digital capabilities of users when designing event experiences. They emphasized the need for personalized content that resonates with different audiences, ensuring relevance and engagement (P2, P4, P5, P6).

P4: "It is important to know your user group when designing event experiences. For virtual and hybrid events it is even more important to know the digital abilities of your users. For us it seems logical that you can choose an avatar and enter a virtual world, for others, this could already be a challenge."

Lastly, the third sub-theme centers on 'separate storylines' between online and in-person attendees during hybrid events. Participants underscored the need for event organizers to recognize and address the distinct needs and experiences of each audience group. They emphasized that while hybrid events may share a common overarching theme, the execution and delivery of content should be tailored to the unique characteristics of each audience segment. This includes considerations such as interaction methods, engagement strategies, and event routes, reflecting the nuanced differences between digital and live event experiences (P3, P4, P5, P6).

P6: "Digital and live will always stay two different event-story-lines, you would always have to do things differently online vs. live. It is like you organize two fully different events."

Attendee engagement

The second theme delves into the attendee experience, emphasizing crucial elements that enhance engagement. Participants emphasized factors like storytelling, interaction, and maintaining an appropriate energy level as key drivers for delivering impactful and connected experiences to attendees.

P4: "There are multiple things important during online and hybrid events; storytelling, event-program, interaction between visitors and the visitor journey."

Participants highlighted the importance of using networking activities to facilitate personal connections among attendees. Despite the desire for connection, participants acknowledged the challenge of creating meaningful interactions behind a screen (P1, P2, P4, P5, P6). Even if networking isn't the primary goal of the event, attendees expressed a desire to connect with others, emphasizing the limitations of virtual networking compared to in-person interactions (P5, P6).

P5: "Even if the main goal of the event is not to network, people still want to talk to each other and be able to connect with each other."

Additionally, participants underscored the significance of interactions both between attendee groups and within groups themselves. They emphasized that purposeful interactions contribute to overall engagement and attendee satisfaction, highlighting the importance of meaningful engagement activities within the event context (P2, P5, P6).

P6: "It is all about interaction. If you as a visitor do not feel connected, the event message, whatever it is, will not come across."

Lastly, participants emphasized the importance of narrative and event flow in maintaining attendee engagement. A seamless event flow and compelling storytelling were identified as essential elements for delivering a positive event experience and ensuring high levels of engagement among attendees.

P2: "During an event, storytelling is leading and the flow of the entire event is super important to ensure a good experience."

5.2.3 Conclusion

Two primary themes have been identified: 'Hybrid Event Design' and 'Attendee Engagement'. These themes encompass distinct elements that influence the attendee experience during hybrid events. Consequently, these themes serve as the basis for establishing various requirements to consider when developing a new solution in the later stages of this research.

Hybrid event design

The first key insight that emerged is that events must offer dynamic, rapidly evolving content to engage attendees effectively. Furthermore, content must be tailored to the specific preferences of target groups. As a result, solution design should prioritize adaptability to suit various target groups. Importantly, even within hybrid events, online and in-person attendees have unique requirements, emphasizing the need for solutions that can accommodate and satisfy these individual needs.

- The solution should provide dynamic, engaging content to captivate attendees
- Customization is essential; solutions should cater to the specific needs of diverse target groups.

- The solution should create one event experience, while still accommodating different needs from online and in-person attendees.

Attendee engagement

This theme focuses on factors that enhance attendee engagement in hybrid events. Among these, networking, connecting, and interacting with fellow attendees are highly valued, yet challenging in hybrid settings. Consequently, the forthcoming solution should facilitate these interactions. Additionally, the seamless flow and narrative of an event significantly impacts the overall experience, underscoring the importance of a solution that does not disrupt this flow.

- The solution should help attendees to create connections with others.
- The solution should provide meaningful interactions.
- The solution should not interrupt the flow of the event.
- The solution should contribute to the storyline of the event.

5.3 Bodystorming

The objective of this bodystorming exercise is to gain a deeper insight into the needs and behaviors of event attendees. It is important to note that, within the research timeline, there were no hybrid events organized by FX Agency available for study. Therefore, the bodystorm was conducted during a virtual event, with the acknowledgment that the full hybrid event experience cannot be fully replicated. It is crucial to recognize that the experience of a hybrid event differs from a virtual one. Consequently, this bodystorming exercise serves as an additional tool during the empathy and define phase of the research, but it is not the sole determinant of decisions.

Throughout the bodystorm, the researcher took notes regarding their personal experiences, encompassing what they observe, see, feel, and think. These experience aspects were chosen as they contribute to the completion of the empathy map. Next to that, the researcher documented any remarkable action that transpires during the event, including other participants' comments, emojis exchanged, and reactions to polls. These observations and insights contribute to a more comprehensive understanding of the event's dynamics and inform the research process.

The bodystorming session delivered valuable insights, yielding multiple requirements for the design of a solution in a later stage of this research. The full results can be found in appendix C.

Requirements:

- The solution should offer more engaging interactive features beyond polls, emojis, and comments.
- Attendees should have the ability to view other participants who are watching alongside them.
- The solution should offer simple user interface interactions.
- Interaction should be displayed in real-time within the solution.
- The solution should provide the attendees with quickly switching content.

5.4 Empathy mapping

This empathy mapping activity was done to gain new insights by exploring and ordering the understandings from the previous activities. The empathy map is completed with insights derived from the previously held interviews, the bodystorming session and the knowledge gained during the empathize phase of this research. The empathy map canvas used in this research is designed by Gray [56].

As desired, the empathy mapping activity yielded fresh insights, primarily emphasizing the engagement requirements of attendees' experiences. Refer to the completed empathy map (Appendix D) for a detailed overview. These newly transformed insights can be found in the requirement list below.

- The solution must decrease the 'zoom-fatigue' effect.
- The solution should actively engage online attendees throughout the event.
- The solution should facilitate connections by offering easy, low-threshold interactions among attendees.
- The solution should ensure visibility of all participants, both online and in-person.
- The solution should encourage a relaxed atmosphere, including humor and lightheartedness.
- The solution should use simple to understand technology to facilitate online attendees' participation in interactions.
- The solution should help with delivering unforgettable experiences.

5.5 MoSCoW method

The MoSCoW method primarily serves to prioritize overarching requirements derived from the previous methods in order to have a clear requirements list for the forthcoming solution. Therefore, this activity answers SQ1, advancing this research one step closer to its resolution.

The requirements are categorized into two groups: technical requirements and experience enhancement requirements. This division is implemented to provide a concise and structured overview of the requirements. Furthermore, the 'origin' of each requirement is indicated in the last column of the table. On average, the cases where a requirement is identified through multiple methods, it is given higher priority. However, it is important to note that this principle is a guiding principle and not an absolute rule, as certain company-mandated requirements are non-negotiable. The 'won't' category in the MoSCoW method is absent since there are no identified requirements that are deemed unnecessary or undesirable for the upcoming solution. Lastly, all requirements get a identification number for easy future referencing. The results can be found in table 5.5.

5.6 Personas

The personas act as a 'human' representation of the problem space, serving as an important tool when designing the solution in the following phases of this research. The personas have been shaped by insights drawn from literature, desk research, expert interviews, bodystorming and empathy mapping. Importantly, the personas' objective is not to encompass all potential audiences or comprehensively address every user's needs. Instead, their purpose is to focus on the primary requirements of the most critical user segments, ensuring a targeted and effective design approach.

Hence, every persona encompasses essential needs and frustrations, with a foundation rooted in the 'must' and 'should' requirements identified through the MoSCoW analysis (section 5.5). Complementing these fundamental criteria, certain 'could' requirements have been incorporated as well. Notably, the emphasis is primarily placed on 'experience' requirements, prioritizing them over 'technical' requirements. This strategic choice acknowledges the seamless integration of experience-related elements into the persona framework, contributing to a more holistic and user-centric representation.

Opting for four personas is deliberate, as it allows for a diverse range of needs, opinions, and perspectives while maintaining clarity in design direction. The four personas are Peter, Rik, Flam and Sjanet. The selection of these four personas stems from a comprehensive analysis of the results. Mainly through in-depth interviews and bodystorming activities, a diverse spectrum of attendees at corporate hybrid events was revealed. From the outgoing extrovert to the introspective introvert, and spanning positions from CEO to office manager, these gatherings attract a wide array of personalities and professional roles.

To encapsulate this diversity, the personality of these four personas were crafted: Peter and Sjanet, embodying the extroverted attendees; Rik as a representation of the middle

MoSCoW	Category	#	Requirement	Derived from
Must	Technical requirements	M1	Must be a 'general' solution and therefore usable within several different events.	FX agency
		M2	Must use the hybrid event platform Reply-live designed by FX Agency	FX Agency
		M3	Must be accessible for many users at the same time	FX Agency
		M4	Must be accessible for online and in-person attendees	FX Agency
		M5	Must be able to update real-time	FX Agency
		M6	Must be interactive in nature and provide meaningful interactions	Related work, In-depth interviews, Bodystorming
		M7	Must provide accessible interaction possibilities between online and in-person attendees (in groups as well as one v one)	FX Agency, Empathy mapping
		M8	Must be accessible for persons with low-technical knowledge by using simple to understand technologies	FX Agency, Empathy mapping, Body storming
		M9	Must create one event experience, while still accommodating different needs from online and in-person attendees.	In-depth interviews, Related work
	Experience requirements	M10	Must provide the attendees with quickly switching content	Bodystorming, In-depth interviews
		M11	Must provide dynamic, engaging content to captivate attendees	In-depth interviews, Related work
		M12	Must promote active participation from attendees online and in-person	Related work, Empathy mapping
		M13	Must ensure visibility of all participants, both online and in-person.	Bodystorming, Empathy mapping
		M14	Must inspire, engage, educate or entertain the attendees	Related work
		M15	Must be able to generate a sense of togetherness among all attendees.	Related work, In-depth interviews, Empathy mapping

Figure 5.4: Moscow table, part 1/2

MoSCoW	Category	#	Requirement	Derived from
Should	Technical requirements	S1	Should be accessible from anywhere in the world	FX Agency
		S2	Should not interrupt the flow of the event.	Related work, In-depth interviews
		S3	Should decrease the 'zoom-fatigue' effect.	FX Agency Related work, Empathy mapping
		S4	Should provide opportunities for spontaneous conversations	Related work, Bodystorming
	Experience requirements	S6	Should foster connections amongst attendees	Related work, bodystorming
		S7	Should be comfortable to use for introverted attendees.	FX Agency, In-depth interviews
		S8	Should generate feelings of excitement	Related work, Empathy mapping
		S9	Should create memorable 'WOW' experiences for attendees.	Related work, Empathy mapping
		S10	Should encourage a relaxed atmosphere, including humor and lightheartedness.	In-depth interviews, Empathy mapping
		S11	Should contribute to the storyline of the event.	In-depth interviews
		S12	Should create a mutual focus of attention	Related work
		S13	Should generate high emotional energy	Related work
Could	Technical requirements	C1	Could be a physical or virtual installation	FX Agency
		C2	Could offer real-time visibility into others' reactions.	Body storming
		C3	Could be using innovative technologies	FX Agency, Related work
		C4	Could offer multisensory experiences	Related work
		C5	Could use participatory co-creation of the attendees	Related work
		C6	Could be usable during all stages of the event, pre-event, during-event and after-event.	FX Agency
	Experience requirements	C7	Could encourage attendees to initiate conversation	Body storming, empathy mapping
		C8	Could enable attendees to share their feelings and thoughts.	Related work, bodystorming
		C9	Could be a complete novel idea	Related work
		C10	Could be using gamification	Related work, In-depth interviews
		C11	Could use cognitive biases to influence attendees behavior	Related work

Figure 5.5: Moscow table, part 2/2

ground; and Flam, representing the introverted participants. Also the other personality traits are crafted to ensure a wide diversity. Therefore, each persona is associated with specific professional roles; with Peter as the project manager, Rik as the developer, Flam as the designer, and Sjanet as the human resources representative. Recognizing the significance of technical literacy in the context of the solution, the personas are also categorized based on their levels of technological proficiency. Rik stands out as the tech-savvy individual, while Flam and Peter fall in the middle category, and Sjanet is positioned with a lower level of technical expertise. This thoughtful selection ensures a well-rounded representation of the diverse audience, both in terms of personality and technological understanding.

Another key revelation stemming from the in-depth interviews is the diverse landscape of hybrid corporate events, encompassing various formats and structures. To ensure the proposed solution remains universally applicable, a deliberate decision has been made not to narrow down the personas to specific types of hybrid events. Instead, these personas are crafted with versatility in mind, adept at seamlessly participating in both in-house corporate gatherings and events involving external clients. This approach ensures the adaptability of the solution across the spectrum of hybrid corporate event scenarios (M1).

Peter

The first created persona is Peter. As stated before, he is an extrovert and has medium technical knowledge. His main needs are focussed on active participation (M12) and direct contact with others during different stages of the entire event (M13, S6). His frustrations are focussed on difficulties in fostering connections with others based on the lack of emotional energy (S13) or the lack of interaction possibilities (S4, C8).

Flam

Flam is the second created persona. She, in comparison with Peter, has an introverted character and does not feel comfortable to speak in front of an unknown audience. Therefore, her core needs are focussed on accessible and low-threshold interaction possibilities within a relaxed environment (M7, S7, S10). Additionally, she needs a trigger to start a conversation and in that way form connections with others, as she is too shy to start one herself (S6, C7). In that way, she could feel included in the event (M15).

Sjanet

The third persona is Sjanet, a 34 year old woman whose occupation is human resources. Her technical knowledge is low and therefore she needs easy to understand technological solutions during the event (M8). Unlike Flam, Sjanet loves to talk and interact with others (S4) and wants to be constantly presented with new (active) input to stay interested (M10, M12). Consequently, she misses opportunities to 'really' connect with in-person visitors when she is visiting the event online (M15, S6).

Rik

The last persona is Rik, a career oriented male who has high technological knowledge. His core needs are therefore less focused on the technological side, but more on the content aspect. Rik needs fast changing content that impresses him (M11, M14, S9). Furthermore, he wants to be compelled by the event storyline (S11). Lastly, he wants to share his event experience with his network after the event, therefore he wants out-of-the-ordinary moments (S9, C9).

Visuals of the persona's can be found in appendix E.

5.7 Conclusion problem space

Through methods such as in-depth interviews, bodystorming, empathy mapping and persona creation, a comprehensive understanding of the thoughts, needs, and opinions of corporate hybrid event attendees has been attained. These insights have been transformed into solution-based requirements and prioritized using the MoSCoW method (section 5.5), effectively addressing SQ1.

The formation of the Design Challenge, concludes the problem space and thereby answers SQ2. It is essential to emphasize that this design challenge defines the problem while allowing room for creativity and experimentation in the solution space. To craft a design challenge incorporating the most important findings of the problem space, three crucial components must be established: the users, the desired outcome, and the driving factors. These elements are carefully determined through an in-depth analysis of the insights gleaned from preceding methods.

The initial aspect revolves around understanding the user base. In the context of this research, our target audience comprises individuals attending corporate hybrid events, encompassing both online and in-person formats. These attendees typically fall within the age range of 30 to 70 and possess a moderate level of technical proficiency. Shifting focus to the second facet, attention is directed to the driving forces behind the design challenge. Attendees often experience feelings of exclusion, limited opportunities for interaction, and a notable lack of connection with their fellow participants. Lastly, the third aspect, closely associated with the driver, is the desired outcome. In this context, the goal is to cultivate a profound sense of inclusion, nurture feelings of togetherness, and introduce innovative avenues for interpersonal connection.

With these results in mind, the following design challenge is formed:

Corporate hybrid event attendees want to feel connected, so we will deliver an interactive product to achieve a sense of togetherness and thereby support community building between online and in-person attendees.

In conclusion, the problem space has been thoroughly explored through various user-focused

research methods. The design challenge serves as a central link between the problem space and the solution space, facilitating the transition from understanding user insights to creating innovative solutions.

Chapter 6

Solution Space

The main purpose of the solution space is to come up with a design concept, leading to the development of a corresponding PoC. The concept is designed to address the specific design challenge introduced in section 5.7. This design challenge is formulated based on the established requirements outlined in the problem space. The solution space consists of two main phases; concept development (sections 6.1, 6.2, 6.3, 6.4) and PoC development (sections 6.5, 6.6, 6.7). See figure 6.1 for an overview of the solution space.

During these two phases, the innovation team of FX Agency contributes to the process. This innovation team meets on a weekly basis, dedicating four hours to exploring novel, innovative concepts subsequently creating mock-ups of these ideas. This innovation team is eager to contribute to this research and therefore takes part in these various phases. Its members are seasoned in brainstorming and have a keen sense for innovation. This team comprises six participants. All team members are employees of FX Agency, possessing prior knowledge of hybrid events. This team ensures a diverse representation of professions, including two developers, two content creators, one digital artist, and one account manager.

As stated before, concept development is the first part of the solution space. This phase is facilitated through co-creation, co-exploration, and co-validation sessions in collaboration with the innovation team of FX Agency. During the co-creation session, the innovation team collaborates to generate a multitude of creative ideas (section 6.1). Subsequently, co-exploration sessions guide the transition from these initial ideas to manageable concepts, involving the creation of sketches and user flows (section 6.2). In the concept validation and selection phase (section 6.3), participants of the innovation team and FX's creative director evaluate the concepts and choose the most suitable concept to progress, ultimately providing a response to SQ3.

Following this, a PoC is designed and developed through even more iterative steps. Initially, the concept undergoes refinement based on feedback from the concept validation session (section 6.5). This refined concept is then transformed into a paper prototype illustrating

user interactions and other relevant design choices (section 6.6). The paper prototype is evaluated through heuristic evaluation (section 6.6.1) and discussions with a User experience (UX) professional and a client of FX Agency (sections 6.6.2 & 6.6.3). Findings from these activities are incorporated into a new design iteration of the PoC. Through these iterative steps, the PoC takes shape and is presented at the conclusion of this chapter (section 6.7).

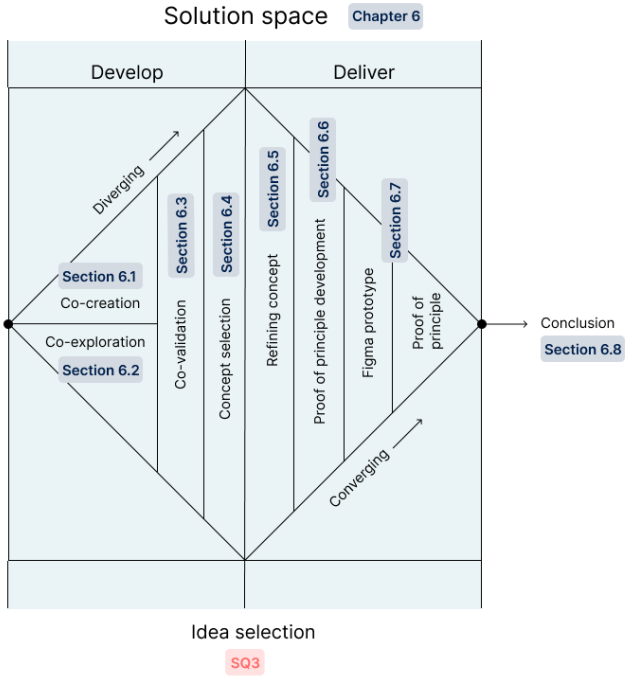


Figure 6.1: Overview of the solution space and its methods

Throughout the entire design process, special consideration is given to the personas developed in section 5.6, ensuring their needs are incorporated. Subsequently, a brief check is conducted to verify that the design and the PoC aligns with and meets the requirements of these personas (section 6.5.2).

Upon completion of the PoC's, the second diamond of the double diamond method is finished, and the PoC is ready for evaluation in the subsequent phase.

6.1 Co-creation

The goal of the brainstorming session was to find many interactive concepts which support community building between online and in-person attendees. The conducted brainstorming session involved six participants of FX Agency's innovation team. Given that one participant was working remotely, the brainstorming session was conducted in a hybrid format. Five participants gathered in a meeting room, while the sixth participant connected via Google Meets, displayed on a large screen. To fully integrate the remote participant, a Miro board was utilized for the brainstorming session, offering accessibility from anywhere

with an internet connection. This choice of brainstorming tool was made to accommodate a range of needs during the session, including the use of digital sticky notes, the addition of images, copying of results, and more.

As stated in the brainstorm agenda (appendix F) the initial activity was an icebreaker. An icebreaker is a structured activity aimed at fostering relationships, facilitating information sharing, and creating a relaxed environment conducive to the development of a creative team climate. In this particular icebreaker, the 'Mentimeter' website was employed to create two word-clouds. Participants were encouraged to think quickly and are discouraged from criticizing each other's responses during this activity.

Following the icebreaker, the session comprised various brainstorming sub-activities. The objective here was to prevent the brainstorming process from reaching a point of stagnation where no new ideas were generated, as emphasized by [57]. To address this concern, [57] recommend the incorporation of multiple creativity techniques within a single brainstorming session.

The first sub-activity was rapid ideation, wherein participants were tasked with writing down as many ideas as possible on sticky notes within a 10-minute timeframe on the Miro board (figure 6.2). When a participant generated more ideas than there were available sticky notes on the board, they had the option to include additional sticky notes. Additionally, participants had the freedom to enrich the Miro board by incorporating photos, stickers, and GIFs to enhance their contributions.

Rapid ideation deliberately avoids providing specific guidelines or instructions regarding the thought process, allowing participants to determine their own approach to idea generation. The primary focus communicated to the participants is the overarching goal of the brainstorming session, as advocated by [57]. Silence was maintained during this phase, as it helped prevent distractions that may arise from exposure to others' ideas, potentially hindering the development of one's own concepts, as pointed out by [49].

Following the rapid ideation phase, the brainwriting technique was introduced. During this activity, participants built upon the ideas of others, offering a collaborative approach to idea generation that could help minimize production blocking. Each participant took one of their ideas from the previous phase and wrote it on the assigned sticky note. Subsequently, the participants followed the sticky notes in their own color from top to bottom and added an improvement or addition to the ideas of others, see figure 6.3.

Subsequently, a group discussion was convened to present and discuss all the ideas that have been generated. This step was included because research by [58] indicates that actively engaging participants in discussion can enhance the overall idea generation process by increasing the quantity of ideas shared. Additionally, Ritter and Mostert [57] support this approach, emphasizing that a group discussion can be intellectually stimulating for the participants. In this phase, the Miro board was intentionally left relatively bare, as the primary mode of interaction is verbal among the participants. Nevertheless, a few sticky notes

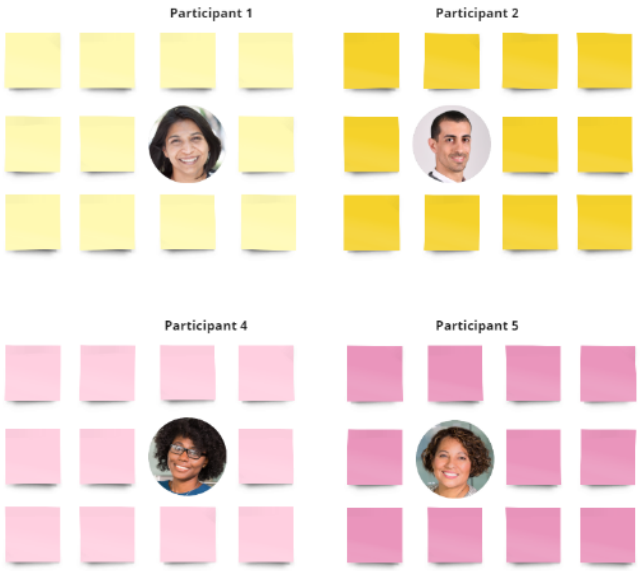


Figure 6.2: Screenshot of the designed Miroboard for rapid ideation

Figure 6.3: Screenshot of the upper part of the designed Miroboard for brainwriting

are visible on the board for capturing comments and any new ideas that may arise during the discussion, ensuring that these valuable contributions are not overlooked or forgotten.

After a brief break, participants were encouraged to form groups and identify commonalities among the ideas, a process known as the affinity diagram, as proposed by [59]. This step served the purpose of streamlining the problem-solving process within the group brainstorm and visualizing the overarching structure of the ideas to gain a better understanding of the problem [59]. For this step, the Miro board remained blank, allowing participants to independently organize the sticky notes with their ideas by dragging and dropping them into various categories. Additionally, the number and size of these categories can vary from one brainstorming session to another, and they are not predetermined. As such, a pre-designed Miro board was unnecessary for this phase.

Once the categories were formed, the ideas were prioritized using the New useful feasibility (NUF) prioritization tool. In pairs, participants assessed the ideas based on three aspects: newness (innovation), usefulness (the extent to which the idea aligns with the goal), and feasibility. All three aspects were rated on a Likert scale ranging from 1 (fully disagree) to 7 (fully agree), as can be seen in figure 6.4. The three scores were added and form a final score for the idea. This activity was undertaken to establish a ranking among the ideas, with the intention not to eliminate promising concepts but to identify potential areas of improvement before they are fully developed. This ensured that the selected ideas are refined and enhanced before implementation.

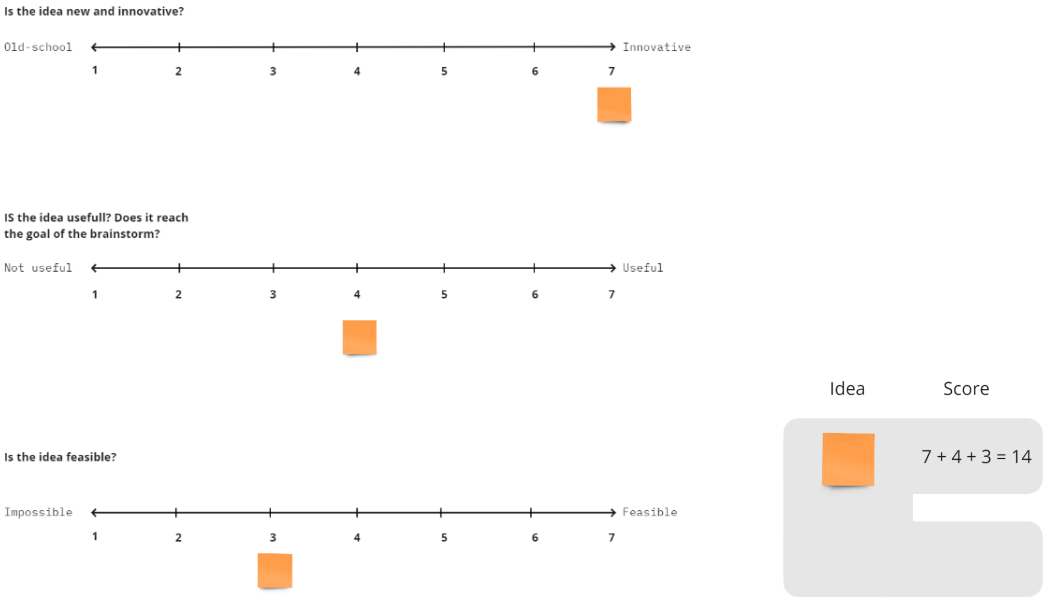


Figure 6.4: Screenshot of the designed Miroboard for NUF prioritizing.

The ideas that received the highest scores in the NUF prioritization were advanced to the final phase of this brainstorming session, known as 'idea analysis'. During this step, the

selected ideas underwent in-depth discussion within the group. Participants identified the strengths and weaknesses of these ideas, and together, they outlined the risks, unknowns and next steps for further development and refinement. Figure 6.5 displays a screenshot of the Miroboard designed for this step.

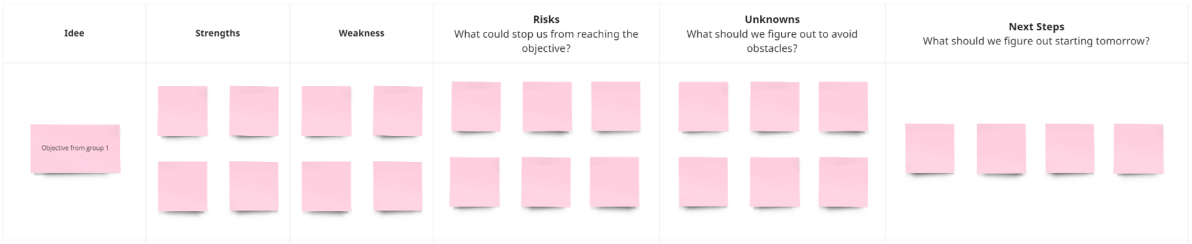


Figure 6.5: Screenshot of the designed Miroboard for idea analysis.

6.1.1 Co-creation results

Icebreaker

The two word clouds created during the icebreaker phase consist of 51 and 52 responses. This means that every participant responded on average 8.5 times within the time frame of one minute during the first word-cloud, and 8.66 times within the time frame of one minute during the second word-cloud.

Rapid ideation

During the rapid ideation step, the total number of ideas generated is 54 in a time frame of 10 minutes. Removing duplicate ideas between participants, a total number of 38 unique ideas were generated. As can be seen in the results (appendix G), participants 3 and 5 generated the most ideas (12 each) and participant 6 the least amount of ideas (4 ideas). Additionally, the extent to which an idea was thought about differs per participant, some only wrote three words for each idea, while others wrote multiple sentences.

Brainwriting

Each participant could take one of their ideas from the previous phase, into this brainwriting activity. When building upon the idea of others, all except one sticky note were filled by the participants within the 10 minute timespan. An interesting finding emerged as participants began to adopt a more practical perspective towards the ideas. This shift is evident through two distinct aspects. Firstly, participants started annotating sticky notes with various technological concepts for bringing these ideas to life, while still elevating the original concepts. Some notable technologies suggested included GPS, walking ipads, holography, AR, 3D visual illusions, smart wearables, and digital interactive screens. Secondly, sticky notes were used to outline when the ideas would be best implemented, with a primary focus on the event's stages (pre-event, during the event, or post-event).

Affinity diagramming

During this stage, participants worked together to form categories and find commonalities between ideas. Eventually, five main categories were formed with one sub-category. Figure 6.6 displays these results.

Category	Sub-category	Amount of ideas
Visualizing the online group in the live event	-	9
Interaction	Games	Interaction: 6 Games: 6
Equalizing the experience of online and in-person visitors	-	4
Live communication	-	8
Connection before the event	-	2

Figure 6.6: Affinity diagramming results

NUF prioritizing

In total, thirteen ideas were prioritized with the NUF prioritization tool. This is because it was up to the participants to choose how many ideas they would like to prioritize, with a recommendation of three per category. As can be seen in figure 6.7 and figure 6.8, idea number 2 and number 8 both have the highest scores of 17 points. In second place with 15 points in total are idea numbers 3, 4, 10, 12 and 13. Idea number 7 scored the lowest (only 10 points).

Idea Number	Description	Total points
1	3D / 360 photo / video of the location so the online visitor has a feeling they are on the event site itself	14
2	Interactive portal between online and in-person	17
3	Breakout rooms in the live event to connect visitors	15
4	Big entrance screen	15
5	Cameras on the event site that online visitors can control	12
6	Speeddate finding commonalities between each other	14,5
7	Interactive event location map for the people online	10
8	A man in the chair' Interactive games in teams combined online and in-person visitors	17
9	Babbel-box (big screen with red button)	12,5
10	Theme rooms with a stream between online and in-person (maybe AR/hololens)	15
11	Project online persons during the lunch as if they are joining	13
12	Breakout booths	15
13	Online visitors are the dj during the live event	15

Figure 6.7: The idea number with their description and total amount of points (NUF prioritization tool)

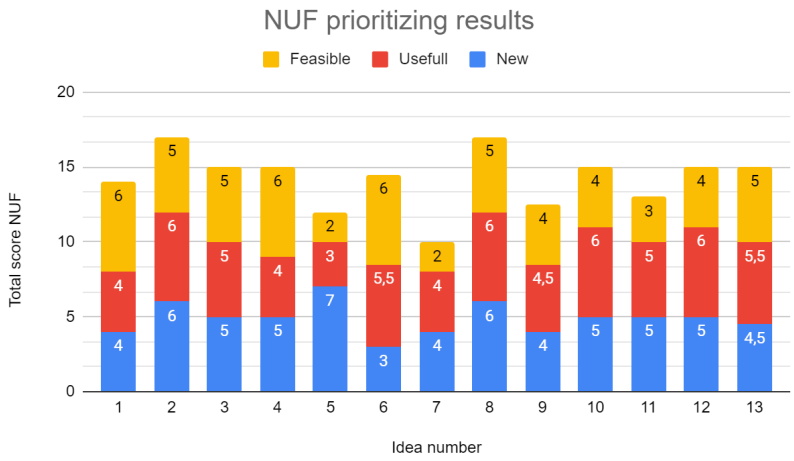


Figure 6.8: The NUF prioritizing results

Idea analysis

During this step, five ideas were analyzed, namely idea numbers: 2, 4, 7, 8, 13. These ideas were chosen by the participants based upon the NUF prioritization (section 6.1.1) and personal preferences. It is remarkable that idea number 7 was chosen to include in this analysis while it 'only' scored 10 points in the NUF prioritization. However, as one of the participants still saw the potential of this idea, the others agreed to explore the idea further.

Idea Number	Description	Total points
2	Interactive portal between online and in-person	17
4	Big entrance screen	15
7	Interactive event location map for the people online	10
8	A man in the chair' Interactive games in teams combined online and in-person visitors	17
13	Online visitors are the dj during a live event	15

Figure 6.9: An overview of the ideas that were analyzed during the last step of the brainstorm session.

6.2 Co-exploration

The purpose of this step was to dive into the ideas generated during the previous co-creation session and thereby transform the ideas to manageable concepts. This exploration enabled a deeper insight into the content of these ideas, identified potential future applications, and assessed whether there are existing solutions with comparable attributes. Additionally, the risks and unknowns stated inside the co-creation session (section 6.1) were examined; how can the consequences of these risks be minimized and how can the unknowns become known? Lastly, it was explored how the discovered weaknesses can be turned into strengths. Thus, the goal of this exploration was to discover how these concepts can be refined, further

developed and implemented effectively during corporate hybrid events.

This exploration involved three co-exploration sessions, which are informal gatherings where participants, working in pairs, analyze one of the concepts. The participants in these sessions corresponded to those involved in the co-creation session (as detailed in section 6.1). Each week, two pairs explored a different concept. The exploration of these concepts took various forms. Among other things, it involved further brainstorming, online research, and discussions with colleagues to further expand upon these ideas. There were no rules which these exploration sessions needed to follow, as this could restrict the creative process.

Similar to the co-creation session, the outcomes of these exploration sessions are documented on a Miro-board. This platform allows participants to record their discoveries through text, sticky notes, images, flowcharts, and tables.

6.2.1 Co-exploration results

The outcome of these collaborative exploration sessions yields five explored concepts. These concepts now include user journeys, potential applications, an examination of technologies that can bring these ideas to life, their level of complexity, and potential design possibilities. A small summary of each concept is presented below.

1. Interactive portal connecting in-person and virtual attendees

At the event site, a physical interactive screen serves as a connection between in-person and virtual event attendees. Enabled by a camera and the screen, it establishes a video connection between both groups. For in-person attendees, a physical phone is attached to facilitate hearing the remote participants. Throughout these interactions, the screen can display statements to spark conversations and initiate dialogue between the attendees.

Figure 6.10: A sketch of concept 1: Interactive portal

2. Big entrance

This concept aims to offer online attendees an immersive event experience by introducing an additional phase between the login website and the reply.live streaming event site. During this phase, online visitors simulate walking into the event venue, mirroring the experience

of in-person attendees. Through a live video feed displaying the in-person event entrance, online visitors control their avatar's movement across the screen using arrow keys, effectively mimicking the act of walking inside the event venue. Simultaneously, the online visitors' avatars are projected at the real entrance, ensuring mutual visibility between both attendee groups.

Figure 6.11: A sketch of concept 2: Big entrance

3. Interactive basecamp

This concept fosters a sense of unity among virtual attendees by displaying everyone's presence on the basecamp, showcasing their mouse movements. Notably, the basecamp is expanded to encourage more engagement within its various sections, allowing visitors to explore different areas. Attendees are granted the ability to click on others, initiating connections through chat or video, mirroring the experience of seeking out colleagues or friends for a chat, much like the interactions you would expect upon arriving at a physical event site.

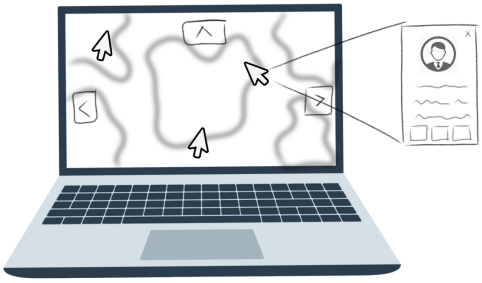


Figure 6.12: A sketch of concept 3: Interactive basecamp

4. Virtual DJ

Attendees, both online and in person, are empowered to play DJ in an innovative concept where 'silent' intervals or breaks between presentations are transformed into interactive music battles. Participants can request songs, pitting two against each other, with everyone given the power to vote for their preferred track. Alongside voting, attendees can engage

by commenting on songs and expressing themselves with smileys. Remote participants, from their laptops or phones, can partake in this musical showdown, experiencing the same tunes as those at the event. Meanwhile, in-person attendees can engage by voting and commenting through their phones, witnessing the battle displayed on a presentation screen at the event location.

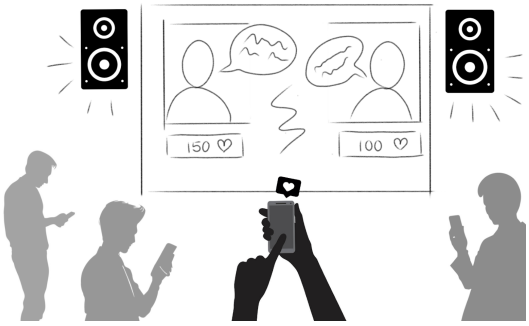


Figure 6.13: A sketch of concept 4: Virtual DJ

5. Connection via interactive projections

This concept, stemming from the 'man in the chair' idea, introduces novel interaction opportunities for both online and in-person attendees. It revolves around statements that prompt visitors to voice their opinions, facilitated by a spectrum ranging from 'Totally agree' to 'Totally disagree'. This is visually represented as a projection on the floor. Next to the projection beamer, a camera is placed which is streamed to online attendees. They can express their views on the statement by clicking on the correct place on the live video feed, while in-person attendees physically position themselves along this spectrum. When an online participant selects a position, their avatar appears at the corresponding spot in the real environment (by projection), bridging the gap between virtual and physical spaces.

Figure 6.14: A sketch of concept 5: Interactive projections

6.3 Co-validation

The goal of this co-validation activity was to select one concept from the five concepts presented in section 6.2. It was aimed to address not only the technical feasibility but also the strategic and financial aspects of the concept. By methodically considering these three elements, the session laid the foundation for a well-informed decision-making process, ensuring that the selected concept not only met the requirements but also delivered substantial value and remained within the acceptable cost parameters.

Part of this evaluation was done with the innovation team of FX Agency and part of it was done by means of an expert assessment. The first step; requirement validation was done without the help of these teams, the second and third step (value validation and cost validation) were done with the help of these two teams.

Innovation team

The innovation team during these meetings involved four FX Agency employees, including two developers, a concept creator, and a sales-manager. The concept validation was done based on two critical aspects: the concept's perceived value, and its associated costs. To facilitate this process, a Miro board was employed to visually map out these two steps.

Expert assessment

During this assessment, the Creative Director (CD) at FX Agency, known for their innovative flair and expertise in discerning effective features for events, shared valuable insights into the value and costs of the concepts. As he was also a participant during the in-depth interviews of the 'discover' phase, more information about the creative director can be found in section 7.1. The main objective was to explore the director's perspectives on the developed concepts. This included determining which concept should be further pursued, identifying the one with the highest overall value, and discussing the potential for testing.

For this assessment, a PowerPoint slideshow was prepared to explain and show the process, the design challenge and the developed concepts. Per developed concept, the director's perception of the value and the costs of these concepts is explored. The main objective here was to explore the concept with the most overall value (attendees, client and FX Agency) according to the director. Additionally, his perception on costs is examined. How much may the realization of the concepts cost? Which concept can be sold for the highest amount, and how much are clients willing to pay? After this has become clear, the session was concluded by a small summary of the findings.

The entire session was recorded and transcribed. As the session was held in Dutch, the quotes used in this research are translated to English.

6.3.1 Requirement validation results

During the requirement validation a thorough analysis was conducted to check whether the concept met the MoSCoW analysis requirements created in section 5.5.

The results of the MoSCoW requirement check can be seen in appendix H. Focused on the positively met requirements, interactive projection has the most points (28), followed by the portal (26), big entrance (25), virtual DJ (23) and lastly interactive basecamp with 19 positively met requirements (see figure 6.15).

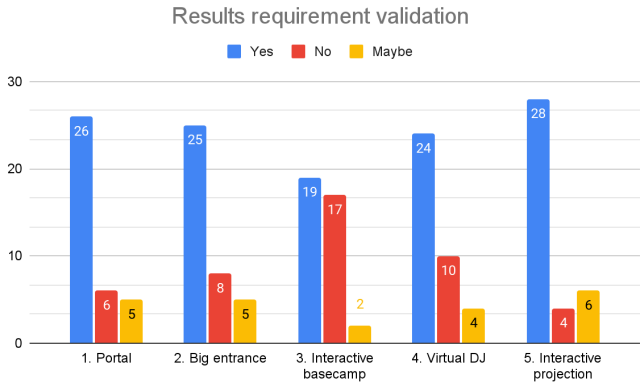


Figure 6.15: The requirement check results

Next to having the lowest amount of positively met requirements, interactive basecamp also has the highest amount of requirements not met. This is mostly due to the fact that this concept connects online with online visitors, and is not fully focused on connecting online with in-person attendees. As this research is focused on the latter, many requirements are not met.

When further inspecting the results, it can be seen that virtual DJ has the second highest amount of unmet requirements. However, a deeper analysis shows that the amount of unmet requirements in the 'must have' category is not higher than the portal and the big entrance, as these concepts all have 2 unmet (must) requirements (see figure 6.16). Therefore, the higher amount of unmet requirements of the Virtual DJ in the total score does not lead to exclusion of the concept.

To conclude, the front runner concept from this requirement check is the interactive projection. However, the portal, the big entrance and the virtual DJ are close competitors as these concepts also have a high amount of positively met requirements and a low amount of unmet 'must have' requirements. As the interactive basecamp scored very negatively, this concept is dismissed for the future validation steps and is thereby not selected to continue within this research.

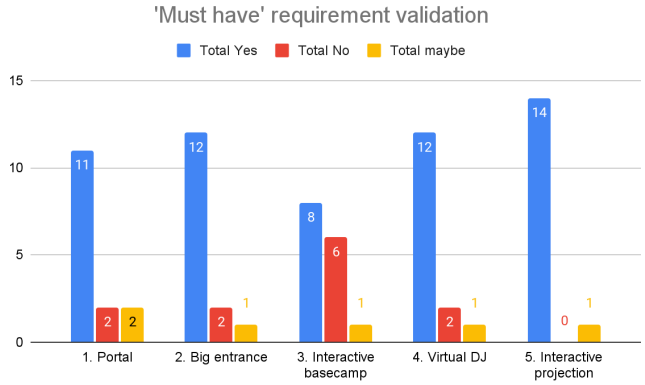


Figure 6.16: The must-have requirement check results

6.3.2 Value validation results

Results innovation team

The second step in this validation process was focused on assessing the concepts value. This step was divided into the three aspects; user value, client value and value for FX Agency. Each aspect was discussed and given a ranking on a Likert scale from 1 (low) to 7 (high). Eventually, the sum of three values represented the total value of the concept.

While assessing the user value, value was defined as the perception that users have of the product in relation to their expectations and needs. The discussion revolved around understanding what unique and superior value the concept could offer compared to alternatives in the market. This involved crafting concise value statements to clearly articulate the benefits.

Secondly, when evaluating client value, the focus was on exploring novel opportunities each concept presents in favor of the client. This involved considering whether a concept offered fresh approaches to reiterating event goals to visitors or introduced innovative methods to deliver information. Additionally, in determining the value of each concept for FX Agency, the definition of value was put in a broader perspective. For example, contemplating whether a concept could aid in acquiring new clients or expanding into new markets through its implementation.

The innovation team results are summarized in figure 6.17. As can be seen, interactive projection has the highest total perceived value (14.5 points). Followed by the portal (13.5), the big entrance, (11,5) and lastly the virtual DJ (7.5).

Results expert assessment

Towards the conclusion of the value assessment, the CD refrained from singling out a specific concept as the best choice. Nevertheless, he emphasized a preference for a solution that is

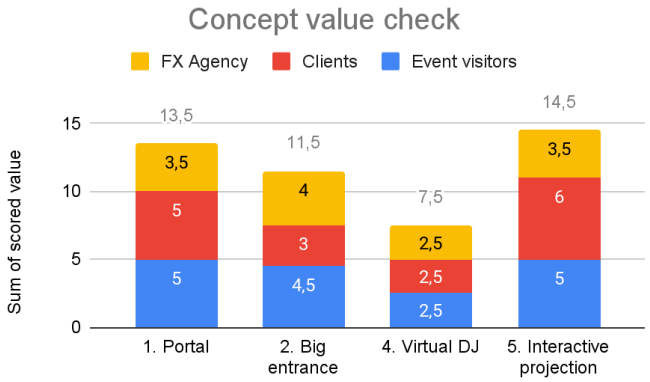


Figure 6.17: Results form the concept value validation with the innovation team

utilized or, at the very least, noticed by all event attendees. Highlighting the importance of broad engagement, he suggested potential implementation points such as the entrance or within the event room itself as means to achieve widespread visibility and participation.

Regarding concept 1, the portal, the director expressed significant reservations, particularly emphasizing concerns about its limited interaction scope for a specific group of individuals. He posed constructive questions aimed at enhancing the concept to foster more open and inclusive interaction possibilities.

CD: "How do we adjust this concept so it can be used for a bigger audience? It needs to be relevant and interesting to participate. How can we create this feeling for people? I am missing the real value and without it, it seems too expensive to realize."

Concerning concept 2, the big entrance, the director expressed enthusiasm, particularly focused on the extra value it would bring to online attendees and the opportune timing and location of the concept. He also suggested ideas for enhancing this concept further, such as adding extra functional features to enrich the experience.

CD : "I think this could be a perfect moment for online visitors to feel really welcome when entering an event. Especially if you compare it with just clicking play to start a video of the event."

For concept 4, the virtual DJ, the director was enthusiastic about the potential for interaction during the event's waiting moments. However, he noted a lack of personal expression in the interaction options provided, suggesting the need for additional features to foster a deeper sense of connection among attendees.

CD: "The interaction is low-threshold which I like, however I am missing something personal. They can only vote on songs, but not express themselves personally."

Regarding concept 5, interactive projection, the director initially expressed enthusiasm, particularly appreciating the accessibility of the interaction and the simplicity of what online visitors would experience. He focused on the interaction possibilities presented by the concept and the mechanisms by which these interactions were structured, highlighting its potential for engaging attendees.

CD: "A good thing about this idea is that what online visitors see is really simple, just a camera from above. You can really see the in person visitors walking and expressing their opinion.‘"

6.3.3 Cost validation results

Results innovation team

This step involved assessing the concept's cost implications. Questions were raised about the potential financial investment required to bring the concept to fruition. It is sought to determine whether the concept was financially viable and aligned with the agency's resources.

The costs were explored using online web sources and on the basis of experience of the participants. Eventually, the costs were compared to each other and represented in the amount of coins, from 0 coins being practically free, to five coins being expensive. The virtual DJ is cheapest (1.5 coins), the big entrance and interactive projection got 3 coins each and the portal got 4.5 coins assigned.

With the overall value and costs known, the value per coin can be calculated. This provided a new value which thereby represents these two aspects together. The higher this value, the better this concept scored in this test. As can be seen in table 6.18, the virtual DJ and interactive projection have the highest outcome, after a gap followed by the portal and the big entrance.

Concept #	1. Portal	2. Big entrance	4. Virtual DJ	5. Interactive projection
Overall value	13.5	11.5	7.5	14.5
Estimated costs (in coins)	4.5	3	1.5	3
Value per coin (v/c)	3.86	3.83	5	4.8

Figure 6.18: The results of the value and cost check

Results expert assessment

Regarding costs, the creative director emphasized a preference for an economical solution, with the notion that the more cost-effective, the better. Furthermore, he underscored a preference for utilizing existing technology at the event site, citing both cost-effectiveness and the ease of implementation in a live event setting. He expressed concern about the

expenses associated with installing new technology, such as a big LED wall or projection mapping, highlighting the high costs involved and the potential for logistical challenges.

CD: "I think a solution with not much extra technical effort has the most potential to be successful. You know how fantastic I would think it is to install a big LED wall at the entrance and use projection mapping for a special interaction. However this means 10k, 20k or 30k just for the tech, this is too expensive."

Specifically addressing feedback on the portal concept, the primary concern highlighted was the elevated costs associated with implementing it. Furthermore, he raised concerns about the scalability and cost-effectiveness of the idea, particularly in connecting large numbers of attendees. He questioned the practicality of investing in expensive technology if only a small fraction of attendees would utilize it.

Furthermore, the creative director expressed immediate worries about the expenses tied to projection mapping and the logistical effort required for its setup on each occasion. These insights highlighted his pragmatic approach to cost management and his preference for solutions that are both affordable and logistically feasible.

CD: "You have the biggest advantage when you work with technology that is already present at the event site."

6.4 Concept selection

To conclude the co-validation session, a small recap of the results is given. Firstly, projection mapping meets the most requirements from the MoSCoW requirement list. The portal, the big entrance and the virtual DJ follow thereafter. As already stated before, interactive basecamp was dismissed as it does not meet a limited amount of requirements from the list. With regards to the value and cost check, virtual DJ and interactive projection are the best fitted with a value per coin of 5 (virtual DJ) and 4.8 (interactive projection).

To summarize the validation session with the creative director, two important aspects should be highlighted. First of all, the solution should not use expensive technology that should be bought specially for this cause. Thus, the solution should preferably use technology that is already present at the event site or online in the platform. Secondly, the solution should be placed in the correct space and time during the event, so as many attendees as possible should be able to enjoy the solution. This could for example be at the entrance or in the event room itself.

With the above considerations in mind, the portal can be dismissed. This is due to the limited interaction it provides and the high costs it brings. Furthermore, interactive projection, although the high perceived value by the creative director and in the co-validation session, is too expensive and does not offer interaction possibilities at the wanted place or time. Therefore, two best fitted concepts are the big entrance and virtual DJ. As the cost restrictions the creative director has put forward are non negotiable, virtual DJ fits better

than the big entrance. Therefore, this research continues with the virtual DJ.

Nevertheless, as previously mentioned by the director, the virtual DJ lacks essential elements that would enable individuals to genuinely express themselves. Furthermore, as indicated in section 6.3.1, the virtual DJ fails to meet all necessary requirements. Consequently, refining this concept is imperative, involving the incorporation of additional expressive elements for participants, and the adjustment of requirements from rejection to approval.

6.5 Refined concept

Based on the co-validation session (section 6.3), the concept was refined accordingly. Additionally, the interactions between concept and participant were further explored and explained within this section.

The primary aim of this concept is to actively engage attendees, even during seemingly uneventful waiting periods, thereby fostering a stronger sense of community. Particularly, online participants tend to lose interest during such downtime and disengage from the event. The solution ensures sustained engagement, keeping all participants captivated and focused throughout the entire event, extending the engagement even slightly before and after the scheduled program.

To address these 'waiting' moments, a virtual DJ battle is introduced, showcased on the large screen within the event space and on the stream for virtual attendees. This feature presents a lively competition where two participants, whether online or physically present, showcase their favorite songs for the next play. These selected tunes are broadcasted within the event venue and simultaneously included in the online stream for virtual attendees. To further enhance interactivity, all participants, both online and in-person, have the opportunity to vote for their preferred song. The voting process is seamlessly facilitated through the Reply.live platform by FX Agency.

Online attendees will find all interaction concentrated on the right bar of the platform, mirroring the current setup of the platform. In contrast, in-person participants engage through their phones. Regardless of their mode of attendance, all participants must have the capability to vote for their preferred song, upload their own selection to join the battle, and maintain visibility of the general chat.

Addressing the creative director's feedback on the need for personal expression, a new feature encourages attendees to personalize their experience. This entails the ability to alter their avatars, incorporate amusing stickers, and insert comments during the voting process, allowing for a more individualized expression of personal preferences and sentiments.

6.5.1 Competitors check

When the refined concept is compared to features offered by competitors, a distinctive absence of similar solutions becomes clear. While competitors in domains such as baseball

competitions have introduced engaging elements like the kiss-cam to captivate visitors during 'waiting' moments, no parallel solutions are identified for corporate hybrid events. It is noteworthy that although competitors may not prominently feature comparable innovations on their websites, it does not necessarily imply they have never experimented with similar approaches. Nevertheless, the lack of similar initiatives by others should not be viewed as an obstacle. Thorough testing is planned to assess the concept's viability within the evaluation. Interestingly, the distinctiveness of the concept could become an advantage, as the absence of comparable products can suggest potential for success.

6.5.2 Persona check

The alignment of persona needs and requirements with the refined concept is crucial for ensuring a harmonious and tailored user experience. By carefully checking each requirement against the established concept, the design and execution of the concept can be fine-tuned to meet the specific needs and preferences of the four identified personas (see section 5.6). Moreover, any unmet requirements highlight potential gaps in the concept that may need refinement or adjustments to better cater to the diverse needs of the users, ultimately contributing to a more user-centric and successful implementation. A small summary of the person-concept check per individual can be found below.

Sjanet

In accordance with the insights provided by Sjanet, certain needs and frustrations find resolution with this concept. On the affirmative side, Sjanet seeks exciting events that offer both entertainment and engagement, craving a continuous influx of fresh stimuli to sustain interest (M14, S8, M10). Active participation in shaping these events is also a preference (M12). The desire for easy-to-use technology aligns with their inclination towards brief attention spans, avoiding the need for prolonged focus (M8, M11). However, there are areas where her needs remain unmet. Notably, the lack of network creation is identified as a drawback (S4), yet this limitation may serve as a potential conversation starter, turning an obstacle into an opportunity for meaningful interaction. Lastly, Sjanet would love to meet people who are visiting in-person while she is visiting online (M15). However, with this concept, she will not directly meet them, but she does become aware of the other's who are joining the event.

Peter

Most of Peter's preferences, as reflected in the persona, align seamlessly with the proposed concept. The persona highlights a positive inclination towards active participation (M12), real-time opinion sharing via voting or chat (S4, C8) and the desire to observe reactions from others—all of which are effectively addressed by the concept (M13). Furthermore, this concept also solves the frustration of feeling bored during lunch (C6). However, an unmet need emerges when considering Peter's preference for direct contact with other attendees during different stages of the event (S6, C7). The contact this concept offers between attendees can not be described as direct and therefore does not accommodate this preference.

Last of all, this concept does not provide Peter with higher emotional energy, and therefore also requirement S13 remains unmet.

Flam

In line with the insights outlined in Flam, certain needs and frustrations are met. First of all, accessibility is assured, offering a degree of anonymity by not requiring full-face exposure (M7), catering to introverts who may choose to observe without active participation (S7). Secondly, Flam would not be compelled to join conversations but could feel inclined to engage with comments and replies (C7, C10). Furthermore, inclusivity is achieved through a voting system accessible and visible to everyone, fostering a sense of belonging (M15). The environment is intentionally not serious, allowing for a lighthearted experience, and the ability to observe all reactions enhances the overall engagement (S10). However, certain needs remain unmet. Flam expresses a desire to be part of the event community but faces a sense of detachment (M13). While there is freedom to express oneself, the options for connecting with others in diverse ways are limited, leaving room for improvement in this aspect (S6).

Rik

Rik's outlined requirements compared to the concept indicate areas of satisfaction but also areas of unmet needs. Positively met requirements include the presence of a dynamic event program that seamlessly transitions into a continuous flow (M11). Furthermore, visibility is ensured without necessitating personal disclosures (M13), and the appeal of footage will depend on thoughtful design (which could differ each event) (M14). The need for a mutual focus of attention is successfully addressed for both online and in-person engagements (M4, S12), catering to the needs of both groups. However, the absence of a truly 'wow' experience to share with his network (S9), suggests a gap in the fulfillment of this particular expectation.

6.6 Proof of Concept development

Paper prototypes are made to realize the concept and test the different interaction design choices. Two paper prototypes are made; one for online attendees and one for in-person attendees. This is done as the attendees visiting online most often are behind their laptop, and the attendees visiting in-person engage with the interaction modules on their mobile phones.

The outlines for both prototypes were created in Figma, a prototyping design tool. These outlines are based on the current outlines of the Reply.live platform (figure 6.19). The frames with the outlines are printed and the content is drawn with a pen inside. Additionally, extra papers are used to create modals and buttons. Colors are added with the help of highlighters to direct attention to various features. Photos of the two paper prototypes can be seen in appendix I.

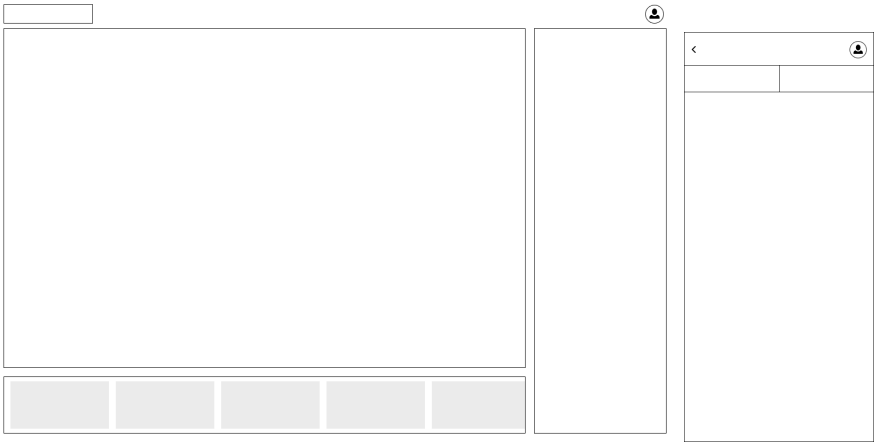


Figure 6.19: Outline paper-prototype for online attendees (laptop version) on the left, outlines paper-prototype for in-person attendees (mobile version) on the right.

6.6.1 Heuristic evaluation

The goal of this heuristic evaluation was to identify and focus on specific issues without having to speak to users. In this way, usability problems were discovered with regards to individual elements and the impact on the overall user experience. The issues found during this phase should be solved when designing the PoC. The heuristic evaluation workbook designed by the Norman group [52],[60] is completed and a summary of the findings can be found in figure 6.20.

6.6.2 Evaluation with UX designer (FX Agency)

This session was dedicated to delving into the insights and viewpoints of a seasoned UX designer at FX Agency regarding the paper prototype. With extensive expertise, boasting 10 years in UX and an additional background in design, this professional plays a crucial role in assessing and crafting user experiences and flows of the concept. The discussion revolved around key queries such as identifying opportunities to enhance interaction flows, pinpointing crucial yet absent information, and addressing uncertainties, issues, and recommendations uncovered through the heuristic evaluation (section 6.6.1).

The process unfolded in the following manner: initially, the concept is explained to the UX designer. Subsequently, the UX designer engaged with the paper prototype, undertaking specific tasks. Following this interaction, feedback is solicited concerning the various task flows and informational elements. Lastly, any lingering uncertainties from the heuristic evaluation (section 6.6.1) were raised and deliberated upon. The entire session was voice recorded. As the evaluation session was held in Dutch, the quotes were translated to English for the purpose of this research report.

Heuristic	Description	Issues or unknowns	Recommendations
Visibility of the system status	The design should always keep users informed about what is going on, through appropriate feedback within a reasonable amount of time	Is it clear enough that a song-battle is going on? Is it clear that you can go back to the general chat by clicking the cross in the right upper corner? It is not clear how long this battle still continues and when the event will start. The system does not warn the user that the photo they take will be shown on the big screen.	Add a timer to show when the song-battle stops. Warn users with consequences of their actions, for example with a small pop-up or hover text.
Match between system and the real word	The design should speak the users' language. Use words, phrases and concepts familiar to the user, rather than internal jargon	Works pretty much like many other applications in the real world.	Keep familiar terminology in the design. Check with others if the words used in this design are understandable.
User control and freedom	Users often perform actions by mistake. They need a clearly marked 'emergency exit' to leave the unwanted action without having to go through an extended process	It does not support users to go one step back during the voting sequence.	Create a 'go-back' button in the voting sequence.
Consistency and standards	Users should not have to wonder whether different words, situations or actions mean the same thing. Follow platform and industry conventions	The 'go-back' cross in the right upper corner should be consistent throughout the full design, not only on some pages. Use the same icons throughout the full design.	Add the cross on every page to allow users to go back to the 'main' page. Create one icon style throughout the full design.
Error prevention	Good error messages are important, but the best designs carefully prevent problems from occurring in the first place. Either eliminate error-prone conditions, or check for them and present users with a confirmation option before they commit to the action	They can not re-vote their vote. However, is this necessary? Users need to cancel their song in battle after they have added it (before it is on the big screen). Should users be able to edit their comment after they have pressed send?	Add a column in the right plane in which users can cancel their song waiting to battle.
Recognition rather than recall	Minimize the user's memory load by making elements , actions and options visible. The user should not have to remember information from one part of the interface to another.	The photo they want to use is visible every time when they vote again, so they do not have to remember how it looks. Does your profile picture also change when you change your avatar in the voting module?	Design the 'change avatar' the same when voting as when you do it the first time when setting up your account.
Flexibility and efficiency of use	Shortcuts - hidden for novice users - may speed up the interaction for the expert user such that the design can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.	There are no shortcuts, is this necessary? As users are mostly novices and the things they need to perform do not consist of many steps. The photo they take is used for all votes until they change it again, this makes voting quicker.	Keep the amount of clicks and steps minimal. Search for opportunities to do this.

Heuristic	Description	Issues or unknowns	Recommendations
Aesthetic and minimalist design	Interfaces should not contain information that is irrelevant or rarely needed. Every extra unit of information in an interface competes with the relevant units of information and diminishes their relative visibility.	The visual design is focused on the essentials.	Keep the design simple and minimal when designing the clickable prototype. Check with others if this is the case.
Help users recognize, diagnose and recover from error	Error messages should be expressed in plain language (no error codes), precisely indicate the problem and constructively suggest a solution.	No error messages are added yet, they should definitely be added. - When the voting does not work. - When a comment does not show - When the song does not make it to the battle.	Add error messages in traditional error message visualizations, like bold and red text.
Help and documentation	It's best if the system doesn't need any additional explanation. However, it may be necessary to provide documentation to help users understand how to complete their tasks.	Users need something at the start to understand what is happening and what happens if they join the voting or battle as well.	Create a 'help' modal where users can see an explanation and the purpose of the system.

Figure 6.20: Heuristic evaluation of the paper prototype using the heuristic evaluation workbook designed by [60]

Adding a briefing page

Initially, the UX designer stated that introducing an intro page or onboarding process would enhance the experience for first-time users. Despite the straightforward nature of the interactions, providing users with an overview of what to expect could be beneficial. Furthermore, he recommended incorporating a clearer time indication on the screen to communicate the event status more explicitly, such as displaying messages like 'The event starts in 10 minutes' or 'Break is over in 5 minutes'.

Structure of the platform

The UX designer suggested a preferable alternative to having a pop-up for casting votes. He proposed the inclusion of an extra tab in the upper section of the right plane, creating a 'DJ battle' tab alongside the existing 'Chat' and 'Private Chat' tabs. This arrangement provides users with easy access to the voting functionality. Nevertheless, he cautioned that there might be an excess of information in the tabs. Hence, he recommended implementing the suggested changes, evaluating the user experience, and then making a judgment on its efficacy. Moreover, he emphasized the importance of coordinating with the development department to assess the feasibility of this new idea in the back-end.

UX designer: "Yes, then you have three tabs; chat, private chat and DJ battle. When you click DJ battle, you will switch to the tab in which you can vote on your favorite song."

Voting process

Regarding the voting process, the UX designer offered valuable insights. Initially, he recommended renaming it to something like 'Vote on your favorite' rather than 'Song battle,' emphasizing the clarity it would bring to users about their expected action. Furthermore, he proposed relabeling the 'change your avatar' button to 'Spice up your avatar!' to provide a clearer explanation of its purpose to the user and to challenge the user to use stickers.

To optimize the interaction flow for this section, the UX designer recommended enabling users to vote directly left or right upon clicking the button. This entails removing the 'vote' button, eliminating an extra click for the user. To accommodate this change, the 'add a comment' section should be relocated above the 'vote left or right' buttons.

UX Designer: "I think it is cool when you click on the one you want to vote on, and it votes immediately! In that way, you do not need the 'vote' button, and eliminates another unnecessary click for the user."

Uploading your own song

Initially, the option for users to participate in the song battle and upload their own favorite songs was presented by a button located above the right panel. However, the UX designer recommended relocating it to avoid the appearance of a standalone button unrelated to the main screen. The suggestion is to integrate it within the vote tab or present it as a sticky notification positioned at the top of the chat.

Additionally, the UX designer expressed enthusiasm regarding the withdrawal feature for users in the song battle. However, he advised against implementing it as a notification that floats from the bottom to the top. Instead, he recommended using a notification that remains fixed at the top of the chat for a more cohesive user experience as they can withdraw any time until they are battling.

Avatars and stickers

To facilitate avatar changes for users, the UX designer recommended maintaining the current flow employed across the platform, ensuring a consistent design throughout. He expressed a preference for the current modal-popping flow for changing avatars, suggesting it should stay like this.

Moreover, he underscored the importance of enhancing the visibility of stickers in this process, highlighting their significance as the primary user input during this step. Additionally, he acknowledged potential development challenges associated with dragging stickers and proposed the implementation of specific and permanent positions for the stickers to prevent future difficulties. Lastly, he recommended the inclusion of a reset button to efficiently remove all stickers at once.

UX designer: "I think the stickers should be on a specific place in the photo frame. Dragging a sticker can be done, but is way more complicated than the first option. Also, I would add a 'reset' button which deletes all added stickers immediately."

Additional inspiration

Finally, the UX designer contributed further inspiration to enhance the concept. Proposing an engaging element, he suggested incorporating push notifications for users on the previous winning side, inviting them to upload their own song and take on the role of the DJ. Moreover, he expressed the idea of visualizing the remaining voting time on the big screen, aiming to reduce confusion in case users are prompted to vote again.

UX designer: "Yes i think that will work, however I think you should warn the users in some way that they are aware a next voting round is coming in, so it will not be super random. Maybe add it inside the big screen with a timer or so."

6.6.3 Evaluation with client

The primary objective of this evaluation was to delve into the client's perspective regarding both the conceptual framework and the prototype under consideration. Conducting this assessment at this stage was important, as it afforded numerous opportunities to refine and modify the concept prior to the development of a PoC. Unlike the approach taken at the UX evaluation (section 6.6.2), this evaluation placed a greater emphasis on inspecting the overall concept rather than focusing on specific user interactions. By prioritizing the conceptual aspects, this evaluation contributed to shaping a foundation for the subsequent

stages of development, ensuring that the final product aligns with the client's vision and requirements.

This evaluation session was done with the same expert who participated in the in-depth interviews earlier this research (participant 4, section 7.1). The entire session was recorded and manually transcribed afterwards.

First impression

The client displayed significant enthusiasm for the concept, praising its capacity to bridge audiences and its visually appealing nature. She particularly valued its ability to engage online viewers with live participants, addressing a common disconnect in such interactions. While she acknowledged the concept's potential for creating a 'wow-factor' effect and its versatility for various applications, she also raised concerns about its financial and developmental feasibility. Despite these reservations, her overall outlook remained positive, suggesting a belief in the concept's potential success with the right resources and development strategy. Her feedback underscored both excitement for the concept's possibilities and a pragmatic consideration of its practical challenges.

Client: "I think with this concept you do the thing of connecting the two audiences, also as it is very visual. The good thing here is that also the online audience can see the live participants a bit. Normally they only see a waiting screen at the start or during breaks, and that is one of the biggest disconnections. So, i think that is very valuable."

Type of events

The client, primarily organizing relationship events, was asked about the potential applicability of the concept in both corporate relationship events (similar to those they organize) and in-house (employee) events. Reacting positively, she expressed confidence in its suitability for both types of events, seeing it as a valuable addition. When asked if there were specific events where the concept might not work, she couldn't think of any, indicating a broad potential applicability. Furthermore, she emphasized the concept's adaptability, noting its suitability for hybrid events while also being versatile for online-only or in-person-only occasions.

She elaborated on the versatility by suggesting that the concept could work seamlessly for online-only events, envisioning scenarios where it enhances the experience even without physical presence. Similarly, she highlighted its potential for use in real events, proposing the idea of experiencing it live with a real DJ, showcasing its flexibility and ability to elevate different event formats. This insight highlighted the client's belief in the concept's versatility across various event types and settings.

Client: "Yeah absolutely, that is also what I was thinking! This could also work for online only events I think. And also real events as well, like, see it live with a real DJ for example, that would be cool"

Timing

The client raised a concern regarding the feasibility of implementing the concept at the start of an event. She noted the typical online behavior of users logging in just before an event begins, suggesting that this brief timeframe might limit engagement, particularly with only one song. Instead, she proposed that the concept would be more effective and better received during breaks, where attendees have a longer period to interact and derive greater value from the experience. Furthermore, she expressed hesitation about the effectiveness of introducing the concept at the beginning of an event, emphasizing the need for a longer engagement window for users. In response to a query about incentivizing earlier attendance, she suggested contextual prompts, such as networking opportunities, but cautioned that such changes might necessitate a significant overhaul of the project's scope and goals. This exchange highlighted the importance of timing and engagement strategies in maximizing the concept's impact during events.

Concept value

The client expressed skepticism regarding the concept's value, indicating a reluctance to invest a significant amount in it. While she didn't specify a particular price point, she suggested caution in charging too much for such features, deeming them not unique enough to warrant a high price tag. She compared its value to that of a poll feature, indicating it holds greater worth but not substantially more. However, she emphasized the concept's potential to serve as a selling point for attracting new clients, particularly in convincing them to choose the client's event organizing services. This perspective highlighted a pragmatic approach, valuing the concept more for its potential to enhance overall service offerings rather than as a standalone revenue generator.

Client: "It is a nice feature to use as a selling point, for example for FX to convince clients to choose FX as their event organizers."

Additional inspiration

Finally, she shared additional insights on elevating the concept to a higher level. Emphasizing the transformative impact, she suggested that having a live DJ present at the event site playing the chosen songs could enhance the concept by introducing a WOW-factor. Furthermore, she proposed the idea of incorporating the selected songs into a remix, adding an extra layer of creativity and engagement to the overall experience.

Client: "Incorporating a DJ live putting in the song would immediately put in the WOW-factor."

Client: "Maybe you can do like a piece of the song, remixed into another song? A general background sound and that the songs are edited into the remix."

Furthermore, she highlighted the potential value enhancement for both companies and attendees through comprehensive branding of the entire concept. Expanding on this no-

tion, she suggested the implementation of branded AR filters as an alternative means for attendees to express themselves, surpassing the conventional use of branded stickers and providing an additional avenue for immersive and personalized engagement.

6.7 Figma prototype

Figma serves as a tool for crafting a dynamic, clickable prototypes, with a focus on illustrating the concept through thoughtfully designed interactions and animations. The prototype is intentionally user-centric, allowing interaction for users to engage with the envisioned concept. The design is deliberately kept simple to ensure clarity in interactions and facilitate the execution of key features. It is important to note that while the current design effectively conveys the concept, it will not serve as the final design for FX Agency. The flexibility to adapt the branding to the unique characteristics of each specific event implies that the design will undergo modifications to align with the distinct branding requirements of each occasion.

This section serves as a clarification of design decisions, explained through the presentation of screenshots from the created Figma model. The design is encapsulated in figure 6.21, drawing inspiration from the existing design of Reply.live. The focal point is the primary screen, showcasing the Virtual DJ, visible to online attendees through Reply.live, while in-person attendees experience the projection of this display within the event room. Directly beneath, a timeline of the event unfolds, complemented by the placement of an interactive panel on the right side.

The decision has been made to exclusively develop an interactive iteration for the laptop design, while opting against a similar approach for the phone. This choice stems from the fact that the interactive panel on the right side of the laptop design mirrors the functionality of the phone version. The similarities between the two are substantial, and for evaluation purposes, focusing on a single version suffices. Consequently, the design plan entails an interactive version for the laptop and a static design tailored for the phone.

6.7.1 Main screen design

Delving into the design decisions for the main screen display, emphasis is placed on several key elements. Firstly, it is crucial to visually represent the origin from which attendees join the musical battle (online or in-person). The display also features the battling participants, showcasing their avatars, selected songs, and accompanying comments. The percentage balance between their respective votes adds to the competitive edge. Additionally, the winner of the preceding battle and the currently playing song contribute to the dynamic atmosphere and therefore need to be displayed. Lastly, a timer is integrated to signify the remaining time for attendees to cast their votes, enhancing the interactive and engaging nature of the experience. See figure 6.22.

This particular design is specifically crafted for events hosting approximately 100 attendees. This is due to the flow each vote has (as show in appendix J). With each vote requiring

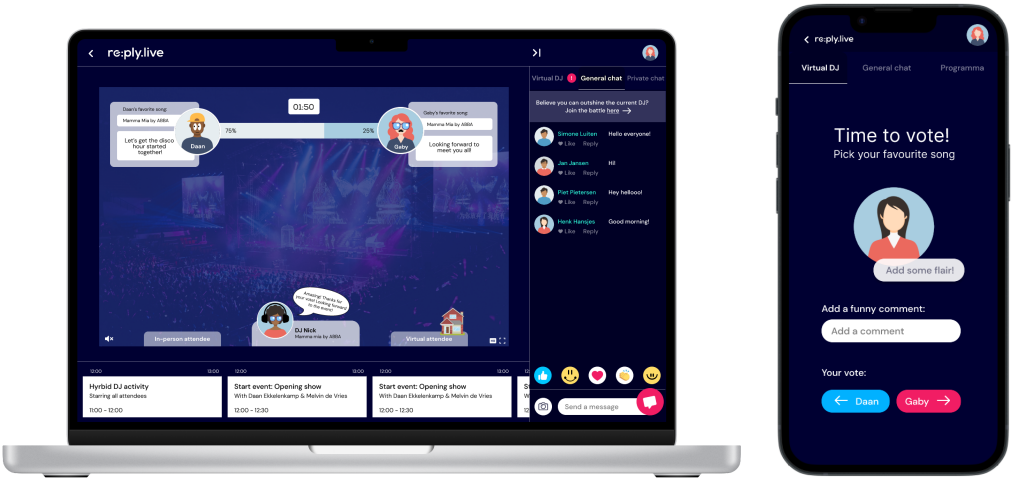


Figure 6.21: Screenshots of the UI of the concept on a laptop and a phone.

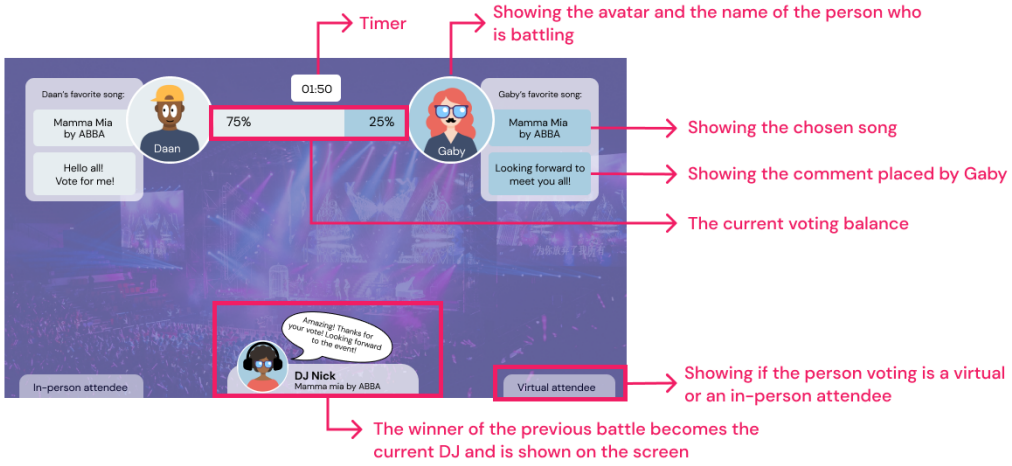


Figure 6.22: Explanation of the design choices 'Main screen'

approximately 3 seconds, the system can process up to 20 votes per minute. For instance, during a 3-minute song, a total of 60 votes can be accommodated. However, as the event scale increases, this is not feasible anymore. Consider a scenario with 2000 attendees. In such cases, certain aspects of the design need to be adjusted. For instance, attendees will not have the option to comment alongside their vote to ensure a more streamlined process, as commenting consumes considerable time when shown on the screen. Instead, the system will display only the corresponding avatars representing the votes, with multiple avatars flying simultaneously to ensure everyone gets their vote on the screen. Although this might make it slightly more challenging for attendees to spot their own avatar, it significantly enhances the efficiency of managing a large volume of votes at the same time.

Upon the expiration of the timer, which synchronizes with the conclusion of the current song, the musical battle concludes, and the winning participant is prominently displayed at the center of the screen (see figure 6.23). To enhance the event's flow, a secondary timer is introduced, counting down the time until the commencement of the next battle. This seamless transition ensures a dynamic experience for attendees, maintaining a rhythm that captivates participants throughout the battle.

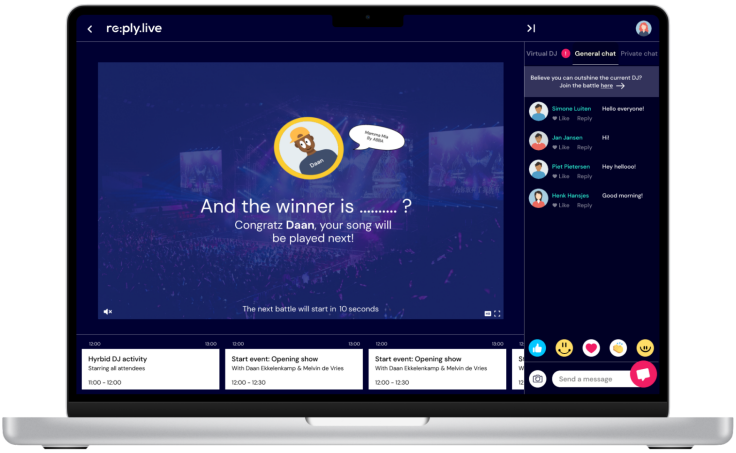


Figure 6.23: 'Winner' screen design

6.7.2 Interactive panel design

The interactive panel serves as the core for all interactions between the attendee and the platform. This component is divided through tabs, each outlining distinct functionalities. The introduction of a new module, namely 'Virtual DJ,' prompts the addition of a corresponding tab to facilitate navigation. The intricate details of this tab system are presented in figure 6.24, providing a guide to its functionalities.

Moreover, two distinct designs have been crafted to facilitate the needed functionalities: one dedicated to attendee voting and another tailored for uploading songs and thereby engaging in a music battle. The design of the voting panel is visually represented in figure 6.25, offering a detailed glimpse into its layout and features.

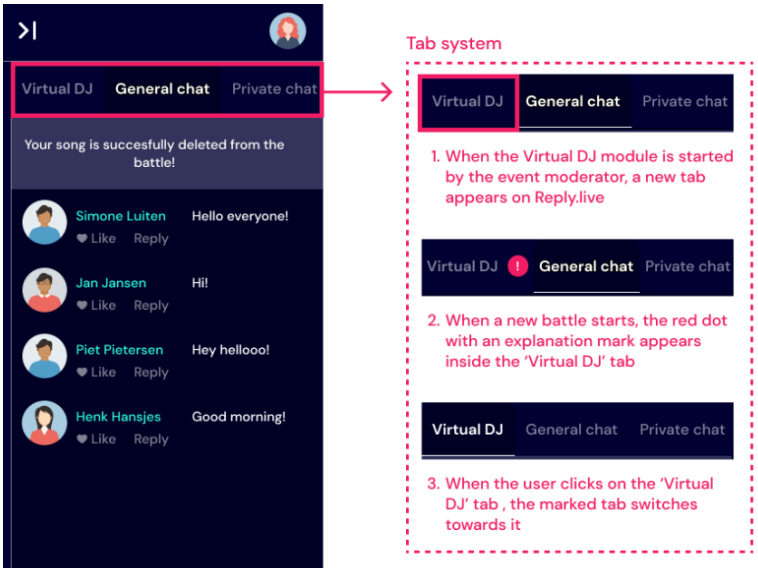


Figure 6.24: The tab system design within the interactive panel explained.

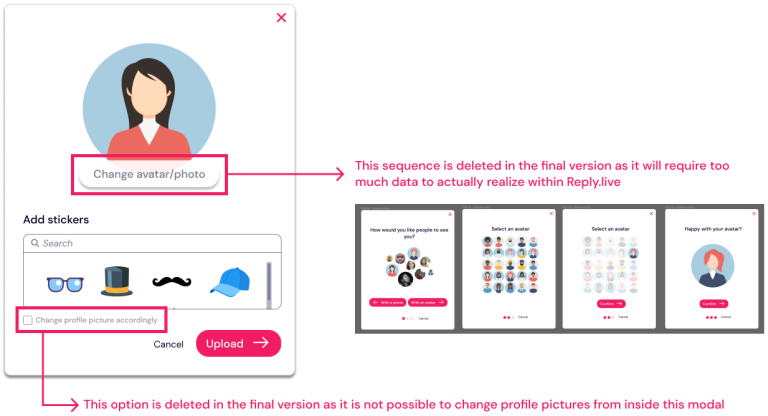


Figure 6.25: Explanation of the design choices 'change avatar' modal

As can be seen, a modal opens when the attendee wants to 'add some flair' to their avatar or photo. Subsequent discussions with the FX agency's development team led to a decision to streamline the functionalities within this modal. This adjustment was deemed necessary due to the substantial data load imposed on the platform during the upload or saving of new photos, particularly in scenarios with a high attendance exceeding 500 people, where simultaneous actions by all attendees could strain the system. Consequently, certain functionalities were removed. The initial design of this modal, encompassing the now-deleted features, is shown in figure 6.26.

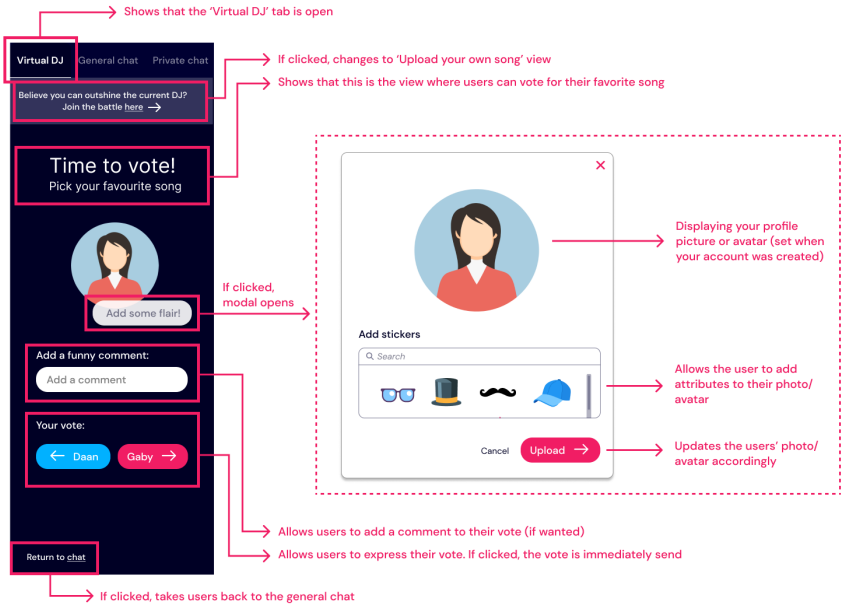


Figure 6.26: Explanation of the Virtual DJ module (interactive panel) - 'Vote view'

When attendees wish to upload their own song, they are presented with the panel showcased in figure 6.27. Eventually, this part will be connected to a Spotify API, allowing attendees to use it and find their favorite songs. Notably, the design of this panel harmonizes with the layout of the 'voting' panel. This consistency in design ensures a cohesive experience, allowing participants to seamlessly navigate between different functionalities while maintaining a visually cohesive interface.

Choosing two songs for a new battle involves exploring three distinct design options. The first way is incorporated directly into this PoC, while all versions are applicable once the system is developed. The first version embraces a simple concept, arranging battles and votes in chronological order. This approach is particularly handy for smaller events, as this ensures everyone gets their turn in the spotlight. The second version introduces a dynamic twist, with the current DJ selecting two songs for the next battle, providing added impact and interaction possibilities, albeit limited to the DJ. The third version takes it a step further, presenting an upgrade that could be sold separately. This advanced version involves having a real DJ at the event side who curates the songs for the next battle,

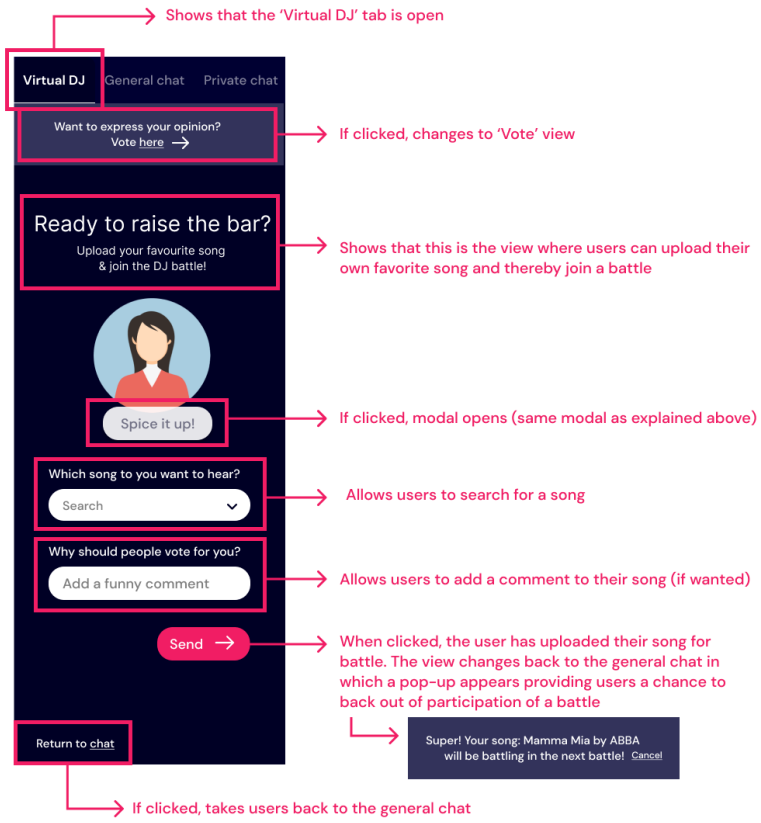


Figure 6.27: Explanation of the Virtual DJ module - 'upload song' view

skillfully remixing them together. This ensures heightened entertainment and interaction, making it an attractive option for those seeking a more immersive experience.

Following the event, a playlist is automatically curated, encompassing all the songs played through the virtual DJ module. This playlist holds the collective musical journey experienced during the event and is designed for effortless sharing among all attendees. It serves as a communal compilation, allowing participants to revisit and relive the diverse soundtrack that contributed to the event's atmosphere.

6.8 Conclusion solution space

The objective within the solution space was to address SQ3: Which identified concept could improve community building between online and in-person attendees during corporate hybrid events? Following an extensive process of co-design, co-exploration, and co-validation, Concept 4; the Virtual DJ, is identified as the most fitting solution.

Once chosen, the concept undergoes an iterative process initiated by rapid (paper) prototyping and evaluation sessions involving experts in UX design and event organization. Throughout this process, features and design choices undergo numerous changes. Ultimately, a PoC is developed using Figma, presenting a clickable prototype that showcases all concept interactions and possibilities. This clickable prototype will play a crucial role during the evaluation phase, serving as a tool for evaluating the impact of the Virtual DJ on community building in hybrid corporate events.

Chapter 7

Evaluation

The primary objective of this evaluation is to respond to SQ4, which explores the degree of support provided by the PoC in fostering community building during corporate hybrid events. This involves facilitating the interaction between participant and prototype through various usability tasks, explaining the concept to the participants in detail, gathering their opinions during a subsequent semi-structured interview and ending with the short version of the user experience questionnaire. The purpose is to comprehensively examine the effectiveness and potential impact of the PoC in enhancing community dynamics within the context of corporate hybrid events.

This chapter is divided into four sections. Section 7.1 provides an introduction to the participants participating in this evaluation. Section 7.2 presents the research set-up and the different procedures within. Section 7.3 explores the results of the usability test, provides a thematic analysis of the semi-structured interview results and presents the results of the user experience questionnaire. Lastly, the results are summarized and SQ4 is answered in section 7.4.

7.1 Participants

This evaluation specifically targets participants with in-side knowledge about the corporate event-organization industry, ensuring a familiarity that allows them to envision themselves actively participating in such events. Furthermore, their expertise within the industry qualifies them to offer valuable insights during the semi-structured interviews.

The intended scope involves conducting 18 evaluations, involving 13 employees from FX Agency, two employees from D&B Eventmarketing, one employee of the Gemeente Utrecht and the remaining two are freelance event-managers. All participants are event experts in their own work-field, from sales and event-marketing to concept-creation and UX-design. These participants are chosen aiming to capture diverse perspectives and comprehensive

feedback. Table 7.1 shows the participants, their company and their position within the company. As two participants could only meet in an online environment (P17 and P18), these participants did not interact with the prototype themselves and did not fulfill the UEQ. The other insights of their evaluation are included in the results. Furthermore, as P17 is also a professional DJ, some extra questions are added to this interview to explore his knowledge and opinion from a DJ perspective.

Lastly, two of the participants also participated in the in-depth interviews during 'discover' phase of this research. Firstly, the participant 2 is equal to participant 6 of the in-depth interviews and participant 3 is equal to participant 3 of the in-depth interviews (section 5.2.1).

Table 7.1: Participants evaluation session

Participant	Company	Position
Participant 1	FX Agency	Digital Designer
Participant 2	FX Agency	Lead Creative
Participant 3	FX Agency	Creative Director
Participant 4	FX Agency	Account Management
Participant 5	FX Agency	Lead Creative
Participant 6	D&B eventmarketing	Innovation Director
Participant 7	FX Agency	Head of Creative team
Participant 8	FX Agency	Project Manager
Participant 9	FX Agency	Account Management
Participant 10	FX Agency	Project Manager
Participant 11	FX Agency	Head of Creative team
Participant 12	Freelancer	Project Manager
Participant 13	FX Agency	Design
Participant 14	FX Agency	Project Manager
Participant 15	FX Agency	Operational Director
Participant 16	D&B eventmarketing	Event Manager
Participant 17	Freelancer	Event Manager & DJ
Participant 18	Gemeente Utrecht	Event Manager

7.2 Evaluation set-up

This evaluation procedure included three main methods; a usability test, a semi-structured interview and the user-experience questionnaire. However, to ensure a smooth evaluation procedure, some extra steps were added. For these evaluation sessions, the University of Trento has provided ethical clearance. The information brochure and the informed consent can be found in appendix K.

A summary of the evaluation procedure can be found below:

1. Verbal explanation of experiment procedure (5 minutes)

2. Participant reads information brochure and signs consent form (5 minutes)
3. Verbal explanation of the global concept by the researcher (2 minutes)
4. Participant reads the scenario card (3 minutes)
5. Participants acts out the tasks provided by the researcher while thinking aloud (5 minutes)
6. Concept clarification by the researcher (5 minutes)
7. Semi-structured interview (25 minutes)
8. Short version of the UEQ (5 minutes)
9. Conclusion and summary (5 minutes)
10. The participant is thanked and receives a small incentive (5 minutes)

Total time: 1 hour

7.2.1 Usability testing

The objective of this usability test was to assess the UX decisions made within the prototype. This test involved assigning tasks to participants to preform. This was accompanied by a request for them to articulate their thoughts aloud during these interactions, providing additional insights. Task explanations were kept minimal to prevent the introduction of biases.

This usability test aimed to evaluate the efficiency and effectiveness of the system, utilizing metrics such as success rate and task completion time. Task completion time was measured and compared against the time taken by a prototype expert to perform the same tasks, given the absence of a strict time limit. Throughout the usability test, these metrics were carefully recorded in an observation table. This table also includes columns for general comments, verbalized thoughts, and facial expressions.

Usability tasks:

1. Navigate to the place where you can vote for your favorite song
2. You want to vote for Gaby's song, but first you want to change your avatar by adding a mustache and sunglasses.
3. After that add a comment to your vote.
4. Vote for Gaby
5. As you already voted this round, you want to go back to the chat to see others' reactions in the general chat.
6. Suddenly a perfect song pops up in your head and you want to participate in a battle, navigate to the place where you can do that.
7. Spice up your avatar again with a mustache.
8. You change your mind and you do not like it anymore, please remove your mustache and close the avatar change modal
9. Add your favorite song: ABBA Mamma mia
10. Add a comment to your song and upload it to the battle.
11. Suddenly you change your mind, please remove your song from the battle.

7.2.2 Semi-structured interview

The goal of the semi-structured interviews was to explore the thoughts and opinions of the participant by asking questions about their previous experience with the prototype. The questions of this interview were focused around findings from literature to test if it matches the found community building framework of Osler [26]. See appendix L for the interview structure and questions.

Before the interview starts, some demographic information was asked to ensure the participants are really 'experts' in the field. The questions that were asked are about the company they work for, what they do within this company and how much experience they have in the field.

7.2.3 User experience questionnaire

The goal of the UEQ is to get valuable feedback from the participants and thereby improve the concept and prototype. The scales of the questionnaire cover a comprehensive impression of user experience. Both classical usability aspects (efficiency, perspicuity, dependability) and user experience aspects (originality, stimulation) are measured. For the short version of the UEQ, see appendix M

7.3 Evaluation results

This section provides the results of the performed evaluation sessions. It is divided into the three main methods of the evaluation session; usability testing, semi-structured interviews and the UEQ.

7.3.1 Usability testing

The usability tests are done with 16 out of 18 participants. P17 and P18 did not participate in this part of the evaluation as they could only meet in an online environment.

Success rate

Overall, there were two tasks with some experienced difficulty, task 1 and task 6. Firstly, eight participants (P3, P6, P7, P8, P11, P12, P15 and P16) did not complete task 1 without a small clue given by the researcher. These participants were looking to vote on the screen instead of within the right interaction panel. During task 6, participants also experienced some trouble navigating to the correct spot. Two participants did not succeed to complete this task without a clue (P8, P11). All other tasks were successfully completed by all participants.

Task completion time

Each task was time recorded to explore usability issues within the designed system. Overall, this went very well. Table 7.2 presents the amount of recordings, average time and standard deviation of each task. As can be seen, tasks up from task 7 have a lesser amount of

recordings. This is due to the fact that tasks 7, 8, 9 and 10 looked a lot like tasks done earlier (tasks 3,4 and 5). This resulted in participants doing these tasks without the task stated aloud by the researcher first. Therefore, for some participants the time of these tasks could not be recorded. Nevertheless, this should not be a problem as the goal was to explore the usability of the tasks. As these tasks were done too quickly to record, there is almost no chance these tasks would provide usability problems.

Table 7.2: Results task completion time (in seconds)

Task number	Amount of recordings	Average time (sec)	Standard deviation (sec)
1	16	41	36
2	16	12	10
3	16	2	1
4	16	2	2
5	16	2	2
6	15	17	17
7	12	4	4
8	13	2	1
9	11	1	1
10	7	2	1
11	12	6	3

Table 7.3 displays the average time it took participants to fulfill the task, the expert time to fulfill the tasks and the calculated difference between them. As can be seen, task 1 has the highest average time (41 sec). Additionally, the average time of this task differs the most with the expert time, namely 39 sec. These results are in line with the success rate results and the thinking aloud results, presented in the sub-section above. After task 1, tasks number 2, 3, 4 and 5 have an average time pretty close to the expert time, with 4 seconds being the biggest gap. Thereafter, task 6 shows a big difference between the expert and participant time, namely 15 sec. This could be due to the difficulty of the task as participants needed to navigate to a completely new page upon the right interaction panel. Tasks 7, 8, 9, 10 and 11 are done very quickly an sometimes even quicker than the expert time (tasks 7). The other times are in line with the expert time.

Thinking aloud

During the usability test, participants were asked to think-aloud. The first notable thought which rose for multiple participants was aimed at the place where they would have to vote (task 1).

P6: "I think I would have to click on the avatar on which I want to vote?"

P7: "I want to click on the hearts, but how do I say to whom I will send the hearts?"

P11: "I really do not know where to vote."

Table 7.3: Comparison average time participant vs. expert (in seconds)

Task number	Average time participants	Expert time	Difference
1	41	2	39
2	12	8	4
3	2	2	0
4	2	1	1
5	2	1	1
6	17	2	15
7	4	5	-1
8	2	2	0
9	2	2	0
10	2	2	0
11	6	6	0

P13: "Should I be at the DJ itself? Ah no, found it!"

Another participant was not even aware of the need of voting (even tough it was explained to them before):

P12: "When I see this screen, I would not even think I have to vote on something, it is not clear to me."

Another thought that was said aloud by P3 is aimed at the comment users are able to add to their vote:

P3: "I have no clue what will happen with this comment I have to add."

When the participants were provided with task 6; uploading a song themselves, some interesting thoughts were stated.

P2: "The letters are super small, but I think it is here!"

P12: "I know where I can upload a song, but it is not super clear."

The last task (task 11) was not hard for participants to understand and perform. Thoughts like this were stated aloud:

P13: "Ah cancel, that is easy!"

However, this task had to be done by clicking on the pop-down in the right interaction panel. P4 stated:

P4: "I knew where to look, as the interaction is placed in the most logical place, however

the letters are super small so it is difficult to read"

7.3.2 Semi-structured interviews: thematic analysis

The interviews were done with all 18 participants. As all participants are Dutch and do not have a sufficient knowledge in English, the interviews were done in Dutch. The recordings of the semi-structured interviews were transcribed manually and translated to English for research purposes.

The first part of the thematic analysis has a deductive approach; called codebook analysis. This is done as the interview data needs comparison to existing frameworks found during related work research (chapter 3). The second part of this thematic analysis used an inductive approach, leaving room for new themes and codes to emerge form the data. This approach is called reflective thematic analysis.

Part 1: Codebook thematic analysis

As previously mentioned, the initial stage of the thematic analysis adopted a deductive approach. Four of the five themes are derived from a framework developed by Osler [26]. This framework is particularly applicable as it incorporates online experiences and aims to foster a sense of collective experience and community. As detailed in the related work (chapter 3), this framework comprises four key elements that promote communal feelings within groups, whether they are interacting online or in person: common intentionality, reciprocal awareness, interdependence, and affective requirement. However, in order for the concept to effectively support community building, it is essential for participants to be genuinely motivated to engage with it during an event. Therefore, 'engagement preferences' is the first code explored within the data.

These themes are divided into different codes which are found within the interview data. As this is a codebook thematic analysis, the codes were developed beforehand according to the the themes needed in this analysis. These codes, and their amount of occurrence can be found in figure 7.1

Engagement preferences

It is observed that among all participants, there was a clear interest in engaging with the interactions, although there was a notable divide in preferences between online participation and on-site attendance. Some participants expressed a strong inclination towards both online and on-site engagement, highlighting the enjoyment of seeing themselves on screen and the interaction of having others vote for their chosen song (P1, P4). Conversely, others favored the experience of being physically present at the event, citing the ability to directly converse with fellow attendees and engage in the atmosphere (P4, P11). Additionally, there was recognition that online participants might be more active in voting due to the continuous accessibility of the platform (P10). Moreover, the presence of active voters in the physical space was seen as a motivating factor for participation (P12). However, one participant's willingness to engage seemed contingent upon the ambiance within the event

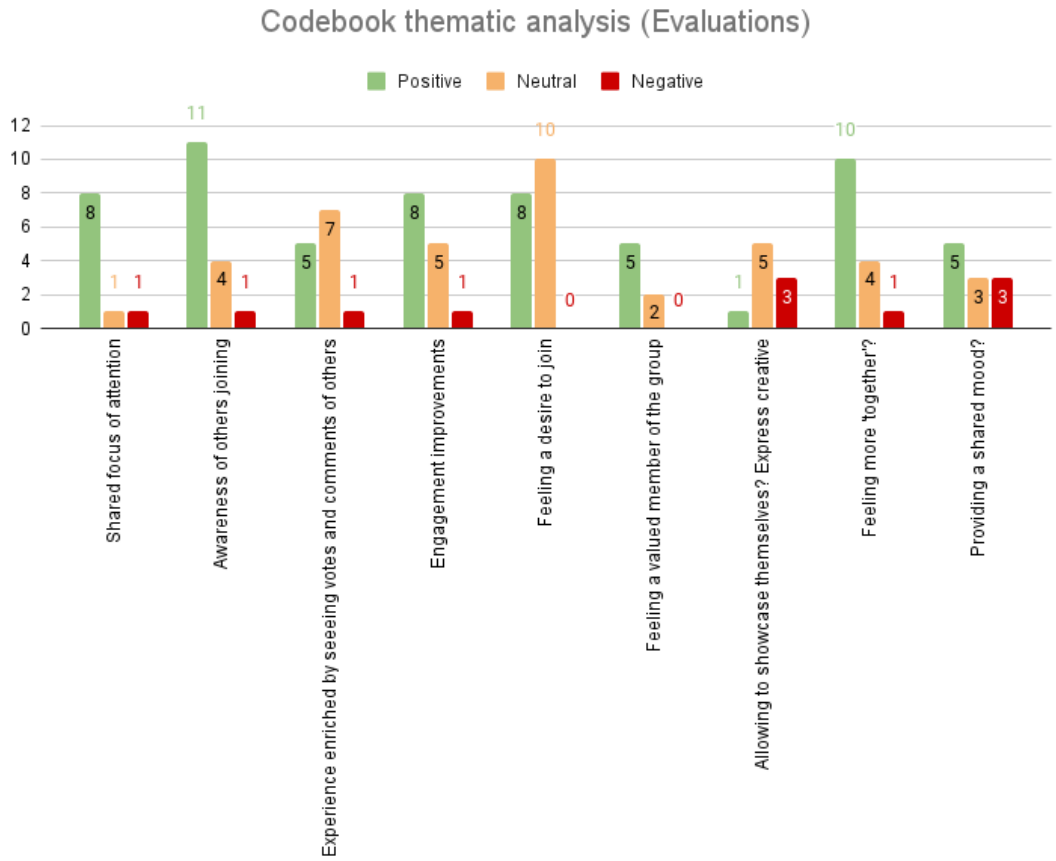


Figure 7.1: Graph of the codebook thematic analysis: codes and their amount of occurrence

room, indicating a nuanced consideration of environmental factors in their decision-making process (P11).

P1: "This is definitely something I would love to join myself, both whether I am at home or on-site. The fun thing is to see yourself on the screen and that people could vote for your song"

P11: "If I would join? Depends on the mood in the event room"

Common intentionality

Common intentionality involves individuals having something in common, such as a shared focus or mood. Some participants believed that a shared focus could be achieved despite challenges between on-site and remote participants (P13, P15), while others were skeptical, foreseeing a decrease in shared focus over time. Regarding shared mood, many participants agreed that music could connect people and foster collaboration (P3, P6, P8), but some expressed concerns about diverse music tastes and competition disrupting the shared mood (P9, P11). Lastly, some participants doubted whether the event's mood could effectively transfer to remote participants, highlighting the sensory experience of being present at the event (P15,P16).

P13: "Yes i think so, It is difficult as the people on-site do not know what the people at home are doing, and visa versa, but this concept can form a bridge in-between. So yes, I think there will be a shared focus of attention."

P15: "I am not sure if the mood will transfer to the people at home, in the event room you really hear and feel the music, I would have that feeling less when I would be home"

Reciprocal awareness

Reciprocal awareness, the consciousness of others participating in the event, was seen as potentially enriching the experience for nearly all participants. They believed it could enhance their awareness of both online and in-person attendees, regardless of which attendee group they are in (P2, P3, P7). While some expressed doubts about the depth of mutual interest between the groups (P11, P14), others saw it as a positive step forward. Suggestions for improving awareness included displaying votes and indicating the location of participants, aiming to strengthen the sense of connection among attendees (P1, P4).

P2: "I think on the moment you hear your own song, it will definitely help with the feeling of 'I am looking online, but all the people there are hearing my song as well' and vise versa of course"

P14: "You are not really networking or talking, like you do when you are at the event itself. But I think it is a right step to take and people do become a little more aware of each other"

Interdependency

Interdependency, where one's experience intertwines with others', was a key aspect of the virtual DJ concept according to participants. They enjoyed seeing others' reactions and discussing the event with friends, whether in person or through texting (P4, P8, P12). Participants also noted that receiving votes, especially on their own songs, enhanced the event experience and fostered a sense of connection, whether they were attending in person or online (P7, P8, P9). Overall, these insights emphasized the importance of shared experiences in enriching the virtual DJ event.

P8: "I would love to join with others around me, so at the event itself. For example laughing with my colleague about the songs and choosing a song together! If I am online, I would start texting them"

P7: "If your song is chosen, and you can see that people in the event room like it, maybe even dance, that would be amazing!"

Affective requirement

In Osler's framework, 'affective requirement' involves feeling emotionally bonded with others rather than just making cognitive judgments [26]. Participants believed this concept could make them feel appreciated, especially when their song suggestions were voted on, and remote attendees felt cared for by the event (P4, P6, P8, P16). However, opinions varied on whether this concept would make them feel more 'together'. Some felt it positively impacted their ability to influence the event and maintain a connection afterward, while others doubted its significance, citing differing priorities between on-site and online attendees (P7, P11). Participant 3 suggested enhancing togetherness by allowing avatars to interact (for example 'dancing') on screen.

P6: "Mainly the people at home would think 'Hey, the event also cares about me! However, people at the event site do maybe not even want to know the group online, they could have complete different priorities "

P14: "I think the playlist shared after the event also has a huge impact afterwards, as people would remember the event again and thereby feel connected. Even if the playlist is not super nice, the fact that they see if again has impact!"

P16: "I would feel less alone when I would join from home. And I also think people would feel more part of the group because they can specifically see and do something which directly influences the event site"

Part 2: Reflective thematic analysis

The second part of this thematic analysis uses an inductive approach; called reflective thematic analysis. This means that the codes emerged form the data, and are not predetermined (as seen within codebook thematic analysis (part 1)). The codes and their

amount can be found in Appendix N. These codes are put inside a thematic map to display their interrelations, see figure 7.2. After reviewing this, codes are combined into categories and themes are formed, see figure 7.3. The following subsections explain the themes and their codes.

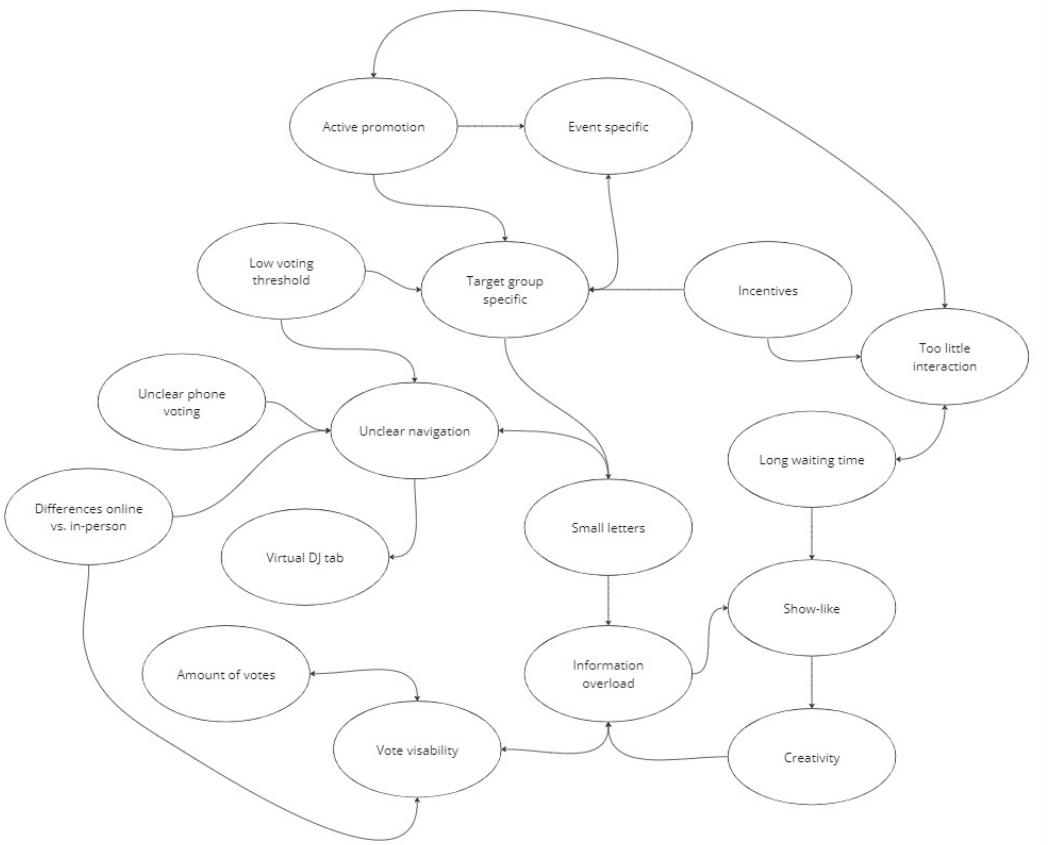


Figure 7.2: First version of the thematic map of the evaluation results, displaying the created codes and their inter-relations

Figure 7.3: Final versions of the thematic map, displaying two main themes; *Interface design and Concept details*

Theme 1: Interface design

This theme focuses on the interface design of the prototype, with a primary emphasis on usability. It comprises three sub-themes: visibility, navigation, and information overload.

Visibility

The first sub-theme addresses the visibility of various elements within the prototype. Participants highlighted the importance of visibility in pulling virtual attendees out of anonymity, thereby enhancing engagement. Additionally, participants expressed a desire for prolonged visibility of votes and battles, suggesting that seeing other participants' activities contributes to a sense of community. However, concerns were raised about the potential demotivating effect of displaying low numbers of votes , prompting suggestions to artificially boost participation levels. (P1, P3, P6, P7, P15).

P7: "A fun thing about providing virtual attendees with a voice is to provide them a way out of anonymity, it is important to visualize this correctly, and I think you have done that in this concept"

P1: "Seeing lower amounts of vote could even be demotivating, but seeing an amount of how many people have voted, would be a nice feedback for me"

Furthermore, participants provided feedback on distinguishing between online and in-person attendees, suggesting alternative visual cues such as icons or color coding (P1, P2, P5, P13). Some participants proposed emphasizing unity between online and in-person attendees rather than accentuating their differences (P7).

Navigation

The second sub-theme relates to navigation within the system. Participants expressed confusion over similarities between voting and song uploading interfaces, suggesting improvements to distinguish between the two (P3). Concerns were also raised about small text size and hidden elements, with participants emphasizing the importance of clarity and ease of use (P6, P11, P13).

P13: "You are hiding a lot now, and some other elements are super small. You want people to vote and connect, lead them to it!"

Participants highlighted the need for intuitive navigation, particularly considering the additional effort required from attendees to engage with the system (P6). Additionally, participants suggested revising the name "Virtual DJ" to improve clarity and align with attendee expectations (P4, P16).

P4: "Name virtual DJ is not clear to me, and probably also not for an audience who is a little older. This needs to become more clear."

Information overload

The third sub-theme addresses concerns about information overload within the prototype. Participants expressed feeling overwhelmed by the amount of information displayed on the screen, advocating for a cleaner design with less clutter (P3, P7). Some participants felt that the design emphasized irrelevant information while neglecting crucial elements, suggesting a reevaluation of the visual hierarchy (P9, P11, P13).

P7: "Less is more"

Moreover, participants recommended transitioning to a more show-like design to enhance engagement and attractiveness (P4). Finally, several participants questioned the necessity of certain features like avatar customization, suggesting their removal to streamline the user experience (P5, P12).

P4: "You are displaying a music battle, it should look way more 'show-like' and less like and interface"

P5: "I like the functionalities, however I do not need to change my avatar. I am a person who likes text and jokes, so for me only the comment would be enough"

Theme 2: Concept details

The second theme; Concept details, primarily explores the practical aspects and potential success of the concept within a real event setting. It delves into sub-themes such as event and target group specificity, participation dynamics, and the nature of dynamic content.

Event and target group specific

Concerning event and target group specificity, almost all participants emphasized the importance of tailoring the concept to suit the nature of the event and its attendees. Opinions varied, with some suggesting that the concept would thrive in certain contexts (P1, P12, P16) while others expressed doubts about its universal appeal (P2, P8). For instance, opinions ranged from its potential success in larger events to its suitability for internal personnel gatherings over events with a heavy emphasis on knowledge exchange (P6, P7, P16). Notably, insights were provided by participants regarding the varying perspectives regarding the concept's applicability.

P16: "I think it is super event specific, it could work really well for internal personnel events, but way less for events with high knowledge content"

Participation

Participation emerged as a key aspect, with participants expressing varying preferences for joining the Virtual DJ activity. While many expressed interest, opinions diverged on whether they would prefer to participate online or in-person. Some favored the idea of engaging in the activity alongside colleagues at the event (P8, P14, P15, P16), while others

preferred the comfort of participating remotely (P3, P7, P13). Questions were also raised about the incentives for participation, with participants questioning whether there were rewards or additional benefits beyond having their song played (P5, P13).

P4: "I think this would be much more fun on-site, as you can talk about it with your colleagues at the same time"

P13: "The first thing I think is; what is in it for me? Why would I join? Just because my song would be played, or is there more? I would create a bigger incentive to maybe insert visuals etc."

Dynamic content

Dynamic content, another sub-theme, attracted attention regarding the level of interactivity and engagement offered by the concept. Participants highlighted concerns such as the length of waiting times between votes and the duration of songs played (P3, P9, P12). Suggestions were made to keep the content dynamic and engaging, including shortening the duration of songs or incorporating mechanisms to skip through songs more quickly (P5, P6, P15). Overall, participants stressed the need for active promotion and integration of the Virtual DJ activity into the event program to maximize participation and engagement among attendees (P2, P9, P13).

P6: "If many songs are being uploaded at the same time, maybe you can shorten the amount of time one song plays. So you relate the length of each song to the amount of songs uploaded"

P13: "You should add a host which states: Lets go guys, lets become a dj together! If you start it in that way, instead of having it running on the background, more people would join for sure!"

Extra results from a DJ perspective (P17)

As P17 is also a professional DJ, some extra questions were added to this interview. The first concern expressed by P17 is about the sound quality of Spotify songs. P17 pointed out that Spotify compresses songs, resulting in reduced sound quality, which might not be noticeable when played from a phone or laptop but could become apparent in a large event room. Furthermore, P17 highlighted that the concept of playing random songs in sequence could pose challenges. P17 explained that not all songs can be seamlessly mixed into each other, as it depends significantly on factors like the beat. Consequently, DJs typically work towards building a coherent musical journey, incorporating connecting songs to create a sense of flow throughout the event. P17 emphasized that this concept limits the DJ's freedom to curate such a cohesive experience.

Additionally, P17 raised the point that if the audience has complete control over song selection, the role of the DJ becomes redundant. According to P17, while a sequence of different songs could be enjoyable, it eliminates the need for a DJ, as simple programming could

achieve the same effect. On the other hand, P17 acknowledged the value of maintaining an element of surprise in the event. P17 expressed concern that allowing the audience to choose all songs could diminish this element. The unpredictability of song selections adds excitement and keeps attendees engaged, a unique aspect that a DJ traditionally brings to an event.

P17: "Predictability of songs can be fun, but it could also be scare people away from songs they do not want to hear"

To conclude, P17 remarked that while a DJ prefers to have the final say in song selection, input from the audience can enhance the overall experience. This balance between DJ expertise and audience engagement is crucial for creating a memorable and enjoyable event atmosphere.

7.3.3 User experience questionnaire

When analyzing the results of the UEQ, participants' placements of crosses are converted into numerical values ranging from -3 to 3. A cross positioned far to the left corresponds to a value of -3, while one placed to the extreme right indicates a value of 3, with increments of 1 in between. These values are then averaged. An average mean score below -0.8 indicates a negative evaluation, while scores between -0.8 and 0.8 are considered neutral, and those above 0.8 are deemed positive. It is important to recognize that mean scores above 1.5 may appear less positive than they truly are due to a 'central tendency bias', as in section 4.7.3.

The UEQ is completed by 16 participants (as P17 and P18 participated online and therefore did not interact with the prototype themselves). The results of the UEQ are summarized in table 7.4, showing the average and the standard deviation per pair and the average mean of the pragmatic and hedonic quality. The pragmatic quality mean is the average of the first four pairs, the hedonic quality mean is the average of the last four pairs. As can be seen, both quality means have a positive evaluation. When analyzing the pragmatic mean in more detail, it can be seen that only the first pair (obstructive - supportive) has an average above 1, namely 1.47. The second pair (complicated - easy) has the lowest average mean quality of all pairs and also has the only 'neutral evaluation' (average mean smaller than 0.8). Also the standard deviation of this pair is the highest of all, which indicates many different opinions. On the other hand, pairs 3 and 4 both have a slightly positive evaluation as their averages are (just above) 0.8.

The hedonic quality results (pair 5 to 8) are more positive. All averages are above 1 and the averages of pair 7 and 8 are even above 1.5. Again, it is good to keep in mind that due to the 'central tendency bias', the average means of all pairs do not look as positive as they really are.

Table 7.4: Results user experience questionnaire

Pair	Average mean	Standard deviation
1. Obstructive - Supportive	1.47	1.25
2. Complicated - Easy	0.53	1.73
3. Inefficient - Efficient	0.8	1.52
4. Confusing - Clear	0.87	1.19
Pragmatic mean average	**0.92**	**positive evaluation**
5. Boring - Exciting	1.2	1.15
6. Not interesting - Interesting	1.67	1.23
7. Conventional - Inventive	1.6	1.3
8. Usual - Leading edge	1.47	1.3
Hedonic mean average	**1.49**	**positive evaluation**

7.4 Conclusion evaluation

This evaluation is aimed at providing an answer to SQ4: To what extent does the PoC support community building during corporate hybrid events? To provide an answer to this question, the evaluation consisted of three distinctive methods; usability testing, interviewing and fulfilling the UEQ. Firstly, a conclusion per method is given. After that, this chapter ends with an overall evaluation conclusion and an answer to SQ4.

Usability testing

Based on the usability testing results, it can be concluded that task completion times varied, with some tasks involving difficult navigation, particularly tasks 1 and 6, while the remaining tasks were relatively easy to accomplish with excellent task times. The observations also noted a swift learning curve, which is promising. However, participants encountered challenges with navigation and expressed confusion about certain design elements during the tasks, as shown in the think-aloud results. These findings underscore the importance of refining navigation and addressing design confusion to enhance overall usability and user experience.

Interviews

The deductive thematic analysis approach yields insights into the four elements of Osler's framework [26] and an extra code 'engagement preferences'. This code was added to explore attendees motivation to participate. Within this code, it was found that among all participants, there was a clear interest in engaging with the interactions, although there was a notable divide in preferences between online participation and on-site attendance.

Under the first element of Osler's framework, the code 'common intentionality,' participants generally acknowledge a shared focus of attention, with occasional breaks such as getting coffee or using the restroom. However, opinions diverge regarding whether the shared mood

effectively translates to online attendees.

Secondly, within the code 'reciprocal awareness,' most participants appreciate becoming more aware of the other group, considering it a positive step. Nonetheless, some participants express doubts and suggest prolonged visibility of votes and battles to enhance this aspect.

Thirdly, code 'interdependency' shows that participants are inclined to interact with others based on their voting activity displayed on screen. Moreover, participants report an improved personal experience when observing others' votes, especially when they vote on the song they uploaded themselves.

Lastly, achieving the 'affective requirement' proves challenging as it extends beyond cognitive judgment. While some participants feel a sense of togetherness and reduced isolation when participating online, others find it elusive and dependent on attendees' priorities.

The inductive thematic analysis approach also uncovers several noteworthy insights. Under the theme of 'interface design,' it becomes apparent that enhancing the visibility and clarity of the votes and the battle itself is crucial. Moreover, some participants found the interface and navigation within it to be unclear, indicating a need for redesign. Additionally, there is feedback suggesting that the screen displays an overwhelming amount of information.

The second theme, 'concept details,' highlights several key findings. Firstly, there is an anticipation of high participation, although opinions are divided between rather participating remotely or on-site. Secondly, it is advised to carefully consider the nature of the event and the target audience, as many participants view the concept as highly specific to certain groups. Lastly, there is a call to enhance the dynamic nature of the concept, as some participants express a desire for more engaging activities.

User experience questionnaire

Thee user experience questionnaire highlights areas for improvement and potential enhancements. The pragmatic quality is relatively low with an average mean of 0.92. This indicates room for improvement within the usability of the prototype. Especially pair 2 (complicated - easy) scored low and needs redesign.

The hedonic quality is generally satisfactory and shows an average mean of 1.49. However, there is an opportunity to elevate the excitement level, particularly since it scored the lowest among the evaluated hedonic quality aspects. Addressing these findings can lead to a more fulfilling and engaging user experience.

Overall conclusion

Through the use of three methods, key insights were gathered. While participants appreciated aspects of the PoC, such as shared focus and increased awareness of others, several challenges were identified. Usability testing highlighted navigation difficulties and design confusion, particularly in tasks 1 and 6, suggesting the need for refinement. Secondly, inter-

view findings emphasized the importance of improving visibility, clarifying navigation, and addressing information overload. Additionally, the UEQ identified opportunities to enhance pragmatic quality, particularly focusing on navigation improvements. In summary, while the PoC shows promise, addressing usability issues and refining concept details are essential for its successful implementation in facilitating community building during corporate hybrid events.

Chapter 8

Conclusion & Discussion

This chapter consists of two main sections; conclusion and discussion. The conclusion section provides an answer to the main research question. The discussion section provides interpretations of the main results, including theoretical and practical implications, limitations of the research and recommendations for future application and further development.

8.1 Conclusion

This research is aimed to explore and identify solutions that facilitate community building during corporate hybrid events. It harnesses qualitative data as a tool for comprehensively understanding the defined problem and fostering the development and evolution of an innovative solution. The main research question guiding this research is:

RQ: In what ways can the design of corporate hybrid events contribute to the cultivation of a community atmosphere among attendees, whether they are participating online or in person?

By following a Double Diamond approach, finding the exact problem within the provided scope is as important as exploring possible solutions to solve these problems. Therefore, the first two sub-questions are based within the problem space (the first diamond) and focused on exploring the exact problem. Therefore, SQ1 explored core needs, thoughts and opinions of hybrid event attendees. This was done through methods such as related work research, in-depth interviews, body-storming, and empathy mapping. Through these methods, it was found that online attendees often experience feelings of exclusion, limited opportunities for interaction, and a notable lack of connection with their fellow participants. Furthermore, related work research revealed an interesting framework created by Osler [26], which presents four needs that contribute to the establishment of community bonds; common intentionality, reciprocal awareness, interdependency and affective requirement. Together, these findings provide the answer to SQ1 form the basis for SQ2.

SQ2 focused on identifying an actionable and impactful design challenge. The findings of SQ1 were prioritized by means of the MoSCoW method, which sequentially formed the foundation of a desired outcome needed for the development of the design challenge. The accordingly developed desired outcome states: cultivate a profound sense of inclusion, nurture feelings of togetherness, and introduce innovative solutions for interpersonal connection. These insights led to the formation of the following design challenge, thereby answering SQ2.

Design challenge: Corporate hybrid event attendees want to feel connected, so we will deliver an interactive product to achieve a sense of togetherness and thereby support community building between online and in-person attendees.

With the formation of the design challenge, an understanding of the main problem and it's opportunities was created and completed thereby the problem space (first diamond). The solution space, the second diamond, started with exploring SQ3; identifying one concept with the most potential to effectively provide an answer to the design challenge (SQ2). Building upon the insights from the problem space, co-creation, co-exploration, and co-validation sessions with the innovation team of FX Agency were held to identify potential concepts. These collaborative efforts successfully led to five concepts aimed at solving the design challenge. By using the MoSCoW requirements and the NUF prioritization tool, Concept 4; the virtual DJ, emerged as the most suitable solution. This is due to the highest ratio of value/costs among all concepts. This means that even though other concepts can potentially provide more absolute value (concerning community building aspects), their financial costs and implementation difficulties supersede the potential value. Therefore, the Virtual DJ proved to be most feasible from a value/costs perspective.

Other than that, the Virtual DJ concept has it's own advantages. The potential value of the Virtual DJ is based on the strategic moment the Virtual DJ can be implemented, namely during 'waiting' moments of an event (for example during a break). Thereby, the Virtual DJ acts as an hook activity for online and in-person attendees. To summarize, the concept based upon the Virtual DJ answered SQ3.

The second part of the solution space was aimed at the creation of a PoC based on the Virtual DJ. The Virtual DJ is a module integrated into Reply.live in which attendees can vote for specific songs to be played on the stream and inside the event room. Attendees can also upload songs to join a song-battle themselves. The iterative design process facilitated by the Double Diamond method allows for continuous refinement and enhancement. Therefore, the PoC underwent multiple iterations based on a heuristic evaluation and expert feedback, resulting in improvements to it's functionality and usability. Ultimately, a clickable prototype of the PoC is created using Figma.

SQ4 focused on the extent the PoC supports community building at corporate hybrid events, mainly during the 'waiting' moments of an event. The PoC was evaluated through three methods: usability testing, interviews, and the UEQ, conducted across 18 evaluation sessions. The usability tests highlights some navigation difficulties and design confusion for participants, particularly in tasks 1 and 6, suggesting the need for refinement. The other

tasks did not present any troubles and were successfully done by the participants.

To interpret the data of the interviews, codebook thematic analysis and reflective thematic analysis were used. The codebook thematic analysis was based upon the framework of Osler [26] and it's four factors were used as codes. Additionally, an extra code 'engagement preferences' was added to explore attendees motivation to participate. Within this code, it was found that among all participants, there was a clear interest in engaging with the interactions, although there was a notable divide in preferences between online participation and on-site attendance.

The first element of Osler's framework, 'common intentionality' states that the Virtual DJ provides a shared focus, but not always a shared mood (depending on the type of event). Secondly, 'Reciprocal awareness' presents that most participants appreciate becoming more aware of the other group, considering it a positive step. Nonetheless, some participants express doubts and suggest prolonged visibility of votes and battles to enhance this aspect. Thirdly, 'interdependency' shows that participants are inclined to interact with others based on their voting activity displayed on screen, thereby improving interactivity. Lastly, 'affective requirement' states that while some participants feel a sense of togetherness and reduced isolation when participating online, others find it elusive and dependent on attendees' priorities.

Furthermore, during the reflective thematic analysis, two themes emerged. The first theme; 'interface design' underscores findings about limited visibility of votes, difficult navigation towards main actions required from participants and an information overload within the designed display. The second theme 'Concept details', highlights dependency of success on type of target audience and event, the inconsistency in opinions about rather participating as online or in-person attendee, and the high interactivity provided to attendees.

The last evaluation method, the UEQ, presents that although both quality evaluations are positive, the pragmatic quality results are lower than the hedonic quality results. This implies that the 'joy of use' of the Virtual DJ concept is high, but the utility, efficiency, and simplicity of the Virtual DJ can be improved. These improvements are in line with the usability test results presented above.

Combining the evaluation findings presented above, and thereby answering SQ4, it can be concluded that the Virtual DJ has potential to support community building by enhancing the sense of togetherness during 'waiting' moments among online and in-person attendees of corporate hybrid events. This is mostly due to the shared focus, the reciprocal awareness and the interactivity of the Virtual DJ. Furthermore, the evaluation results underscore the significance of a low participation threshold, intuitive UX, and well-designed visualizations for the success of the Virtual DJ. Therefore, further refinement in design and navigation is necessary to fully optimize its potential for supporting community building during corporate hybrid events.

To conclude, these results show the importance of following a structured design method such

as the Double Diamond. Along the way, the relatively broad research question is further defined into specific focus points such as 'waiting' moments, interactivity and connectivity between online and in-person attendees. Therefore, this research has demonstrated that thoughtful and innovative solutions, informed by user insights and guided by established frameworks, have potential to enhance the community atmosphere within corporate hybrid events. By addressing the identified challenges and iteratively refining innovative solutions, event organizers can create more connective and engaging experiences for all attendees.

Thereby, this research has successfully addressed the main research question and sub-questions, shedding light on the ways in which the design of corporate hybrid events can contribute to the cultivation of a community atmosphere among attendees, both online and in person. Through a systematic approach utilizing qualitative methodologies, the research uncovered key challenges faced by attendees, including feelings of exclusion and limited opportunities for interaction. The development and evaluation of the Virtual DJ provided actionable insights into how innovative solutions can address these challenges and foster community building within hybrid events.

8.2 Discussion

This section provides interpretations of the main results including unexpected findings, theoretical and practical implications, limitations of this research and recommendations for future development.

Unexpected findings

Unexpected findings within this research shed light on nuanced participant preferences and behaviors, challenging initial assumptions and revealing deeper insights into the effectiveness of the Virtual DJ concept.

Firstly, a notable difference in engagement choice emerged among participants, driven by individual preferences. Remarkably, approximately half of the evaluation participants expressed a strong inclination to engage with the Virtual DJ concept when attending hybrid events online. On the other hand, the remaining half of the participants leaned towards active participation when physically present at the event, expressing a lesser interest in engaging with the concept remotely. This contrast is attributed to the tangible impact perceived by physically present participants, contrasting with the perceived disconnection felt by those attending online. This finding underscores the personalized nature of engagement with the Virtual DJ, highlighting the importance of individual preferences in hybrid event design.

Moreover, unexpected participant behavior during the evaluation process provided interesting insights into the interaction patterns with the PoC. Despite explicit instructions to focus solely on designated tasks, many participants exhibited a natural inclination to explore additional features autonomously. This exploration not only demonstrated participants' curiosity and adaptability but also revealed potential in the prototype's user experience. By

spontaneously engaging with unanticipated features, participants offered valuable feedback on usability and functionality, informing iterative refinement and optimization of the PoC.

Furthermore, while the Virtual DJ concept was primarily designed to foster community building within hybrid events, unexpected positive outcomes emerged from participant feedback. Beyond its intended purpose, the Virtual DJ concept evoked feelings of connectivity and value among online attendees, as evidenced by participants' expressions of appreciation for being acknowledged and valued. This unexpected dimension of the Virtual DJ's impact underscores its potential to transcend its primary objective.

Theoretical and practical implications

The theoretical implications of this research include three main elements; contribution to knowledge, theoretical integration and interdisciplinary insights. First of all, this research contributes to the theoretical understanding of community building within the context of corporate hybrid events by integrating Osler's framework [26]. By applying this framework to the analysis of hybrid event dynamics, the research extends the applicability of existing theoretical frameworks to current event settings. Through qualitative explorations and thematic analysis, the study explores how elements of common intentionality, reciprocal awareness, interdependency, and affective requirement occur within hybrid event environments. By integrating empirical insights with theoretical frameworks, this research enriches the understanding of factors that contribute to community building within hybrid event settings. Furthermore, the identification of these theoretical findings provides a foundation for future research aimed at exploring community dynamics within diverse event contexts.

Secondly, this research demonstrates the practical application of theoretical frameworks in the design and evaluation of an innovative solution. By integrating Osler's framework [26] into the analysis, this research bridges theoretical perspectives with empirical findings, illustrating how theoretical knowledge informs real-world event experiences. Through qualitative methodologies such as thematic analysis, this research showcases how insights from Osler's framework are reflected in attendee perceptions and interactions within hybrid event environments. This theoretical integration underscores the relevance of established theoretical frameworks in addressing practical challenges faced by event organizers and other stakeholders. Furthermore, by grounding the study in theoretical concepts, the research contributes to the validation of these existing theoretical frameworks.

The last theoretical implication is based interdisciplinary insights, as this research draws upon insights from multiple disciplines, including event management, psychology, and human-computer interaction. This is done to provide a comprehensive understanding of community dynamics within corporate hybrid events. By adopting an interdisciplinary approach, the research enriches the theoretical discussion surrounding event design and attendee community building by integrating diverse perspectives and methodologies. Thereby, this research highlights the interplay between social, psychological, and technological factors in shaping attendee experiences within hybrid event environments. This interdisciplinary lens not only enhances the theoretical understanding of community building but also underscores the need

for collaborative approaches to address challenges in event management. By embracing interdisciplinary insights, this research contributes to the advancement of knowledge within both academic and practical domains, providing a way for innovative approaches to event design and attendee community building.

Next to theoretical implications, this research also hold practical implications. For FX Agency and similar organizations, the practical implications of this research are interesting as well. As hybrid events become increasingly essential to corporate event strategies, the need for effective solutions to enhance attendee community building becomes most important. Organisations such as FX Agency stand to benefit from researching and implementing such solutions, as they can serve as a competitive advantage in the rapidly evolving events industry. By investing in the development and deployment of innovative approaches to enhance attendee engagement, such as the Double Diamond Design methodology, FX Agency can distinguish itself as a leader in delivering impactful hybrid event experiences. This proactive approach not only enhances attendee engagement and connectivity but could also strengthen FX Agency's position in the market.

Limitations

However, several limitations need to be considered when interpreting the (unexpected) findings and implications mentioned above. First and foremost, qualitative research inherently involves subjective interpretation, as it relies on the researcher's interpretation of participants' responses. Despite efforts made to mitigate bias, the inherent subjectivity of qualitative data interpretation remains a challenge. This subjectivity introduces the potential for researcher bias, where preconceived notions or personal perspectives may inadvertently influence the interpretation of data.

Furthermore, qualitative analysis allows for multiple valid interpretations of the same data, adding another layer of complexity to the research process. While efforts were made to maintain accuracy and consistency in data analysis through methods such as coding and thematic analysis, the possibility of alternative interpretations cannot be entirely eliminated.

Consequently, the subjectivity involved in interpreting qualitative data poses a significant limitation to this research. It necessitates a cautious approach to drawing conclusions and making generalizations based on the findings, as interpretations may be influenced by the researcher's biases or perspectives. Despite these limitations, transparent reporting of the research process and findings, alongside reflexivity in acknowledging the researcher's role in data interpretation, aim to enhance the credibility and trustworthiness of the study's findings.

Secondly, time constraints posed a significant challenge to the project, with only six months allocated for problem identification and solution development. While qualitative research requires time for thorough data collection, analysis, and iterative refinement, the compressed timeline imposed limitations on the depth and scope of the research process. Additionally, the limited time frame restricted the ability to iterate extensively with the prototype, despite

the understanding that iterative design processes typically leads to more refined and effective solutions. As a result, the final solution may not have undergone as many iterations or refinements as desired, potentially compromising its effectiveness and robustness.

Thirdly, resource limitations also posed challenges to the research, particularly in terms of participant recruitment and sample diversity. A significant portion of the participant pool for the evaluations consisted of employees from FX Agency. This concentration of participants from a single organization introduces the potential for bias in the findings, as participants may share common perspectives or experiences related to their organizational context.

Despite efforts to include external participants and diversify the sample, achieving a truly representative and diverse participant pool proved challenging. Out of the 18 participants involved in the evaluations, only 4 were from outside FX Agency. This limited external representation raises concerns about the generalizability of the findings beyond the specific organizational context of FX Agency. It may also affect the validity of the insights gleaned from the evaluations, as the perspectives of external participants may differ from those of internal employees.

Next to that, the evaluation process required cautious interpretation of results due to several factors. Firstly, evaluations were conducted outside of the 'real' hybrid event environment, with participants asked to imagine themselves in the intended setting (with the help of a scenario card). While efforts were made to select participants with hybrid event experience to reduce this limitation, it may not fully capture the diverse demographics and dynamics of corporate hybrid event attendees. The absence of the authentic event context may have influenced participants' perceptions and responses, potentially affecting the validity and applicability of the findings to real-world settings.

Additionally, the prototype lacked specific event-related features such as styling and branding elements. As stated by the participants, this impacted the user experience. This limitation highlights the importance of incorporating event-specific elements into the prototype to provide a more realistic and immersive user experience during evaluations. Including these elements in the prototype would enable researchers to obtain comprehensive insights into user perceptions and preferences, thereby enhancing the validity and relevance of the evaluation results.

In conclusion, despite efforts to address limitations, it is crucial to acknowledge these constraints when interpreting the research findings and developing recommendations for future developments. On the other side, even tough this research presents little prototype iterations and evaluation sessions with limited diversity in participants, promising results show confidence in the viability of the Virtual DJ, its methodology, and its emphasis on enhancing community building among attendees. This assurance may provide FX Agency with the necessary trust to persist with the Virtual DJ and implement the Double Diamond approach within other projects, laying foundations for tangible progress and impactful outcomes.

8.2.1 Recommendations

The recommendations for future application and further development are divided into three sections; process, prototype and company recommendations. Each section offers multiple insights aimed at enhancing various aspects of the researched domain. Together, these recommendations guide process enhancement, prototype refinement, and organizational innovation.

Process recommendations

First of all, the implementation of the Double Diamond methodology proved to be effective within this research, providing a structured framework for exploration and innovation. However, due to time constraints, the full potential of this methodology could not be realized. It is clear that more iterations, particularly within the second diamond, would be beneficial. Within this research, iterations of the prototype were initiated following a heuristic evaluation and sessions with a UX professional and a hybrid event expert. Subsequently, a comprehensive evaluation was conducted with 18 participants. While these evaluations yielded valuable insights, the need for more frequent evaluation rounds became apparent during the evaluation phase. Specifically, during usability testing, it was observed that after the first couple of participants, not many significantly new insights were uncovered. This phenomenon can be attributed to the tendency for users to encounter similar issues in the early stages of product design. Therefore, smaller and more frequent evaluation rounds would be more effective in addressing these initial user experience challenges sooner.

However, to fully realize the benefits of these smaller evaluation cycles and the Double Diamond process, additional time is required. Hence, it is recommended to allocate more time for research endeavors of this nature. By allowing for a more iterative and thorough exploration of solutions, researchers can better leverage the Double Diamond methodology to its fullest potential, ultimately leading to more robust and impactful outcomes.

Throughout the entire process, many professionals were actively involved. During the first diamond, their opinions were used to create the design challenge, and during the second diamond they helped with the creation and the evaluation of the PoC. Even though it took time and effort to gather these professionals, it is strongly advised for this type of research, fostering innovation and creativity in the outcomes. However, as stated in the limitations, many of the professionals are affiliated with FX Agency. This could lead to unwanted biases within the research findings. To minimize this risk, it is advisable to diversify the pool of professionals involved even more, drawing from a broader range of organizations and backgrounds. This approach promotes a more balanced understanding, which could strengthen the credibility and reliability of the research findings.

In conclusion, these process recommendations underscore the importance of allocating sufficient time for iterative exploration and collaboration, ensuring that the Double Diamond methodology can be fully leveraged to drive innovation. Additionally, it is recommended to include a diverse range of experts within the realm of hybrid events to enrich the breadth of perspectives and insights, ultimately leading to more comprehensive and effective solutions.

Prototype recommendations

Having demonstrated valuable findings in the preceding sections, there is sufficient confidence to advance this prototype into the next phase. Recommendations regarding the next phase of the prototype emerge mostly from the evaluation sessions. First of all, the usability testing revealed challenges in navigation and design comprehension, notably during tasks 1 and 6 (navigating to a new panel). Also insights from the UEQ underscored opportunities for improving pragmatic quality, particularly through navigation enhancements. Therefore, it would be suggested to delete the extra tab participants have to click before navigating to the voting interface. Instead, the voting could be placed in the same tab as the general chat, for example as a dropdown from the upper part. This will ensure the low voting threshold, providing as little amount of click as possible and thereby keeping it idiot proof. Additionally, considering the playful nature of the Virtual DJ, a user-friendly design with intuitive navigation is important. Minimizing complexity and ensuring ease of use will help maximize participation and enjoyment among attendees, particularly those who may not be tech-savvy.

Furthermore, it was found that the current main screen has too much information displayed upon it. Therefore, it would be recommended to delete unnecessary information such as the comment along side the vote placed upon the screen. It can be recommended that all comments should be done within the general chat instead of on the screen itself.

Regarding the votes, also some recommendations can be made. First of all, interview data emphasized the need to enhance voting visibility, ensuring that attendees' vote stays longer on the screen. This means that the attendees' vote should stay visible instead of dispersing into the left or right side (depending on the vote) of the screen. Furthermore, participants suggested showing the difference between online and in-person attendees in a different way. Now, the votes from online attendees emerge from the left side and votes from in-person attendees emerge from the right side. It is suggested to let them emerge from one side to create unity and group feeling. The difference between the two groups can be made with for example icons, color, or shape. As color is already used within the prototype to show the different battle-sides, the suggestion is to clarify the difference with an icon or shape.

Another suggestion regarding the prototype is to change the voting buttons to showing the name of the chosen song instead of the name of the person battling. In this way, the purpose of these buttons is more clear and people are also able to vote when they currently not see the screen.

Addressing these identified issues is essential, necessitating the development of a second prototype. Evaluating this revised version within a 'real' hybrid event environment would provide valuable feedback. The relevance and effectiveness of this user feedback could be improved by designing the prototype's aesthetics in alignment with the event's branding and the preferences of the target audience. Lastly, it has become clear that this concept is event and target group-specific. Therefore, it is suggested thinking about the goal of the event before introducing the Virtual DJ to the event. Additionally, it could be different

per event how much control the organizers should have; maybe for one event attendees can choose every song to battle with, and for other events, it could be recommended to keep more control and let the attendees choose songs from only one genre, for example. However, it is good to keep in mind that it is not tested how participants would react if their freedom with choosing songs is limited.

Company recommendations

For companies like FX Agency, it is crucial to continue exploring innovative solutions to foster connections among attendees during hybrid events. These innovative solutions should be based on a shared focus among all attendees, reciprocal awareness and interactivity. Positive feedback during the evaluation, such as expressions of surprise and appreciation for considering individual attendees, underscores the importance of this effort. Therefore, it would be recommended to continue developing and evaluating innovative solutions (such as the PoC) which support community building during hybrid events.

In terms of strategic recommendations for FX Agency, leveraging the PoC as a sales tool presents an opportunity to gain interest of new clients. Tailoring the PoC to match the branding style of potential clients can enhance its appeal and alignment with their vision. Once a partnership is established, prioritizing further development is essential. Conducting user experience testing during the first event can unveil areas for improvement, guiding subsequent iterations. Additionally, delving into the functionality of the Spotify API and understanding music rights will be crucial in incorporating desired features.

Expanding the scope beyond the specific PoC, there are several key areas that FX Agency and similar organizations could address to further enhance community building within corporate hybrid events. Firstly, prioritizing connectivity in event design is very important. This involves not only catering to the needs and preferences of both online and in-person attendees but also proactively ensuring that all participants feel valued and included throughout the event experience.

Secondly, using technology to facilitate meaningful interactions and connections among attendees is essential. Beyond the specific functionalities offered by the Virtual DJ or similar interactive tools, there are many opportunities to integrate social networking features, matchmaking algorithms, and virtual networking spaces to encourage networking and collaboration among participants. By providing platforms for attendees to connect with like-minded peers, share insights, and form (professional) relationships, event organizers can contribute to the cultivation of a vibrant community within their events.

Moreover, embracing a culture of co-creation and co-innovation with attendees can foster a sense of ownership and belonging among event participants. Soliciting feedback, ideas, and contributions from attendees throughout the event planning and execution process not only demonstrates a commitment to attendee-centric experience but also empowers attendees to shape their event experience according to their preferences and interests. By embracing a participatory approach to event design, organizations can tap into the collective intelligence

and creativity of their audience to co-create memorable and impactful event experiences that resonate with attendees.

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Appendices

A Interview framework

Phase	Purpose	Time	Questions
Introduction	Tell the purpose of this interview	1 min	In this interview, I aim to delve into your thoughts and opinions regarding the prototype and concept you've just engaged with. Your perspective is important to this research, and I encourage you to openly express your opinion. There's no need to be concerned about diverging opinions or potentially disagreeing with certain statements; every insight you provide contributes to this research. Your honest feedback is highly valued! Let's begin the conversation!
Key-topic	Explore the participants thoughts upon subjects like; community building and sense of togetherness	20 min	Community building: - Do you think this concept provides the attendees with a shared focus of attention? Why (not)? - Do you think attendees will be aware of others joining the activity as well? Both online and in-person attendees? - Would your experience be enriched by seeing the votes and comments of others? Why (not)? - Do you think this concept can be used to form emotional connections between attendees? Why (not)? Sense of togetherness: - Are you engaged by the concepts? - Do you feel a desire to participate with the concept? - Do you think this concept would make participants feel like a valued member of the group? - Would this concept allow participants to showcase themselves? For example their skills and influence? - Does this concept allow participants to get respect from other attendees? Interaction ritual framework: - When you are an online attendee, would this make you feel more 'together' with other attendees (online and in-person)? Why (not)? - Do you think this concept helps by creating a shared mood among the attendees at the event? Both online and in-person? Why (not)? Out-of-the-ordinary: - Do you think this concept provides WOW-moments for attendees? - Does this concept, in your opinion, use novelty factors? Could you explain this? Improvements of the concept: - What can, in your opinion, be improved to increase the sense of togetherness within this concept? - Are there any features you miss / features you would like to see incorporated within this concept?
Summary	Summarize participants insights and validate them	3 min	*Repeat main insights gained during this interview and ask if I understood correctly.* Is there anything you would like to add?
Conclusion	Thank the participant and close the interview	1 min	*Thank you so much for your participation in this interview!*

Figure 1: Semi-structured interview structure by [34]

B Codes thematic analysis

Code	**Frequency of occurrence**	**Quotes** (some examples chosen from the entire data-set)
Event content	6	P4: *'People are spoiled with fast content, think of TikTok and Instagram. Events should also provide this as well'* *P5: 'We also try to implement some entertainment pieces, something to break out of the content you are currently watching"*
Dynamic agenda	4	P2: *'The content needs to stay dynamical'* P5: *'The key is to keep the event dynamic, keep the engagement high for online persons as well'* P6: *'You need to have a high variety in content to ensure people are glued to the screen.'*
Target user group specific	3	P4: *'It is important to know your user group when designing event experiences. For virtual and hybrid events it is even more important to know the digital abilities of your users. For us it seems logical that you can choose an avatar and enter a virtual world, for others, this could already be a challenge.'* P5: *'People don't want to be formal and too stiff. it's trending to be more chill and cool, you want to be more casual'*
Interactions	9	P1: *'Clients want to provide the full event experience to their visitors, from arriving on site, having a coffee with other visitors and being able to see the others.'* P2: *'Interaction can trigger the visitor'* P2: *'Competition can ensure interaction, but also engage the visitors'* P5: *'That's why interactions are so important;, like sending emojis but you also want to get people to engage, so it needs to be fun and actually genuinely nice'* P6: *'It is all about interaction. If you as a visitor do not feel connected, the event message, whatever it is, will not come across'*
Networking	5	P1: *'Many event organizers do not want to organize hybrid events as they are afraid the bonding and networking between visitors will be too little.'* P5: *'Even if the main goal of the event is not to network, people still want to talk to each other and be able to connect with each other'*

Figure 2: In-depth interview results; Thematic analysis codes (part 1)

Code	**Frequency of occurrence**	**Quotes** (some examples chosen from the entire data-set)
Storytelling	2	P2: *'During an event, storytelling is leading'* P4: *'There are multiple things important during online events, one of them is storytelling'*
Two different (event) storylines (online vs. in-person)	5	P5: *'But you also have to understand that they are audiences with two different experiences so you can't copy paste exactly the same thing to both audiences. That is going to be weird.'* P6: *'If you really organize a digital and live event together, like a hybrid event, you actually organize two different events. This is because the target group online has a complete different needs, different interactions and a complete different event-route in comparison with the live event side'*
Feeling connected/valued	6	P2: *'Visitors stay engaged or when the content is super engaging, or when they feel connected, valued and/or needed'.* P3: *'The main challenge within FX Agency is to provide equally valuable experiences for both groups; in-person and online, during hybrid events'* P6: *'The key is to translate the content in such a way, with the right energy and the right interaction, that visitors feel impacted, that they feel changed.'*
Hybrid events (general info)	3	P5: *'Hybrid events are up and coming and definitely here to stay. Lots of people say it is the future as people can choose to join online or on-site'* P6: *'Hybrid events exist in many different forms, and will for sure in the future play a even bigger role than it has now'*

Figure 3: In-depth interview results; Thematic analysis codes (part 2)

C Bodystorming results

	Researcher	Other attendees
See	- A big screen displaying a virtual studio - The event agenda underneath the screen - A chatbox on the right side - My own comments and comments of other participants - Emojis that I or other participants send - Poll answer percentages - Different hosts switching during the presentation - Slide shows and powerpoint presentations	This is equal to what the researcher sees as both groups joined the event in a similar way.
Think	- I like the polls as I can see what the others are thinking and where I stand in the group - It is fun to see the poll entries in real time - However, they do a lot of different polls, it becomes a little boring - They have many different talks, that is nice as it stays interesting for a longer period of time - The host had a big impact on the experience, some hosts are more engaging than others - 'Who is watching as well?' - I can not find a feature to see who is watching this event with me	*Unknown*
Feel	- Engaged as the content is switching quickly - Interested to see where the others are watching from - A little bored when a specific host was not presenting in an engaging way - Engaged when participating in a poll - Curious about the answers of other attendees - Bored when the only interaction seems to be polls - Annoyed when I can not find a function to see who is watching as well - Lonely - Annoyed when I did not know how to switch breakout rooms	*Unknown*
Do	- Answer in the chat when a question is asked to the attendees - React on the polls - Like others comments - Send emojis (not only when a question is asked, but also when I like something the hosts show or tell) - Joining breakout rooms, and switching when I needed new input to stay interested - Searching for an option to see other participants that are joining, did not work.	- Answer in the chat - Tell everyone where they are from - Click on polls - Like comments of others - Send emojis - Join breakout rooms

Figure 4: Bodystorming results (problem space)

D Empathy mapping

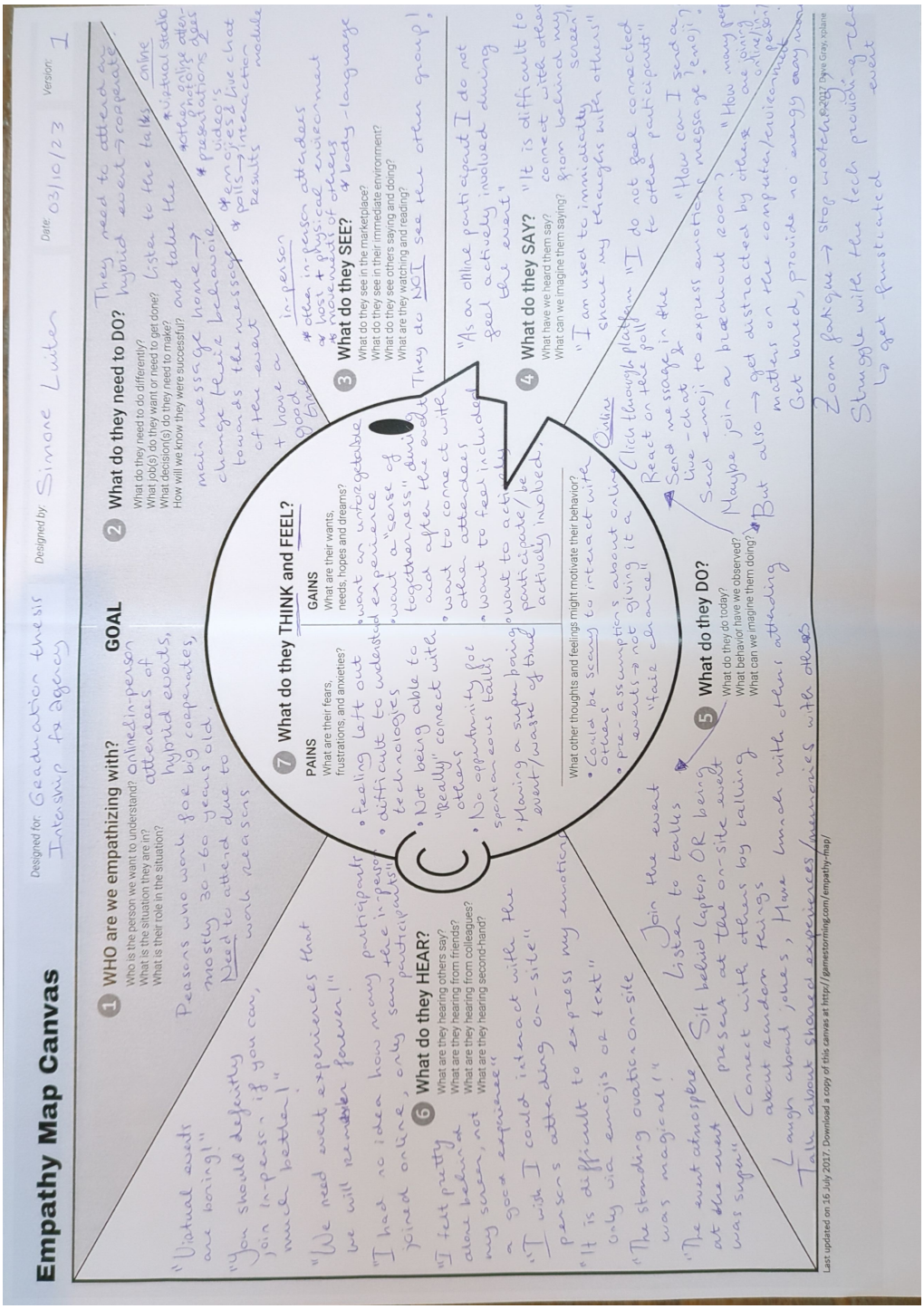

Figure 5: Completed empathy map, designed by [56]

E Personas

Figure 6: Persona Rik

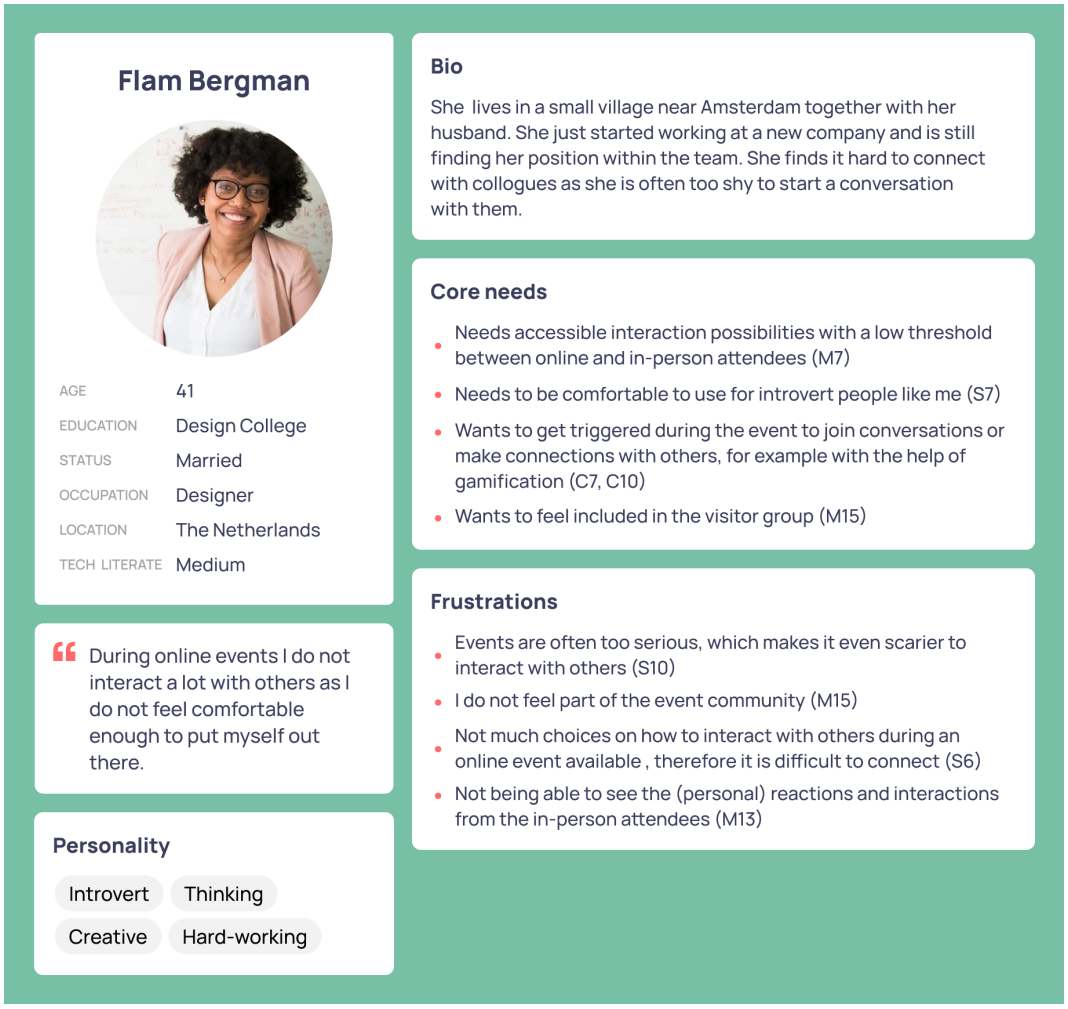

Figure 7: Persona Flam

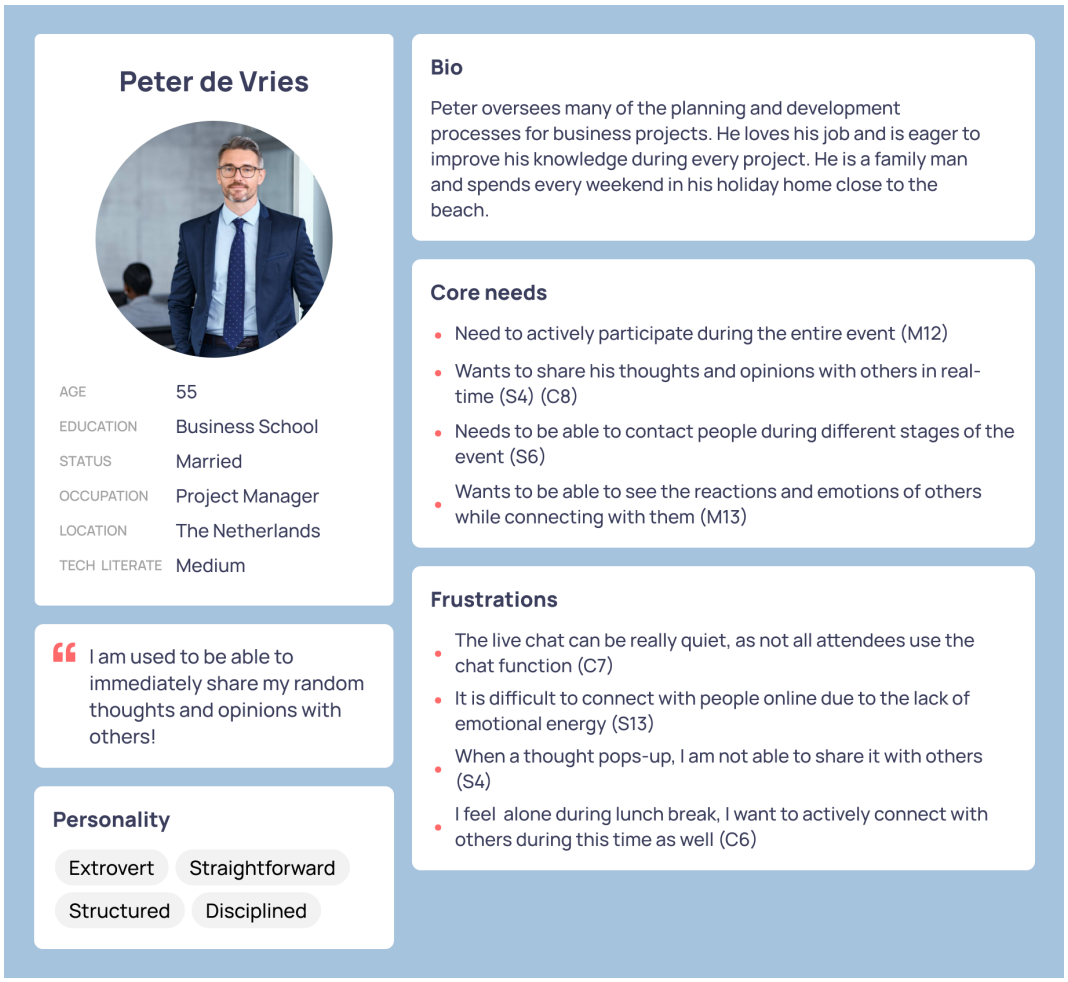

Figure 8: Persona Peter

Sjanet Jansen

AGE	34
EDUCATION	High School
STATUS	Single
OCCUPATION	Human Resources
LOCATION	The Netherlands
TECH LITERATE	Low

> I am used to quickly connect with others, however during online events I do not succeed to do this.

Personality

Extrovert · Chaotic · Forgiving · Impulsive

Bio

Sjanet already works at her company for 6 years and is really positive about the company-atmosphere and its employees. She is often the point of attention during group conversations as she talks a lot. However, she is also very interested in others. Currently, she is single and likes to go out with friends to meet new people.

Core needs

- Wants to network and meet new people (S4)
- Needs an exiting event to stay entertained and engaged (M14, S8)
- Needs to be actively involved during the event (M12)
- Needs to be constantly presented with new input to stay interested (M10)

Frustrations

- Does not fully understand the technologies used, and sometimes gets lost while using it (M8)
- I am easily distracted during online events as I have a short attention span behind my laptop (M11)
- Misses opportunities to meet the people who are visiting in-person while I am visiting online (M15)
- Finds it difficult to 'really' connect with others in online environments (S6)

Figure 9: Persona Sjanet

F Brainstorm session agenda

Activity	Time	Goal	Comment
Opening of the brainstorm	5 minutes	Explanation topic, goal and context	Use powerpoint slides for clarity
Time for participants to ask questions about the topic	5 minutes	Make sure all participants fully understand the goal and context of the session.	
Icebreaker: create a word-cloud with each other	5 minutes	Breaking the ice among participants & build empathy with hybrid event attendees	Use mentimeter website to create a word-cloud
Explain the ground rules	2 minutes	Make sure all participants are aware of the rules and adhere to them during the session.	Show the rules on the powerpoint
Rapid Ideation	10 minutes	Think of as many ideas as possible in a short time	Miro board
Brainwriting	15 minutes	Build upon ideas of others	Miro board
Group discussion	15 minutes	Present and discuss your ideas with others	Miro board
Break	10 minutes	Relax and reload	
Creating categories and subcategories	15 minutes	Finding commonalities among ideas	Miro board
Prioritizing NUF	15 minutes	Assigning value to each idea.	Miro board
Idea analysis	20 minutes	Summarizing and analyzing the ideas with highest prioritization.	Miro board
Closing	3 minutes	Thank participants and close the brainstorming session	
	Total time: 120 minutes		

Figure 10: Brainstorming session agenda

G Brainstorm session results

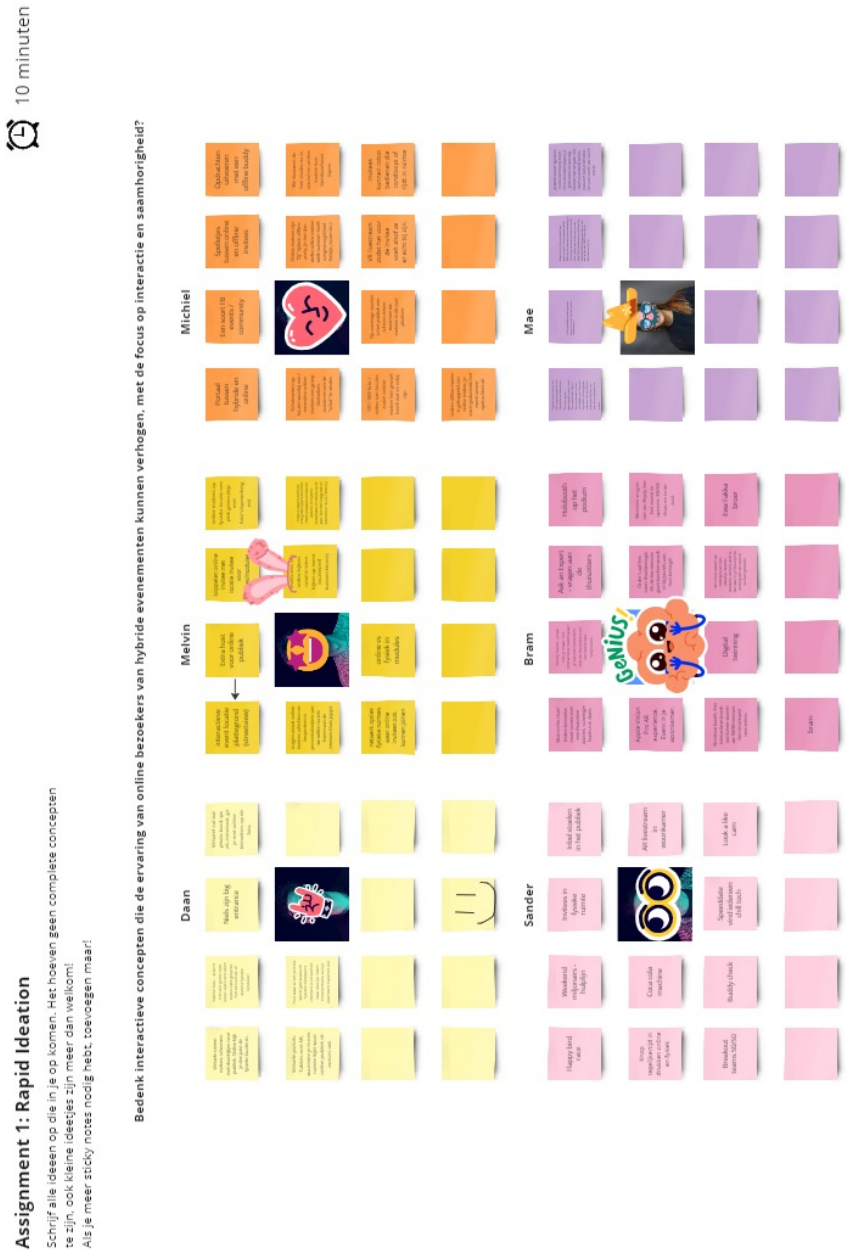

Figure 11: Rapid Ideation results

Figure 12: Brainwriting results

Figure 13: NUF prioritizing results

H MoSCoW check results

MoSCoW	Category	#	Requirement	Concept 1	Concept 2	Concept 3	Concept 4	Concept 5
Must	Technical requirements	M1	Must be a 'general' solution and therefore usable within several different events.					
		M2	Must use the hybrid event platform Reply-live designed by FX Agency					
		M3	Must be accessible for many users at the same time					
		M4	Must be accessible for online and in-person attendees					
		M5	Must be able to update real-time					
		M6	Must be interactive in nature and provide meaningful interactions					
		M7	Must provide accessible interaction possibilities between online and in-person attendees (in groups as well as one v one)					
		M8	Must be accessible for persons with low-technical knowledge by using simple to understand technologies					
		M9	Must create one event experience, while still accommodating different needs from online and in-person attendees.					
	Experience requirements	M10	Must provide the attendees with quickly switching content					
		M11	Must provide dynamic, engaging content to captivate attendees					
		M12	Must promote active participation from attendees online and in-person					
		M13	Must ensure visibility of participants, both online and in-person.					
		M14	Must inspire, engage, educate or entertain the attendees					
		M15	Must be able to generate a sense of togetherness among all attendees.					
Should	Technical requirements	S1	Should be accessible from anywhere in the world					
		S2	Should not interrupt the flow of the event.					
		S3	Should decrease the 'zoom-fatigue' effect.					
		S4	Should provide opportunities for spontaneous conversations					
	Experience requirements	S6	Should foster connections amongst attendees					
		S7	Should be comfortable to use for introverted attendees.					
		S8	Should generate feelings of excitement					
		S9	Should create memorable 'WOW' experiences for attendees.					
		S10	Should encourage a relaxed atmosphere, including humor and lightheartedness.					
		S11	Should contribute to the storyline of the event.					
		S12	Should create a mutual focus of attention					
		S13	Should generate high emotional energy					
MoSCoW	**Category**	**#**	**Requirement**	**Concept 1**	**Concept 2**	**Concept 3**	**Concept 4**	**Concept 5**
Could	Technical requirements	C1	Could be a physical or virtual installation					
		C2	Could offer real-time visibility into others' reactions.					
		C3	Could be using innovative technologies					
		C4	Could offer multisensory experiences					
		C5	Could use participatory co-creation of the attendees					
		C6	Could be usable during all stages of the event, pre-event, during-event and after-event.					
	Experience requirements	C7	Could encourage attendees to initiate conversation					
		C8	Could enable attendees to share their feelings and thoughts.					
		C9	Could be a complete novel idea					
		C10	Could be using gamification					
		C11	Could use cognitive biases to influence attendees behavior					

Figure 14: Results from concept check with the MoSCoW requirement list. Red = not met requirement, green = successfully met requirement, orange = maybe/depends/not sure

I Paper prototype

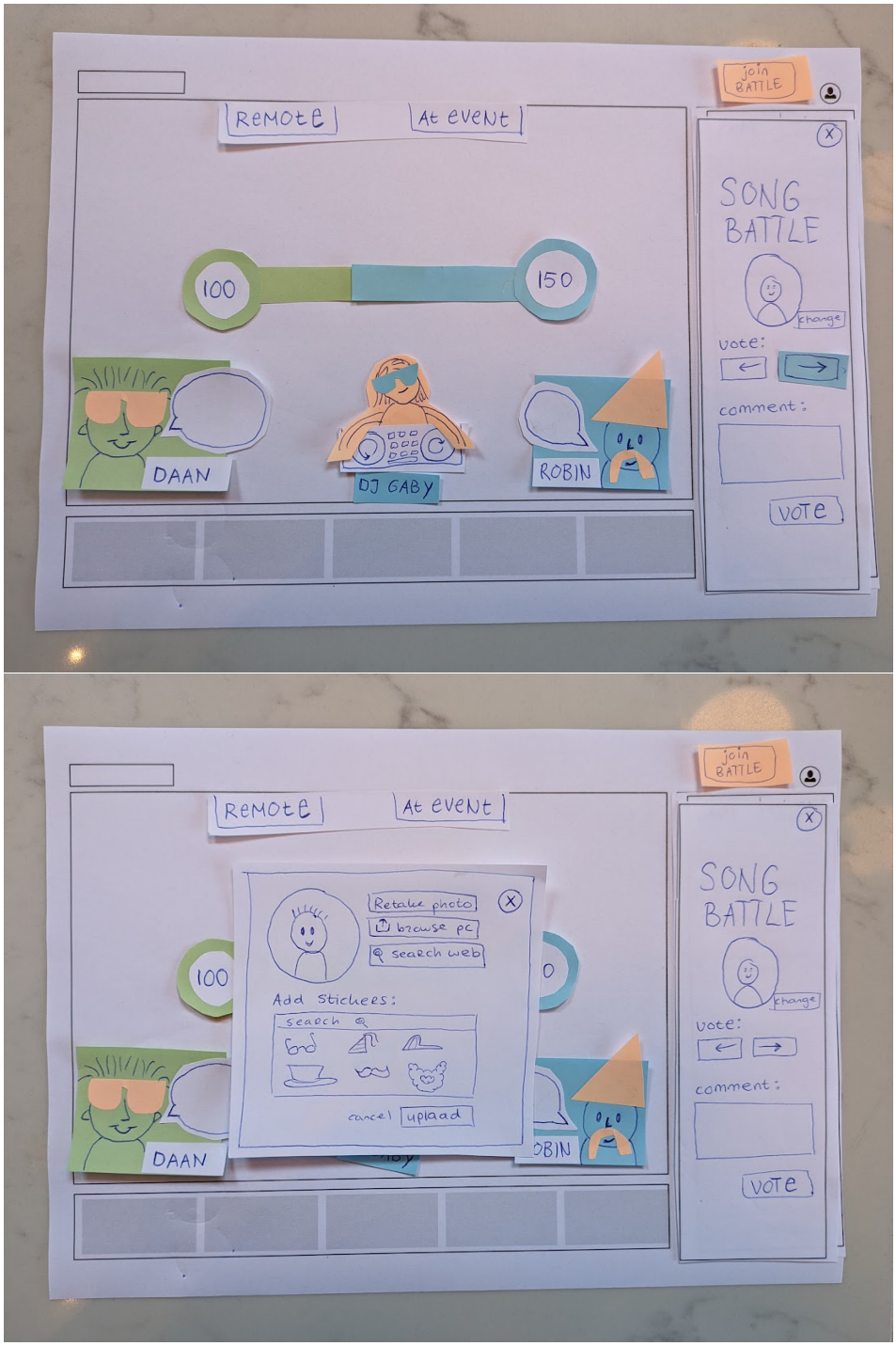

Figure 15: Paper prototype interfaces

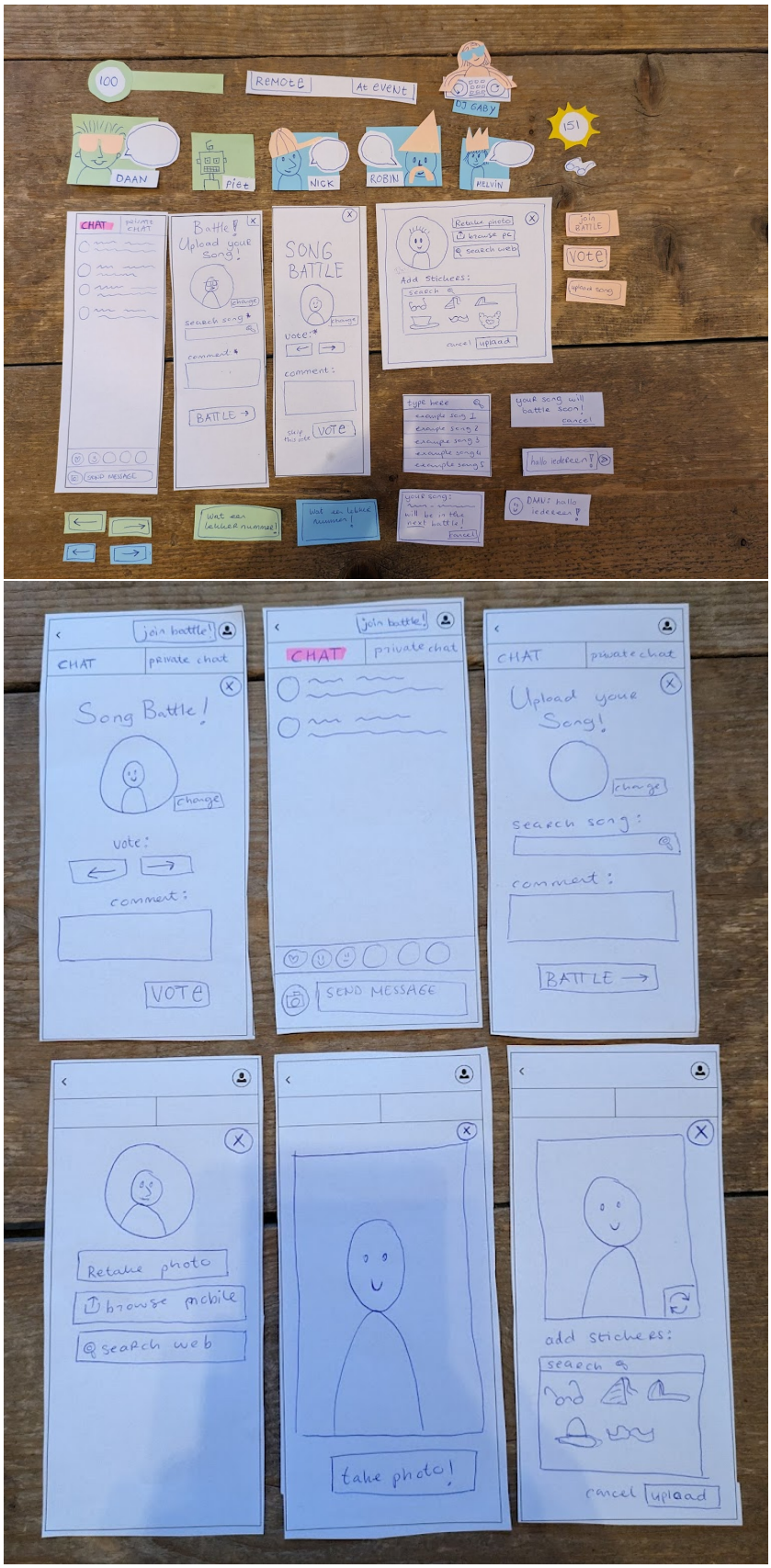

Figure 16: Paper prototype elements & interactive panel designs

J Storyboard of the voting flow within the PoC

Figure 17: Storyboard of the main screen design

K Informed consent and Information brochure

Information brochure

This research is conducted to get insight into user experience and the human-computer interactions of the developed system. The research procedure will consist of two steps. The first step is to interact with the system by participating in a usability test. Here, the participant interacts with the figma prototype and performs several tasks provided by the researcher. During this process, the participant is asked to think-aloud. The second step in this research is a semi-structured interview. This interview is about the participants' experience of the prototype and asks about its features and purpose. There will be no questions asked about sensitive information during the semi-structured interview.

There are no adverse effects for the participants of this research. The research will be fully focussed on improving the user interactions and experiences of the prototype. Participants of the research will receive no remuneration. Participants need to be 18 years or older. There are no further limitations for participants.The entire experiment is voice recorded and transcribed afterwards. The information gathered during this research will solely be used to improve the system. Afterwards, the information is put anonymously in the report and it will be deleted before the last of July 2024. The information will not be shared with third parties.

The participant may discontinue the experiment at any moment, which will have no negative impact for the participant. After a participant withdraws, the data that is already gathered will be removed completely. The participant also has the right to withdraw from the research within 24 hours after the interview.

For objections regarding the design or execution of the research, you can contact the secretary of the Ethics Committee of the Faculty of Electrical Engineering, Mathematics and Computer Science at the University of Twente, P.O. Box 217, 7500 AE Enschede (NL), email: ethics-comm-ewi@utwente.nl). If you have specific questions about the handling of personal data, you can contact the Functionary Data Protection of the University of Twente, by mailing dpo@utwente.nl. Finally, you have the right of a request for insight, modification, removing or altering of your personal data. This can be requested through the research manager.

Informed consent

'I hereby declare that I have been informed in a manner which is clear to me about the nature and method of the research as described in the aforementioned information brochure. My questions have been answered to my satisfaction. I agree of my own free will to participate in this research. I reserve the right to withdraw this consent without the need to give any reason and I am aware that I may withdraw from the experiment at any time. If my research results are to be used in scientific publications or made public in any other manner, then they will be made completely anonymous. My personal data will not be disclosed to third parties without my express permission. If I request further information about the research, now or in the future, I may contact Simone Luiten.'

If you have any complaints about this research, please direct them to the secretary of the Ethics Committee of the Faculty of Electrical Engineering, Mathematics and Computer Science at the University of Twente, P.O. Box 217, 7500 AE Enschede (NL), email: ethics-comm-ewi@utwente.nl).

Name participant: Signature:

'I have provided explanatory notes about the research. I declare myself willing to answer to the best of my ability and questions which may still arise about the research'

Name researcher: Simone Luiten Signature:

L Evaluation interview set-up

Phase	Purpose	Time	Questions
Introduction	Tell the purpose of this interview	1 min	In this interview, I aim to delve into your thoughts and opinions regarding the prototype and concept you've just engaged with. Your perspective is important to this research, and I encourage you to openly express your opinion. There's no need to be concerned about diverging opinions or potentially disagreeing with certain statements; every insight you provide contributes to this research. Your honest feedback is highly valued! Let's begin the conversation!
Key-topic	Explore the participants thoughts upon subjects like; community building and sense of togetherness	20 min	Community building - Do you think this concept provides the attendees with a shared focus of attention? Why (not)? - Do you think attendees will be aware of others joining the activity as well? Both online and in-person attendees? - Would your experience be enriched by seeing the votes and comments of others? Why (not)? - Do you think this concept can be used to form emotional connections between attendees? Why (not)? Sense of togetherness - Are you engaged by the concepts? - Do you feel a desire to participate with the concept? - Do you think this concept would make participants feel like a valued member of the group? - Would this concept allow participants to showcase themselves? For example their skills and influence? - Does this concept allow participants to get respect from other attendees? Interaction ritual framework: - When you are an online attendee, would this make you feel more 'together' with other attendees (online and in-person)? Why (not)? - Do you think this concept helps by creating a shared mood among the attendees at the event? Both online and in-person? Why (not)?

Figure 18: Part 1: Interview framework for the semi-structured interview during the evaluation. Structure from [34]

Phase	Purpose	Time	Questions
			Out-of-the-ordinary: - Do you think this concept provides WOW-moments for attendees? - Does this concept, in your opinion, use novelty factors? Could you explain this? Improvements of the concept: - What can, in your opinion, be improved to increase the sense of togetherness within this concept? - Are there any features you miss / features you would like to see incorporated within this concept?
Summary	Summarize participants insights and validate them	3 min	*Repeat main insights gained during this interview and ask if I understood correctly.* Is there anything you would like to add?
Conclusion	Thank the participant and close the interview	1 min	*Thank you so much for your participation in this interview!*

Figure 19: Part 2: Interview framework for the semi-structured interview during the evaluation. Structure from [34]

M Short version of the UEQ

obstructive	o o o o o o o	supportive
complicated	o o o o o o o	easy
inefficient	o o o o o o o	efficient
confusing	o o o o o o o	clear
boring	o o o o o o o	exciting
not interesting	o o o o o o o	interesting
conventional	o o o o o o o	inventive
usual	o o o o o o o	leading edge

Figure 20: Short version of the UEQ used wihtin the evaluation sessions

N Reflective thematic analysis results (evaluations)

Codes	Amount
Amount of votes	9
Visibility	10
Voting thershold too high	7
Voting threshold is already low	2
Music tempo	5
Too much song uploaded	4
Clarity for inperson attendees	3
Promoting the concept	10
Creativity upon the avatar	6
Content ideas	6
Design ideas	10
Thuis vs. online	2
Too much information leads to confusion	7
Displaying online and in-person	5
Interface design needs show elements	3
Text too small	5
Unclear navigation	10
Virtual Dj tab	6
Concept ideas	4
Target group specific	12
Event specific	12
Incentive to vote	3
More interaction needed	7
Unclear interaction	3

Figure 21: Thematic analysis codes