Fate of the Minotaur - A Scalable Location-Based VR Experience

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Figure 1: From left to right: King Minos, Pasiphae, her daughter Ariadne and the Minotaur.

ABSTRACT

Within our narrative location-based VR experience "Fate of the Minotaur", the players embody the role of human sacrifices from Athens who are sent into the labyrinth of the Minotaur by Minos, King of Crete. The players learn about the tragic family story behind the ancient Greek myth and have to pick a side by either killing the Minotaur or sparing the troubled creature's life. In a unique approach, the content can be experienced in different immersive scale levels, depending on the technical and physical limitations of the location presenting the experience. From a technical perspective, a novel engine-agnostic and flexible open-source virtual production framework was used to realise the multiplayer network part of the game. Our non-photorealistic visual approach is inspired by ancient Greek murals and vases, allowing us to provide the experience with a small footprint in energy consumption and required equipment.

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CCS CONCEPTS

• Applied computing \rightarrow Media arts; • Human-centered computing \rightarrow Virtual reality; Collaborative interaction.

KEYWORDS

Location Based Experience, Immersive Experience, Multiplayer, Virtual Reality, Extended Reality

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1 INTRODUCTION

EMIL, the European Media and Immersion Lab[EMIL 2022], is a pan-European XR lab establishing a physical and virtual infrastructure with the aim of promoting innovation and the development of next-generation XR content, services and applications. It clusters the expertise of major academic institutions in four key creative industry regions in Europe (Finland, Germany, Spain and UK), bringing together excellence in narrative media production, smart garments, animation, VFX, embodied interaction, digital cultural

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heritage, digital health, motion capture/analysis, scientific research and technological development. In pursuit of fostering innovation and collaboration with the creative industry community, EMIL initiated funding opportunities through two calls, allocating a total budget of 5.6 million EUR for third-party XR projects. Additionally, each EMIL node creates an XR Lighthouse project around its core competence: smart garments, embodied interaction, digital health and narrative storytelling (Fate of the Minotaur).

2 EXPERIENCE DESIGN

In this location-based VR experience, the players descend into the Minotaur's labyrinth. The experience tackles the universal topics of guilt and shame, as the players learn about the tragedy behind the ancient myth through their encounters with characters from the story. They meet Pasiphae, the mother of the Minotaur, who tries to protect her son. His half-sister Ariadne wants to convince the players that the Minotaur is a raging monster. Players may choose to become the "Slaughterer of the Minotaur", but the heroism of this action is put into question in the context of our narration, which also offers a chance to spare the creature's life. In the multiplayer version, the players have to solve small puzzles and collaborate with virtual objects to proceed. From a game design perspective, maintaining pacing across the entire group of players while weaving a narrative through appearing characters was a significant challenge.

2.1 Scalability

A common challenge among location-based VR experiences is to deal with individual hardware and on- and offboarding constraints. To reach a wide audience with our work we designed it in three scale levels:

- Non-interactive seated: Stereoscopic 180° film, running on any VR headset.
- (2) Single-player stationary: Running on mobile VR headsets like Vive Focus 3.
- (3) Free-roaming multiplayer: Requires Vive Focus 3, a dedicated router and 8 x 8 meter play area for 4 players.

3 ART DIRECTION

Due to the historical background and the technical limitations for mobile VR-devices, a stylised look was chosen for the experience. Based in part on the aesthetics of ancient Greek pottery, it fits in well with the look of the Minoan illustrations from murals and vases. The character design and clothes are also heavily inspired by illustrations from the Aegean Bronze Age. The clothes and their patterns are very close to the style of the Minoan culture of the time. The design language of the surroundings is largely based on the excavations of the palace of Knossos. The architecture of the palace with it's rich collection of ornaments served as an additional inspiration. To complement our unique style, we designed a custom lighting setup to create a more dramatic atmosphere. The use of hard, dark shadows helps to accentuate the sensation of being lost in the confined 8 x 8 meter space, encouraging players to navigate the maze with caution.

4 TECHNICAL FOUNDATION

Multiplayer games rely on network-driven replication logic and specialised methods for keeping all relevant data in sync. Our VR experience makes use of them in the third scale level to create the players themselves and their joint interactions with the world. Adopting the underlying Framework (TRACER[FABW 2024b]) into a multiplayer VR project presented novel challenge, particularly since it was the first time it had been used in a gaming context rather than a virtual production environment. The implementation of an additional, decentralized server-client system required to establish a robust structure for identifying connecting clients and seamlessly synchronizing them with their replicated counterparts across all other connected clients. Furthermore, ensuring authoritative control over global events and physics simulations was crucial in shaping our design philosophy. These specific components are to be released open-source by end of 2024 on the GitHub repository [FABW 2024a].

5 EVALUATION

The first public presentation in December 2023 revealed promising feedback, with approximately 85% of the 36 participants expressing enjoyment of the location-based setting. Many of them appreciated the freedom of physical navigation alongside controller usage, citing it as a significant factor in their enjoyment. The majority of participants highlighted the immersive potential of the experience, particularly enjoying the opportunity to walk together in a group and interact with each other within a real-world environment while being immersed in VR. However, the feedback also included some constructive criticism. Participants identified areas for improvement, with common suggestions including further enhancing the game interactions with the real environment to deepen immersion and refining audio cues to better guide players through the world. These insights indicate a strong foundation for the project but also underscore the importance of refining certain aspects to enhance the overall experience.

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