Interreg — Co-funded by the European Union — **GLOW2.0**

Northern Periphery and Arctic

D2.1.2 Technical Requirement Specification

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Photo: Noel Bauza/ Pixabay

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From work package 2 in period 1 (12.2022 – 05.2023) the activity, 2.1 – Developing the requirement specification for the immersive technology/virtual planetarium, generated two outputs.

- D.2.1.1 – Concepts of the virtual planetarium
- D.2.1.2 – Technical specification

The specifications are for the fully virtual planetarium.

1 Introduction

Before starting the development of the virtual environment, desired features and functions needs to be addressed first and followed by a concept phase. Also, the level of immersiveness and interactions should be specified early in the project as a part of the scope.

The virtual environment could then be built in 4 stages:

- First stage is to create stars and planets.
- Second stage is to establish the locations where the "virtual tourist" is spectating from.
- Third stage could be implementing storytelling with a narrator.
- Fourth stage could be a preview of a real video or photograph captured from that location.

The application made for showcasing and displayed is suggested to be primarily developed to exclusive locations that are equipped with high end virtual reality (VR) computers and a high-resolution VR headset for the ultimate experience, and then later released to VR enthusiast that wish to have the experience from home.

2 Requirements to Hardware

2.1 VR headset

The headsets mentioned below are supposed for use by partners and end-users.

There is planned a release of a VR headset in Q1 2024 that offers 12K resolution@90Hz, 210 degrees horizontal field of view (FOV) and 135 degrees of vertical FOV. Brand and model for this headset is Pimax Reality 12K QLED, and this is going to be the headset with the highest resolution and highest FOV on the marked that is announced.

On the marked today there is a few suitable head mounted displays (HMD):

- HTC Vive Pro 2 (Best quality HMD),
- HP Reverb G2 (Best HMD under $400).

None of these has an OLED display, OLED would have been perfect to preview the dark skies with. However, there is one manufacturer that provide this today and a few other are planning this for the future:

- Sony PSVR 2 (On the marked, only for PS5),
- BigScreen Beyond,
- Arpara Tethered,
- Apple Vision Pro.

2.2 VR computer for users

To be able to utilize the headset full potential, the computer needs to be designed for heavy graphical processing and calculations. For a comparison, there is 24,883,200 pixels that needs to be rendered and processed for 4K VR, and for 12K VR there is 120,441,600 pixels.

Requires a 64-bit processor and operating system.
OS: Win 10
Processor: i7 7700k or Higher
Memory: 16 GB RAM
Graphics: Nvidia RTX 3090 or Higher (20 GB VRAM)
DirectX: Version 12
Network: Broadband Internet connection
Storage: 60 GB available space
Sound Card: Any
VR Support: OpenXR, Seated, Standing, Roomscale. Valve Index, HTC Vives and Pico using SteamVR. Oculus headsets with Oculus Runtime. WMR headsets with WMR Runtime.
Additional Notes: Virtual Desktop not recommended (Questlink/Airlink Fully Supported).

2.3 Development computer

A professional workstation where the CPU, GPU, RAM are working together in an optimum configuration for the best possible workflow. A few examples are listed below:

- Lenovo P620 (AMD Threadripper Pro, 256 GB RAM, Nvidia RTX 6000 x2),
- Lenovo P7 (Intel Xeon, 256 RAM, Nvidia RTX 6000 x2),
- Dell Precision 7865 (AMD Threadripper Pro, 256 GB RAM, Nvidia RTX 6000 x2),
- Dell Precision 7820 (Intel Xeon, 256 RAM, Nvidia RTX 6000 x2).

3 Technical Specification

The features and functions that the virtual planetarium should contain, and the hardware aspects are presented in Table 1. They were established in collaboration with all the partners.

Table 1 - Technical Specifications

Technical specification		
	Demands	Additional
Software (VR)		
Stationary	X	
Free Motion in the 3D environment		X
Photorealistic	X	
Interactive		X
Support multiple users		X
Age-appropriate options for the narrative (eg. School tours)	X	
Language options	X	
Country options	X	
Regional options (within a country)		X
Storytelling (personalizing regional experience)		X
Lines between the stars		X
Audio Quality (High as possible	X	

Ambient sounds (wind, water, rain etc)		X
Hardware (PC/HMD)		
Off shelf solution (Pre-built systems and ready to use)	X	
Solutions with different price options	X	
Refresh rate of HMD (High as possible)	X	
Screen resolution (High as possible)	X	
Vertical and horizontal field of view (High as possible)	X	
Comfortable HMD	X	
Possible to stand and sit	X	

FURTHER INFORMATION

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Link to project website: NPA GLOW