**Using Immersive Technologies to Engage with Network Rail’s Digital Assets**

**Pin Response Document - APPENDIX**

**Appendix A**

NR have proposed the following system concept. This should be used as a reference, however it is not a definitive/prescriptive approach.  If you believe that you have a novel/alternative approach or an individual technology that would satisfy the challenge, or parts of the challenge, then NR are keen to know more about your business, technologies and proposed solution.

The Solution shall:

1. Enable multiple geographically dispersed users to access and participate in reviews and collaboration activities (using Immersive technologies)
2. Be capable of displaying 3D content:
	1. Within a physical visualisation suite.
		1. Using multiple AV displays (screen or projector systems)
	2. Using immersive headsets (AR/VR/XR) tethered to PCs.
	3. On PCs / monitors.
3. Import the following file formats
	1. CAD/BIM L2 files
		1. .dgn
		2. .IFC,
		3. .obj,
		4. .FBX
	2. Lidar Point clouds
		1. .laz
		2. .pod
	3. Image files
		1. .jpeg
4. Functionality
	1. The solutions shall enable users to:
		1. Teleport and/or navigate freely around the BIM and virtual environment
		2. Access and control
			1. BIM meta data
			2. ability to retain materials applied to the existing NR Virtual Railway Models
			3. Layers of information/detail
			4. Edit content
				1. Position/reposition,
				2. Adjust/add basic dimensions
			5. Add notation/sketches
			6. Import/export 3D assets
			7. 3D data/models should be imported into the solution and automatically/accurately positioned
			8. Export meeting information in a format/s that all stakeholders can make use of without the need for specialist/licensed software or hardware.
		3. Edit the virtual environmental
			1. Adjust date and time
			2. Adjust weather conditions
			3. Sun position (geo-positional accuracy of 3D assets on the globe)
5. Provide a mechanism that displays updates/changes/versions are clearly visible so that users can quickly understand what has changed/been added/modified.
6. Shall not overwrite or edit the source BIM data.
	1. Edits/notes/comments shall be stored in a local file/directory.
7. Shall provide end to end encryption of data and communications.

The Solution should:

1. Enable users, that do not have access to or cannot use immersive technologies, headsets or dedicated/special hardware to participate in collaborative activities.
	1. A fall-back solution:
		1. If there are software/hardware issues
		2. If Hardware/Equipment/facilities are not available.
2. Be capable of integrating with and displaying a range of live and recorded/historical AV sources including:
	1. social media,
	2. video conferencing software
	3. 360 footage
	4. GIS data/visual information
3. Be able to select, view and position data sources inside the virtual environment including live and historical data sources.
4. Consider the challenges that IT security and firewalls could have on software installation, delivering software updates and bug fixing.
5. Enable IT and users leading collaborative session to administer/edit user profiles and assign the appropriate functionality to each user/guest user.
	1. User profiles should capture all user activity for auditing and meeting minutes.
	2. The functionality available for user profiles/type should be scaled from low PC skills / Immersive tech experience with basic functionality that can be learnt in minutes, through to a fully populated suite of functionality for experienced users.
		1. An introductory “how to” video for the user/guests for each function should be easily accessed prior to and/or during the use of the solution.

The Solution could:

1. Enable BIM/data to be displayed on the following hardware
	1. Mobile (tether-less/standalone) Headsets (AR/VR/XR)
		1. A separate processor and battery pack that is worn by the user would be acceptable.
	2. Smart handheld devices. (phone/tablet)
2. Time Control
	1. Users could be able to manipulate 4D information (4th dimension is time).  This would be used to view historical data/files/assets (i.e. foliage, construction progress) and determine historical changes and predict future outcomes.
		1. An intuitive UI will be necessary to select time/date and ensures all users understand the context/point in time that they are observing.
		2. A record function could be available to enable users to record milestones and create/use animations to describe/visualise project progression. (for marketing/communication and wider distribution).