



Prof. Jose M Alcaraz Calero
University of the West of Scotland
(UWS)



Prof. Qi Wang
University of the West of Scotland
(UWS)

6G PATH Use Case 4: The Classroom of the Future in the Education Vertical

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6G-Path



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- Leverage XR, 6G and related technologies to create a highly immersive and interactive teaching and learning environment for Classroom of Future.
- Allow a large number of students who are geographically distributed to receive and enjoy high-quality learning with a superior experience.
- Enable interactive group discussions and collaboration regardless of the physical distances among the students.
- **Goals**
 - By testing this 6G use case in a realistic environment, it can accelerate the deriving of various related KPIs from these different perspectives to drive further development of new 6G technologies and applications.
 - By providing an immersive and engaging learning experience based on XR and 6G, this Classroom of Future can potentially significantly improve learning effectiveness for students.
 - By facilitating real-time collaboration and group discussions, students can work together to solve problems and learn from each other, nurturing the culture of being a team player, an essential personal merit to handle complex problems in real-world projects.
 - Boost the accessibility of education, especially for students who are unable to attend physical classes due to distance or other factors.

Description of the use case



Functional	<p>Ultra-high-bandwidth, ultra-low-latency connectivity to enable real-time communication and collaboration between students and lecturers. XR devices such as VR headsets, AR glasses, and haptic suits are required to create immersive learning experiences for students.</p> <p>Edge computing is required to process the massive data and run the XR service applications closer to the students.</p>
Security	<p>XR applications require secure network connections and high service availability to deliver the scheduled education. It is required to ensure that data is stored securely and processed in accordance with applicable data privacy laws. Appropriate security measures such as Digital Rights Management (DRM) should be in place to protect against content threats.</p>
Performance	<p>Ultra-low end-to-end delay and jitter, ultra-high bandwidth, low packet loss, etc.</p> <p>The perceived quality of the XR-based teaching and learning content delivered through the system to a large-scale of students.</p> <p>The smooth and immersive learning experience through the collaborative learning features.</p>

Classroom of Future

Champion: UWS
Testbed: UWS

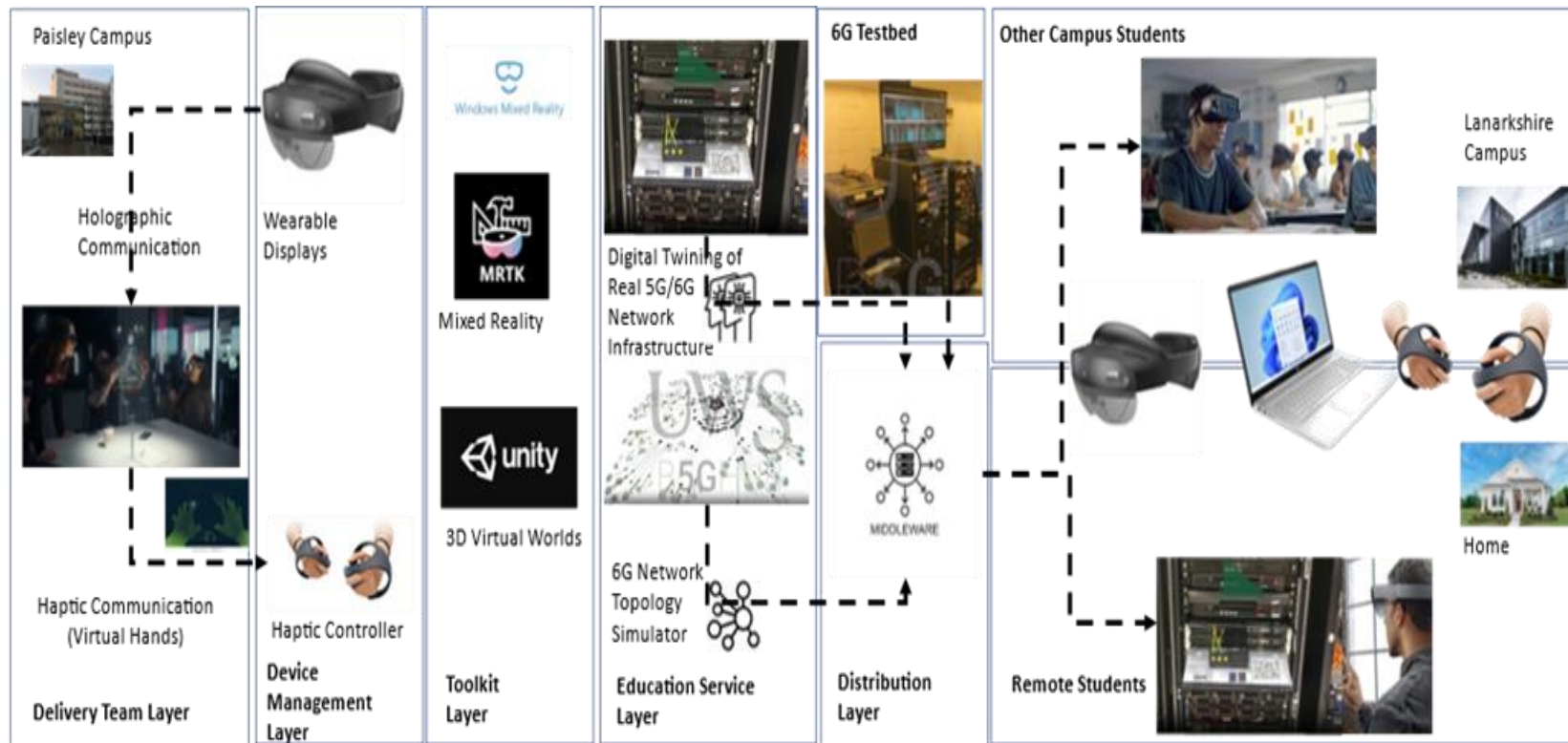
KPI	Description	Objective
Perceived usefulness	High perceived usefulness ratio for teaching and learning experience	>70%
Newly developed XR application	Develop new XR teaching and learning materials	>= 2
Visualised devices	Number of supported networked devices to be visualised in the same topology in the subject domain (5G and beyond)	>=1000
Visualised connections	Number of supported connections among devices to be visualised in the same topology in the subject domain (5G and beyond)	>=2000
Key technological concept visualisation	Number of visualised key technological concepts (visual representation) in the subject domain (5G and beyond)	>=3 (e.g., virtual machines, multitenancy, virtual equipment and interfaces, which would be difficult to explain without XR-based visualisation)
Key business scenario visualisation	Number of visualised key business roles and scenarios (visual representation) in the subject domain (5G and beyond)	>= 2 (e.g., Infrastructure Service Provider and Infrastructure Service Consumer, and their business scenarios, which would be difficult to explain without XR-based visualisation)

KVI	Description	Objective
Student satisfaction	High satisfaction rate from the students	>=70%
Academic performance	High students performance vs. the performance in a control group (understanding the complicated 5G and beyond topology)	>=20% (compared with a control group)

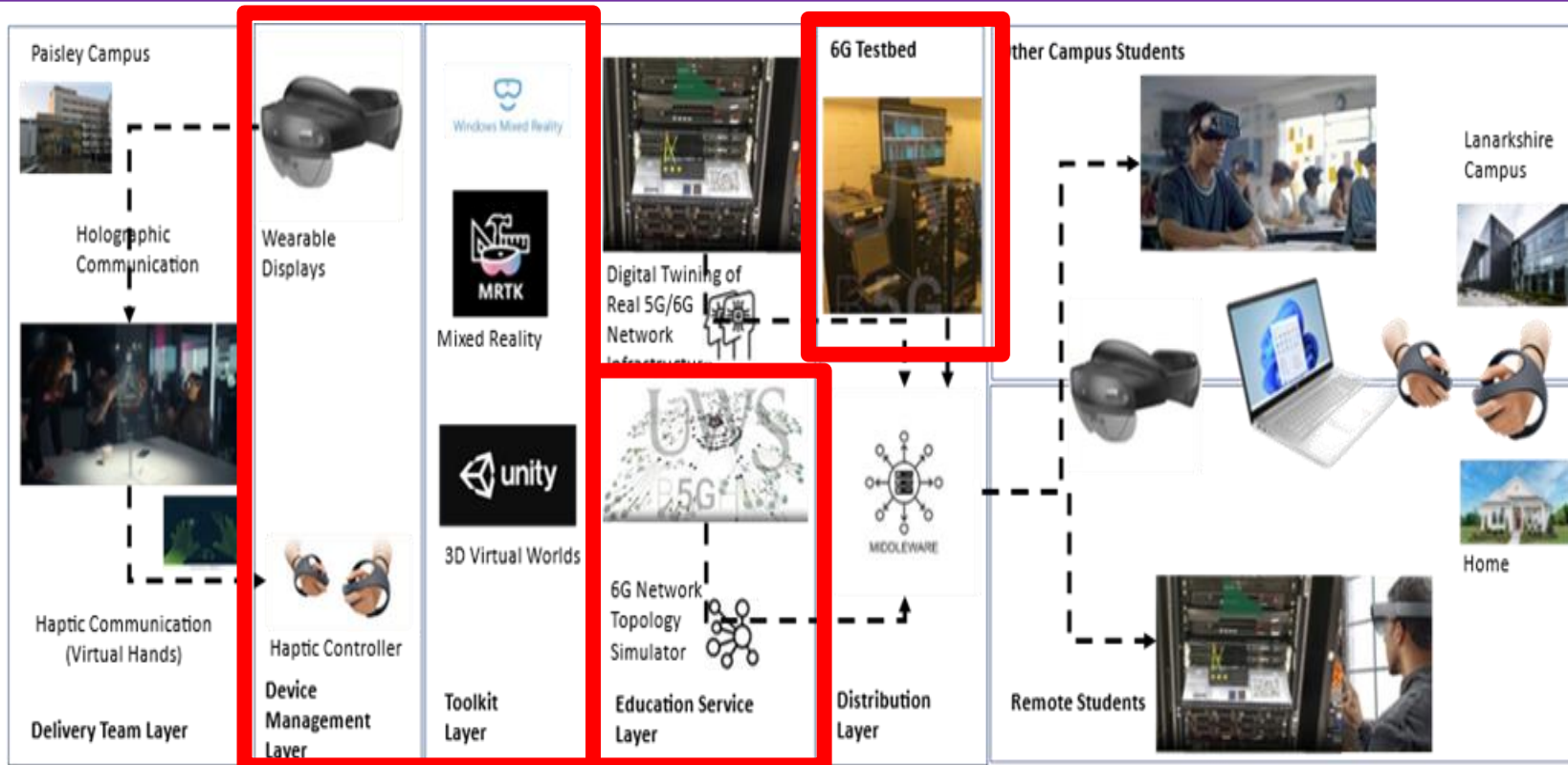
Classroom of Future framework



6G-Path



Classroom of Future framework



Status – first prototype demo



GG-Path

- First Prototype of the Topology already available
- Support for HoloLens 2
- First Prototype for Synthetic Topology generations already available



- Planning the delivery of 1 or 2 lectures using the technologies
- Gamification of the App to drive challenge-driven for students
- Optimization to allow smother interactions
- Packaging the application backend to allow executions in our testbed
- 3rd-party testing through the open call

Thank you for your attention!



University of the West of Scotland



Jose M Alcaraz Calero; Qi Wang



Jose.Alcaraz-Calero@uws.ac.uk

Qi.Wang@uws.ac.uk



uws.ac.uk



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