Intergenerational Codesign of Immersive Technology for a Heritage Site and Underwater VR Experience

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Presenters:

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Dr Marius Varga

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- Research Fellow in Digital Health and Social Care at University of Plymouth
- Member of Centre of Health Technology (CHT) research group
- Early career researcher with specialisms co-design, immersive technologies and gamification and serious games development
- Interested in using immersive technology and game-based approaches to solve real world problems
  - Bridging project: VR environment used for training autistic people for job interviews
  - Glide for Frailty: immersive paragliding simulator used for low impact exercise for Frailty patients

Dr Dena Bazazian

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- Lecturer in Machine Vision and Robotics at the University of Plymouth
- Research interest and expertise in Computer Vision and Deep learning
- PI and Co-I of various multidisciplinary projects focused on use of AI and Computer Vision in Art, Health and Marine Science applications
- Interested in use of advances in AI and Computer Vision approaches for VR techniques

ICONIC (Intergenerational Codesign of Novel technologies in Coastal communities)

- Coastal regions face challenges to digital infrastructure from socio-economic & geographic marginalisation
- Older adults are often digitally excluded
- Intergenerational codesign of four novel technologies:
  - Heritage Extended Reality (HXR)
  - Underwater Telepresence (UT)
  - Social Games
  - Voice AI

Heritage Extended Reality (HXR) and Underwater Telepresence (UT)

HXR

- Partnered with Cotehele – National Trust UK – old manor house in the heart of Cornwall

UT

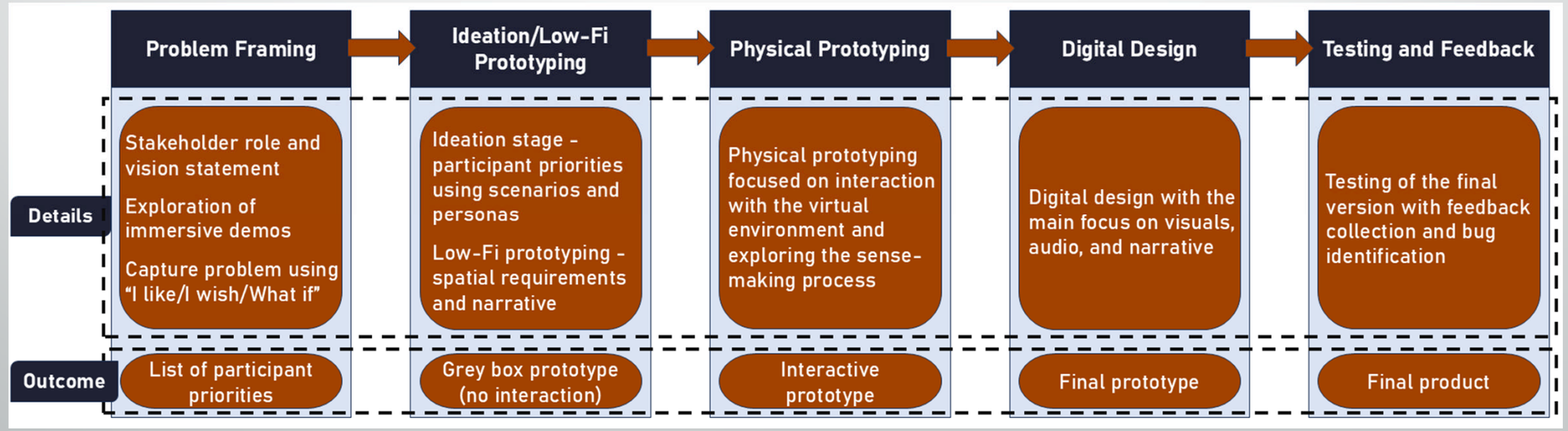
- Partnered with Ocean Conservation Trust Plymouth

Recruitment:

- 24 Digitally Excluded Older People (DEOP) aged 50+
- 12 Young People (YP) aged between 16 – 30
- Additional 20 YP from partner college for asynchronous codesign

Technology development through a codesign approach

- Approximately 8 months for each package
- Monthly iterations: design workshop; deliver workshop; feedback analysis; and develop technology for next iteration



Implementation

HXR

- Cotehele’s Great Hall in a Virtual Reality (VR) with all objects interactable
- Delivered on Quest 2 using controllers
- Multisensory experience using visual, audio and haptics through the controllers
- Used Photogrammetry to capture some of the historical objects found at Cotehele

Implementation

UT

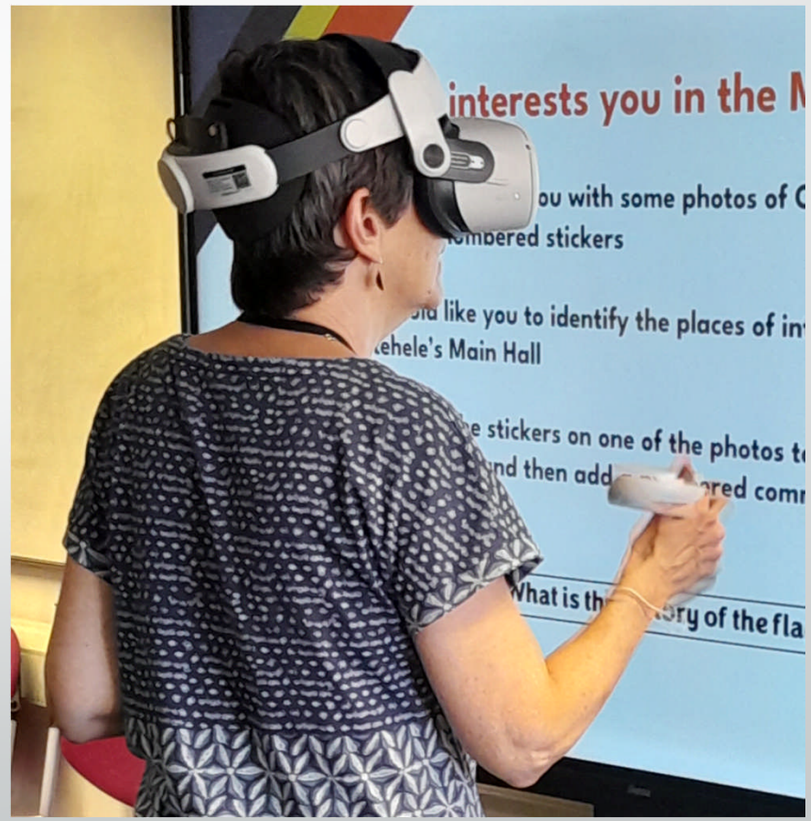
- 360 video capture of underwater environment form National Marine Aquarium (NMA) in Plymouth
- Two modes of engagement:
- Relaxation using ambient sounds with fish swimming around
- Learning focused on the help of AI image recognition model identifying providing information on the fish

Older adults Comfort and Personalisation

- Comfort using the headset and the controllers played a crucial role
- Headset were front heavy applying pressure to forehead
  - Purchased a mechanical head strap that distributes weight
- Controllers complicated and difficult to reach certain buttons
  - Purchased controller straps and simplified the interactions to one button
- Custom interaction to work on one button includes grabbing objects at a distance

Onboarding and support for using the VR equipment

- Supervision and support while using the VR equipment
- Safety measures with options to explore the environment sitting or standing
- Scaffolding during the VR experience – dialogue with the user
- Additional VR onboarding sessions to increase level of confidence



Familiarity with the technology

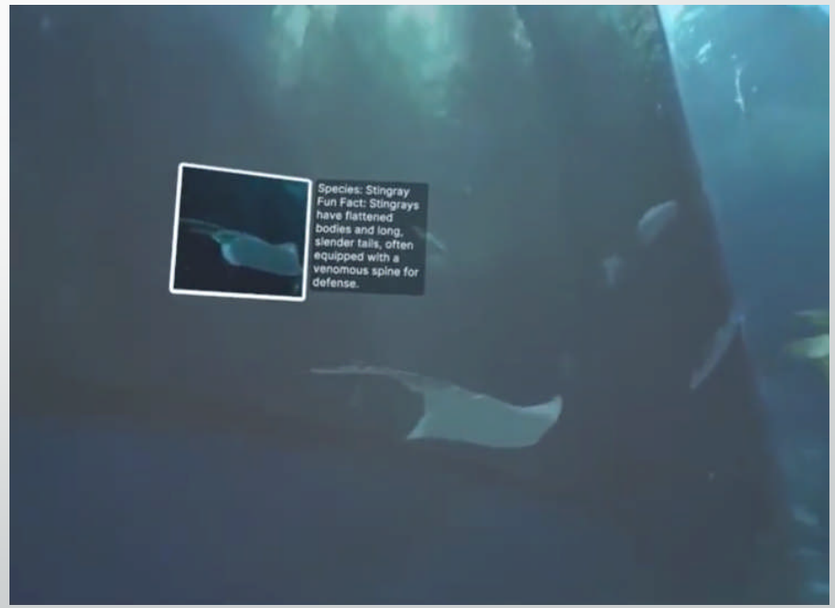
Levels of confidence and familiarity with the equipment affected the experience

- Locomotion in VR – started with the teleportation
- Dedicated co-design workshop to locomotion: “Grab and Drag”
- Reverted to teleportation after users became familiar with the technology

Evolution of preferences

UT

- 360 live streaming footage was initially preferred
- Due to latency and streaming quality participants preferred recorded 360 footage
- Genuine underwater sounds were initially thought to be crucial for immersion
- Later, the co-design team preferred artificial ambient sounds



Key recommendation

Factors such as accessibility, affordability, and hardware usability

Ergonomic solutions for headset and controllers combined with a simplified interaction metaphor

Ample onboarding support and adaptability to users with different levels of dexterity

Thank you!

Any questions?

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