Title: Augmented sites. Exploring realities, accessibility and participation, one marker at the time

Abstract:
Augmented Reality (AR) has seen constant growth in both consumer and professional markets with increasing interest and applications. The proliferation of mobile devices is among the reasons that facilitated its broad dissemination, along with the democratization of development tools. While a significant portion of AR experiences concentrate on visually overlay digital content on the real world, other sensory modalities such as auditory and haptic feedback can now be effortlessly integrated, using current technologies and devices, as powerful solutions to enhance training experiences, facilitate audio tours, engage a broader audience through a novel form of interactivity, and ultimately enrich our *realities*.
However, the provision of devices, infrastructures, and toolkits is only a single aspect of the equation, as the design and creation of the content, the development process and overall experience of the application are equally crucial.
In this presentation, I will introduce four iterative co-creation activities we conducted to explore the untapped potential of Augmented Reality by considering its entire process, as a means of empowering individuals, beyond the use of its outcomes.
Specifically, our exploration delved into collaborative content creation, the materiality of the AR markers, and the wider accessibility of the outcomes.
Building on our prior experiences, we opted to use WebXR solutions rather than the established native approaches provided by ARCore and ARKit. This decision was based on the broader accessibility that WebXR can offer, despite its experimental status, without requiring a commitment to developer's accounts and digital distribution platforms. Furthermore, this approach enabled us to rapidly prototype the outcomes of the workshop as the activities were taking place.
Although AR markerless solutions are currently available also using web technologies, for our activities, we focused on more traditional marker-based AR solution. The main reason for this decision was to utilise the markers themselves, which are frequently viewed as *secondary* to the content being visualized, as a central activity, serving as portals to bridge and facilitate the access to both digital and physical spaces.
Regarding content creation, two of the experiences were centred on shared memories in both outdoor (ARGH Mateys!) and indoor (Unravelling) settings, while the other two activities explored diverse methods to access and communicate sensor-based data (ARTES and CARED). During these activities we engaged with a diverse group of users including community groups, young adults, children, experts, receiving generally positive feedback and constructive suggestions, demonstrating that these experiences can serve as valuable blueprints for further iterations. We do have to address and acknowledge various limitations in using web-based approaches. Some of these were primarily associated with the relatively new technologies, while others were more systemic that could not be addressed at the time (e.g. multi-browser compatibility). Additionally, dealing with breaking changes among the libraries used was also a challenge that we had to take into consideration, for projects running for extended periods. Although open-source solutions can be very effective in these contexts, the lack of official support, or abandoned repositories remains a concrete issue. The diverse ecosystem of web-based approaches presents both limitations and strengths. Nevertheless, we believe that WebXR will play a central role in the future of accessible and inclusive immersive experiences. ARTES (Augmented Reality Tiles for Environmental Sensing) and Unravelling are available on GitHub with a step-by-step guide to replicate them. CARED (Connected Augmented Reality Energy Displays) and ARgh Mateys (Augmented Reality Grounded Heritage: Portholes for Environmental and Youth Stories) will be available soon.