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Digital Transformation of Critical Water Infrastructure

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The ongoing fourth industrial revolution has accelerated the transformation of management and maintenance of assets into the digital era. This involves the application and interoperability of management systems in an upper system like the one described as Civil Infrastructure 4.0 [1]. CI4.0 involves the collection and process of data from the surrounding infrastructure over a wide range of assets and systems, incorporating a multi-integrated decision support system for efficient asset management. This is particular important for ageing water infrastructure as it is threatened by the occurrence of flood-related hazards, which have significant degradation impact and consequences to transport systems, e.g. bridges, embankments, waterways etc.

Despite the recent advances in the development and application of immersive technologies, transport and water infrastructure are still considered to be managed in a traditional way. This process involves on-site engineers making decisions based on their skills and experience, while in the majority of the times using paper-based analytics.

This study presents the development of intelligent tools to efficiently advance decision making about the maintenance procedure of water infrastructure, aiming to reduce costs and assessment times. One of the technological pillars, which can upgrade the traditional procedures is Augmented Reality (AR) technology, which is already used in other industries like Manufacturing and Automotive [2]. AR creates a combined environment in which the views of real and virtual worlds co-exist. AR technology provides valuable key information to inspectors, through AR glasses or mobile devices, pointing out areas of interest. Such an AR solution can register the coordination of location of the defects, analysing the possible maintenance solutions, and communicating effectively between in-house operators and inspectors on-site.

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