Leveraging Transdisciplinary Engineering through the Coalescence of Digital Twins and XR-Technologies

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Abstract. Digital Twins (DTs) as a disruptive technology of digital transformation are emerging as a true game changer in several application fields. Through digital representations of physical entities, vertical and horizontal integration can take place. This is the basis for comprehensive interoperability and accessibility between human and machine. This paper elaborates an application scenario bringing together DT in a collaborative environment with manifold devices like computers, tablets, or Extended Reality (XR) devices. Therefore, a DT has been developed which can describe and adapt itself according to the user requirements. This is complemented by a cross-compatible application that visualizes the sensor data in almost real-time and allows the user to interact with or control the DT from any location. In a first proof of concept, a seminar room has been equipped with interior air quality measurement devices which encapsulate several sensors within a 3D printed surrounding. The resulting data was then made available via the corresponding DTs of the measurement devices to the user on a HoloLens 2, Varjo XR-3, computer, or mobile device. The bidirectional flow of data and information between the physical and digital space enables to influence the physical devices through their DTs. The DT, combined with XR, can be used transdisciplinary in teaching or industrial environments.

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