

# Cross Reality in Crisis Management

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## EXECUTIVE SUMMARY

*The continuous technological advancement of computer simulation, display technology, and the internet of things leads to the opportunities to use cross-reality (XR) technologies in crisis management. XR emphasizes the compositions of different concepts in reality-virtuality continuum under a shared online virtual world, including virtual reality (VR), augmented reality (AR), and mixed reality*

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*(MR). It is touted as a promising tool to facilitate crisis management strategies in different stages, including prevention, onsite management, and recovery. This research contributes to the field of research in VR, XR, and crisis management (an essential component of healthcare) in the following four ways: (1) It proposes an idea to apply XR in crisis management. (2) It proposes a framework to connect VR, AR, and MR serving one purpose. (3) It presents a qualitative study to examine the user perception of the XR-based crisis management method. (4) It brings out the challenges and opportunities of using XR in crisis management.*

## **INTRODUCTION**

Emergency and disasters can strike anytime, damaging infrastructures and inflicting human casualties. Therefore, it is essential for every stakeholder, including firefighters, police, first-aiders, healthcare staff in the emergency department, and emergency response engineers, to respond to the incidents systematically and efficiently. To achieve this, the readiness and the efficient collaboration of the emergency response teams in responding to crises, such as fire and earthquake, are critical. Normally, organizations would develop emergency response procedures and disaster management plans to guide their crisis response teams to settle the crisis. A big assumption behind these plans is that every individual could follow the guidelines and react correctly under stress. However, human history told us that this assumption is not valid (Kwok et al., 2020). In particular, Robert and Lajtha (2002) specified that “the key to effective crisis management lies not so much with the writing of detailed manuals (that have a low likelihood of being used, and an even lower likelihood of being useful)”. Also, it is not surprising that humans would make mistakes during emergency incidents, leading to more severe consequences. Therefore, organizations should provide regular training and practical onsite guidance to their emergency response teams to equip each staff with the capabilities, flexibility, and confidence to handle sudden and unexpected events (Robert & Lajtha, 2002).

Crisis management is the actions that are taken to prevent or lessen the impact of a crisis. Crisis management involves three phases: pre-crisis (preparation), crisis response, and post-crisis (recovery) (Coombs & Laufer, 2018). Each phase requires tight and rapid coordination among different stakeholders and departments. For this reason, the use of cross reality (XR) concept, which emphasizes the collaboration of virtual reality (VR), mixed reality (MR), and augmented reality (AR) under a shared online virtual world (Paradiso & Landay, 2009), in the crisis management training can produce a marked effect in the following aspects:

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