

SMART SOLUTIONS FOR SAFER COMMUNITIES

Dublin City University Pilots Digital Twin Technology

Dublin City University's campus is currently being used to trial and refine digital twin applications in a bid to improve real-time decision-making during emergencies. Part of the Digital Twins for Emergency Management project, the pilot scheme is testing the technology before deployment across the wider Dublin City Council area, and subsequently on a national scale.



DCU's campus is a testbed for trialling and refining the application of digital twin technology before the wider implementation across the Dublin City Council region.

DCU Business School, DCU Insight and Dublin Fire Brigade (DFB) are pioneering the next generation of smart emergency management solutions. By harnessing their combined expertise, these strategic partners are spearheading groundbreaking innovations in digital twin technology, setting a new benchmark for risk assessment, pre-incident planning, and emergency management.

The Digital Twins for Emergency Management (DT4EM) project is revolutionising traditional emergency management practices, particularly in terms of pre-incident planning with Dublin Fire Brigade (DFB). Historically, these procedures have relied on paper-based methods, requiring extensive time and effort to create and retrieve critical information during emergencies.

The DT4EM project now aims to

fully digitise this process, drastically reducing the time needed for pre-incident planning. With this new framework, all essential data will be accessible on a digital device, significantly enhancing the speed and efficiency of emergency response.

This collaboration between DCU Business School, DCU Insight and DFB is now poised to transform emergency management, enhancing real-time decision-making and operational efficiency through cutting-edge digital solutions.

REAL-TIME DECISION-MAKING

A key objective of the DT4EM project is to improve real-time decision-making during emergencies. By creating a dynamic 3D model of emergency sites, digital twin technology integrates live data from multiple sources, providing emergency

responders with instant access to crucial information such as building layouts, hazard locations, and resource availability.

This enhanced situational awareness allows for optimised resource deployment, helping first responders and campus managers make quicker, more informed decisions in critical situations.

MULTI-STAKEHOLDER COLLABORATION

The project is driven by a multidisciplinary collaboration between DCU's Insight Centre, Smart DCU, Bentley Systems, DCU Business School and DFB. By combining academic research with emergency management expertise, this partnership fosters innovation and ensures the technology is both practical and impactful.

DCU's campuses currently serve as a testbed for trialling and refining digital twin applications before wider



Pat Leahy, former Garda Assistant Commissioner, explores the potential of the digital twin technology using Virtual Reality at the EMII breakfast briefing at DCU Business School.

implementation. The campus infrastructure offers a controlled yet complex environment for realistic emergency scenario testing, ensuring the technology is rigorously validated before it is deployed across the Dublin City Council area, and subsequently on a national scale.

INNOVATION IN EMERGENCY MANAGEMENT

A recent event at DCU Business School brought together members of the Emergency Management Institute Ireland (EMII) and leading experts in emergency management to explore the transformative potential of digital twin technology.

Organised by Prof Caroline McMullan and researcher Romal Thakkar, the breakfast briefing event showcased the project's innovative strategies for enhancing risk and emergency management.

Experts from DCU's Insight Centre, DCU Business School, and Dublin Fire Brigade delivered insightful presentations on the practical applications of digital twin technology in emergency management.

Dr Ali Intizar, Co-Principal Investigator of the DT4EM project at DCU School of Electronic Engineering, shared groundbreaking insights into the future of pre-incident planning and emergency management strategies, alongside Dr Jaime Fernandez from Insight Centre, and DFB's Michael O'Donnell and Robert Howell.

"Over recent years, we have successfully created a digital twin of DCU campuses, enhanced with real-time data analytics. This highlights the transformative power of digital technologies for smart city applications, significantly improving our quality of life and society.

"The DT4EM project exemplifies the crucial real-world impact of digital twin technologies, particularly in emergency response and risk management, where their benefits are most critical," according to Dr Intizar.

PIONEERING FUTURE OF EMERGENCY MANAGEMENT

The successful adoption of digital twin technology will pave the way for a safer, more responsive future, enhancing emergency management both on campus and across the city.

"The DT4EM project, spearheaded by Insight/DCU and Dublin Fire Brigade, holds the potential to redefine the emergency services sector by integrating advanced academic and sector-specific expertise.

"By leveraging real-time data, the project empowers emergency responders to act with greater precision, reducing response times and ultimately safeguarding lives in critical situations," noted Celine Heffernan, Business Development Manager at the Insight Centre.

TRANSFORMING LIVES AND SOCIETIES

"Digital twin technology represents a transformative leap forward in emergency management, allowing us to simulate and visualise real-world scenarios in real-time. By bridging the gap between digital innovation and practical emergency response, we can ensure faster, more informed decisions that save lives and protect communities," Romal Thakkar, DT4EM Project Researcher, pointed out.

Prof Caroline McMullan, Co-Principal Investigator of the DT4EM project, said it is "incredibly exciting to collaborate with leading experts in data analytics, digital technology, emergency management, in addition to the fire and rescue service to create a best-in-class approach to pre-incident planning and broader emergency management".

Prof McMullan said that this partnership not only enhances risk and emergency management capabilities on the university campus in the short term "but also lays the foundation for a transformational shift in this field over the medium and longer term".

PRE-PLANNING TO POST-INCIDENT ANALYSIS

Dennis Keeley, Dublin Fire Brigade's Chief Fire Officer, told the EMII breakfast meeting that assisting emergency response technology is only as good as its usability, adding that "clear added value; if it is not simple, intuitive and does not solve problems immediately, then firefighters are less likely to adopt any of these initiatives".

The DT4EM project is being developed with practitioners and academics from DFB and DCU/Insight Centre, and DFB's fire chief said that every aspect of the project is being developed with user experience and safety benefits in mind.

"Upon completion, it is anticipated that the integration of this project will help streamline everything from pre-planning and training to emergency response to post-incident analysis," he pointed out.



Dr Ali Intizar, co-principal investigator of the project, shared his insights on pre-incident planning and emergency management, using digital twin technology.