

## **Research project on digital modelling of evacuation plans with artificial intelligence elements to improve safety**

Prague, June 6, 2023 - A team of Czech experts is collaborating on a digital modelling project to improve evacuation plans in public buildings and public event venues. The project is funded by the Ministry of the Interior of the Czech Republic under the Czech Security Research Programme 2021-2026 (SECTECH) and runs from 2022 to the end of 2023.

Teams from the International Security Institute (MBI), the Faculty of Civil Engineering of Brno University of Technology (VUT), Gatum Group s.r.o. and VDT Technology a.s. are collaborating on the project. The main objective is to apply software simulating the movement of people based on software analysis of real video recordings when planning public events and during spatial planning and construction management.

The project processes data on the movement of people in objects of interest and soft targets, providing accurate simulations of evacuation scenarios based on this data. Structures of interest and soft targets are defined in the framework of the Methodology of protection of population in spatial planning and construction management and the Methodology of the basics of protection of soft targets.

The aim of the project is to facilitate more efficient evacuation processes and procedures, enabling planners to improve public safety for people in buildings. Once the platform has been developed and implemented, the project will verify its proper use, including testing in real-world conditions.

"The combination of these advanced technologies will allow all relevant professionals to set and implement better evacuation measures in case of emergencies," said Erik Feldman of VDT Technology, adding: "By accurately replicating the movement of people based on real video footage, we are developing a software platform that can predict the movement of people in evacuation scenarios. This will help mitigate the problems posed by unpredictable human behaviour in emergency situations."

The software platform will consist of two main components. The first will gather information from video footage of people moving in an area, through metadata analysis. It will be able to identify specific categories (e.g. men, women and children, or people with reduced mobility) and extract information about their movements in the form of metadata, which will then be analysed and prepared for use in digital modelling.

The second part of the platform will be devoted to modelling evacuation scenarios, where users will have the power to input 3D plans of buildings and event locations and then create a visual model of various emergency situations such as fires, natural disasters, terrorist attacks and others. Motion data obtained by analysing video footage will be used in the behavioural model, which uses a simulation algorithm to accurately model specific scenarios based on real motion analysis.

The project combines two separate software components into a single platform to identify critical areas of buildings and spaces, suggesting changes for better evacuation measures. It uses artificial intelligence and neural networks to automatically assess situations in CCTV footage, ensuring public safety, securing property, and protecting lives. It also provides insight into behaviour in unpredictable situations. The data source for the project is a camera that can track people by description, identify dangerous objects, recognize vehicles and automatically analyse footage. Automated analysis allows large amounts of video content to be viewed and evaluated efficiently.

The International Security Institute, as the principal investigator of the project, determines the platform requirements and manages the project delivery. The BUT team provides expertise in behavioural simulation technologies for human movement, while VDT Technology focuses on video analysis software and data transfer to modelling software. Gatum focuses on assistive programming and user interface development.

"This multi-dimensional project will greatly improve the ability and capabilities of designers to create effective evacuation solutions," said Assoc. Mgr. Oldřich Krulík, Ph. "In the event of emergencies, evacuation measures that use digital modelling can reduce the impact on human life and health. The project will make a major contribution to the use of data-driven technology solutions in improving public safety and facilitating more effective interventions by emergency services."