

## D23.2 Simulation models

### PUBLIC SUMMARY ONLY

### Reference SCR-WP23-D-UPB-002-PS

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# 1 Public Summary

SECUR-ED Project federates, with a delegated management and in a balanced manner, major operators and top industrial integrators to enhance the security of urban public transportation in medium and large cities, through live demonstrations. SECUR-ED rationale is to create a global European improvement in mass transportation security through the development of packaged modular solutions validated through the demonstrations, and made available to the full community of operators.

The objective of the WP23 is to develop a modelling and simulation (M&S) framework for mass transport security. Within the project, the work will support in particular the Demonstration Methodology and Coordination in WP51 and Assessment in WP54. Building a reasonably complete M&S platform for mass transport security will not be achievable within either WP23 or even the whole of SECUR-ED. The role of WP23 will be to partly achieve such a platform by efforts within the WP itself and in other parts of SECUR-ED. Doing this will enable the assessment work in SP5 but the embryonic M&S platform will also be a final deliverable in its own right, for the mass transport community after SECUR-ED to improve. A key to this work – both in and beyond SECUR-ED – is interoperability among the various M&S components.

This document shows a survey of existing, relevant models (e.g. passenger flow models, traffic models, threats and attacks models – fire propagation, gas diffusion) and describes the requirements for those that are missing. The sources of such models were universities and research institutes, but also commercially available models were studied. Other sources of models were the partners in the project who were surveyed in detail.

Chapter 1 of this deliverable gives a brief overview and describes the purpose of the document. The used references are listed in chapter 2. In chapter 3 an introduction about simulations in the context of safety and security in underground systems is given.

Seven main categories of simulations in the context of “Public Safety and Security” are presented and analysed:

- Person flow
- Traffic flow
- Sensor networks
- Human behaviour
- Stability of constructions
- Spread of hazardous/dangerous substances (includes explosions)
- Safety & security processes in case of emergency

Based on these categories a survey concerning the knowledge, the needs and the requirements of urban transportation operators considering simulation models was conducted in cooperation with the SECUR-ED Advisory Group for Public Transport Operators and Authorities. The final version of the questionnaire contains six questions considering simulation models and applications. The answers are shown and analysed in chapter 4 and show at least a huge interest in using simulations for the purpose of “Public Safety and Security”.

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In order to incorporate the appropriate expertise of every SECUR-ED member, a further questionnaire considering the knowledge of developed and available simulation models was distributed within the SECUR-ED consortium. The answers of the 14 partners are shown in chapter 5.

In chapter 6, a detailed simulation survey for the presented categories is described. After a phase of requirements engineering, each category contains an introduction, a selection of simulations, a description of simulations, a conclusion and a case-based proposal. For the presented selection of simulations different characterisations of the models are presented.

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