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MATRIX City: A Multi-Risk Platform

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MATRIX City (the MATRIX Common IT sYstem) is the computational platform that is being developed in the course of the New Multi-Hazard and Multi-Risk Assessment Methods for Europe (MATRIX) project. MATRIX aims to develop multi-type hazard and risk assessment and mitigation tools suited to the European context. The core of MATRIX City is a risk engine of a novel type that is based on a sequential simulation approach, which allows to quantify interactions and other time-dependent processes at the hazard, exposure, vulnerability and risk levels. For risk estimation in realistic scenarios, data availability is crucial. To overcome this limitation, MATRIX City provides a component called Virtual City. It is a collection of heuristic databases, which provides a generic approach to quantifying multi-type hazard and risk when data coverage is poor, and for sensitivity analysis. MATRIX City results are intended to provide a "big picture" of the expected impact of multi-type hazard and risk modelling (as opposed to static modelling), thus being a valuable tool for decision support. MATRIX City development uses a modern software engineering approach (test-driven development, continuous integration). The architecture is flexible, so that new perils, new models and large datasets can be accommodated easily. However, it should be noted that hazard computation is not part of MATRIX City. Hazard footprints have to be provided as input data, as well as exposure and vulnerability. The data model used in MATRIX City is an enhancement of the Natural hazards' Risk Markup Language (NRML). An XML serialization of this data model, which is a GML (Geographic Markup Language) application schema, is used for data interchange.