Simulating flood emergency response with synthetic populations: a layered modelling approach for non-historical scenarios

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le 10 juillet 2026 12h45 Manufacture des Tabacs MF103Fernando María de Villar Rosety, invited researcher, Universidad de Navarra.

Abstract: This work explores the use of agent-based simulation as a testbed for emergency response under plausible but non-historical flood scenarios, taking a pilot area in Gipuzkoa (northern Spain) as a case study. The aim is not to reproduce a particular flood, but to provide a controlled environment in which institutional protocols, population behaviour, and physical dynamics can be examined together under conditions that emergency managers may eventually have to confront. The approach is organised as a stack of loosely coupled layers — geography and infrastructure, flood dynamics, synthetic population and behaviour, institutional decision-making and field response, and the observation systems that feed information into the chain. Each layer draws on different data sources and carries its own degree of abstraction and uncertainty, and the layered design is intended to keep these differences transparent and manageable. The working pipeline integrates all layers, ranging from established physical and demographic models to simplified representations of institutional and behavioural dynamics. The seminar will present the current state of the framework, the modelling choices made so far, and the open questions raised by moving from physical realism towards the representation of decisions, communication, and compliance.

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