1. From Static Plans to Live Intelligence: What Is a Self-Adaptive Simulation?

In the field of disaster risk management, traditional simulation models have long been a cornerstone of preparedness. These models, however, are often static—they represent a single "snapshot" in time, based on a fixed set of initial parameters. In a real-world crisis, this is a critical limitation. A wildfire's direction can change with a sudden wind shift, or an aftershock can alter evacuation routes. When conditions evolve, a static plan becomes obsolete.

This is the problem our work seeks to solve. As outlined in deliverable D4.3, we are developing **self-adaptive simulations**.

A self-adaptive simulation is a dynamic model that ingests a continuous stream of real-time data—such as sensor readings, traffic reports, or weather updates. As this new data arrives, the simulation's underlying AI algorithms (detailed in Section 3) automatically re-evaluate the situation and adjust the model's own parameters.

To use an analogy, a static simulation is like a printed map. A self-adaptive simulation is a live, dynamic GPS system that not only shows your route but actively re-calculates it in real-time based on new traffic, accidents, or road closures.

A clear example is the **Wildfire Model (Section 3.3)**. A traditional model might predict a fire's spread based on the 8:00 AM weather forecast. Our self-adaptive model, however, continuously monitors wind speed and humidity. When a sudden gust is detected, the simulation automatically updates its "wind influence" parameter and re-runs its calculations, providing emergency responders with a new, more accurate prediction of the fire's immediate path and intensity.

This technological leap is fundamental. It moves disaster response from a reactive posture (following an outdated plan) to one of proactive, dynamic adaptation, enabling decision-makers to act based on what is happening, not just what was predicted.