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A Federated Data Fabric to Enhance Disaster Resilience for Extreme Weather Events

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Climate change is a pressing issue that affects countries and communities around the world. As global temperatures change intermittently, so do the occurrences and intensities of extreme weather events: which creates compounding, and sometimes simultaneous, instances of disasters. Thus, it is evident there is an urgent need for improved paradigms within the Disaster Risk Management (DRM) and climate change adaptation (CCA) domains, to promote better risk assessment, governance, communication, and systems which prevent, and respond, to disaster events. The DIRECTED project aims to facilitate disaster resilience among European societies, by creating a cohesive approach to Disaster Risk Reduction (DRR) and CCA strategies, and by promoting multi-risk thinking in relation to compounding events. The project will achieve this through integrated models, interoperable data, governance, cross-communication between actors, and the central platform, the Data Fabric.

This presentation provides an overview of the technical requirements and analyses which will provide the foundation for the DIRECTED Data Fabric; the Data Fabric will serve as a federated spatial information system, capable of integrating diverse data sources and executing flood and risk modeling across institutions. The Data Fabric requires collaboration within the entire DIRECTED consortium, which will ensure interoperability, useability, and longevity of the platform. Technical requirements have been discussed with data providers and modelers to establish infrastructure which is capable of visualizing flood and risk model outputs, as well as readily available climate data. Datasets involved range from custom file-based datasets to Spatial Data Infrastructures with Open API-based data access. Additionally, data mining activities have been carried out to produce flood forecasts based on a re-analysis of publicly available data from Copernicus: this has been done by accessing archives and calculating pixel-wise statistics, to spatially quantify upcoming forecasts and their potential severity. Significant challenges which have emerged include semantic interoperability, which encompasses aspects from data input and model parameterization, to the interpretation of model outputs. This presentation details how these challenges are addressed in DIRECTED, to create a cohesive and user-friendly spatial information system.

Based on an in depth requirement analysis of the RWLs, we will develop preliminary visualizations

of climate services, which in turn will be hosted in the cloud-based Data Fabric. The co-creation and co-design approach thereby ensures end-users' understanding of information in the platform, and the useability of the platform as a whole.

Since a plethora of extreme weather patterns exist within the scope of DIRECTED (including, but not limited to: pluvial and fluvial flooding, droughts, wildfires, and erosion), the Data Fabric represents a significant step towards establishing a robust and adaptable spatial information system, capable of meeting evolving climate needs for geographically diverse stakeholders.