



## HEIMDALL platform for Landslide emergency/risk management

Jordi Marturià<sup>1</sup>, Jose Becerra<sup>1</sup>, Pere Buxò<sup>1</sup>, Clàudia Abancó<sup>2</sup>, and Xavier Rodríguez<sup>1</sup>

<sup>1</sup>Institut Cartogràfic i Geològic de Catalunya, Geotècnia i Prevenció de Riscos Geològics, Barcelona, Spain  
(jordi.marturia@icgc.cat)

<sup>2</sup>University of Exeter, College of Life and Environmental Sciences

The management of complex crisis situations, whether natural, accidental or intentional origin, generally requires the participation and coordination of multiple first response organizations, including, but not limited to: firefighting units, police departments, medical emergency services, civil protection units and command and control centers. Considering this multi-disciplinary context, there is the need to provide integrated tools which can address the requirements of the different first responders involved in disaster risk management and enhance cooperation and inter-organizational coordination.

In this sense HEIMDALL (Multi-Hazard Cooperative Management Tool for Data Exchange, Response Planning and Scenario Building), a H2020 granted project (project number 606982), aims at improving preparedness of societies to cope with complex crisis situations by providing a flexible platform for multi-hazard (wildfires, floods and landslides) emergency planning and management, which makes use of innovative technologies for the definition of multi-disciplinary scenarios and response plans, providing integrated assets to support emergency management, such as monitoring, modeling, situation and risk assessment, decision support and communication tools.

On one hand, HEIMDALL platform allows impact assessment and risk management through merging geo-spatial information (inhabited areas, industrial facilities, transport infrastructure ...), hazard modeling and the data generated during the on-going crisis, such as in situ information generated by the first responders, satellite images, meteorological data and monitoring sensors. All in real- or near real-time. On the other hand, includes a catalogue of past events where one can see the impact the hazard had, which decisions and actions were taken to manage the disaster and the lessons learnt. This approach provides an overall perspective of the situation, helping the disaster risk management decision-making and enhancing the preparedness and training of first-responders units by creating fictional situations or replicating historical scenarios, as it can be used before, during and after a disaster.

To support landslides management HEIMDALL platform includes two modules developed by the Institut Cartogràfic i Geològic de Catalunya (ICGC): Landslides and in situ sensors for terrain monitoring. Landslides module performs simulations of terrain movements in order to enhance the emergency response and identify safe areas for the deployment of advanced command &

control post. The module integrates and automates the mapping of landslide susceptibility through two open source software (Scoops3Di and FLOW-R). Also included a tool that process pre- and post-event meteorological data in order to record the triggering rain's intensity and foresee whether the hazard will increase or not during the next days. This tool helps establishing regional thresholds for landslide triggering rain. The in situ sensors module integrates data from monitoring sensors (tiltmeters, crackmeters, ...) installed on slow moving landslides, allowing the raising of warnings in case of any acceleration that could represent any risk.