

Reducing the risk from climate induced hazards to buildings and infrastructure; KLIMA 2050 - A centre for research-based innovation

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Introduction

Klima 2050 (www.klima2050.no) is a Centre for Research-based Innovation (SFI) financed by the Research Council of Norway and 20 consortium partners from research, education, public entities and industry, with the goal of reducing the societal risks associated with climate change and increased precipitation and flood water exposure to the built environment. The Centre, lasting for 8 years, until 2022, is organized in 4 work packages, dealing with adaptation of buildings, urban flooding, landslides and governance. NGI is responsible for work package (WP) on 'water triggered landslides'. All performed research have practical applications, and must be beneficial for the user partners, as well as for society at large.

Methods

The WP on landslides comprises innovations in numerical codes for landslide modelling, mitigation measures, early warning systems, and management of landslide risk, and there are PhD candidates as well as several MSc students working on topics related to these themes. PhD and MSc candidates perform studies related to improved landslide numerical modelling, early warning by the use of remote sensing data, and innovative mitigation measures to reduce the impact of debris flows, with a particular focus on reducing entrainment.

Pilot projects form an important part of the activity. The intention is to test new methods and services in close collaboration with user partners. Pilots may be physical objects or localized sites, or they may be databases or services. The development of a Landslide Risk Mitigation Toolbox (LaRiMiT) is the first of the pilots of the landslide work package, and

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two more are being started during the fall of 2019. These focus on vulnerable transport infrastructure and comprise:

- Instrument-based warning system as a mitigation measure in potentially unstable soil slopes. This is a continuation of the activity described above, but also widened in scope to test out various innovative drainage solutions and assess their effect on soil conditions and stability.
- Establish a warning system for one of Norway's touristic roads, 'Trollstigen', based on improved analyses of weather systems and the use of weather radar data.

Results and discussion

Main achievements so far include:

- Improved reliability of landslide hazard mapping through establishment of an event-based landslide inventory, field mapping and run-out back analyses of historic landslides and establishment of improved input parameters for landslide models for Norwegian conditions.
- Development of a web-based toolbox for selection of appropriate landslide mitigation measures for a given case (LaRiMit - Landslide Risk Mitigation Toolbox). The toolbox contains more than 70 different measures classified in 11 different mitigation categories and has been updated recently with Nature Based Solutions (NBS). The toolbox is designed to assist decision-makers and stakeholders to choose the right mitigation measure, in accordance with their needs and resources. It is based on a scoring system and delivers a set of options the user may choose from.
- Establishing a base for improving landslide warning systems using locally monitored data, in particular piezometer data, and follow this up by installation of in-situ instrumentation in potentially unstable soil slopes, with the goal of early warning to replace costly and complicated mitigation measures at locations along linear infrastructure. This will be further developed as a pilot project with user partners (below).
- Improving the use of thresholds in early warning by applying machine learning techniques and assess the influence of rare but important extreme events.
- Identification of needs and deficiencies in landslide risk management in Norway, and establishment of a framework for local (municipal) management of climate related risks, including landslides and multi-hazards.

Klima2050 activities have led to several spin-off projects. Among these is the large EU-H2020 innovation action 'PHUSICOS', on nature-based solutions (NBS) also presented at the Interpraevent 2020.

Conclusion

This presentation provides only a brief overview of the present status of Klima2050, and some of the main results. More details are however provided by posters presented at the conference.

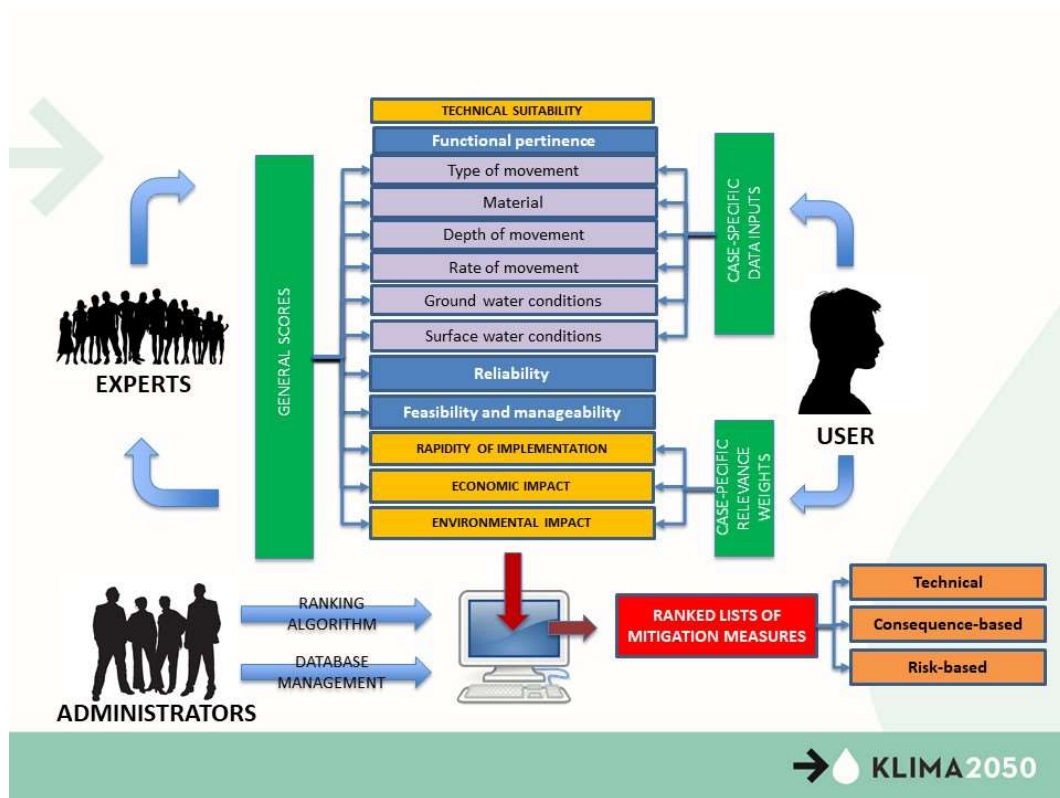


Figure 1. Data flow chart for the LaRiMIT web based mitigation tool.