

# 'Mobilize Project of NBRO

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The international research collaboration between NBRO and the THINKlab at the University of Salford in the UK has been going from strength to strength over the last couple of years. The



purpose of this collaboration has been to strengthen the NBRO's digital capabilities to better respond to disaster risk reduction and disaster response capacities. This collaboration has been possible due to the MOBILISE project ([www.mobilise-project.org.uk](http://www.mobilise-project.org.uk)). This collaboration activity was launched during the NBRO's annual research symposium 2019 during which the MOBILISE platform was donated to NBRO by the THINKlab team. Since then the two parties have been working together to understand NBRO's requirements for disaster risk reduction to develop a focused set of digital environments. In addition, the University of Salford offered a PhD position to Mr. Dayan Munasinghe, Snr. Scientist at Human Settlements Planning & Training Division under the collaboration.

Now, the MOBILISE platform has reached its maturity to fully integrate it with the existing digital infrastructure within NBRO. This article elaborates on the ongoing applications that are being developed through this collaboration for enhancing NBRO's capacity to deploy advanced IoT technology, drones, modelling, simulation and visualisation in DRR activities.

## 1 Digitisation of the Early Warning System for Landslides

The digitisation of the process of generating early warning messages has been an active collaborative research programme over the last few months. In order to facilitate this innovative journey, NBRO initially provided access to the MOBILISE technical team to a set of rain gauges. This work has now

led to the development of a workflow engine to manage the Early Warning (EW) messages passing from NBRO to the appropriate authorities. In this novel approach, NBRO district officers, NBRO-EWC, DMC and other stakeholders (such as District Secretaries, Divisional Secretaries, NDRSC, GN Officers) receive personal login facilities to the EW system. Using the reconfigurable MOBILISE workflow engine, NBRO can trigger EW messages through the MOBILISE system to the responsible officers.

The scenario that is being tested is as follows: based on the rainfall threshold the automatic rainfall EW message is generated; the Duty officer of NBRO will then coordinate with the relevant district officers and modify the EW message according to the manual rain gauge network data; the EW message is issued by the Duty officer at NBRO using the MOBILISE platform; the MOBILISE platform will then automatically forward the digital EW message to the NBRO's EW Director for approval; once approved the MOBILISE platform then sends the EW message to the Disaster Management Centre; the DMC Emergency Operation Centre then has the ability to ask the MOBILISE platform to transmit the message to the appropriate authorities such as the District Secretaries, Divisional Secretaries, NDRSC and GN Officers.

The digitisation of the EWS will allow the organisations to work together and improve the efficiency of the EW message generation process through continuous improvement.

## 2 Drone Image Visualization for supporting Resettlement Programmes

NBRO continuously captures drone-based images in many landslide prone locations. However, it has been difficult to share this information among wider participants due to the lack of visualization power of computers and the large file size of images. This limitation is addressed by the MOBILISE platform. The solution delivered by the MOBILISE platform allows users to upload a number of high-quality drone images to the platform and offers access to a range of interested parties. This facility will enhance the NBRO's ability to better collaborate with multiple stakeholders in community resettlement programmes. This will fulfil NBRO's essential requirement for engaging with stakeholders (such as District Secretaries, Divisional Secretaries, Disaster Relief Officers) to achieve better decisions and outcomes. The key facilities provided by the MOBILISE platform are the sharing of drone images, zonation plans, and site layouts among the required stakeholders.

## 3 Drone Based Landslide Mitigation Activity monitoring

NBRO undertakes a number of landslide mitigations in identified potential landslide locations. At present, the construction of landslide structural mitigations in 147 locations is in progress. One of the key challenges facing NBRO is the continuous monitoring of the progress of the construction work at these landslide mitigation sites. The MOBILISE drone-based construction monitoring application is aimed at addressing this challenge.



*Figure 1: Drone Data Visualization System*

The usage scenario offered by the MOBILISE platform is as follows. For the monitoring of the construction work at these landslide mitigation sites, drone images and videos are captured at different time intervals. The MOBILISE platform take these images and videos and constructs a 3D mode of the construction site to be analysed by the engineers. A set of virtual tools are available to the engineers to conduct cross section analysis, soil cut & fill calculation and movement analysis. The cross-section analysis provides a 2-D cross section of any plane where the user wants to investigate. Results can be presented as a 2-D graph with several ground situation lines in drone image taken over different time periods. The soil, cut & fill volume calculation tool provides statistics as to how much soil is filled or removed in a particular site. Movement analysis provides the 3D movement of the selected location in time lapse, in which the user required to observe the ground settlements, horizontal movements of structures etc.



Figure 2: Ability to make cross sections

These applications can be further extended to monitor rock falls in identified locations. Previously, NBRO used UAV photogrammetry along with structure-from-motion in combination with a multi-view-stereo (SFM – MVS)<sup>1</sup> technology-based 3D model for rock fall monitoring. In the future, this process can be calculated automatically with the MOBILISE platform.

#### 4 MOBILISE Data sharing system

The ‘MOBILISE’ system was developed by the THINKlab team and, the system has data-sharing capacities of spatial data between many government organisations. The system has better visualization performance, which helps to use the system for non-technical persons as well. This system will share the information between many organisations and, each organisation could visualize the data on their systems.

So far MOBILISE platform has reached many milestones, but this is only the beginning of our innovation journey! The above research and development work has strengthened the collaboration between NBRO and the THINKlab, and has triggered many other innovative ideas. As a result, the two parties have now initiated research into sensor-based ground water level monitoring systems, disaster risk analysis, climate change impact analysis, disaster cascading etc. By being an active partner,

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[https://www.researchgate.net/publication/334249162\\_Application\\_of\\_UAV\\_Photogrammetry\\_Survey\\_along\\_with\\_SFM-MVS\\_image\\_processing\\_technology\\_in\\_rock\\_fall\\_monitoring\\_in\\_the\\_context\\_of\\_Sri\\_Lanka](https://www.researchgate.net/publication/334249162_Application_of_UAV_Photogrammetry_Survey_along_with_SFM-MVS_image_processing_technology_in_rock_fall_monitoring_in_the_context_of_Sri_Lanka)

NBRO has managed to steer the R&D development within the MOBILISE project to bringing digital innovation into the disaster risk reduction activities within Sri Lanka.

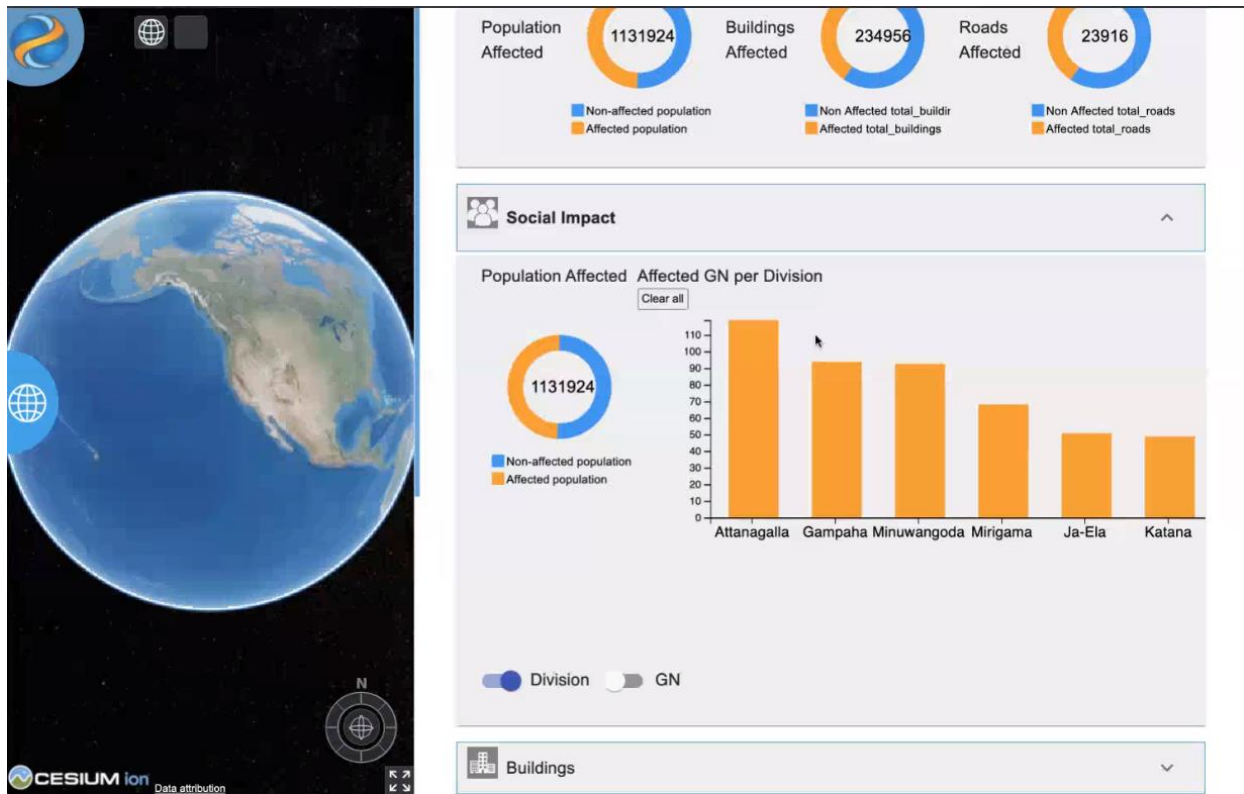


Figure 3: Mobilize System

With the support of NBRO, THINKlab has now been able to secure two further research grants (TRANSCEND, Unite4Resilience) from the Global Challenges Research Fund (GCRF) and the Economic and Social Research Council. These grants will allow both teams to strengthen this ongoing collaboration and bring further innovation into other aspects of disaster management. The TRANSCEND project ([www.transcend-project.org.uk](http://www.transcend-project.org.uk)) will promote risk sensitive urban development, equitable resilience and climate change adaptation. In addition, the recently funded Unite4Resilience will work towards building capacity for collaborative decision-making across government institutions to promote the creation of resilient environments and communities against increasing climate change risks, giving due consideration to the poor and vulnerable.

Please visit to MOBILISE platform: <https://nbro.mobilise-srilanka.org/>