Australian Government
Geoscience Australia

Senate Environment and Communications References Committee
Parliament House
Canberra

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Inquiry into Emergency Communications - The capacity of communication networks and emergency warning systems to deal with emergencies and natural disasters.

Please find attached a submission from Geoscience Australia to the Senate Environment and Communications References Committee on the Inquiry into Emergency Communications.

Sincerely yours,

Dr. Chris Pigram
Chief Executive Officer

Background

Geoscience Australia (GA) works with the Australian Government to provide the nation with high level advice on Earth processes and on all aspects of geoscience to meet the needs of the nation to build Australia's future. GA is Australia's custodian of geographic and geological data and knowledge. Geoscience Australia also assists in providing information on natural disasters, climate change and the availability and efficient use of energy, water and other resources.

Within this portfolio of work, Geoscience Australia presides over:

- the 24/7 monitoring and analysis of seismic activity to produce alerts for significant earthquakes that occur in Australia and overseas that threaten Australia's interests and as a part of the Australian Tsunami Warning System;

- a satellite image-based national bushfire monitoring system called Sentinel that provides timely information about hotspots to emergency managers, the public, and business across Australia;

- the coordination, capture and analysis of Earth observation data in response to major disasters, and the provision of geographical analyses and maps to support the Commonwealth's response, and where appropriate the jurisdictional response, to the event; and

- a capability to develop knowledge of Australia's risk from natural and human-caused hazards to assist the Australian Government to define the mitigation of these risks to communities in Australia and the region. This includes the capability to capture the impacts of disasters in order to better inform systems to mitigate the effects of future disasters.

Addressing the Committee's Terms of Reference

The questions posed through the Committee's Terms of Reference will be addressed under each item below.

Terms of Reference

The capacity of communication networks and emergency warning systems to deal with emergencies and natural disasters, with particular reference to:

a. the effectiveness of communication networks, including radio, telephone, Internet and other alert systems (in particular drawing on the spate of emergencies and natural disasters of the 2010/2011 Australian summer):

   (i) in warning of the imminent threat of an impending emergency,

With reference to Geoscience Australia's responsibility in emergency warnings, the only system that has a specific warning role is the provision of timely and accurate alerts for earthquakes that have the potential to generate tsunami that can impact Australia or its territories. This is a function managed co-operatively with the Australian Bureau of Meteorology within the Joint Australian Tsunami Warning Centre located in Canberra and Melbourne.

Communication networks play a significant role in this function. Firstly, in the transmission of real-time seismic data streams recorded at 109 seismic stations across Australia and our region and a further 239 stations globally, provided by international and national seismic networks, to Canberra. Secondly, in the communication of earthquake alerts, produced from the immediate analysis of the real-time seismic data,

from Canberra to Melbourne. Geoscience Australia has selected commercial data communication services based on a design where multiple redundancies are available so as to limit the impact of a single system failure. Once the earthquake alert has been successfully delivered to the Bureau of Meteorology, the Bureau's communication networks are used to deliver the tsunami warnings to emergency managers, the media and the public.

Geoscience Australia's Sentinel hot-spots service has no role as a formal warning system. However, it provides regular and timely information on the locations of 'hot-spots' that generally correspond to fires and this information is used in an operational sense by fire and emergency managers around Australia to provide an overview and situational awareness of bushfires. It is also used by the public, by land managers and by the private sector to help to generate warnings when bushfires threaten assets such as power-lines. Satellite data are collected at GA's Alice Springs ground station as satellites pass over the continent. Once received, the data are automatically analysed to identify thermal anomalies referred to as hot-spots. The location and other details of each hot-spot are transmitted from Alice Springs to Canberra by normal commercial telecommunications networks which are adequate to this purpose. Hot-spots appear on the Sentinel web site roughly 40 minutes after each satellite overpass.

(ii) to function in a coordinated manner during an emergency, and

During major emergencies Geoscience Australia provides satellite images, and information derived from those images, to help to inform the emergency response. During the 2010-11 emergencies in eastern Australia GA acquired over 600 images from 17 different satellites, from which 109 maps were produced. Over 200 satellite images were received directly by GA at the Alice Springs ground station, whilst the remainder were provided through the internet as voluntary support from the international community. The maps, which were downloaded 2600 times in total, helped emergency services agencies to plan access and food and medical drops, provided information for briefs, and helped in the administration of natural disaster relief and recovery payments by allowing Centrelink officers to cross reference addresses with the known locations of flooded areas. GA provided similar support during the 2009 Black Saturday fires in Victoria, tropical cyclone Yasi, and tropical cyclone Larry in 2006. <u>These activities are hampered by lack of effective communications between Alice Springs, where data are received directly from satellites, and Canberra, where information is extracted and passed on to response agencies.</u>

Timeliness of information is critical during emergencies. This is a widely recognised problem; for instance it was raised by the Commissioner of the NSW Rural Fire Service at a plenary session of the recent International Conference on Remote Sensing of the Environment held in Sydney. The conference was sponsored by the Australian government, CSIRO, and NASA.

Lack of available high-speed communications between Alice Springs and Canberra delays the provision of information by a minimum of two hours and in general by a day or more. Satellite observations received at Alice Springs must be transmitted to Canberra for processing. GA does not currently have access to the AARNET optical fibre which passes through Alice Springs, and the commercial telecommunications systems offered by Optus and Telstra are of very limited capacity. There is no assurance at this point that these issues will be resolved by an NBN, and the timing of the NBN is unknown.

During emergencies Australian government agencies pass information between each other via the internet. Each organisation takes its own copy of the information and works essentially in isolation. The sharing is not automatic, but requires individuals in each organisation to 'discover', and to then access, the available information. This activity consumes hours of staff time, and is in general delayed by network limits in transferring large data volumes.

It is clear that a better way of sharing information across Commonwealth, state and local agencies is required to maximise the value of the information available. In the normal civilian internet, programs such as 'dropbox' allow people to share photographs with nominated individuals automatically. An analogous service for national emergency response is required as a priority.

During an emergency Geoscience Australia can be requested to supply a variety of information; geographic information in the form of satellite imagery, paper maps and hazard and risk information relevant to the emergency at hand.

For emergencies involving significant earthquakes, Geoscience Australia supplies information on the analysis of the earthquake to the Attorney-General's Department Crisis Coordination Centre via the Internet and the telephone network.

(iii) to assist in recovery after an emergency;

In the same way as in (ii) above, during the recovery phase immediately following an emergency, Geoscience Australia can be requested to supply geoscientific information in the form of satellite imagery, paper maps and hazard and risk information relevant to the emergency at hand.

b. the impact of extended power blackouts on warning systems for state emergency services, including country fire brigades and landholders or home owners;

Geoscience Australia has no role in this area.

c. the impact of emergencies and natural disasters on, and implications for, future communication technologies such as the National Broadband Network;

With respect to the Joint Australian Tsunami Warning Centre and the reporting of earthquakes, access to high bandwidth telecommunication systems such as the NBN would provide an alternative to the options of commercial satellite data providers, and Internet based on lower bandwidth technologies. These technologies are currently used for the movement of data from remote sensor sites such as seismic stations to the data analysis centre in Canberra. As a minimum this would provide a further level of redundancy. It could also allow higher sample rate data to be shifted in a more cost effective manner, assuming that it constitutes a competitor for current commercial data communication providers, thereby allowing higher sample rate data that would in turn allow for higher levels of data analysis leading to more effective reporting of earthquakes.

The major limiting factor in the use of satellite observations to inform emergency response is the time required to move the data from the ground station, where the data are received from the satellite, to a processing centre, where the data can be decoded and analysed to produce information. Due to competition for radio-frequency spectrum, satellite ground stations will generally be sited away from population centres; however remote locations generally lack the high-speed ground networks necessary to complete the loop. To address this, the development of an NBN should be directed in part toward strategically important civilian telecommunications requirements including satellite ground stations.

d. the scope for better educating people in high-risk regions about the use of communications equipment to prepare for and respond to a potential emergency or natural disaster;

Geoscience Australia has no role in this area.

e. new and emerging technologies including digital spectrum that could improve preparation for, responses to and recovery from, an emergency or natural disaster; and

Geoscience Australia has no role in this area.

f. any other relevant matters.

Geoscience Australia has been closely engaged with the development and implementation plans for the Common Alerting Protocol (CAP) managed by the Attorney-General's Department. Geoscience Australia is currently developing the Australian Government's first CAP system which will be available for access via the Internet on Geoscience Australia's website.

Geoscience Australia provides information in emergency situations largely on the basis of available tools, data and resources. Examples include estimates of the geographic area affected by a flood or the numbers of buildings potentially damaged by a tropical cyclone. It is important to recognise that with the added capability to transmit information via communication networks, there comes the opportunity to value-add this communication with more detailed information. For instance, as communication systems become better able to communicate in real time and to specific locations or stakeholders, the obvious next step is to support the demand for more accurate, timely and location-specific information. Thus, differentiating between the needs of different users and/or stakeholders will require a commensurate investment in developing the data and tools to tailor and value-add information appropriately.