

New Zealand GIS for Emergency Management (NZGIS4EM): Making GIS and its practitioners integral to emergency management

Derek Phyn

Waikato Regional Council
derek.phyn@waikatoregion.govt.nz

ABSTRACT

Geographic Information Systems (GIS) have often been poorly considered, planned and implemented across New Zealand's emergency management sector. GIS practitioners involved in emergency management events often suffer the consequences. Recent significant events have reinforced both the need for a nation-wide coordinated, planned and pro-active approach to implementing GIS for emergency management, and the advantages that GIS can offer to the emergency management sector if implemented properly. This paper offers insights into the "grass roots" foundation of a community called New Zealand GIS for Emergency Management (NZGIS4EM) to address these issues.

In its founding year (2017/2018) the priority for an interim NZGIS4EM committee has been to establish the foundation of the community, this is primarily administrative projects. Several other subject targeted projects are also underway or planned relating to data, standards, symbology, common operating picture and interoperability. Key challenges for NZGIS4EM relate to a shortage of funding, logistics of physical meetings, current lack of governance and a lack of legal mandate in New Zealand to enforce standards for emergency management.

Attention in the sector is now moving towards the implementation of a Common Operating (or Operational) Picture (COP). Key messages that the author believes are pertinent include: we should not be overly focused on the front end tools we use but more importantly the governance, collaboration, community, data standards and interoperability required to make the tools work; plan big, but then prioritise and implement small; ensure the COP is used BAU; minimal or no training should be required; ensure any system implemented is quicker for frontline users; ensure there is a plan B and a plan C if the internet and/or power goes out; identify and lobby agencies who should be the authoritative source of truth for essential data; implement phases of response for information requirements; consider national and/or regional hosting of platforms, and; recognize that real-time crowd sourced data may be the future of intelligence and plan for that.

Keywords

Geographic Information Systems, GIS, Emergency Management, NZGIS4EM, New Zealand, Intelligence

INTRODUCTION

Geographic Information Systems (GIS) have often been poorly considered, planned and implemented across New Zealand's emergency management sector. While it is granted that some organizations are more advanced with their implementation than others, across New Zealand there is a general lack of alignment with the purpose and principles of New Zealand's Coordinated Incident Management System (CIMS) (CIMS Steering Group, 2014). Further, there is no legal mandate across New Zealand's emergency management sector prescribing which tools, common data schema and interoperability standards must be implemented. This has resulted in an ad-hoc, inconsistent, unplanned, reactive approach to using GIS for emergency management. Recent significant events (e.g. Whanganui Flooding, Jun 2015; Kaikoura Earthquake, Nov 2016; Port Hills Fire, Feb 2017; Cyclones Debbie and Cook, Apr 2017; Otago and Canterbury Flooding, Jul 2017; Cyclones Fehi and Gita, Feb 2018) have reinforced both the need for a nation-wide coordinated, planned and pro-active approach to

implementing GIS for emergency management, and the advantages that GIS can offer to the emergency management sector if implemented properly.

This paper offers insights into the “grass roots” foundation of a community called New Zealand GIS for Emergency Management (NZGIS4EM) to address these issues. This paper will discuss who NZGIS4EM is, what is the vision and purpose, how the community came about, why it is needed, what the community hopes to achieve, what projects the community is involved in or planned, what are the key challenges facing NZGIS4EM and what are the key messages for New Zealand’s emergency management sector as they relate to a Common Operating Picture (COP).

ABOUT NZGIS4EM

NZGIS4EM is a community of like-minded individuals from both the geospatial and emergency management sectors of New Zealand. These individuals were voluntarily brought together by common experiences and concerns about how GIS was or, in many cases, was not, being implemented for the emergency management sector. Membership to the community is open to anyone and a wide variety of organization types have taken up the opportunity to be involved. This includes representatives from local government, central government, national agencies, private sector, education and research institutes and individual stakeholders. Membership to the community is formalized simply by signing up to an online workspace using the [Slack](#) application. As at June 2018 membership sits at over 300 individuals and over 13,000 messages have been sent between members using the Slack application since its inception in January 2017.

VISION AND PURPOSE

In March 2018, an interim committee ratified a proposed Terms of Reference for NZGIS4EM. This Terms of Reference is now awaiting the establishment of suitable governance for NZGIS4EM before final ratification. Under the proposed Terms of Reference (NZGIS4EM, 2018) the vision for NZGIS4EM is:

“GIS and its practitioners are integral to emergency management in New Zealand.”

And the purpose is:

“The Committee is a shared and coordinated voice for the use of Geographic Information Systems (GIS) in Emergency Management in New Zealand. The Committee advocates, educates, advises and provides support, guidance, recommendations and best practice for GIS and Emergency Management practitioners while ensuring alignment to the principles and purpose of the Coordinated Incident Management System (CIMS).”

BACKGROUND

NZGIS4EM was born from the efforts of Dr. Paul Doherty and his employer at the time, Eagle Technology Ltd. One of the things Paul was originally brought to New Zealand for in mid-2016 was to help Bay of Plenty Lifelines Group identify their critical and vulnerable assets using GIS. However, the trajectory of Paul’s work evolved as it was realized that GIS had great potential for the wider Emergency Management sector, not just Lifelines. Then the Kaikoura earthquake happened. Once deployed to Kaikoura, Paul was integral to organizing the GIS response. Many things were learnt from this major event.

Paul recognized a significant gap in communication, collaboration and understanding between the GIS and Emergency Management sectors. Paul convinced Eagle Technology to host several free workshops around the country. These workshops aimed to bring the GIS and Emergency Management sectors together and get them talking. These workshops were well attended by hundreds of like-minded GIS and Emergency Management professionals representing local government, central government, national agencies, private sector, education and research institutes and individual stakeholders. All attendees had an opportunity to see what was being done around the world and in NZ with regards to emergency management GIS and also to get some hands on experience with some applicable GIS tools. Importantly, common themes started to emerge from the resultant conversations across New Zealand:

- There was no consistent or aligned approach to implementing GIS for Emergency Management across organisations or administrative areas
- Very few organisations had a well planned approach to implementing GIS for Emergency Management
- There was a lack of standardized tools, data schema and symbols across the sector

- Interoperability was improving and looked promising but most organisations were still a long way from fully effective adoption of the technology and 3rd party software still has to be used in some instances
- Standard Operating Procedures (SoP) or Geospatial Concept of Operations (GeoConOps) documentation for GIS in Emergency Management is lacking across most organisations
- Few GIS teams have informal, let alone formal, agreements with their Emergency Management partners
- The GIS and Emergency Management sectors do not understand each other well or know how each other works and why that is
- There is a lack of collaboration between GIS teams and their Emergency Management partners, neighboring administrations and the wider GIS community across New Zealand

In August 2017, a full day Special Interest Group (SIG) workshop was held to discuss what to do about these issues. Derek Phyn from Waikato Regional Council and Kate Waterhouse from Western Bay of Plenty facilitated. Over 60 stakeholders attended, again representing a wide variety of organisations, not just local government. Attendees were asked to score their organisation using an adaptation of an American tool known as the Capability and Readiness Assessment Tool (CARAT) (Figure 1). In particular attendees had to score their organisation against what are known as “Common areas” in GIS4EM; *Governance, SoP, Staffing, Technology, Training and Exercises, Usage and Support for CDEM*. We have since also added *Data* as one more common area.

Don't know	0	1	2	3	4	5	6	7	8
Elements	Crawl			Walk			Run		
Governance	No formal governance is in place to support GIS4EM			A committee has been established that deals with internal planning and strategy for GIS4EM when it can			An executive committee is very active internally and also participates with other local, regional and national stakeholders to align strategic planning with regards to GIS4EM		
Standard Operating Procedures	We do not have SOPs for GIS4EM			We have created some SOPs for our organisation and are working with local partners to develop joint SOPs for GIS4EM			We have comprehensive SOPs created for our organisation, have joint SOPs with local partners and our SOPs are aligned with regional and national objectives for GIS4EM		
Staffing	We do not currently have adequate staff and/or the time for staff to do GIS4EM			We have limited governance, organisation structure and budget to support some in-house GIS4EM capabilities within a single department. We outsource some related GIS services.			We have adequate governance, organisation structure and budget to support in-house GIS4EM capabilities across our entire organisation along with external stakeholder collaboration.		
Data	Our data is not stored centrally or backed up. We do not have data backed up offline or remotely. We do not keep metadata or share data openly. Our data schemas are inconsistent with our neighbours and partners.			Our data is centrally stored on local servers and intermittently backed up locally and offline. We do not remotely back up data using cloud services but do keep metadata for key data sets and share copies of the data openly. Some of our key data schemas are consistent with our neighbours and partners.			Our data is centrally stored and regularly backed up offline and remotely using cloud services. We keep metadata for all corporate data sets and openly share this data via live web services. Our data schemas are consistent with our neighbours and partners.		
Technology	We currently do not use or create any GIS technology or information to support GIS4EM			We have limited software, hardware and network infrastructure to support some GIS4EM capability within a single department.			We have an enterprise architecture in place to collaborate across our organisation, as well as with other partner organisations and stakeholders. We can create and share GIS4EM products and information with partners and the public.		
Training and Exercises	No training options are offered or encouraged to support GIS4EM			Budget is in place to support applicable GIS4EM training, and GIS staff submit annual training plans			We collaborate on training across partner organisations and among the community to share our in-house GIS4EM training. Additionally, we take advantage of other external GIS4EM training opportunities		
Usage	We do not create or use maps for GIS4EM			We make map products on an ad hoc basis and have limited capability to do long-term projects in-house. We are implementing plans to expand our geospatial capability under an annual plan.			We conduct geospatial projects according to an annual plan and budget, collaborate with other agency partners (internal and external), and coordinate efforts with regional and national partners.		
Support for CDEM	We do not have any existing relationship with our CDEM outside of unprepared involvement in incidents.			We have an informal agreement in place for GIS to support CDEM that defines general expectations.			We meet regularly with our CDEM stakeholders to train and maintain GIS4EM capability and have a formal support agreement in place that clearly prescribes expectations.		

Figure 1. NZGIS4EM Capability and Readiness Assessment Tool (CARAT), adapted from NAPSG, 2017

While this exercise revealed valuable insights into the state of GIS4EM around New Zealand, more importantly, *Work in Progress Research Paper – Geospatial and temporal information capture, management, and analytics in support of Disaster Decision Making* Proceedings of ISCRAM Asia Pacific 2018 (K. Stock and D. Bunker, eds).

it got the attendees thinking about what actions needed to happen to make a change. Attendees formed sector groups to discuss the results and find common actions they agreed needed to be taken. EMSINA (Emergency Management Spatial Information Network Australia) from Australia and the NAPSG Foundation (National Alliance for Public Safety GIS) from USA were also liaised with to see if they had encountered similar issues and what they had done about it. The outcome of this work was a general consensus that New Zealand needs a formal national level advisory group to address GIS4EM issues and that this group must remain software platform agnostic. An interim committee was established to initiate some high priority work streams, develop a work plan, establish administration and outreach, develop the Terms of Reference and seek appropriate governance. The proposed Terms of Reference was ratified in March 2018 and is now pending governance approval. The first Annual General Meeting and election of formal NZGIS4EM Committee members takes place in August 2018.

WHY NZGISEM IS NEEDED

The common themes discussed in the above section have consequences if not addressed. GIS practitioners involved in emergency management events are often the ones who suffer these consequences. Multiple databases and systems across different agencies (and sometimes within agencies), duplication, poor communication and understanding, inconsistent schema and symbology, lack of mandatory fields and validation, copies of copies, poorly trained contributors and a lack of a game plan for how to best do GIS in emergency management all increase the risk of bad data. The saying goes “rubbish in, rubbish out”. It often falls on the GIS practitioner to spend many valuable hours or days in an event trying to first make sense of data, “data cleaning”, before they can even deliver any intelligence using the GIS skills and tools they have been trained to use. All the while emergency management decision makers are impatiently waiting for all the amazing intelligence that GIS can supposedly deliver. By the time the data is cleaned and the intelligence is delivered, it is often too late. With these consequences in mind it is little surprise that GIS has hardly been at the fore of emergency management intelligence to date.

Local government agencies in New Zealand have historically been numerous and heterogeneous. There is a strong case in New Zealand for small scale local governance to continue, however, as information and communication technology evolves and increasingly overcomes both physical, technological and human obstacles, the case for homogenous systems across local government increases. This is especially so with regards to emergency management as local government is responsible for emergency management in their respective areas and emergency events do not stop at administrative boundaries. Should an event initiate or escalate across several local government agencies the homogeneity of their systems will be one of the key factors in influencing the efficiency and effectiveness of the response and recovery. National scale events are plausible, expected even. Project AF8 reports that:

“...the next severe earthquake on the Alpine Fault is likely to occur within the lifetime of most of us, or our children. (<http://projectaf8.co.nz/about-the-alpine-fault/>)

New Zealand is surrounded by ocean where major tectonic plates meet and subject to large-scale weather events, such as ex-tropical cyclones. Flooding, both coastal and inland, is common and has been associated with at least 64 percent of emergency declarations in New Zealand since January 2002, along with many other non-declared emergencies (<https://www.civildefence.govt.nz/resources/declared-states-of-emergency/>). Many of these events have occurred across multiple districts or regions simultaneously. Homogeneity across all local and national government emergency management systems must be the goal.

Strategically, NZGIS4EM is here to push for the goal of homogenous GIS. We believe New Zealand is small enough, the technology now advanced enough, and the sector momentum now strong enough to start pushing for a national common operational picture system with GIS and its practitioners being at its core. There is a lot of work to do but forming the NZGIS4EM community is the start of a journey we hope to complete before the big one strikes.

If, with every new multi-agency emergency event, there is evidence of increasing homogeneity across geospatial systems and agencies, then NZGIS4EM can assume it is making a positive difference to New Zealand’s emergency management sector.

NZGIS4EM PROJECTS

In its founding year (2017/2018) the priority for an interim NZGIS4EM committee has been to establish the foundation of the community, this is primarily administrative projects including:

Table 1. NZGIS4EM Administrative Projects 2017-2018

Project	Status
Establish interim committee	Complete
Ratify proposed Terms of Reference	Complete
Establish governance and ratify final Terms of Reference	Ongoing
Work Plan & Comms Plan	Ongoing
Stakeholders register	Planned
Administration: Establish Website, Logo, Social Media	Ongoing

Several other subject targeted projects are also underway or planned. Some are led by the Ministry for Civil Defence and Emergency Management (MCDEM) and NZGIS4EM members are just key stakeholders in those projects:

Table 2. NZGIS4EM Targeted Projects 2018-2019

Project	Status
National Geospatial Framework (EEI's and MED) (MCDEM led)	Ongoing
National GeoConOps Template (MCDEM led)	Ongoing
National Disaster Assessment Technical Standard (MCDEM led)	Ongoing
National Address Standard for Emergency Mgmt. (MCDEM/LINZ led)	Ongoing
Technical Advisory Group (TAG) Implications / Common Operational Picture (COP) (MCDEM led)	Ongoing
Emergency Management Symbology Standard (FENZ led)	Ongoing
Interoperability	Planned
AGM and Special Interest Group (SIG) August 2018	Ongoing
Information Systems for Crisis Response and Mgmt. (ISCRAM) Asia Pacific Conference November 2018	Ongoing

Projects initiated by NZGIS4EM require a project lead and a workgroup. Anyone from the Community can volunteer to join a workgroup. Funding for projects at this stage is dependent on sponsorship or the in-kind funding of workgroup members' employers. Projects led by MCDEM tend to involve one or two volunteers from the NZGIS4EM Community to join a wider variety of stakeholders. Funding tends to be covered by MCDEM for these projects.

Some of these projects are expected to be completed in the 2018/2019 financial year while others may take longer to complete. This is especially due to the voluntary nature of the workgroups and challenges when dealing with the finer details of trying to collaborate towards homogenous systems at a national scale.

CHALLENGES

Funding is a core challenge for NZGIS4EM. All committee and community members are volunteers who offer their time with the endorsement of their employers. This means time spent on NZGIS4EM projects can be limited as member's BAU activities are likely to take precedent. Hence, in its current state NZGIS4EM projects can be slow to progress and risk losing momentum if leadership does not remain persistent, pro-active and positive. Some sponsorship from both private and public sector has been forthcoming and is greatly appreciated but permanent funding is required for stability.

While regular virtual meetings are held, physical meetings have proven significantly more productive and beneficial in these early days of the Community. Members of the Community come from all over New Zealand. Travel to major central centers like Wellington can be expensive and logistically prohibitive to organize. This

means trying to align physical meetings with other significant events where most members are likely to be in attendance. Currently the annual AGM is aligned with the New Zealand ESRI Users Conference and the six monthly Committee meeting may have to be aligned with other major events such as the Association of Local Government Information Management (ALGIM) Conferences.

As yet NZGIS4EM has no mandate assigned to it from governance above. As at June 2018 options for Governance that are being considered include under the Hazard Risk Board of the National Security Systems Directorate, under the Governance of New Zealand's Geospatial Strategy and/or under the National CDEM Controllers/Group Managers Forum. The outcome depends on determining which bodies have the appropriate mandate, are willing to govern NZGIS4EM and potentially have funding available to assist with the facilitation of NZGIS4EM. The formation of this Governance group is critical to the success of NZGIS4EM. We are looking for governance that will have legal mandate to make binding decisions on behalf of New Zealand's GIS and Emergency Management sectors on matters relating to at least data standards, symbology, interoperability protocols and standard operating procedures.

Lack of legal mandate is the last major strategic challenge facing NZGIS4EM. There is much legislation that relates to CDEM in New Zealand but in essence the CDEM Act (2002) mandates who does what but not how to do it. For the how there are Directors Guidelines, Best Practice Guides, Technical Standards, Information Series and Supporting Plans from MCDEM but at best even the Technical Standards are only:

"...required to be taken into account when preparing any CDEM Group Plans (s53(2) of the CDEM Act 2002)" (<https://www.civildefence.govt.nz/cdem-sector/cdem-framework/guidelines/#TSs>)

Being inconsistent with Technical Standards is unwise and needs to be well justified. However, there is nothing yet to mandate that CDEM Groups must abide exactly to Technical Standards. The saying goes "the devil is in the detail" and, when it comes to the fine detail of exactly what data to capture and how to do it, this lack of legal mandate makes it hard to enforce consistency and coordination across so many heterogeneous local government agencies. Most New Zealand agencies agree in principal to doing GIS for emergency management to a standard but getting widespread sector agreement of the detail in the standard is a hard task without a legislative framework. It is generally agreed that central government should not mandate the products that must be used in emergency management, however the need to enforce common minimum data standards is critical to ensuring effective and efficient intelligence during response and recovery.

KEY MESSAGES

In light of the recent *Ministerial Review: Better Responses to Natural Disasters and Other Emergencies in New Zealand* (Ministry of Civil Defence & Emergency Management, 2018) attention is now moving towards the implementation of a Common Operating (or Operational) Picture (COP) for New Zealand emergency management. A COP is a military term and can be described as;

"... A single identical display of relevant information shared by more than one command. A common operational picture facilitates collaborative planning and assists all echelons to achieve situational awareness. Also called COP." (US Department of Defence, 2018)

Or where;

"Data is integrated from multiple existing and live (field collected) sources to support all functions of a response using one spatial data platform." (<http://www.responsegroupinc.com>, 2018)

Here are some key messages the author believes are pertinent to consider before the implementation of a COP in New Zealand:

It's not just about the tools

The diagram presented in Figure 2 can be used to explain everything that is wrong with trying to implement information systems for emergency management in New Zealand. Just as our eyes are most comfortably drawn to the "Tools" part at the peak of this diagram so too do we, as GIS and emergency management practitioners, habitually seem to overemphasize the importance of the tools. We spend far more time discussing the pros and cons of different tools rather than working on underlying factors that are required before any tools can actually deliver a decision advantage against a requirement. While tools are the visible front end or "sharp end" of emergency management information systems, in New Zealand we are actually quite advanced in terms of the tools we have available to us (including those that are "out-of-the-box"), so there is no need to spend a lot of time on the tools.

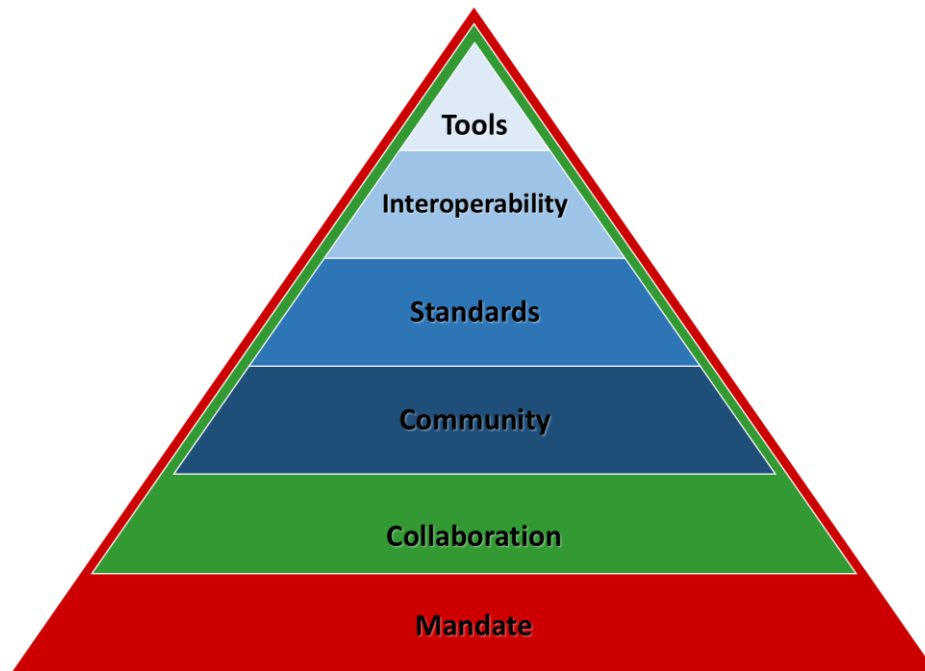


Figure 2. The weight of factors in the successful implementation of information systems for emergency management (Phyn, 2018)

The reality is that it doesn't matter how good the tools are, if we don't have interoperability (such as standard live web services) then we can't readily share real-time data between each other and our tools. And if we don't have national data standards then we don't have consistent data that we can easily share, merge and have understood by others. And if we don't have subject matter expert communities then we don't have applicable stakeholders working together to develop those data standards. All of this requires collaboration and, finally, if there is no legal mandate for the CDEM sector to capture and manage data to at least a national minimum data standard then, you can be assured, most of us will continue to just go off and play with our own tools by ourselves. Further, if we had mandate, collaboration, community, standards and interoperability in New Zealand then we might not even need to use the same tools but still all be able to get a common operating picture.

Plan big, but then prioritise and implement small

Do not try a single launch of a fully comprehensive COP that will do everything. Take small incremental steps. The emergency management sector will be overwhelmed if you launch a whole COP all at once that requires hours and hours of training. Choose just a few key small features the sector will benefit most from and launch those first. Let the sector get used to those parts of the COP before incrementally launching other components and features.

Ensure the COP is used in BAU

Launch something on a platform the sector is already familiar with or is easily implemented into their BAU activities. Anecdotal experience leads the author to believe that if users don't use the COP tools during BAU then they won't use them in a response.

Minimal or no training should be required

Staff turnover is too high in the sector to warrant extensive training programs. The COP should be so simple that a new user should be reasonably comfortable with the particular part of the COP they need to use after no more than one hour of training. Further don't try and train everyone in the sector to use the whole COP. Certain functions should be trained to only use applicable parts of the COP.

Is it quicker for frontline users?

In emergency management the ability of frontline responders to capture and relay information quickly, correctly and respectfully without the risk of duplication or unnecessary angst being placed on those impacted by an event

is paramount. Speed is of the essence, especially in the public eye. It does not matter what back-end or subsequent data, security, analytical or decision making benefits a system offers, if the system does not allow the front-end users to do things quicker than they could have done otherwise then it will fail.

Is there a Plan B and Plan C?

An online, cloud-based solution is the logical choice for a COP given the commonality, scalability, support, up-time and improved internet speeds. However, if the internet fails somewhere there needs to be an easily implemented Plan B, ideally a desktop based solution, or remote support, that continues to capture data and automatically updates master databases in a cloud environment once internet becomes available again. And if both the internet and power fails then there needs to be an easily implemented Plan C. That is plan B plus an alternate power source.

Who is the source of truth?

With the advent of web services allowing us to consume real-time data the importance of identifying who is to be recognised as the authoritative source of truth for each data set now has to be worked through. This is especially important for incident data. In New Zealand there is a legacy of inconsistent duplication in the CDEM sector. Applicable key agencies need to be responsible for their data in New Zealand by establishing live web services and hosting and maintaining that data and service and sharing it. If they don't then there will continue to be gaps in the COP that will be filled by others who are not the source of truth.

Implement phases of response for information requirements

Paul Doherty introduced NZGIS4EM to "Phases" of response and recovery (Figure 3), adapted from the National Damage Assessment Data Set and Dictionary for Phase 2 Assessments (Australasian Fire and Emergency Service Authorities Council Limited (AFAC), 2016). This has helped GIS people understand what information requirements emergency management may need to focus on during different times of an event and plan ahead. Such an approach for a COP would be useful.

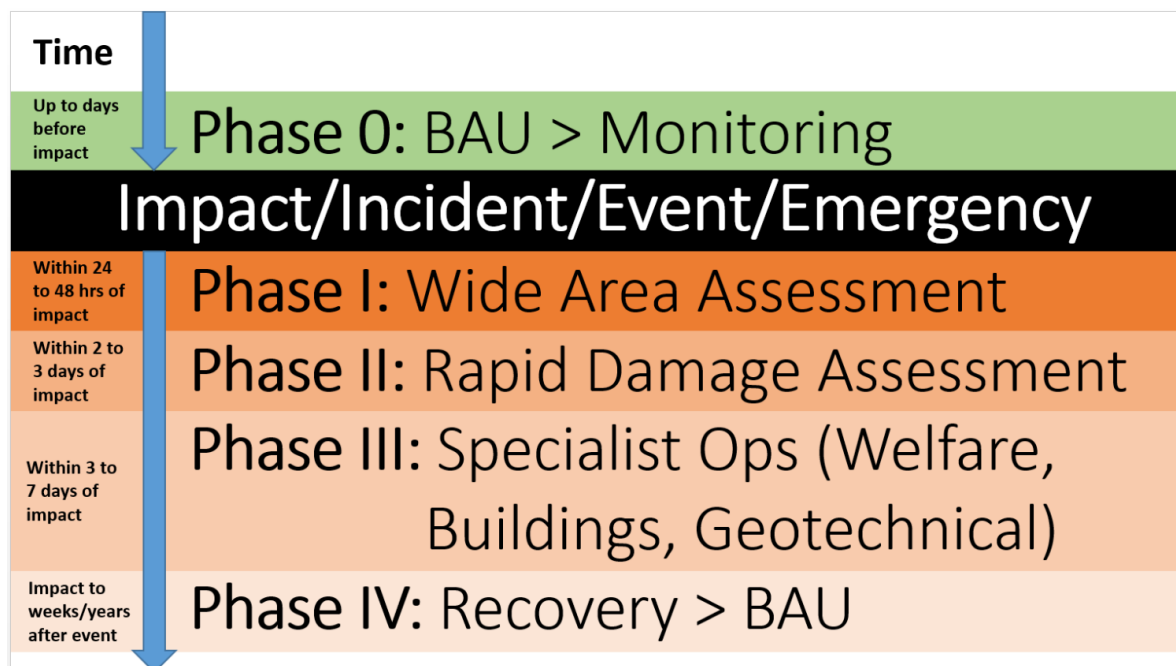


Figure 3. Phases of emergency response and recovery as they apply to information requirements (Paul Doherty, Adapted from AFAC (2016)).

National and/or regional hosting

The current CDEM framework includes the provision of regional CDEM Groups being responsible for coordination of emergency management across their respective regions. Recent recommendations from the

Work in Progress Research Paper – Geospatial and temporal information capture, management, and analytics in support of Disaster Decision Making
Proceedings of ISCRAM Asia Pacific 2018 (K. Stock and D. Bunker, eds).

Ministerial Review: Better Responses to Natural Disasters and Other Emergencies in New Zealand (MCDEM, 2018) also include:

“...requiring the development of more formalised shared service arrangements, implemented by the regional or unitary council, to strengthen a Group-wide approach and accountability.”

And;

“...greater national consistency and standards, and a more robust system of audit and assurance to ensure those standards are met.”

A logical progression from these recommendations into GIS for emergency management practice would be to have regional, or even national, mapping portals hosted, supported and maintained by CDEM Groups or national agencies. While territorial local authorities would contribute data and utilize the tools within the portal they would not be responsible for hosting the data or maintaining the portal. Such an approach would reduce duplication in effort and ensure greater consistency across regions, if not the country.

Real-time crowd sourced data. The future of intelligence?

Another recommendation from the Ministerial Review: Better Responses to Natural Disasters and Other Emergencies in New Zealand (MCDEM, 2018) is to:

“Ensure timely, consistent, and proactive use of the range of appropriate media channels both for communication, and for gathering intelligence.”

The author believes this infers that with the advent of social media the lines between the functions of public information management and intelligence are increasingly blurred. First responders will nearly always be those who are being directly impacted by an event. They are the first “boots on the ground” and, if it is safe and appropriate to utilize them, they can be a valuable source of the most up-to-date intelligence. The media already heavily invests in crowd sourcing of information and provides live updates of information to the public for major events, 24/7 in some cases. Does this sound like something that emergency management should be doing? Verification of data before use has always been a solid principle of intelligence but, especially in the early stages of an event, multimedia and sheer numbers of crowd sourced reports, or lack thereof, speaks volumes.

CONCLUSION

NZGIS4EM has come about because there was a need to improve the adoption of GIS in emergency management in New Zealand and central government agencies were not appropriately resourced to address this. We have followed in the footsteps of our compatriots in Australia and USA and created a “grass roots” community in the hope of bringing change. While NZGIS4EM have a vision statement, a personal vision of the author’s is that any GIS practitioner can be deployed to an event in New Zealand and walk in to an emergency operations centre being confident in what to expect and how to deliver the best of the potential that GIS can offer for emergency management. The key support needed to make this happen is a national community that positively supports each other and national leadership to facilitate change.

REFERENCES

Alpine Fault Magnitude 8 (Project AF8) (2018) [About the Alpine Fault](#). Project AF8, Emergency Management Southland, Invercargill, New Zealand.

Australasian Fire and Emergency Services Authorities Council (2016) [National Damage Assessment Data Set and Dictionary for Phase 2 Assessments](#) (AFAC Publication No. 3045). East Melbourne, Vic: Australia. AFAC Ltd.

CIMS Steering Group (2014) [The New Zealand Coordinated Incident Management System \(CIMS\), 2nd edition](#), Officials’ Committee for Domestic and External Security Coordination, Wellington, New Zealand.

MCDEM (2018) [Declared States of Emergency](#). MCDEM, Wellington, New Zealand.

MCDEM (2018) [Ministerial Review: Better Responses to Natural Disasters and Other Emergencies in New Zealand](#). MCDEM, Wellington New Zealand

NAPSG (2017) [Capability and Readiness Assessment Tool](#), NAPSG Foundation, Washington, DC

New Zealand Government (2002) [Civil Defence Emergency Management Act 2002, Reprint 1 June 2018](#), New Zealand Government, Wellington, New Zealand.

Work in Progress Research Paper – Geospatial and temporal information capture, management, and analytics in support of Disaster Decision Making
Proceedings of ISCRAM Asia Pacific 2018 (K. Stock and D. Bunker, eds).

NZGIS4EM (2018) [NZGIS4EM Terms of Reference PROPOSED v1.0](#), Waikato CDEM Group, Hamilton, New Zealand.

Phyn, D (2018) [NZGIS4EM AGM/SIG 20 August 2018 Acting Chairs report](#), Waikato CDEM Group, Hamilton, New Zealand.

US Department of Defence (2018) [Dictionary of Military and Associated Terms](#), US Department of Defense, Washington D.C., USA.