Disaster Management: Building Resilient Systems to Aid Recovery

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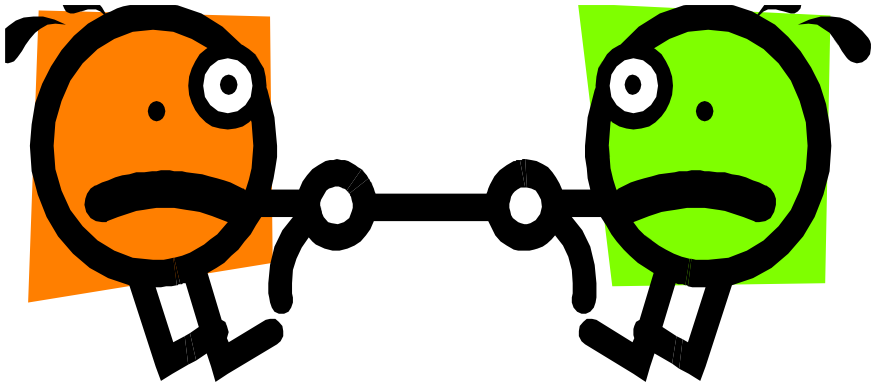
COMMAND AND CONTROL V SELF ORGANISING SYSTEMS

Command and control systems support a centralised view and the integration of agency and organisational systems: **Open innovation platforms** are used by individuals and groups (local and remote) to **self organise, co-ordinate and collaborate**.

“In general, everyone wants to command and control, but few people are happy to be commanded and controlled” (Prof. David Alexander).



AN ORGANISATIONAL VIEW

Evolving Organizations

Uncertainty/Complexity

- Less familiar and less comfortable
- "Internet"; "Knowledge age"
- Strategic conversation and self organization
- Knowledge creation, dilemmas, openness
- Synthesis of knowledge/decision/action—iterative
- Organic, fluid systems (porosity of boundaries)
- Inquiry; intention/communication; influence; connect
- Nimbleness/customization; creativity/speed
- Value webs; relationship oriented
- Less obvious metrics

Command & Control Hierarchy (citadels)

- Familiar and comfortable
- "Mainframe"; "Industrial age"
- Planning
- Experts, right answers, closure
- Separation of knowledge/decision/action—linear
- Mechanical systems (clarity of structures/roles)
- Advocacy; directives; power; control
- Massification/standardization; efficiency
- Value chains; asset oriented
- Obvious metrics

Interface Challenge

Empowered Networks (webs)

Relative Certainty/Predictability

Evolving Organizations – adapted from Star & Levine (2006)

DISASTER SCENARIO ANALYSIS COMMON ISSUES/NEEDS

CENTRAL V LOCAL

- Incompatibility of local responses together with a lack of central global management;
- A lack of centralised oversight and sense of common purpose at a local level resulting in poor resource management;
- “Paralysis” of government agencies not wanting to be seen as complicating and over-reacting to the disaster or wasting resources; and
- Little coordinated oversight of individual agency “command and control” structures, processes and systems which prohibited the effective sharing of situational awareness at a central or local level.

Bunker et al. (2014) – analysis of 9/11 Terrorist Attacks (2001), Hurricane Katrina (2005) and the Black Saturday Bushfires (2009).

COLLABORATIVE MULTI-PERSPECTIVE AND MULTI-UNIVERSITY PROBLEM SOLVING

Research conducted through collaborative and joint processes by researchers and practitioners from a wide range of “systems” perspectives:

- **System of systems** – interoperability – technology, data, governance and organizational structures;
- **Self organizing systems** – open access, social media, communities and volunteers;
- **Command and control systems** – common/dynamic operating pictures and systems integration;
- **System design** – systems architecture approaches but also collaborative design methods; and
- **Information format, content, meaning and use** – social media, geospatial systems, communications systems, information structures and their interpretation.

INTEROPERABILITY FOR EXTREME EVENTS RESEARCH GROUP (IEERG)

- Formed in late 2013;
- Focus on better integrated and more collaborative management of information & processes; and
- Recent focus on social media.

- Event scenario classification: construction; variation; 'test bank' useful to research and training;
- Event scenarios for learning and training support;
- Organisational structures and policy development levers for achieving interoperability;
- Techniques for assessment, measurement and action planning: shortcomings and opportunities for improvement; and
- Communications channels and strategies: changes necessary for improvement.

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IEERG Interoperability for Extreme Events Research Group

WHAT WE DO

focus on
Practical, problem-solving approaches to interoperability issues in disasters and extreme events both naturally occurring & man-made,

apply
Data sharing & use models and evaluate how these can be best utilised to enhance interoperability outcomes

develop
Understanding of: technological innovations, connectivity and communications, governance and co-ordination

WHAT IS INTEROPERABILITY

For emergency management, Interoperability can be defined as *"the extent to which organisations can work together coherently as a matter of routine"*. In order to be effective, interoperability must be sustainable and use resources as efficiently as possible.
source: http://www.jesip.org.uk/glossary/

SYSTEMS interoperability, sustainability and resource efficiency to benefit of society

- Governance & co-ordination mechanisms
- Technology adaptation, manipulation & connectivity
- Data model arbitration schemes

EXTREME EVENTS

Different types of extreme events can result in unique interoperability issues

our aim

Our aim is to produce and apply relevant & rigorous research models, training approaches & consulting expertise to create effective solutions to stakeholder problems that emerge when organisations such as public safety agencies, NGOs and community groups, attempt to work together during a crisis.

We do this through development of: event scenarios (including testing); organizational learning approaches, structures & policy; assessment & evaluation measures, plans & control approaches; communication strategies, mechanisms & processes.

rigorous research | *training approaches* | *consulting expertise*

about us

We are based at the University of Sydney Business School with members from across NSW as well as from the US, UK and Germany.

For Further Information on the IEERG:
Visit **sydney.edu.au/business/research/ieerg**
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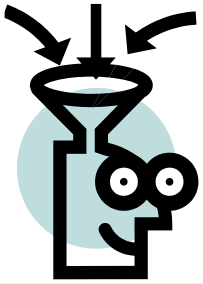
RESEARCH ACTIVITIES

Research guided by multi-university (USyd, UNSW, UTS, UoW and Macquarie) engagement with government, public safety agencies, NGOs and the community.

- **Resilient Disaster Systems Symposium** (Sept 2014);
- Community Resilience & Disaster Recovery Symposium (March 2015);
- Building a Composite picture of Recovery (Aug 2015) – new definition emerging; and



- Ongoing analysis of disaster cases

- 9/11 (2001);
- Hurricane Katrina (2005);
- Black Saturday Bushfires (2009);
- Queensland Floods (2010/11);
- **Christchurch SVA** (2010/11);
- Boston Bombings (2013); and
- Lindt Cafe Siege (2014).

- Presenters from NSW Fire & Rescue, MPES, SES, Red Cross, RFS, Blue Mountains City Council and ANU (Sahana);
- Multi-university academic and wide practitioner audience; and
- Setting a systems research agenda for disaster response and recovery and to commence planning some integrated research projects to support this agenda.

RESILIENT DISASTER SYSTEMS SYMPOSIUM
5 FOCUS AREAS

- System of systems interoperability;
- Community/society expectations, behaviour and resilience;
- Current government approaches/policy;
- Disaster management operations; and
- Knowledge sharing and situational awareness mechanisms.

……AND SOCIAL MEDIA IMPACT

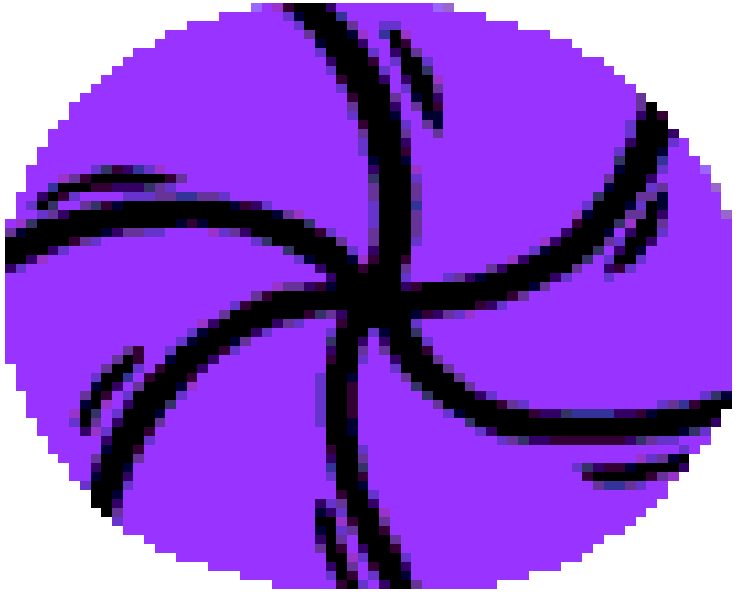
For example in the Boston bombings *"monitoring big events such as this one in real time necessitates a team with the right tools to sift through all the data, collate the info and prepare it in a format that will support online engagement and decision-making by command"* Cloutier (2013)

CENTRAL V LOCAL

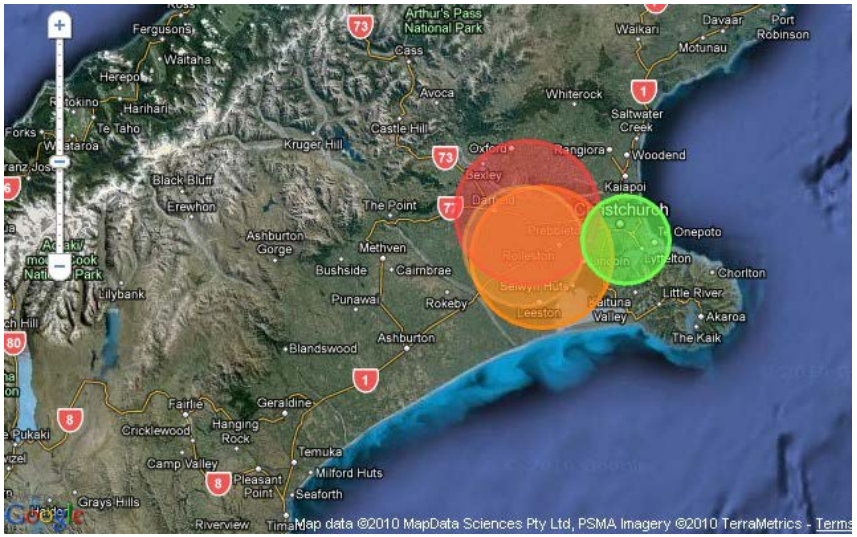
There must be development of appropriate social media mechanisms by emergency agencies.

NON-TRADITIONAL VOLUNTEERISM

- People can now self-organise (and often volunteer) for various tasks through the use of social media;
- These volunteers are not the same as agency volunteers (who undergo various levels of training and orientation to their duties); and
- Engagement with non-traditional volunteers, however, is inevitable and necessary.



CASE EXAMPLE - CHRISTCHURCH EARTHQUAKES: THE STUDENT VOLUNTEER ARMY (SVA)



NOTE: September 4th - **Sam Johnson** (a 22 year old student at the University of Canterbury) - Facebook event called "*Student Volunteer Base for Earthquake Clean Up*" - as an organising mechanism.

Timeline

- September 4th (4:35am) 2010 - 7.1 magnitude earthquake (Darfield);
- February 22nd (12:51pm) 2011 - 6.3 magnitude shallow earthquake (Christchurch) – many buildings were destroyed and 182 people were killed, more were injured; and
- June 13th, 2011 (2:20pm) - 6.3 magnitude aftershock (south east of Christchurch).

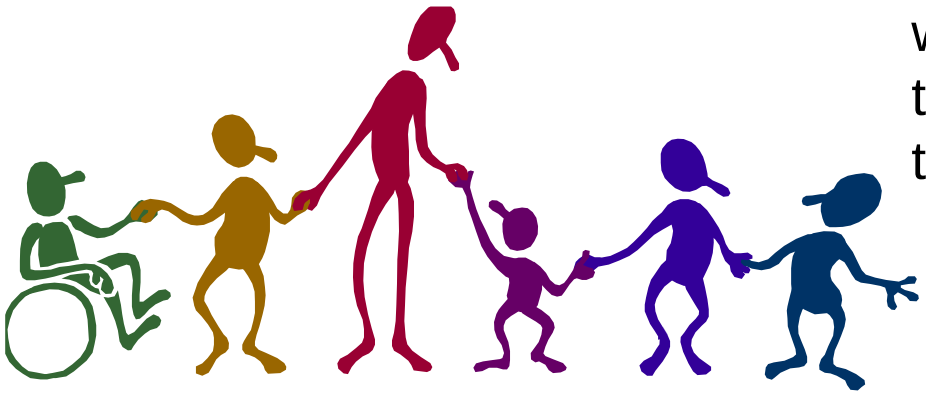
Some Lessons Learned after the initial response
Sam Johnson (2011)

- Over 14,000 people had been invited to the Facebook page with 4,000 of those clicking ‘attending’;

- Little understanding of what a liquefaction cleanup was;
- Little experience in co-ordination of 150 volunteers (feeding and watering volunteers became an issue); and
- Difficulty in coordinating location changes (twice in a few days losing 50-80 volunteers each time) – a significant lack of dynamic process and information management expertise to assure overall sustainability of the volunteer army.

More Lessons Learned

- All stakeholders i.e . volunteer leaders, volunteers, emergency agencies and affected residents needed to embrace **all** available technology to work with each other;
- The relationship with the media to communicate with people who needed assistance was critical;



- The relationship with the Army and the Waimakariri District Council was critical (supplemental to Social Media);
- Funding sources and resources needed to be established as quickly as possible; and
- Harnessing community ethos, goodwill, motivation and momentum was imperative through the use of technology as an “organisational tool”.

SVA Characteristics

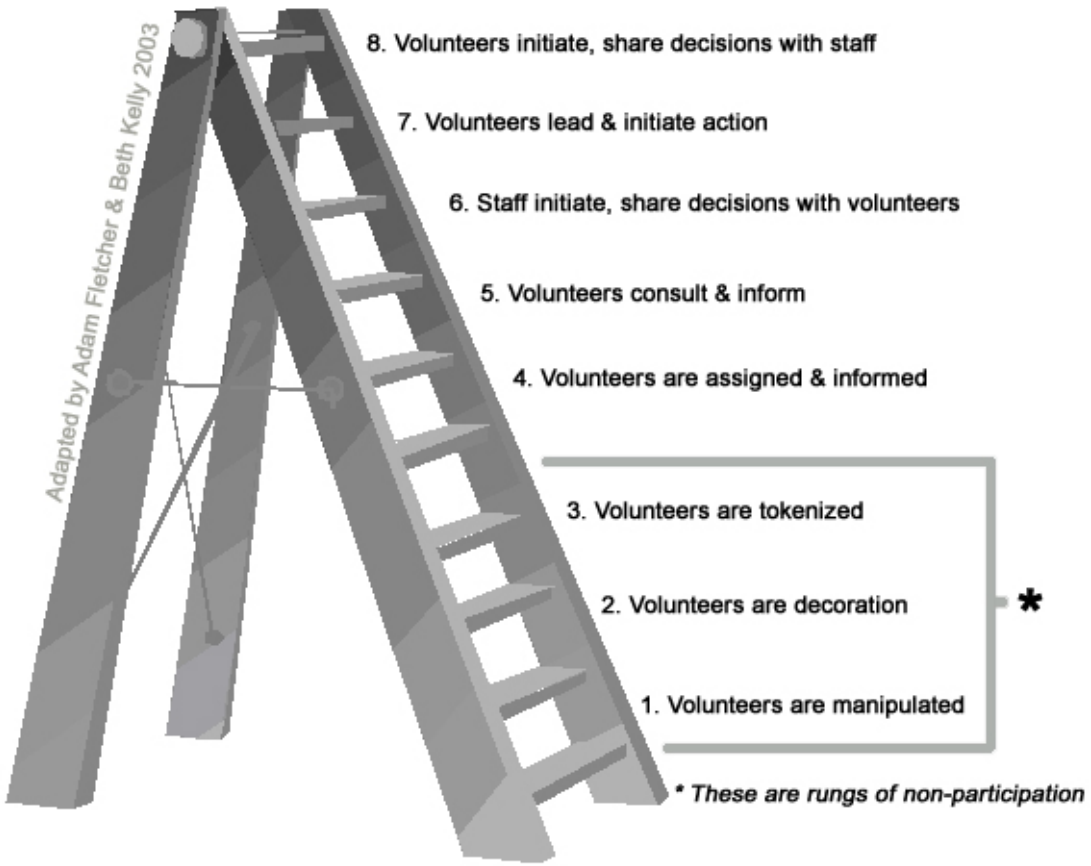
- The need for a leader at each level of the organisation;
- Learning how to work in large teams effectively;
- Need for instant gratification and positive reinforcement; and
- Need for food and resources to physically sustain volunteers.

Volunteer Characteristics

- Not being good at logistics;
- Not wanting to be considered as free labourers; and
- Not wanting long term commitment.

WHAT MOTIVATES VOLUNTEERS?

Ladder of Volunteer Participation



Adapted from Hart, R. (1992). *Children's Participation: From Tokenship to Citizenship.* Florence: UNICEF Inocenti Research Center

SVA Social Media Communications Practices: Facebook and Twitter

We conducted genre analysis of Facebook and Twitter posts, to understand the communication practices between the SVA leaders, their volunteers, the community and emergency services agencies (mid-February 2011 to early March 2011).

FACEBOOK ANALYSIS

The total dataset from February 2011 – June 2011 consisted of 4133 Facebook posts.

Social Praise (33%); Requesting Help (15%); Offering Resources (10%); and Crisis Updates (9%) in ascending order, highlighting self organisation qualities of the SVA and the volunteers themselves.

Supported by the volunteer characteristics: instant gratification and positive reinforcement; not wanting to be considered as free labourers; and requirement of food and resources to physically sustain the SVA.

TWITTER ANALYSIS

A total of 830 Tweets from February 2011 – June 2011.

Providing Information (27%); Requesting Help (21%); Coordination (18%); and Social Praise (9%).

Supported by the the Army characteristics: the need for a leader at each level of the organisation; learning how to work in large teams concepts, communicating effectively; and logistical assistance.

The SVA utilised Social Media as a tool for establishing the open solicitation, management and use of these types of information in an open, social acceptable (appropriate) and sustainable manner.

WHEN SOCIAL MEDIA IS NOT THE RIGHT TOOL FOR THE JOB

- Volunteers would not commit to tasks via Facebook or Twitter;
- Volunteers did not want long term commitment (wanted to offer as much or as little assistance suited them);
- Detailed co-ordination information needed to be obtained, authenticated, shared and acted upon by the SVA and emergency services authorities **together**;
- A less open more easily controlled and operated commercial system (GeoOP - a mobile online job management system) was supplied to match volunteers with tasks (jobs); and
- It could then monitor clean up progress of these “jobs” supporting SVA self organisation in a more appropriate way.

QUESTIONS ?


... and finally Professor, has the tsunami created any tsilly tsubconscious tside effects in tsome tsections of tsociety?
I'd tsuggest that it's tstill too tsoon to tsay for tsure...