Integrated Emergency Management (IEM)

Two main aspects of disasters set them apart from other information management tasks. Firstly, they are uncertain in nature, characterised by “un-ness” as Crichton puts it: “…unexpected, unscheduled, unplanned, unprecedented and definitely unpleasant”*1*. Secondly, they are complex in terms of communication and subject to information lack or overload. Three further factors add to complexity.

Firstly, rapid developments in technology have made data collection easier but information management more complex. However, in an emergency it is essential to know what data and information can be relied upon and trusted. Secondly, though geo-information is vital in addressing IEM, GIS and its interfaces, as pointed out by Goodchild: “…have been designed largely for the comfortable and relatively slow environment of the office rather than for the hectic field conditions of disaster management”*2*. Thirdly, those involved in emergency management and response are specialists in their own areas of expertise and not necessarily in GIS. Yet effective emergency management requires information that underpins joint working and establishes a Common Operational Picture (COP) of risks, resources, incidents, consequences and how to respond to emergency cases. Concerned as they are with carrying out their own specific tasks and activities as effectively as possible, specialists are not interested in geo-information (GI) per se. So if GI and GIS are to be effective in meeting emergency management needs, the challenge is to provide end users with ease of access and use of GI at the time and point of need to enable them to make the right decisions, at the right level, at the right time- with simplicity and clarity!

In the UK this challenge requires establishing appropriate frameworks on policy and information management and ensuring the usability of GI for emergency management. The model of IEM established under the Civil Contingencies Act (2004) provides a single unifying framework and organisational responsibilities to cover preparation for and having the capabilities to respond to and recover from potential emergencies. IEM is a dynamic model of six processes:
- *Anticipate:* “horizon scanning” and effective anticipation of hazards and threats
- *Assess:* appreciating the spread, severity and consequences within a risk assessment framework
- *Prevent:* identifying and taking measures to mitigate against identified risks
- *Prepare:* emergency planning; having structures, processes and resources in place to deal with emergencies and mitigate their effects
- *Respond:* procedures, frameworks and resources required to escalate response as appropriate
- *Recover:* processes and activities necessary for recovery from an emergency.

Effective IEM depends on proper geo- and other information being available throughout each of the above processes. Thus ease of access to and use of GI, as and when required, and robust information management frameworks are essential. Ordnance Survey (OS), as Great Britain’s national mapping agency, has service-level agreements for the provision of digital products and services for IEM and other uses. Users include central and local government agencies, the blue-light services, primary care trusts and strategic health authorities. In response to emergencies, OS runs an out-of-hours service providing mapping products and expertise, and participates in training courses for emergency planners. OS is a major contributor to the Digital National Framework (DNF www.dnf.org) being developed as an industry standard for integrating and sharing business and geo-information from multiple sources. DNF is based on the principles of collecting data once, located to the national geodetic referencing framework, with features referenced through unique identifiers allocated by a registry.

Based on DNF principles, OS developed MasterMap as a digital map database that is nationally maintained and consistent. It contains over 440 million objects with unique sixteen-digit reference numbers (TOIDs) for all features, providing a common denominator (or relate key) for disparate datasets and database tables held within the public and private sectors. Within the context of IEM OS MasterMap has two key characteristics. First, the level of precision and accuracy that allows activities such as damage estimation is detailed and effective, rendering reliable spatial searches on the basis of topology or proximity; and two, TOIDs allow cross-referencing and linkage of data from all sources that employ them. The combination of precision and accuracy attached to attributes allows determination of the consequences of incidents.

Delivering simplicity to the user requires designs centred on users, services and interfaces. Service design is about the “experience of use” of information for the task at hand. Engaging the user is vital to effective IEM, and user needs and usability research at OS is focusing on what, when, where and how GI is important in user tasks and decision-making processes. The issues of providing ease of use and access to GI at the time of need are far from met. But these issues are being tackled as GI increasingly becomes part of the mainstream information economy. Regarding simplicity of interface design, we as a community can learn from Google maps and others.

Note 1: Crichton, M. 2003. Decision making in emergencies. NATO/Russia Advanced Research Workshop: Forecasting and preventing catastrophes, 2-6 June 2003, Industrial Psychology Research Centre, University of Aberdeen, UK, accessed at: www.abdn.ac.uk/iprc/john/Nato_pdf/Margaret%20Crichton.pdf.

Note 2: Mike Goodchild GIM International April 2007.