



Implementation of Geographic Information and Geographic Information Systems in municipal Emergency Management

Research report, May 2007.

Dr. Michaël Le Duc, KTH, Geoinformatics, michael@leduc.se

Dr. Åke Sivertun, Linköping University, IDA, akesiv@ida.liu.se

Abstract

The project reported concerns Emergency Management (EM) for local government especially support from Geographic Information (GI) and Geographic Information Systems (GIS). The questions investigated were: How can municipalities implement the use of Geographic Information and Geographic Information Systems for Emergency Management effectively? How can risk analysis be implemented with a special focus on support from GI and GIS? The purpose of the project was to, based on prior knowledge, develop and, to some extent, validate in a scientific study principles for implementing GI and GIS for EM in municipalities. The theoretical framework used is mainly based on the concepts of adoption of innovations and implementation principles for GIS in municipalities. Innovation adoption is seen as a process composed of several phases. In addition, potential adopters use a set of criteria to evaluate an innovation. There are many types of innovations, including incremental and radical innovations. Regarding software and information systems, different professionals in a municipality can adopt different modules. We performed interviews with two groups of respondents, namely municipal GIS Coordinators and Emergency Preparedness Officers. Some professionals responded by e-mail. Approximately twenty-five respondents from seventeen municipalities participated. Two metropolitan local governments, nine large cities and other municipalities all across Sweden contributed with information.

The results are very rich and complex. The data collected confirm many of the components of the theoretical framework, even if we did not ask questions on every part. We asked for example Emergency Preparedness Officers to rate their municipality's GIS maturity, which was perceived as decent. On the other hand, GIS is in limited use for risk and vulnerability analysis in many of the studied local governments. It was interesting to note that no respondent answered that GIS was not compatible with risk and vulnerability analysis but several were uncertain. Seven professionals consider GI and GIS compatible with risk and vulnerability analysis, thus indicating that with time GIS adoption has the potential to increase for risk and vulnerability analysis. Five respondents do not know how compatible GI and GIS are with risk and vulnerability analysis. The persons in this group have rated GIS use for risk and vulnerability analysis as low, which is consistent with prior research.



GI and GIS support for risk and vulnerability analysis will probably diffuse in concert with other applications of GI and GIS in emergency management. For example, web services were mentioned as promising solutions to many of the existing obstacles. These services seen as open components can be used for many purposes although they have their limitations.

Lantmäteriet and other central agencies for meteorology, geology, road information, etc., can play an important role in supporting municipal Emergency Management. This includes, according to the professionals' statements,

- Information, education and training material
- Education and training
- Web services
- Expertise support, e.g., for flood modeling and the analysis of landslide risks
- Products, data and maps

Technical departments are more adapted to GI and GIS than “soft” activities.

The attitude of management is noted as important to succeed in implementing GI and GIS. This support varies. The availability of GIS data is also noted as paramount. There are problems noted in this dimension. User's motivation and user satisfaction are also confirmed as key factors. There are problems noted, especially regarding Emergency Management professionals.

Education, training and exercises emerge as very important. We obtained mixed results regarding standards and standardization as well as how important it is to have an IT strategy which includes GIS.

Champions are confirmed to be important, even if the statements were mixed. There are also some problems with decision makers' understanding.

The cost of data is a problem, especially for Fire and Rescue Services Federations. A very clear problem is that GIS software is difficult to use in noted cases. There are also still problems concerning data access and quality.

Keywords: Implementation, innovation adoption, municipalities, emergency management, GIS, standardization, risk and vulnerability analysis