

# GeoS4S Module Incident and Crisis Management

Kusse, B., van Manen, N. and Scholten, H.

Vrije Universiteit Amsterdam, School of Business and Economics, Amsterdam, The Netherlands

E-mail: a.a.m.kusse@vu.nl

## Abstract

*This module on Incident- & Crisis Management (ICM) is based on extensive experience in using the methods and technology provided by GIS to manage 'real world' Incident- and Crisis management situations. This has led to the understanding that applying the frameworks for GeoDesign and the Safety Chain clearly provide a solid base for application in specific situations concerning Incident- and crisis management. The way in which the frameworks can be applied not only helps in quicker insights into the requirements for recovering from severe incidents and crises, but also provides an excellent environment for planning and preparation for potential crises. This module teaches the students to understand the frameworks that are used in GeoDesign and the Safety Chain and how these can be used in crisis management and preparation. This paper summarizes the learning objectives, lesson content, learning activities and evaluation scheme for this module.*

## 1. Introduction

In this day and age information is ubiquitous and we rely very much on its' availability and accurateness. Especially when a disaster or a crisis occurs, news reporting via the media (especially 'social media') is our primary source for action. Fortunately however, the police, fire department, ambulance services and other parties who are directly involved in mitigating the result are better equipped to receive the correct information and plan their activities accordingly. The essence of this module is to provide the frameworks for analyzing the threat and applying a logical structure for action. This is supported by some examples that have been used throughout the years.

### 1.1 Module Description

Globally, needs for relief continue to increase substantially, driven principally by the consequences of climate change and population growth. Disasters and humanitarian crises remain an increasing threat to sustainable development and sustainable growth. In addition to this are the many millions affected by conflict and violence with ever increasing number of refugees, displaced people within the borders of their countries, persecution, conflict, generalized violence and human rights violations. In this module the concepts of the GeoDesign framework are combined with the concepts and methodologies for Civil Protection Management (CPM).

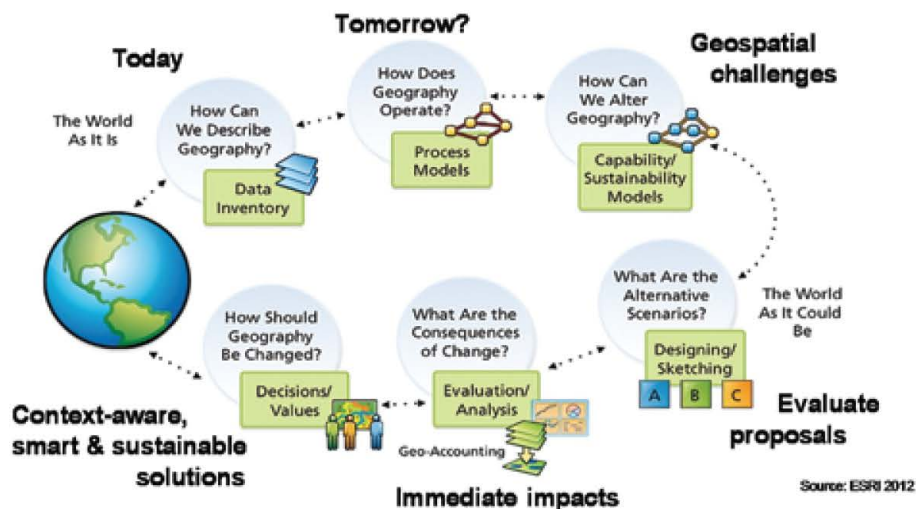


Figure 1: Module Description ( Source: ESRI, 2012)

Together, with the strategic use of possibilities of a National Spatial Data Infrastructure (NSDI), in a netcentric approach these frameworks will support the focus from a Common Operational Picture (COP) of the problem area and the organizations involved, together with a clear Situational Awareness (SA) of the strengths of these participating organizations and the hazards involved, to a status that can be managed in a more sustainable way and that provides a means for all parties to realize the best sustainable outcome.

The framework of GeoDesign is used as a basis that supports the problem-oriented approach to deal with the different risk scenarios and provide a common ground for different geospatial supporting systems that have been developed to turn the challenges into sustainable solutions. NSDI technology support the sharing of location information to provide the best insight in a crisis situation and make use of the steps in the CPM methodology and how a netcentric and spatial approach has been applied in hazardous situations that have been encountered around the world. The module encompasses an explanation of the concept and the frameworks and illustrates how these have been used in previous situations and how they can be used nowadays.

### *1.2 Learning Outcomes*

- The concept of the GeoDesign framework is briefly introduced to understand the framework and how this supports the problem oriented approach of incidents and crises.
- The student is made aware of the differences between incident management, crisis management, risk management and security aspects in the field of geospatial information;
- Have knowledge of the basics of Civil Protection Management and introduction to the role of NSDI facilities and other technologies;
- Discuss, critically, the different components of the safety chain, the organizations involved in each and the decisions to be taken by each component;
- Can design and reflect on visualizations for COP and SA;
- Discuss critically, the frameworks and the Netcentric Information Flow in the aid of decision making

## **2. Module Structure**

### *2.1 Module Overview*

The module consists of 13 lessons, with 2-4 extra readings per lesson, 4 hands-on exercises and 4 assignments. The combination of these teaching and learning systems will amount to approximately 150-180 hours of student learning effort, and provides credit to the equivalence of 6 ECTS. Each lesson consists of a core lecture, consisting of approximately 25 slides and accompanying video material.

### *2.2 Summary of Lesson Content*

This section briefly presents the content and goals of each lesson.

- *Lesson 0: Overview.* This lesson provides an overview of the entire module and gives some background on its' lecturers.
- *Lesson 1: Introduction.* This lesson gives an introduction with definitions that are crucial for the proper understanding of GeoDesign and Incident Management (spatial thinking, context awareness, creating solutions). It also provides some lessons from historical disasters in Europe and hands-on assignment.
- *Lesson 2: Background for ICM.* This lesson provides some background knowledge for Incident and Crisis Management as well as the economics that are involved in looking at the impact. It gives an overview of the hazard types that can be distinguished and how GeoDesign and the Safety Chain fit in.
- *Lesson 3: ICM and the Safety Chain Framework.* This lesson explains the 5 phases of the Safety Chain and shows which organizations are usually involved in ICM and which factors dominate most crises. The use of spatial data is illustrated by a video that visualizes random types of data that are available.
- *Lesson 4: Assignment.* This lesson gives an introduction to the risk of floods in Europe and provides an overview what actions need to be taken to deal with the risks of flooding in the study area. Two situations need to be investigated: Day 1 – which evacuation strategies can be developed; Day 2 – which Emergency response activities can be deployed.
- *Lesson 5: Risk assessment.* This lesson builds on the previous lesson and gives an insight in the possible risks and how much damage this can cause and what the economic impact is.
- *Lesson 6: Example flood risk protection.* This lesson gives an overview of the ingenious measures that have been taken by a Dutch waterboard in the past to prevent regular flooding and what measures have been developed to be able to cope with the possible effects of climate change in the future.

- *Lesson 7: Netcentric Operations and GIS.* This lesson explains the concept of Netcentric Operations and how this aids in obtaining an accurate overview of the current situation and what is needed to cope with how a crisis situation evolves.
- *Lesson 8: Civil Protection Management.* This lesson describes the concept of Civil Protection Management and how this influences the crisis. It also shows how this integrates with the Safety Chain and the different actors that are involved and how these influence one another.
- *Lesson 9: Emergency Response.* This lesson stresses the need for immediate action with accurate data when a crisis occurs. Here it helps to be prepared in advance and realize the importance of location and the use of maps.
- *Lesson 10: Emergency response in the Netherlands.* This lesson explains the structure of emergency response in the Netherlands and how this is organized. Also the different levels of action are described.
- *Lesson 11: Data gathering for crisis management.* This lesson shows the importance of structural data gathering and monitoring to be prepared for any changes in the environment that may cause disruption. It also shows new ways of data collection.
- *Lesson 12: Example for ICM Training.* In this lesson an example is given how training for ICM has been carried out for several organizations in the Kingdom of Saudi Arabia in 2012. This also illustrates the different aspects that are required to take into account in preparation and training itself.
- *Lesson 13: Future of Incident & Crisis management.* This lesson shows the developments that ICM has gone through and which possibilities the future already offers. It is finalized by an assignment.

### 3. Hands-On Sessions

The module provides the students with many hands-on learning sessions, through ungraded exercises and through graded assignments. The 4 assignments are designed to allow students to practice with concepts that they have learned in the lessons. Apart from the ungraded exercises, the students will be set 4 graded assignments. Of these, two are targeted at teaching the students how to evaluate scientific literature discussing Incident and Crisis Management in relation to GeoDesign. Furthermore, two assignments are focused on carrying out assignments that focus on preparations for ICM and also look at risks and the costs for disasters.

### 4. Teaching and Learning System

The learning and teaching strategies are student centered and based on e-learning. They aim to encourage a deep- learning approach by using reflection and self-evaluation. A written Directed Reader with a case study approach will be provided on-line, which will provide the essential background, the framework for study and essential details. It will include self-assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self-assessment exercises and the summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.

Each lesson on the e-learning platform will comprise an introductory text identifying the lesson's learning objectives and its contributions to the module learning outcomes, a short video lecture setting the context and introducing the core concepts and links to academic and professional readings. Students will be required to reflect on their learning as part of self-assessment exercises and assignments assessed by the teaching staff. Online interactions with teaching staff and fellow students, including peer review exercises will provide opportunities for deepening learning and reflection.

### 5. Evaluation System

The performance of the students is assigned based on four assignments that can be grouped as two assignment groups. Each of these two groups accounts for 50% of the final grade and should contain 3000 words (2 x 1500 words). Assessment is done by coursework. There will be two assignments which need to be submitted of equal weighting, the first assesses the student's ability to put a crisis situation of his/her choice into the context of the GeoDesign framework and use one (or a combination) of the methodologies offered to analyze and assess the problem and come up with a proposed solution which will be of sustainable nature. The second assessment requires the student to select a severe incident or crisis that has already taken place and reflect on the approach that is used to deal with the problem, based on the knowledge that has been acquired throughout the learning stage of the module.

### *Assessment 1: Practical assignment (50%)*

A crisis situation (real or virtual) will be chosen by the student and he/she has to address all the aspects that are required to analyze this situation and assess all the steps that are required to reach a sustainable situation. This requires: setting the scene, defining the physical resources, data sources required, etc.;

### *Assessment 2: Essay on incident/crisis analysis*

The student can select any severe incident in his/her surrounding and define measures that he/she would take based on the knowledge of the module and the experiences from other organizations

Furthermore, the students are offered exercises with answers available that they can use to test and evaluate their own knowledge.

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