



Bundesministerium  
für Verkehr,  
Innovation und Technologie



## e-SPIDER

Conceptualization of a Global Virtual Academy for Space-based  
Information for Disaster Management and Emergency Response

**Peter Zeil**

**Centre for Geoinformatics | Salzburg University**

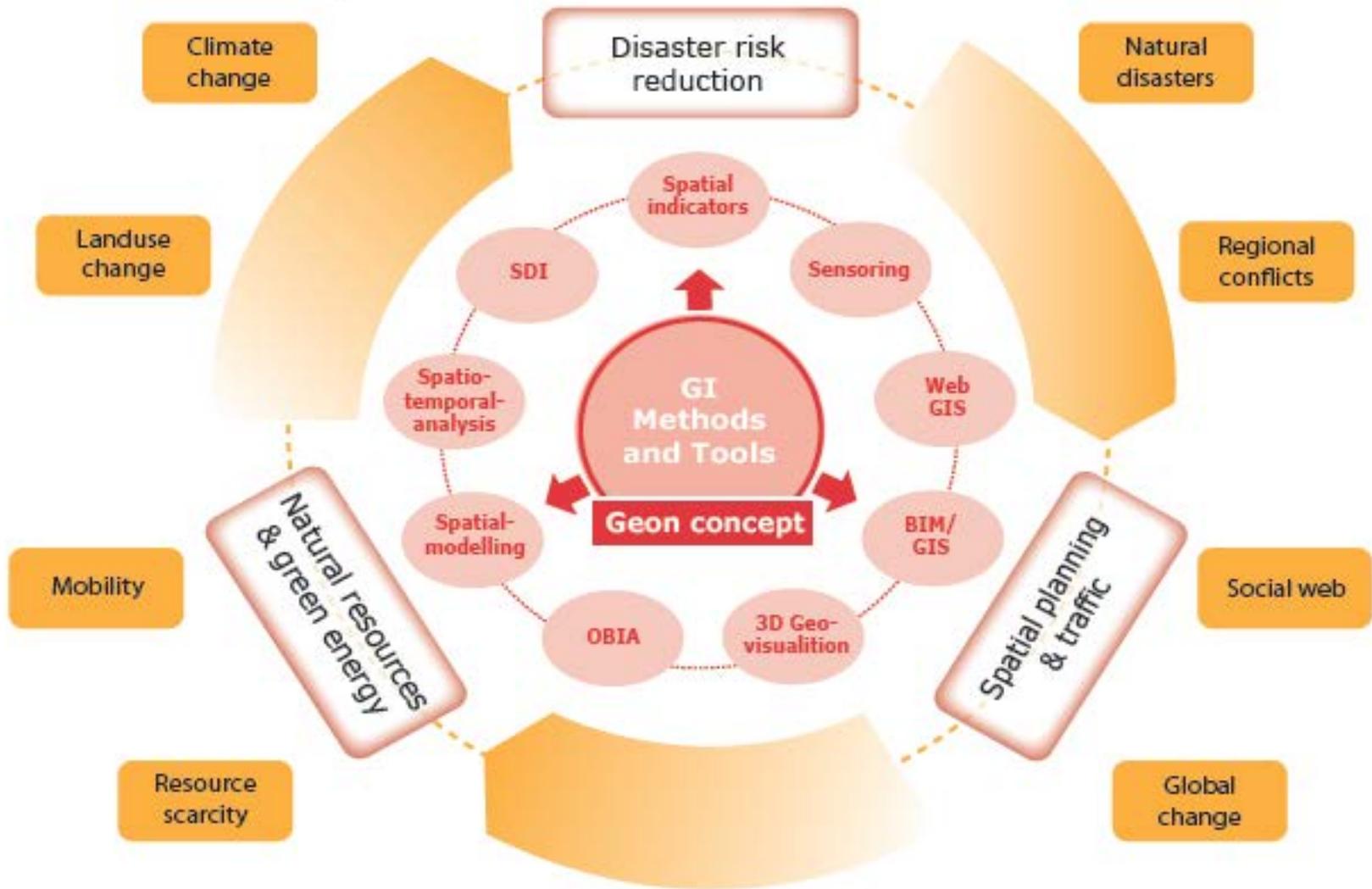
## Strengthen capacity

- Who are we and what do we do ?
- **e-SPIDER** for UN-SPIDER
- Learning context – a **non-e** example

# Centre for Geoinformatics

- **Academic centre for research and innovation**
  - Analyse, understand and visualise spatial phenomena, their causes and mutual relationships as well as their temporal dynamics
  - Impart knowledge by teaching, training activities, and capacity development
  - Establish close links between GI science, industry and administration facilitating platforms for communication and exchange





# International Initiatives

THE GLOBAL EARTH OBSERVATION  
SYSTEM OF SYSTEMS



**GEO** GROUP ON  
EARTH OBSERVATIONS

GSDI

INSPIRE

SEIS

**Gmes**  
European Information Services  
for Environment and Security



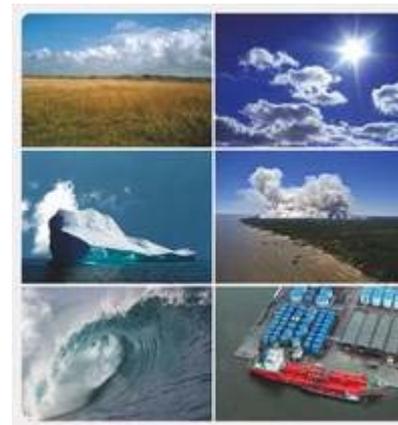
UNOOSA



UN SPIDER



Emergency response  
Land monitoring  
Marine services  
Atmosphere  
Security

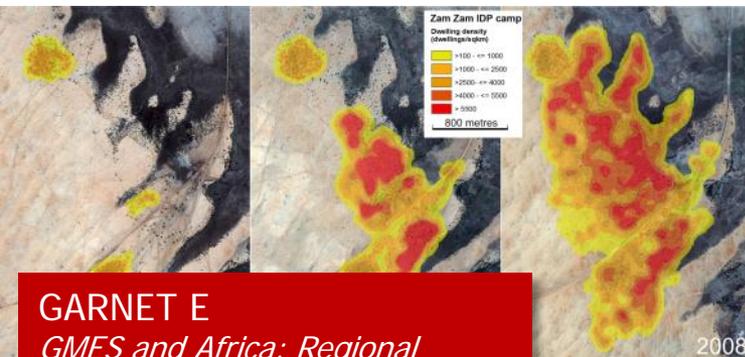
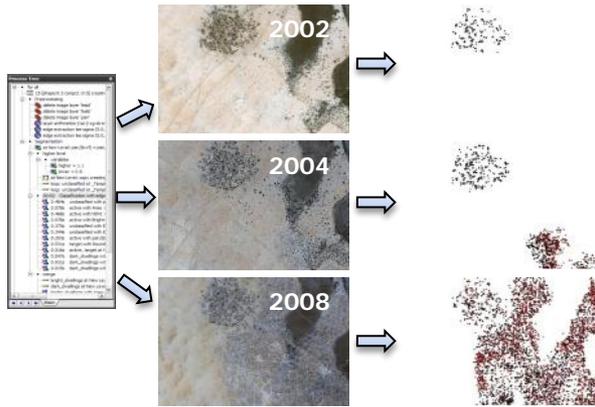


**Z**\_GIS

# > Disaster risk reduction

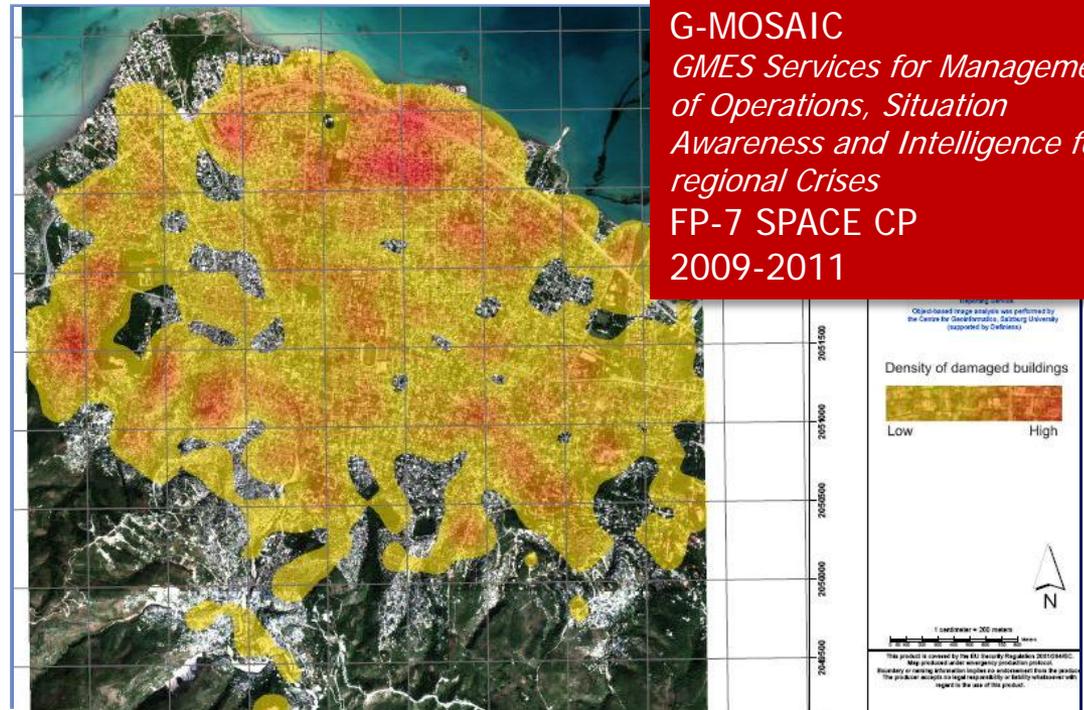
## Automated Methods for Information Extraction and Damage Assessment

Automated analysis of the IDP/refugee camps and derivation of population estimates

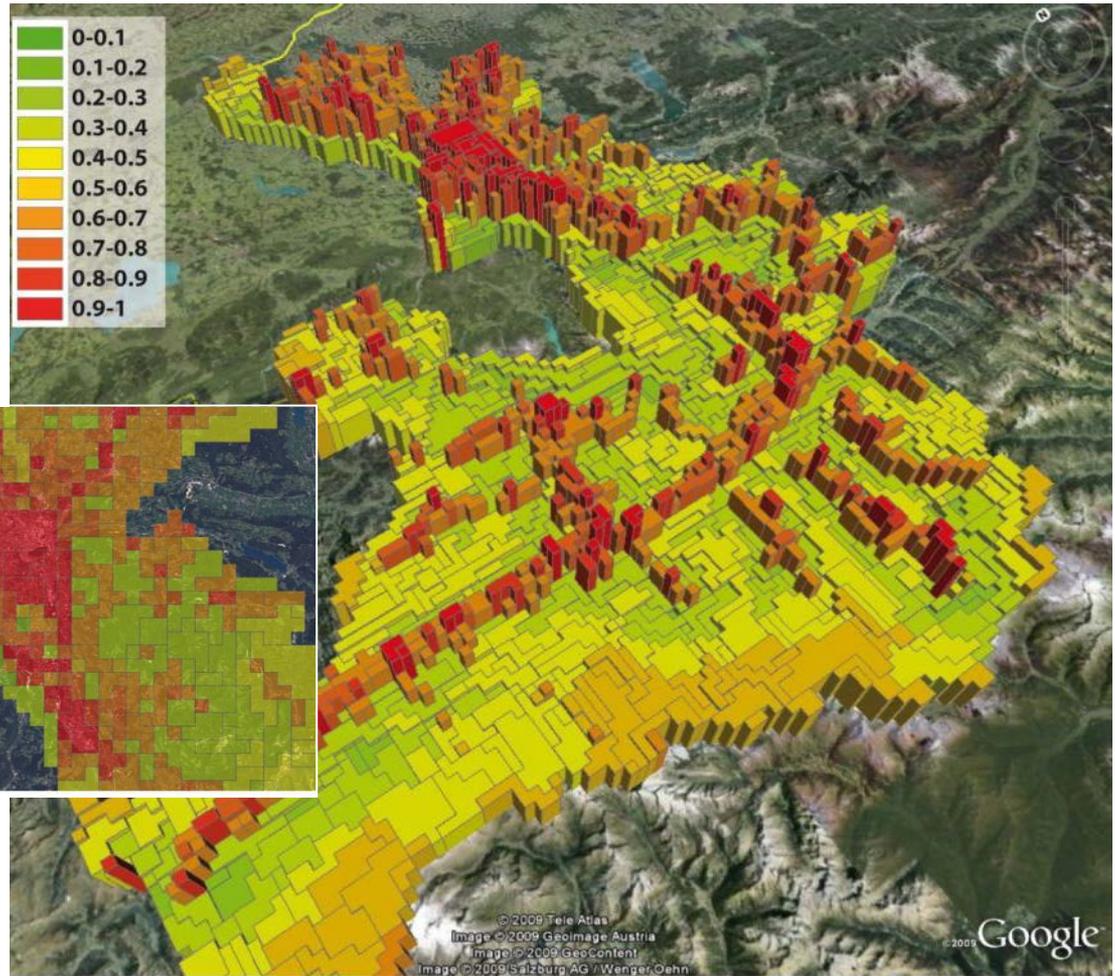
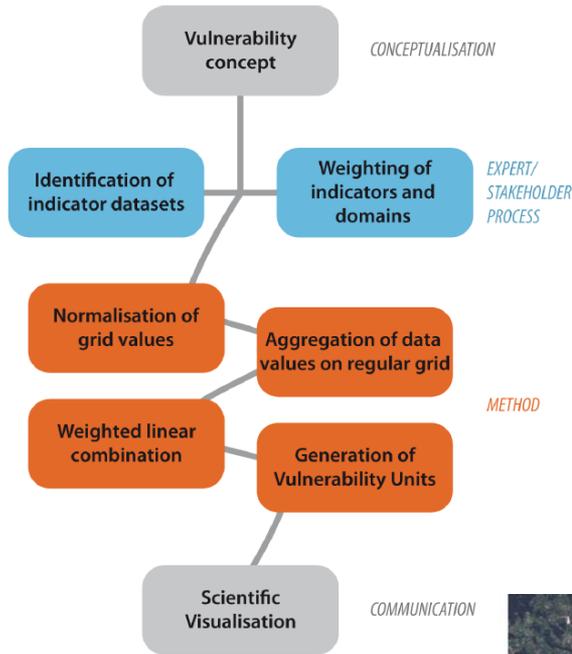


**GARNET E**  
*GMES and Africa: Regional Network for Information Exchange and Training in Emergencies.*  
FP-7 SPACE CP  
2010-2012

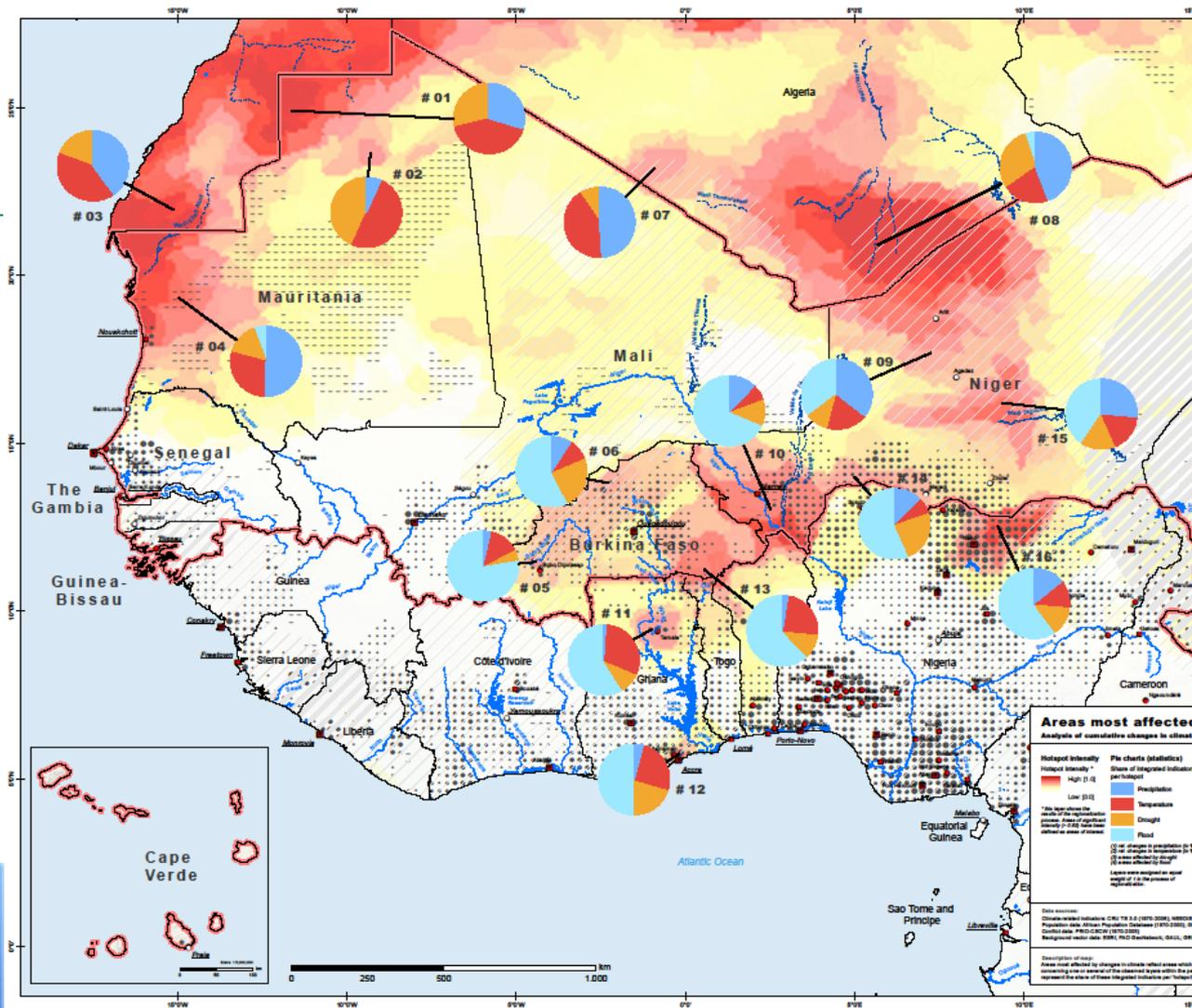
Automated damage indication mapping - Haiti Earthquake



# > Disaster risk reduction Vulnerability Mapping



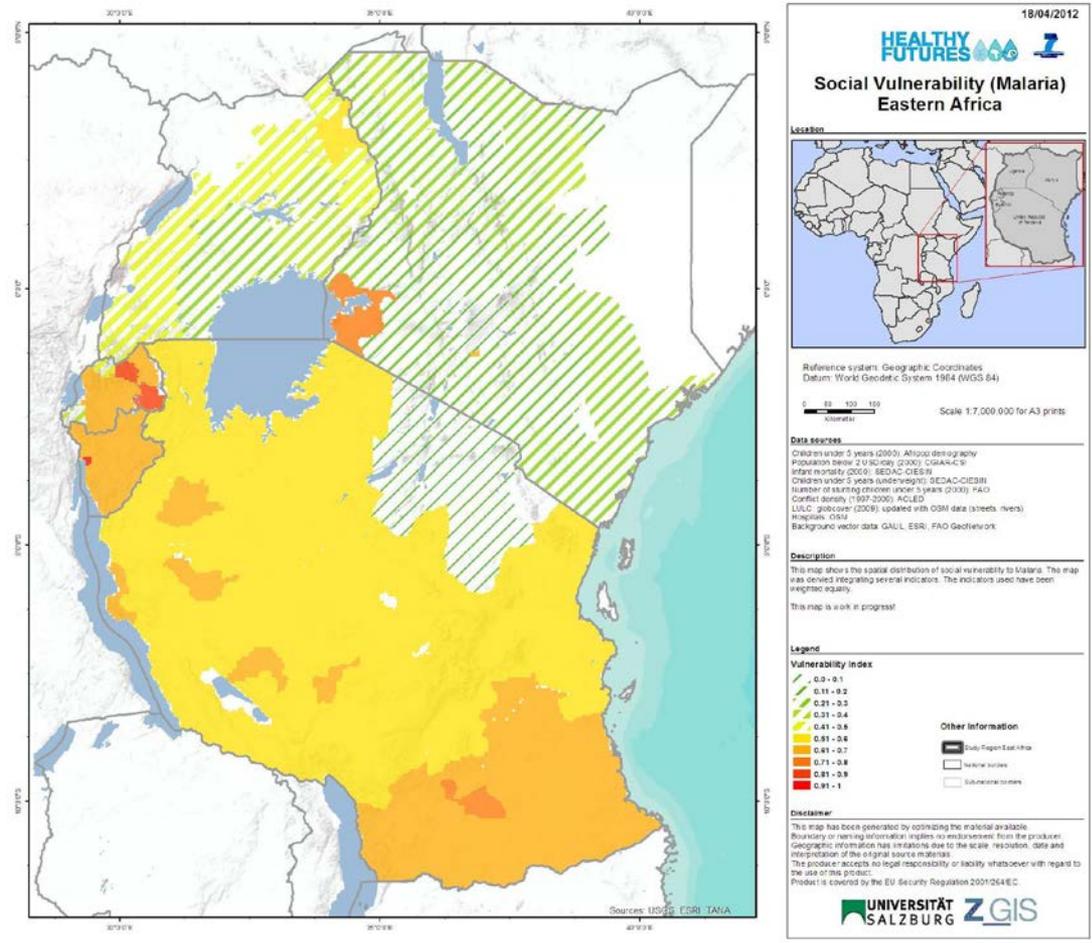
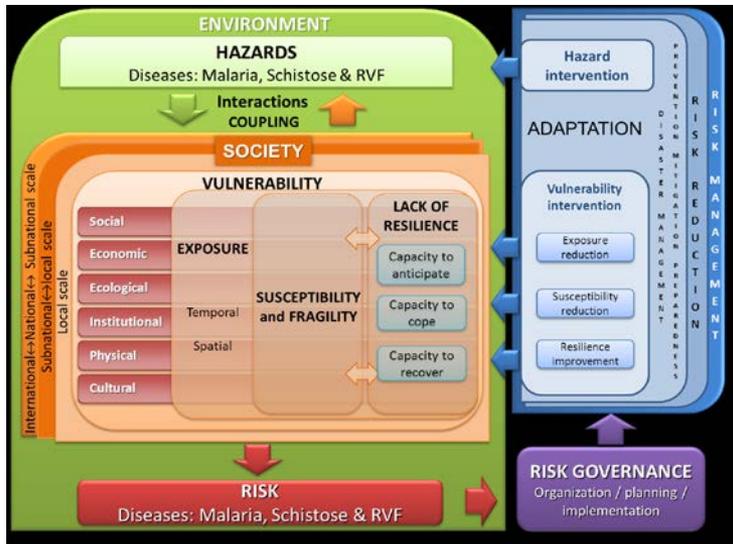
**MOVE**  
*Methods for the Improvement of  
 Vulnerability Assessment in  
 Europe*  
 FP-7 ENV CP  
 2008-2011



Livelihood Security: Climate Change, Migration and Conflict in the Sahel  
at <http://www.unep.org/disastersandconflicts>



# > Health risk reduction Vulnerability (Malaria)



- (a) continued education offers for EO and GIS applied in disaster management available to practitioners in emergency response and DRR are **few or none** existing;
- (b) **inadequate curricula** exist which do not cater for the specific needs of DM experts to improve their skills in application of EO data while remaining at their duty stations;
- (c) there is a **lack of applied research** addressing national priority areas in DRR and only **a few experienced trainers** deliver courses in the regions most affected by natural disasters.

Res 1: existing **e-learning offers** for earth observation (EO) applications in disaster risk reduction and emergency response are assessed on a global level

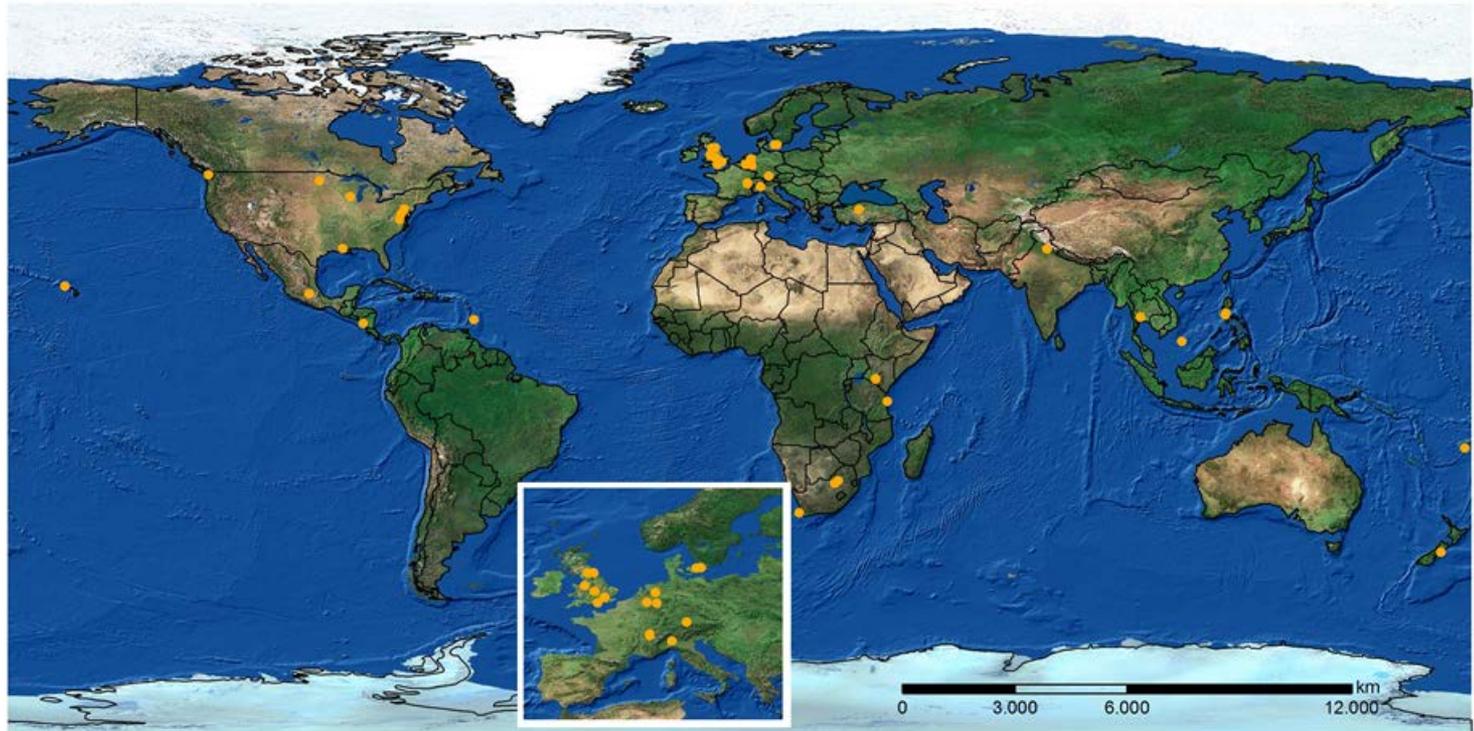
Res 2: an **e-learning concept for UN-SPIDER** is developed considering the requirements for an international platform (in terms of technical performance and content management); the curriculum responds to the need of DM practitioners for continuing education and pays particular attention to the provision of near-real-time exercises.

Res 3: a **monitoring and evaluation system** is established to ascertain the quality of learning modules and exchange of feedback between tutors and participants.

# e-SPIDER > Inventory

Inventory of capacity building courses in disaster management and emergency response with geospatial applications

## Inventory of Capacity Building Offers for Disaster Management and Emergency Response



*e\_Spider*

**Z**\_GIS

**Z**\_GIS

# e-SPIDER > Inventory

Inventory of capacity building courses in disaster management and emergency response with geospatial applications



### *Achievements:*

A **database** including name of organization, course title, delivery modus (on-site/e-learning and duration), content assessment (geoinformation/space-based information), website, place, country, coordinates is available as **excel sheet and kmz-file**.

### *Challenges:*

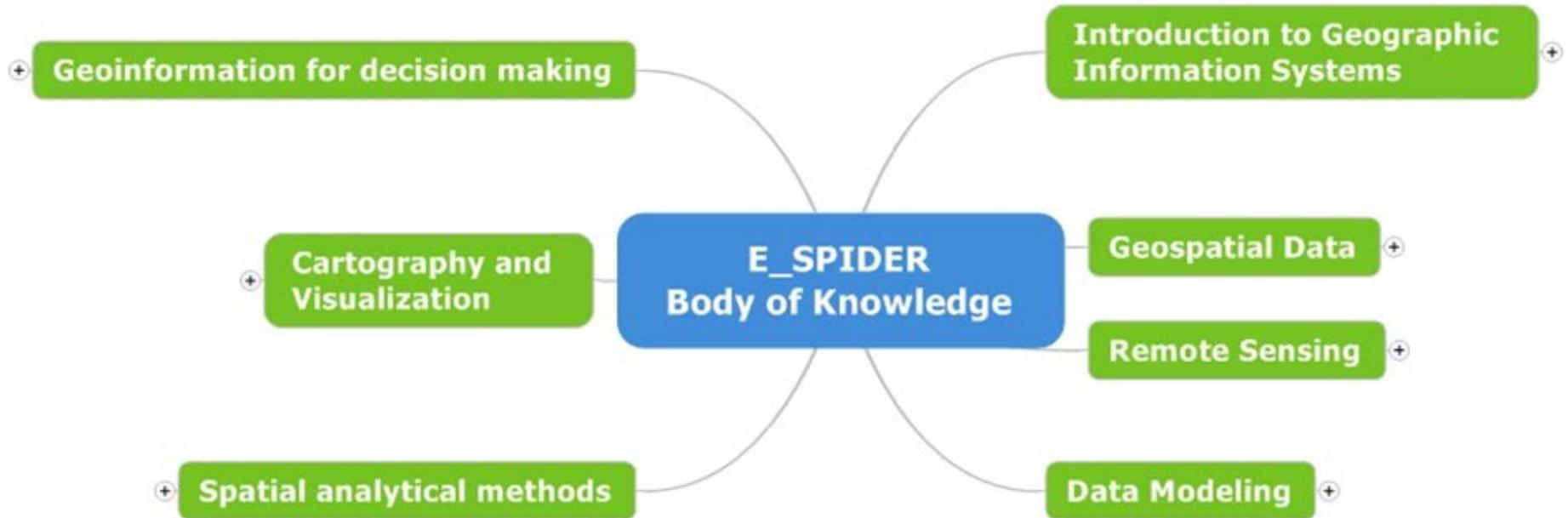
**Regular maintenance** is required to keep the inventory up-to-date.

**to obtain complete details** and regular up-dates (e.g. course content, number of participants, evaluations).

The **visualization in Google Earth** needs to be tested when completed with all information required. However, the format offers compatibility with the geospatial database of disaster management organizations

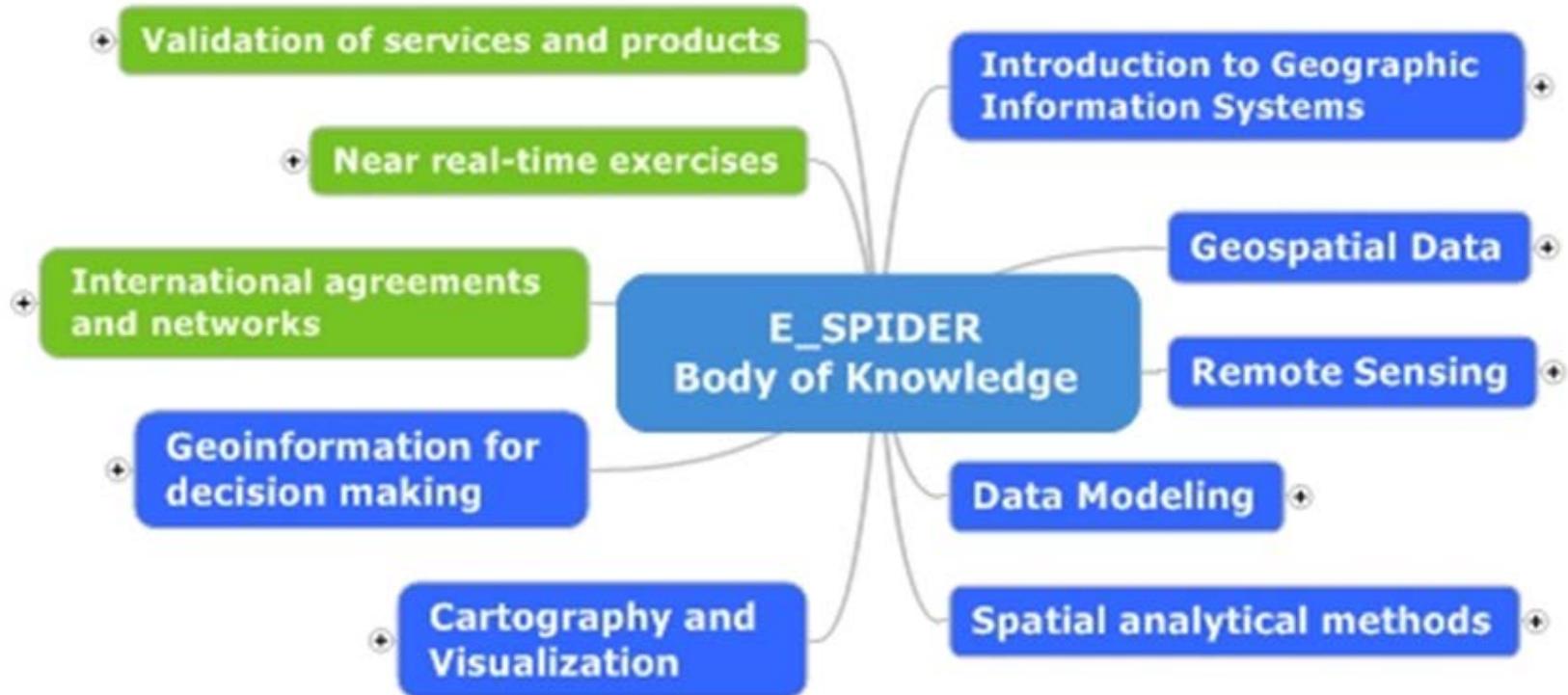
# e-SPIDER > body of knowledge

e\_SPIDER concept and body of knowledge



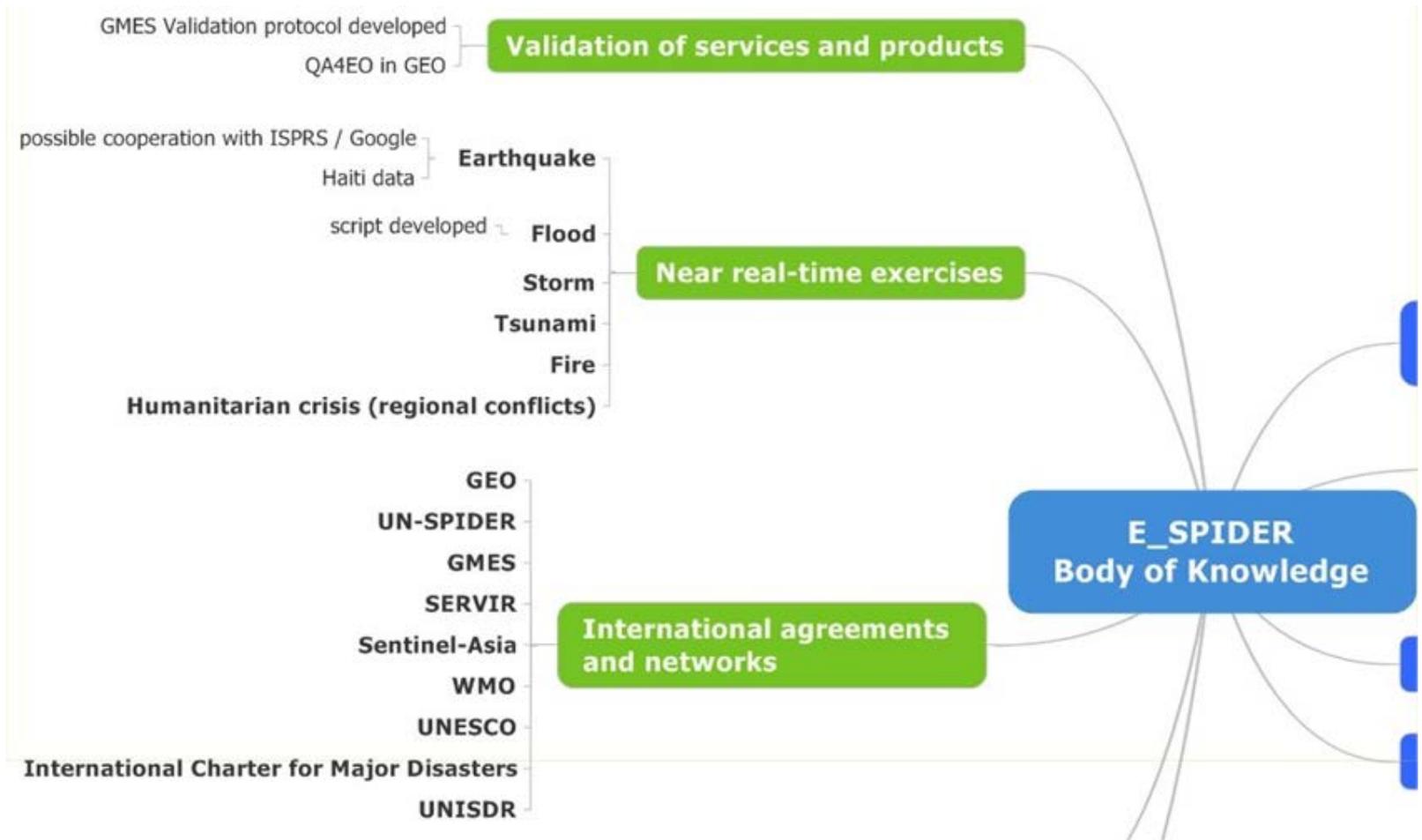
# e-SPIDER > body of knowledge

e\_SPIDER concept and body of knowledge



# e-SPIDER > body of knowledge

e\_SPIDER concept and body of knowledge (Res 2)



# e-SPIDER > body of knowledge

e\_SPIDER concept and body of knowledge

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## *Achievements:*

The e\_SPIDER Body-of-Knowledge (BoK) provides **the starting point for a comprehensive curriculum** to build

## *Challenges:*

**ontology of capacity building for DM** is presently been developed by UN-SPIDER and should be offered at the KP (Knowledge Portal - [www.un-spider.org](http://www.un-spider.org)) which will **provide guidance on terminology and manage relationships**. The terminology of the BoK should be revised according to the forthcoming definitions.

Existing material from the network of training centers has to be tailored into the core curriculum.

## **A learning context has to be developed and maintained.**

The content is 20% of success if continuously kept up-to-date; the learning framework constitutes the remaining 80 %. An important notion in this context: **learning is a social process!**

# e-SPIDER > prototype

prototype of e\_SPIDER platform

The screenshot displays the e-SPIDER prototype interface. At the top, a navigation bar includes links for Home, Courses / LV, Organizations, Hilfe, Contentpool, and eTeachingTipps, along with icons for home, help, and a document. A left sidebar lists menu items: eSpider, GIS Introduction, EuroGIS, Remote Sensing, Assignments, and Announcements, with buttons for Course Map, Control Panel, Refresh, and Detail View. The main content area features the UN logo, a satellite map, the text 'e\_SPIDER', and a stylized globe logo. The central focus is a mind map diagram with 'E\_SPIDER Body of Knowledge' at the center, connected to ten related topics: Validation of services and products, Near real-time exercises, International agreements and networks, Geoinformation for decision making, Cartography and Visualization, Introduction to Geographic Information Systems, Geospatial Data, Remote Sensing, Data Modeling, and Spatial analytical methods.

The screenshot displays the e-SPIDER prototype interface. At the top, there is a navigation bar with tabs for Home, Courses / LV, Organizations, Hilfe, Contentpool, and eTeachingTips. On the right side of this bar are icons for home, help, and a document. Below the navigation bar is a blue sidebar menu with the following items: eSpider, GIS Introduction, EuroGIS, Remote Sensing, Assignments, and Announcements. There are also four buttons in the sidebar: Course Map, Control Panel, Refresh, and Detail View. The main content area shows a breadcrumb trail: COORDINATION TOOLS (PL\_C001001) > GIS INTRODUCTION. Below this, there is a list of lessons, each with a folder icon and a brief description:

- GIS Introduction**
- Lesson 2: Geography and GIS**  
Geography is the "G" in GIS. Let us now explore the impact of geography on the field of GIS.
- Lesson 3: GIS in Action**  
GIS is fundamentally about workable applications. This lesson gives a flavor of the breadth and depth of real-world GIS implementations.
- Lesson 9: Enterprise GIS**  
Enterprise GIS is the full-blown organisational use of a GIS. Organisational and institutional aspects have to be considered for a successful implementation. Only then can real benefit accrue.
- Lesson 10: Current Trends**  
The development of GIS started in the 1960s and 1970s. Since then lots of things have changed and GIS still is in a continuous state of flux.
- Lesson 12: Spatial Reference Systems I**  
What is critically important in GIS? Location, location, location! As soon as we start using spatial data we need some kind of referencing system to locate features on the Earth's surface.

The screenshot displays the e-SPIDER web application interface. At the top, there is a navigation bar with tabs for Home, Courses / LV, Organizations, Hilfe, Contentpool, and eTeachingTips. On the right side of this bar are icons for home, help, and a document. Below the navigation bar is a blue sidebar on the left containing a list of course items: eSpider, GIS Introduction, EuroGIS, Remote Sensing, Assignments, and Announcements. Below this list are three buttons: Course Map, Control Panel, and Refresh, with a Detail View link below the Refresh button. The main content area on the right is titled 'Lesson 3: GIS in Action'. It contains several sections: 'Introduction' explaining the spatial nature of GIS applications; 'Learning Objectives' listing three goals for the lesson; 'GIS in Action: Key Lesson Concepts' with links to presentation files and notes; 'A Gallery of Applications' with a link to a book chapter; and a source citation at the bottom.

Home Courses / LV Organizations Hilfe Contentpool eTeachingTips

eSpider  
GIS Introduction  
EuroGIS  
Remote Sensing  
Assignments  
Announcements

Course Map  
Control Panel  
Refresh  
Detail View

### Lesson 3: GIS in Action

#### Introduction

GIS is applied in many diverse areas where the problems that have to be solved are spatial in nature. One of the reasons for the huge range of GIS applications in transportation, business, local government, environmental and social science etc. is the fact that about 80% of all data have a spatial component. This lesson will introduce you to the different application areas and give some examples of where and how GIS is being used.

#### Learning Objectives

On completion of this lesson you should be able to:

- give examples of some current GIS applications,
- understand where and how GIS is being used,
- describe a wide variety of projects that may benefit from GIS and
- evaluate some of the advantages of GIS for problem solving.

#### GIS in Action: Key Lesson Concepts

[Open Presentation! \(Package File\)](#)  
[Open Presentation Notes!](#)

GIS is fundamentally a problem-solving science. We will now introduce a number of different case studies that demonstrate the usage of GIS, showing that the spatial perspective adds value to decision support.

#### A Gallery of Applications

[Longley et al., 2001. Geographic Information Systems and Science, p. 28 - 57, chpt. 2.1 - 2.4.](#)

This chapter considers how GIS affects our everyday lives, how GIS applications have developed, and how the field compares with scientific practice. It considers the goals of applied problem-solving, and how GIS can be used to study and solve problems in transportation, the environment, local government, and business.

Source: Longley, P. A., Goodchild, M. F., Maguire, D. J. and Rhind, D. W., 2001. *Geographic Information Systems and Science*. John Wiley & Sons, Ltd. p. 28 - 57. Licensed with permission from John Wiley & Sons, Ltd. Copyright (c) 2001 by John Wiley & Sons, Ltd. Order this text in [hardcopy](#).

The screenshot displays the e-SPIDER web application interface. At the top, there is a navigation bar with links for Home, Courses / LV, Organizations, Hilfe, Contentpool, and eTeachingTipp. On the right side of this bar are icons for home, help, and a printer. Below the navigation bar is a blue sidebar menu with the following items: eSpider, GIS Introduction, EuroGIS, Remote Sensing, Assignments, and Announcements. There are also three buttons in the sidebar: Course Map, Control Panel, and Refresh. The main content area is titled 'COMMUNICATION TOOLS (PL. CONTENT) > REMOTE SENSING' and features a 'Remote Sensing' section with a folder icon. Below this, there are four lesson cards, each with a folder icon and a large green hexagonal number:

- 1 LESSON 1: INTRODUCTION INTO THE REMOTE SENSING MODULE**  
In this introductory lesson to the remote sensing module (RS module), answers to the following questions are provided; Why do we use remote sensing? What makes it so fascinating? Why is remote sensing such a useful method for many geo-related projects and why is there sometimes no other alternative but to use remote sensing? How did remote sensing develop over time? Enjoy the lesson and have fun!
- 2 LESSON 2: ELECTROMAGNETIC SPECTRUM**  
In this lesson we discuss the media we mainly use for remote sensing purposes. Observing objects from a remote distance is possible, because we can receive information about them. The transmission media influences the information about the objects in various ways. Objects on the earth's surface are illuminated by radiation and we receive this reflected energy as an image. Where does the radiance come from? What are the physical properties of the radiation and how does it change on its way from the source to the object and back to our sensor? These are the main question we answer in this lesson. But first we need to clarify, how light - as a part of the electromagnetic spectrum - is produced and how temperature play a role in this process.
- 4 LESSON 4: SENSORS & PLATFORMS**  
To record a remote sensing image a sensor is definitely necessary. Before we start this lesson – do you know a very reliable sensor? O.K., go to a mirror and look at the image! Do you see your eyes, your face, and your hair? Of course you do! You have done a good job, especially in terms of remote sensing, because you have just remotely sensed the image of your face with one of your sensors - your eyes! Our eyes permanently sense our environment in the range of the visible electromagnetic spectra. And in addition: this sensing information is processed, analysed and interpreted in real time. Unfortunately we can not record the information we receive with our human brain, because there is no serial bus interface in our brain. That is the only reason why we need a remote sensing sensor with recording and image storage capability. What systems are available and for which task do I use a sensors image product? These are the key questions answered in this lesson.
- 12 LESSON 12: APPLICATION: HAZARD AND CRISIS MONITORING**  
For a fast monitoring of natural and man-made crisis remote sensing imagery is from great value. In this lesson we learn about some projects demonstrating successful application of remote sensing techniques in the respective monitoring domain.

The screenshot displays the e-SPIDER web application interface. At the top, there is a navigation bar with links for Home, Courses / LV, Organizations, Hilfe, Contentpool, and eTeachingTips. On the right side of the navigation bar are icons for home, help, and a red arrow. Below the navigation bar is a breadcrumb trail: COMMUNICATION TOOLS (E-CONTROL) > REMOTE SENSING > LESSON 12: APPLICATION: HAZARD AND CRISIS MONITORING. An [EDIT VIEW](#) link is located at the top right of the main content area.

The main content area is titled **LESSON 12: APPLICATION: HAZARD AND CRISIS MONITORING**. It contains several sections, each with a document icon:

- INTRODUCTION**: Natural and man-made hazards often affect a huge number of people. In most cases it is necessary to get actual information about the extent of and the damage caused by a hazard event. Remotely sensed imagery generally can provide such an information from a bird's perspective and with a lot of detail. This lesson provides some examples for successful, fast application of remote sensing imagery for hazard and crisis monitoring.
- LEARNING OBJECTIVES**: Upon completion of this session you should be able to extract changes of earth surface objects very fast (close to real time). This mapping is necessary to response effectively in case of natural hazards and catastrophe.
- APPLICATION: HAZARD AND CRISIS MONITORING: KEY LESSON CONCEPTS**:
  - [Open Presentation!](#) (Package File)
  - [Open Presentation Notes!](#) ( zip file)Learn more about how to react with remote sensing technology to natural hazards and man made catastrophe in the key document.
- Training Manual on Earth Observation for Decision Makers (ONLINE)**: This is a good manual for remote sensing with examples from environmental monitoring, regional planning, catastrophe analysis and management, climate change, food security, national security, and many more. All examples are discussed from a remote sensing perspective, i.e. how to use remote sensing image analysis methods and processes in respective fields.

The zip file for the training tutorial is available online (see link below in this section). However, due to the big size of the zip file, we offer a CD download as well. The zip file consists of a number of pdf files you have to unzip to a local directory.

Source: GAF, 1999. *Training Manual on Earth Observation for Decision Makers* [online]. Available from <http://www.geoville.com/Train4DM/contents/train4dm.zip>. © 1999, GAF mbH - GeoVille

On the left side of the interface, there is a blue sidebar with the following menu items: eSpider, GIS Introduction, EuroGIS, Remote Sensing, Assignments, and Announcements. Below these are four buttons: Course Map, Control Panel, Refresh, and Detail View.

## *Achievements*

Harvesting on existing experience and material of successfully running programmes, it proofs to be **efficient and effective compiling a course environment for UN-SPIDER**. Pre-conditions are that a well-structured curriculum is in place and the software platform is operational.

## *Challenges*

**Maintenance in all sectors is essential.** Sectors comprise the technical environment (software, data and web server), the tutoring on a continuous basis, as well as the available human resources to keep the content on the e-learning platform up-dated and to develop new material. In our opinion, these factors constitute the most prominent management decision to be made by the UN-SPIDER consortium.

# > Disaster risk reduction Capacity Development & Training

- *Providing Geographical Information Systems (GIS) technical support for Disaster Risk Reduction programmes implemented by DIPECHO partners in the South East African and South West Indian Ocean region*
- *Funded through the **EC DIPECHO framework** (Disaster Risk Reduction in Humanitarian Aid & Civil protection)*

*implemented by*



**Z\_GIS**

*in cooperation with*



**Z\_GIS**

# > Disaster risk reduction Capacity Development & Training

- Focus on various NGOs
- Awareness raising at National levels



# > Disaster risk reduction Capacity Development & Training

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- **Activities include**

- Seminars (Awareness raising at governmental level) in support of UN-SPIDER
- Training (Support NGOs for community and district based vulnerability mapping activities)
- A modular regional DRR database is being established

# > Disaster risk reduction Capacity Development & Training

## ■ Seminars

- Regional Seminar: 9-11 Nov 2010 in Antananrivo (Madagascar) in collaboration with CARE & FAO
- National Seminar Madagascar: 11 Nov 2010
- National Seminar Malawi: 16 Nov 2010



# > Disaster risk reduction Capacity Development & Training

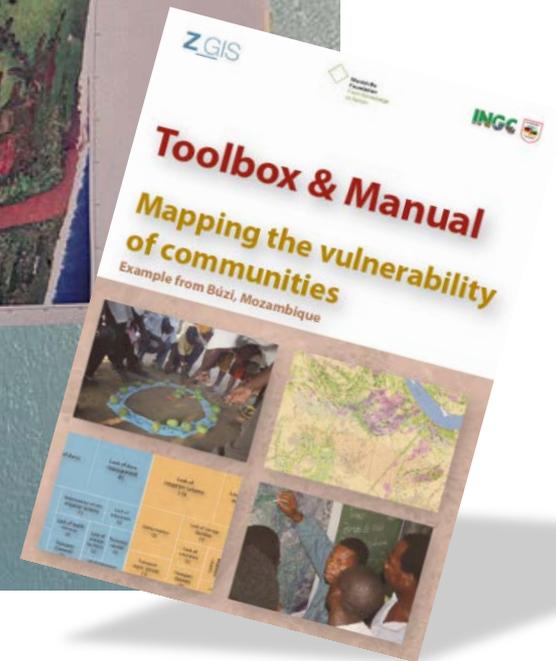
## ■ Trainings

- *Sambava, Madagascar (13 – 17 Dec 2010)*
- *Salima, Malawi (30 Nov – 4 Dec 2010)*
  
- Concepts of GIS/Remote Sensing (Geoinformation) in the domain of Disaster Risk Reduction
- Concepts of vulnerability, hazard and risk
- Introduction to GPS and GIS software
- Methodology on participatory vulnerability community mapping (with hands on exercise)

# > Disaster risk reduction Capacity Development & Training



# > Disaster risk reduction Capacity Development & Training



# > Disaster risk reduction Capacity Development & Training



# > Disaster risk reduction Capacity Development & Training



# > Disaster risk reduction Capacity Development & Training





# Future plans

- **Innovation:** improvement and **automation** of processing chains & **change detection** techniques
- **Research:** risk and vulnerability mapping, including tools and products enhancing mitigation and preparedness, thereby **supporting adaptation strategies** and **prevention capacities** & geo-information tools and products **supporting the recovery process**, such as reconstruction efforts
- **Sharing of knowledge and capacity development:** we are wide open for collaborations

**Thank you**