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Towards an Interactive Educational Environment for Disaster Management Support (IEEDM Project)

Dr. Algis Kucinskas, ENSAPLV, Paris, France

Dr. Brian Tomaszewski, CMS/RIT, Rochester, NY USA

Outline

1. Educational geoportal (IEEDM) project team
2. Moving towards an IEEDM
 - An educational programme
 - DM user community needs analysis/assessment
 - IEEDM project objectives & approach/timeline
3. **Step 1:** General concepts, core components, planned applications / target end-users
4. **Step 2:** IEEDM structure & features in practice
5. **Step 3:** The way forward

IEEDM Project Team

- **Algis Kucinkas**, Ph.D., ENSAPLV, Paris, France
Member UN-SPIDER KP Core Group & Expert Group on CB
former Staff Scientist, JPL/NASA, Pasadena, CA USA
(Geosciences, Space & Geo-information Science & Technology and
Applications , Education & Training, Capacity Building)
- **Brian Tomaszewski**, Ph.D., CMS/RIT, Rochester, NY USA
UN/OCHA Consultant/Researcher, UN-SPIDER KP Contributor
(Geographic Information Science & Technology (GIS & T), Geovisual
Analytics, Disaster Management, Geospatial Technology Education)

Advisors

- **Bikash Chaudhuri**, Architecte DPLG, ENSAPLV, Paris, France
(Architecture, Urban Planning, Environmental Issues, Education)
- **Dogan Seber**, Ph.D., NRC, Rockville, Maryland, USA
former Director, Geoinformatics Lab, SDSC, San Diego, CA USA
(Geophysics, Information Science & Technology, Education)

An Educational Programme

- In response to identified user communities needs & to address recommendations of UNISPACE III & the MDGs, we initiated an educational programme within the Geoinformatics Lab, SDSC (2006).

PROGRAMME GOALS:

- Design, develop, implement & evaluate distributed GIS solutions (digital learning resources & learning environments) for awareness raising, transfer of knowledge, & capacity building specific to the use of space, geo-information & other relevant technologies applications & concepts for addressing social, economic, and environmental impact issues.

Moving Towards an IEEDM: DM User Community Needs Assessment /Analysis

- In the period 2007-2008 A. Kucinskas participated in several UN-SPIDER-relevant Workshops and meetings (ongoing proces).

- One important fact which emerged:

there is a gap between the required basic knowledge/understanding to efficiently use geographic information & the relevant formal training/capacities for some of the planners, managers, and decision-makers involved in DM/ER activities.



10th UNGIWG Plenary Meeting, Bonn, 19-21 Oct 2009

To contribute to reducing this gap & address DM user community needs we adapted our educational programme to support specific activities of UN-SPIDER: (1) systematic compilation of relevant information; (2) define & implement a KP; (3) awareness raising; (7) management & transfer of knowledge; (11) support to capacity building (Ref – UN document A/AC, 105/894).

IEEDM Project: Objectives

- Within our educational programme, the primary aim of this effort is to develop an interactive, web-enabled educational geoportal designed to support full natural disaster management cycle planning & decision making activities.
- The planned inquiry & case study-based, hands-on e-learning/training environment seeks to help end-users at all levels & from a wide variety of backgrounds:
 - acquire an understanding of hazard/disaster risk and impact on society & the environment (awareness raising).
 - Learn of the benefits of space, geo-information & other relevant technologies-based geospatial information/knowledge for DM/ER (awareness raising).
 - Learn how to efficiently use/apply such information & knowledge for improved planning & decision-making (capacity building).

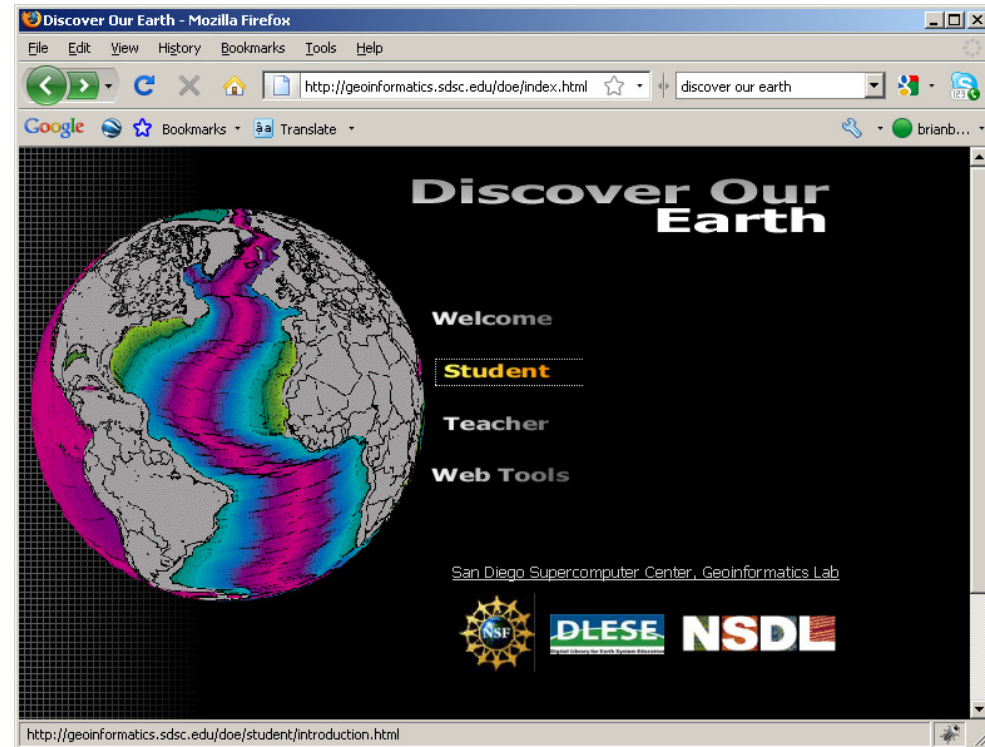
IEEDM Project: Approach / Timeline

Towards our objectives, a stepwise approach:

- **Step 1 (2007-2008):** Launching of the initiative, project roadmap, general concepts and design.
(Ref – Kucinkas & Seber, EGU 2007 & 2008).
- **Step 2 (2009-):** Partnership with Dr. B. Tomaszewski (CMS/RIT): concept expansion, IEEDM proof-of-concept prototype
(Ref – Tomaszewski RIT SIG Grant).
- **Step 3 (2010 ?):** Develop full scale IEEDM, user evaluation.

Step 1 - General Concepts / Educational Foundations

- IEEDM builds on & extends earlier work on a dynamic, web-enabled, interactive & user friendly Educational Information System called « Discover Our Earth (DOE) », built at Cornell & SDSC for geosciences education purposes.
- IEEDM draws upon proven pedagogical concepts developed from DOE, such as: an effective inquiry/discovery-based, hands-on approach to learning & the use of real world geospatial data.
- One key advantage: users feel empowered playing an active part while learning to make & interpret value-added hazards risk information & knowledge map products (Source: DOE student surveys).



DOE was funded in full by the National Science Foundation (NSF)

Step 1 - IEEDM Core Components

- **Geo-databases** for selected disaster-prone areas, including multihazard-relevant geospatial data from various sources.
- **GIS-based software components**, including an interactive mapping/analysis tool.
- **Online interactive study guides** on the topics addressed by the data sets.
- **Interactive applications** for effective inquiry-based, hands-on learning in the form of:
 - study guides-relevant « virtual exercises » and discovery-based mapping activities
 - Personalized regional training case study sessions: **study region selection & documentation; making a hazard info product; make inferences in terms of DM-related risk assessment & reduction, planning & decision-making for the at risk study region.**

Step 1 – Planned Applications / Target End-Users

The IEEDM seeks to complement traditional class-based awareness raising & capacity building initiatives by targeting a wide audience with varying technical skill levels & diverse educational, cultural, and institutional backgrounds.

NOTEWORTHY PLANNED APPLICATIONS:

- **Quickly educating/guiding** those involved in DM/ER but with little or no formal training in geosciences, space science & technology & applications, as well as the handling & interpretation of geospatial data & derived geospatial information and knowledge.
- **Empower novice users** with the required skills/vocabulary to facilitate communication between & help create bridges to connect the various communities involved in DM/ER.
- **Empower local populations** for an increased participation in their own DM efforts, leading to improved 2-way communication, sharing of information & feedback between professionals with technical skills & the vulnerable population in the field.

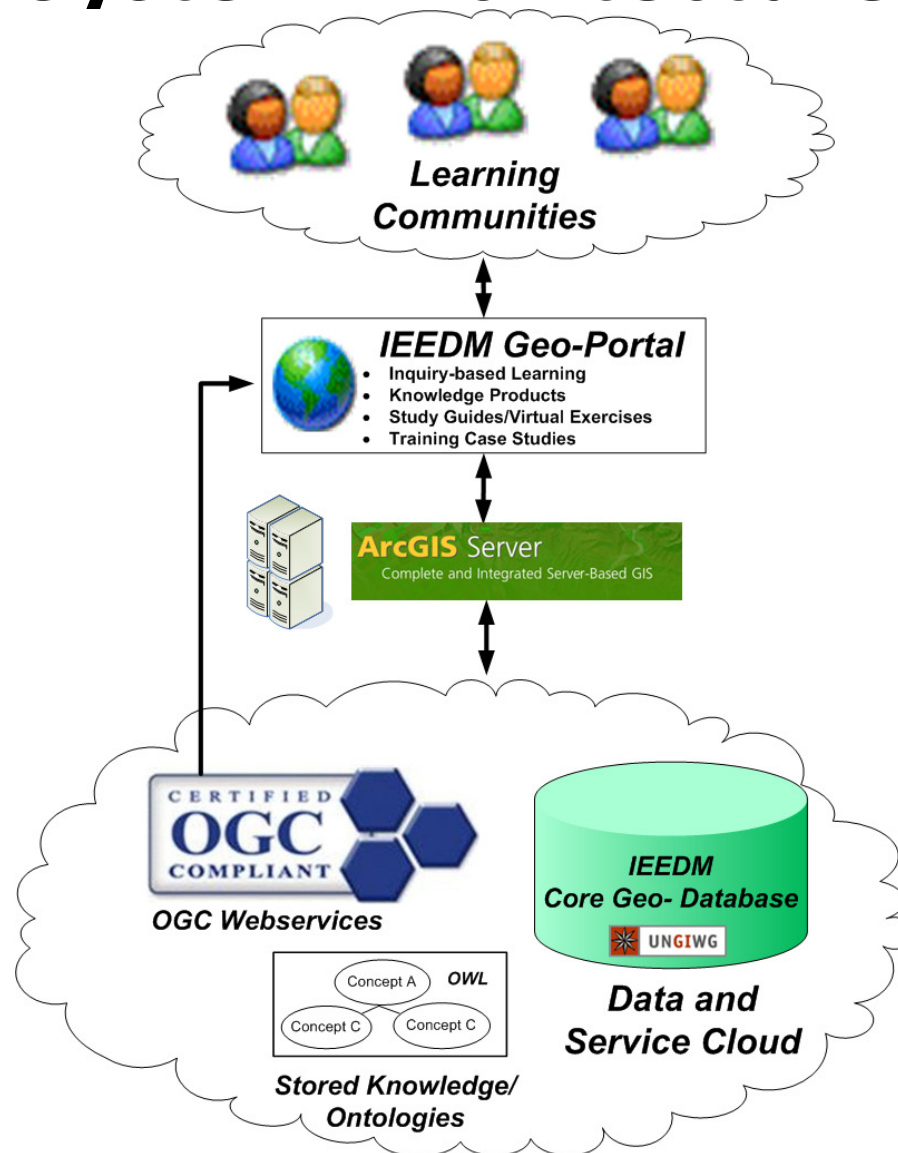
Step 2 - IEEDM System Architecture

Based on a classic 3-tier approach:

- Library
- Middleware of GIS-based software.
- User Interface (simple to use, interactive).

Uses advanced technology:

- Cloud computing
- Knowledge communities



Step 2: IEEDM Features in Practice

The screenshot shows a Mozilla Firefox browser window displaying the IEEDM website. The browser's address bar shows the URL <http://geoapps.rc.rit.edu/geoportal/index.html>. The website header features a globe icon and the title "Interactive Educational Environment for Disaster Management (IEEDM)". Below the header, there is a navigation menu with links: HOME, NEWS, SPACE AID, COMMUNICATIONS, and ABOUT US. A search bar is also present. On the left side, there is a sidebar with a "LINKS" section containing buttons for "GEOSPATIAL DATA", "Defined", "Baseline Data", and "Time-Series Data". Below this, there is a list of categories: GIS TECHNOLOGY, SPACE TECHNOLOGY, EARTH SCIENCES OVERVIEW, HAZARDS & RISKS, DISASTER MANAGEMENT, INTERACTIVE MAPPING TO..., and TRAINING CASE STUDIES. The main content area displays a circular diagram titled "SPACE AID MATRIX" with the instruction "Click on the SPACE AID MATRIX to select a topic from the IEEDM". The diagram is a circular chart with segments representing different disaster types and management phases. The outer ring includes segments for "Disaster", "Oil Spill", "Fire", "Flood", "Drought", "Extreme Temperature", "Earthquake", "Tsunami", "Hazardous Materials", "Mass Movement", and "Volcano". The inner ring includes segments for "Sat Com", "Sat Nav", "EO/RS", "Preparedness", "Response", and "Recovery".

Step 2: IEEDM Features in Practice

Screenshot of the IEEDM website interface in a Mozilla Firefox browser window.

The browser address bar shows: <http://geoapps.rc.rit.edu/geoportal/index.html>

The website header includes a globe icon and the title: **Interactive Educational Environment for Disaster Management (IEEDM)**. Below the title, it lists affiliations: RIT - Rochester Institute of Technology and ENSAPLV - Ecole Nationale Supérieure d'Architecture de Paris La Villette.

The navigation menu includes: HOME, NEWS, SPACE AID, COMMUNICATIONS, ABOUT US, and a Search bar.

The left sidebar contains a "LINKS" section with the following categories:

- GEOSPATIAL DATA
- GIS TECHNOLOGY
- SPACE TECHNOLOGY
- EARTH SCIENCES OVERVIEW
 - Solid Earth Sciences
 - Atmospheric Sciences
 - Hydrology & Ocean Sciences
 - Meteorology & Global Change
 - Earth System Science
- HAZARDS & RISKS
- DISASTER MANAGEMENT
- INTERACTIVE MAPPING TO...

The main content area displays "Earthquake basics" and "Plate Tectonics".

The "Plate Tectonics" section features a satellite image of a tectonic plate boundary.

The "Earthquake basics" section includes a diagram titled "Earthquake basics: Again" showing a 3D block representing the Earth's crust. The diagram labels the following components:

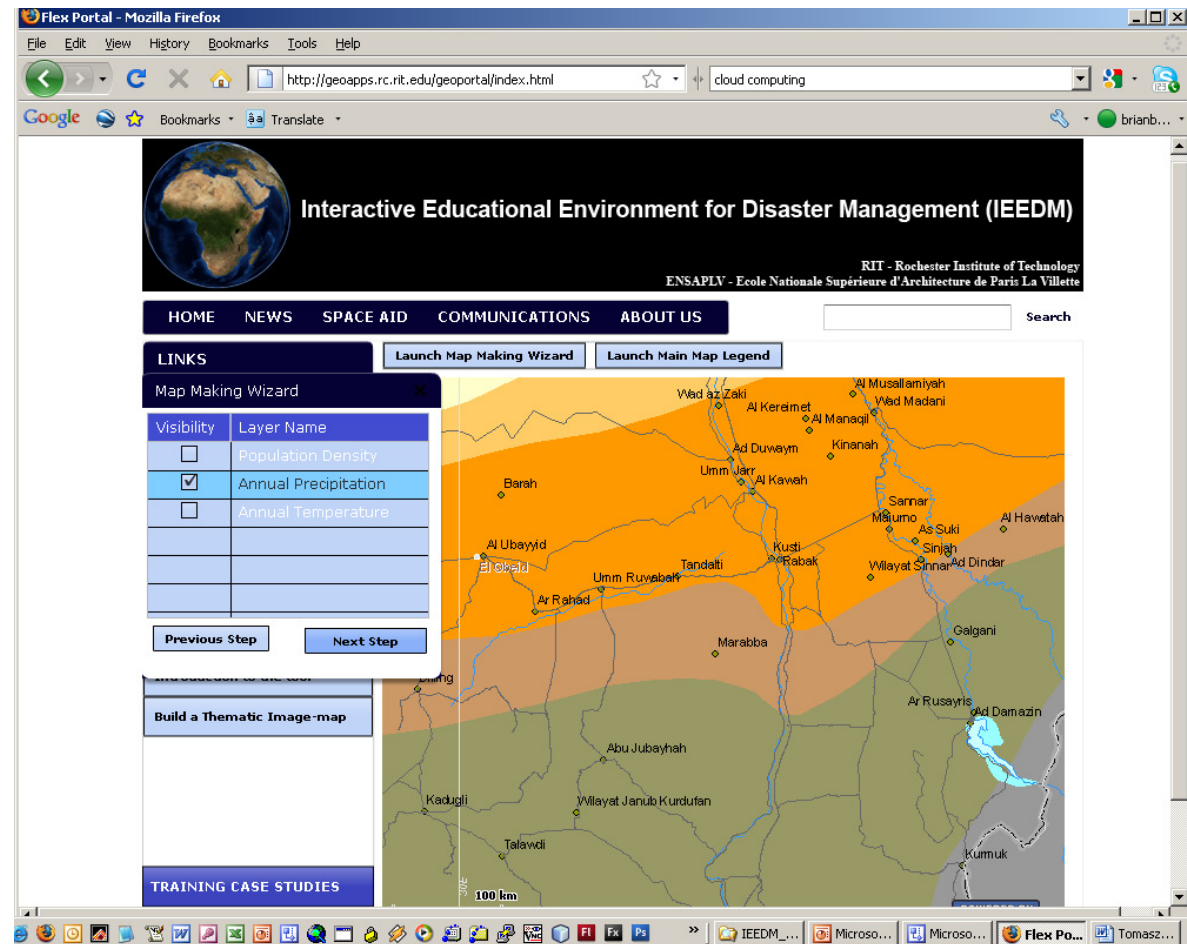
- Fault**: The surface where the rupture occurs.
- Focus**: The point within the Earth where the earthquake originates.
- Epicenter**: The point on the Earth's surface directly above the focus.
- Fault scarp**: The topographic step created by the fault.

Below the diagram, there is a text box explaining Plate Tectonics:

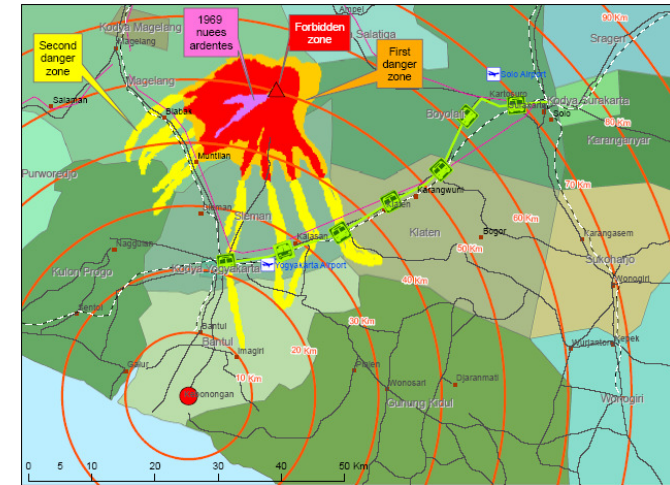
Plate Tectonics is a set of related concepts that describe how the Earth works. Plate tectonics explains what happens when two continents run into each other, how and why parts of the Earth's surface are ripping apart, and why volcanoes and earthquakes occur where they do. The rigid outer

Step 2: IEEDM Features in Practice

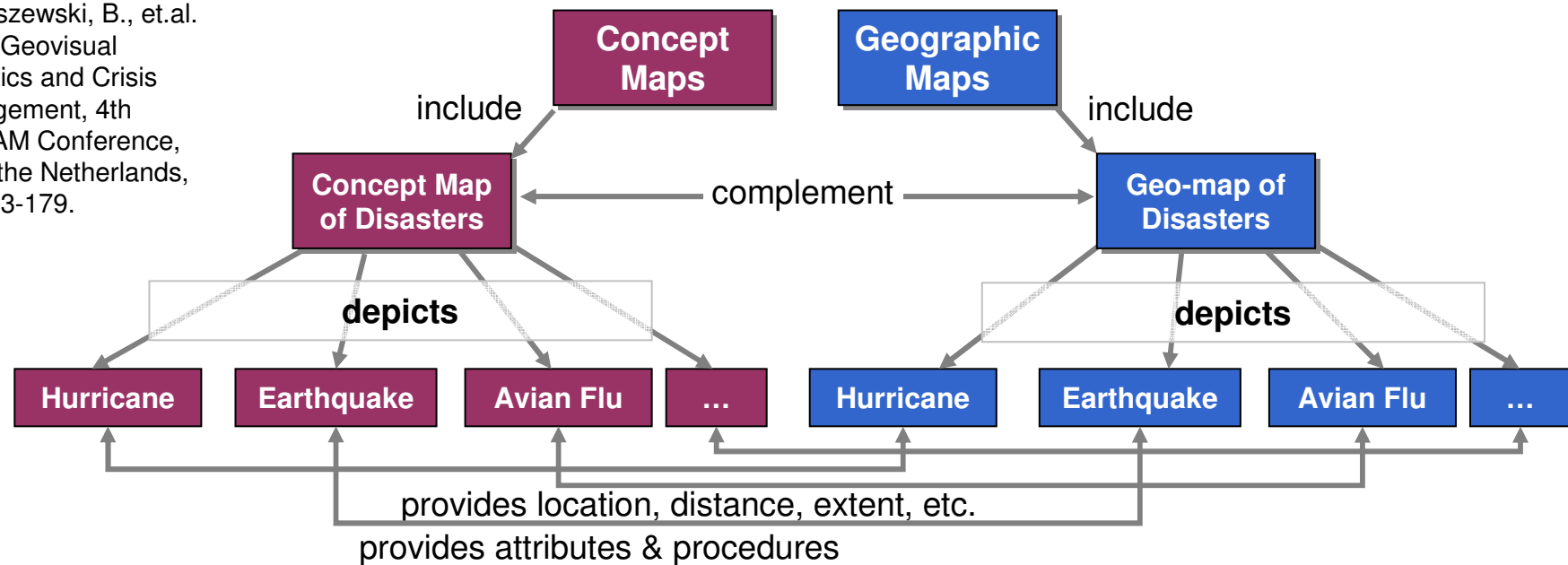
- Thematic image-map
- IEEDM prototype
- Annual Precipitation drapped over eastern Sudan
- Rivers and populations centers
- Custom, value-added hazard risk information and knowledge product IEEDM users can create
- Personalized regional training case study session
- Interactive resources (map wizard)
- Produce, analyse and interpret knowledge products for disaster management-related planning and decision making



Idea - Concept Map – Geographic Map Integration

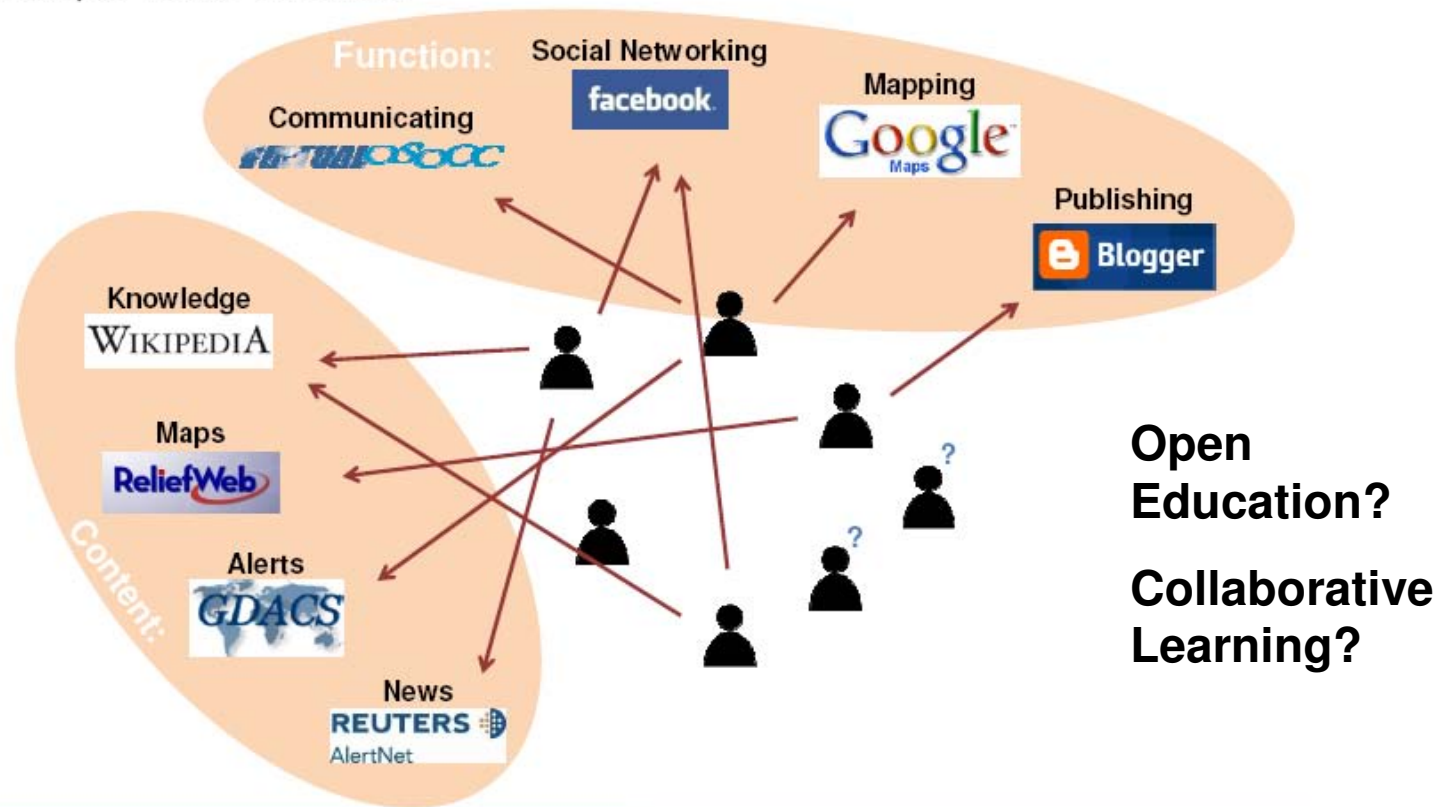


Graphic from
Tomaszewski, B., et.al.
2007. Geovisual
Analytics and Crisis
Management, 4th
ISCRAM Conference,
Delft, the Netherlands,
pp. 173-179.



Idea - Learning Communities

Knowledge + Community.
Multiple Web Platforms.



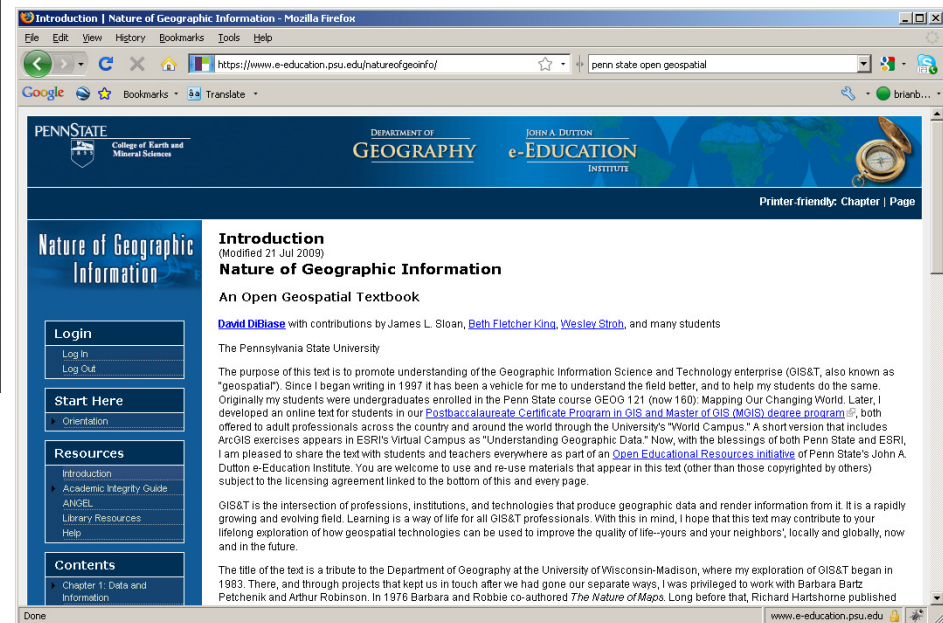
Graphic in part from "UN-SPIDER Knowledge Portal - Development of the UN-SPIDER Knowledge Portal" available online at: http://www.oosa.unvienna.org/pdf/unspider/Bonn2008_presentations/LYU%20-%20UN-SPIDER%20Knowledge%20Portal_v5_211008%20.pdf

Idea - Learning Communities

- Real time/asynchronous collaboration to support education
- Non-core IEEDM content – user driven/created (web 2.0), open content



Examples to demonstrate the idea



Step3 - The Way Forward

- Potential inclusion of the prototype educational environment within UN-SPIDER's KP.
- Usability evaluation of the prototype
- Development & evaluation of full scale IEEDM
- At term, consider uploading user's data for training exercises.
- Ultimately, consider possibility integrating real or near real-time regional data, for interactive blended EIS/DSS functions.

Thank you for your attention

Algis Kucinskas

algis.kucinskas@noos.fr

Brian Tomaszewski

bmtski@rit.edu

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