Mapove zdroje-GEO-GEOSS-DE-Swot-FE-
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GEO, GEOSS, GM, DIGITAL EARTH, FUTURE EARTH, Examples of Disaster Solutions

Milan KONECNY

former president of ICA and ISDE, VP IEAS
Chairman of ICA Commission for Cartography on EW&CM
Masaryk University, Brno, Czech Republic
ViennaUniversity, Austria
ShenzhenUniversity, Shenzhen, China

Nanjing Normal University, Nanjing, China
Chinese PetroleumUniversity, Qingdao, China
Henan University, China

East Kazakhstan State Technical University im. Serikbayeva, Ust Kamenogorsk-Oeskemen

1. GEO, GEOSS
2. Global Map
3. Digital Earth; A European Perspectives - SWOT Analysis
4. Digital Earth in Australia
5. Future Earth
6. How Can Help Cartography? Cartographic Potentials
7. Conclusions

1. GEO, GEOSS

Introduction: responding to global challenges

Scientific understanding of the Earth system and its physical, chemical and biological components continues to improve every year. But ***more data is urgently needed for monitoring trends and predicting* how physical and ecological systems will evolve.**

As humanity places ever greater demands on the Earth's resources over the coming years and decades, a greater ability to understand global change and predict how natural systems will respond to human activities and policies becomes ever more vital.

Recognizing the need for better environmental information, political leaders at the 2002 World Summit on Sustainable Development in Johannesburg called for urgent action on **Earth observation**.

Earth observation summits in Washington, Tokyo and Brussels and declarations by three of the annual Group of Eight (G8) summits built on this momentum.

Acting on a clear international consensus, **ministers established GEO in 2005 with a mandate to build a Global Earth Observation System of Systems, or GEOSS.**

The **cross-cutting data, decision-support products and end-to-end information services**

that are increasingly available through GEOSS are improving the ability of governments to promote "green" economic growth, manage natural ecosystems and resources, ensure food security for a global population that may reach nine billion people by mid-century,

respond more effectively to disasters, and address climate change, biodiversity loss and other global challenges.

GEOSS
10-Year Implementation Plan

Disasters.

A number of operational systems for supporting disaster response have made steady to strong progress. Collaborative ***''Supersites''*** have been established so that the scientific community can monitor and analyze volcanoes and earthquakes more rapidly and effectively; for example, Supersites have improved assessments of recent earthquakes in Haiti, China and Chile.

SERVIR (SERVIR – a concrete example of societal benefit that already is being achieved through coordinated earth observation, monitoring and forecasting).

SERVIR provides mapping for disaster response and has assisted countries in Central America and the Caribbean to respond to hurricanes, earthquakes and other extreme events;

SERVIR is now in the process of expanding its support to other regions, notably Africa and the Himalayas.

Other advances include the **development and contribution to GEOSS of global, regional and national early-warning and detection systems for forest fires;**

improved access for GEO Members to the International Charter on Space and Major Disasters and the satellite data it provides for countries of South East Asia and Latin America and, soon, Africa; and ongoing observations and reports on floods, landslides and other disasters by Sentinel Asia.

Showcase: Better knowledge about geohazards

The Geohazard Supersites initiative is a global scientific collaboration that aims to improve scientific understanding of the risks of earthquakes and volcanic events in selected regions. The Supersites currently being addressed are L'Aquila, Chile, Etna, Haiti, Istanbul, Los Angeles, Naples (Vesuvius), Seattle/Vancouver and Tokyo.

The geohazard community is also working on establishing an earthquake Supersite for the disastrous 2008 earthquake in Wenchuan, China, to better understand China's worst disaster in the last 30 years.

The Supersites partnership consists of the providers of ground-based geophysical data, such as seismic and GPS data; space agencies, which provide satellite radar and other Earth observation data; along with scientists and decision makers who use and analyze these data.

The initiative provides a **cyber-infrastructure platform with a single web entry point that allows fast, easy and free-of-charge access to a complete satellite and ground-based geophysical data set derived from diverse sources and geophysical disciplines.**

The Supersites complement the International Charter on Space and Major Disasters, which provides imagery for search and rescue operations.

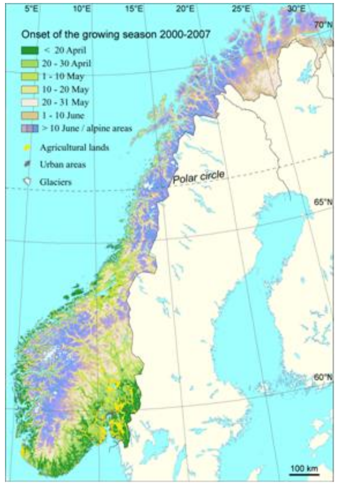
Operational View

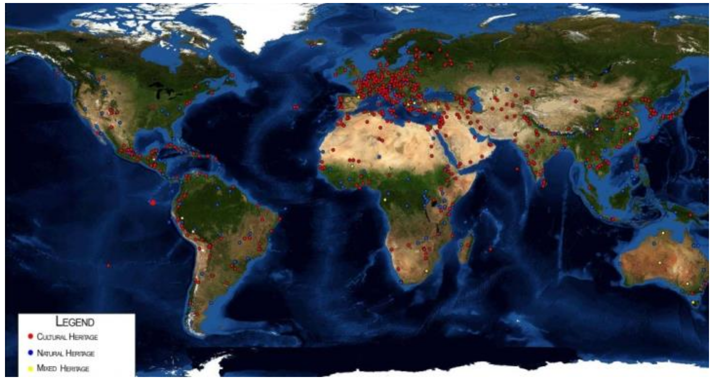
How users access GEOSS data and information via the GEO Portal

- The "GEOSS Common Infrastructure" consists of a dedicated web portal, a clearinghouse for
- searching data, information and services, and a registry containing information about GEOSS. It
- provides a "one-stop shopping" portal to help the users of Earth observations access and search
- for information more easily. After almost two years of development, in July of this year the GEO
- community formalized the arrangements by which leading institutions will operate and sustain
- the GEO Portal and its underlying clearinghouse and registry.

Ecosystem Classification & Mapping

(Australia, Austria, Brazil, Canada, China, EC, Italy, Paraguay, USA, RCMRD, UNESCO)





UNESCO

USGS science for a changing world

ABCC

* SHARE mountain stations operational

* All ecosystem mapping data available; DataCORE

* New maps of growing season

* Atlas of 40 Chinese World Heritage Sites

* Decision-making support: ABCC program

2. GLOBAL MAPPING

https://www.gsi.go.jp/common/000186726.pdf

Informačně/Znalostně-založená udržitelná Informační společnost

Spojení mezi trvalou udržitelností
a rozvojem informační splečnosti
je ještě málo prozkoumán.

Udržitelný rozvoj

soubor <u>rovnocenných</u> aspektů:

- ekonomických,
- ekologických,
- technologických,
- sociálních,
- kulturních,
- etických.

„Jaké procesy je nutno brát v úvahu při zvládání výzev 21. století ?“
EXPO 2000, Hannover

- **Globalizace začíná ovlivňovat mnoho dalších oblastí kromě ekonomie.**
- **Informační a komunikační technologie tento rozvoj řídí. Světově rozšířená Informační společnost nám nabízí mnoho nových příležitostí.**
- **Světová populace stále dramaticky vzrůstá, zejména v Asii a Africe.**
- **Neustálou podporou vyšší životní úrovně pro stále více lidí se zvyšuje tlak na omezené přírodní zdroje Země a zvyšuje se riziko jejich vyčerpání v budoucnosti.**
- **V příštím tisíciletí se budeme muset naučit jak zvýšit desetkrát produkci pro zvýšení ekonomického výstupu, bez zvyšování současného tlaku na přírodní zdroje Země.**
- **Z většího ekonomického výstupu musí mít prospěch zejména země Jihu.**
- **Takováto extrémní dematerializace může být dosažena pouze růstem inovací, pro něž zejména informační technologie nabízejí dobrý potenciál.**

Vlastní okruhy pro řešení problémů trvale udržitelného rozvoje na počátku 21. století byly na EXPO 2000 formulovány takto:

- **znalosti: informace, komunikace (Knowledge: Information, Communication),**
- **lidstvo (Humankind),**
- **životní prostředí: krajina, klimat (Environment: Landscape, Climate),**
- **mobilita resp.pohyblivost: budoucnost práce (Mobility, The Future of Work),**
- **energie (Energy),**
- **budoucnost zdraví (Health Futures),**
- **výživa (Nutrition),**
- **základní potřeby (Basic Needs),**
- **planeta vizí (Planet of Visions),**
- **otázky 21. století (21st Century)**

Kofi Annan, generální tajemník OSN, ve zprávě pro "High-Level Forum on City Informatization in the Asia-Pacific Region", Šanghaj, 1999:

„Svět je uprostřed informační revoluce. Informace a znalosti rychle expandují jak v oblasti kvality, tak i dostupnosti. Nové komunikační technologie přinášejí těm, kteří přijímají řešení, dříve nepředstavitelné nové nástroje pro rozvoj a rozvojovým zemím dramatické příležitosti pro skok do budoucnosti, a opuštění současné stagnace a poklesu, v němž setrvávají po léta a někdy i desetiletí.

Současně ale polovina světové populace nikdy neuskutečnila telefonický hovor nebo si sama neprohlížela WWW.

Propast mezi těmi, kteří přístup k informacím mají a těmi, kteří ho nemají, se rozšiřuje a existuje reálné nebezpečí, že světová chudoba bude vyloučena z informační revoluce. V rostoucím vzájemně závislém světě je něco, co by mělo být zájmem nás všech.

Vlády, mezinárodní organizace a jednotlivci musí všichni pracovat společně v zájmu překlenutí tzv. „digital divide“, tj. nestejného přístupu k informacím.

Joel L. Morrison,
bývalý president ICA,Barcelona ’95:

- **Kartografie je ovlivňována dvěma na první pohled rychlostně nestejně se rozvíjejícími oblastmi:**
  - **rozvojem geografického myšlení (jevící se jako pomalejší, ale naprosto nezbytné pro řešení problémů naší planety) a**
  - **rozvojem technologií (jevícím se jako výrazně rychlejší).**

Rhind 2000: Globální prostorové orientované datové projekty - motivy

- **Politický a vizionářský vliv (např. vize NSDI prezidenta Clintona, resp. vize Digitální planety Země definovaná Al Gore)**
- **Jevy probíhající mezi státy, jež nerespektují jejich hranice a vyžadují monitoring v reálném čase (např. Černobylská krize, která vyžadovala humanitární pomoc od mnoha zemí s minimálním prodlením).**
- **Vojenské požadavky na útočné nebo mírové operace kdekoliv na světě; mezinárodní harmonizace obsahu.**
- **Požadavky mezinárodních humanitárních organizací na konzistentní data pro zajištění (na makro-úrovni) relativních potřeb v různých, často rozlehlých oblastech, anebo ve středním měřítku menších oblastí v rámci jedné země nebo regionu.**

- Konzistentní data pomáhají minimalizovat náklady a maximalizovat kvalitu analytických postupů.

- Příležitosti pro obchod, od informace pro cestování (např. autoatlas) po široké použití v "mikro-geografii", nejbližší bankomat, až po servis poskytovaný pomocí Web samotnými občany (např. místa soukromých událostí). Posledně jmenované nepotřebují bezešvé mezinárodní mapy, ale konzistence obsahu a formy např. velmi vyhovuje nadnárodním poskytovatelům služeb.

- Konkurenceschopnost komerčních organizací na straně jedné a národních mapovacích agentur (v ČR např. ČÚZK) na straně druhé, kdy obě operují na mezinárodním trhu a dosahují redukce nákladů tím, že pracují na základě konzistentních specifikací.

JR 東京駅
Tōkyō Station
丸の内中央口
Marunouchi Central Entrance
●うらが白色灰色の
きっぷ
3-6
7~10

車内のご案内
Information
トイレ・化粧室
Toilet and Wash Room
電　話
Telephone
自動販売機
Vending Machine
くずもの入れ
Trash
空きカン入れ
Cans
乗務員室
Crew
禁煙車
Non-Smoking Car
グリーン車
Green Car
博 多 方面
For Hakata
東 京 方面
For Tokyo
10号車
11号車
12号車
13号車
14号車
15号車
16号車
かけ込み乗車は、危ないのでおやめください。
For your safety, don't rush for your train.
携帯電話はマナーモードなどに切り替えてください。
Please switch your mobile phone to silent mode.
不審物や持ち主のわからないお荷物は、直ちに乗務員までお知らせください。
Please notify the train crew immediately, if you find any suspicious items or unattended baggage.


Linimo
路線図
Linimo Stations
藤が丘
Fujigaoka
はなみずき通
Hanamizuki-dori
杁ヶ池公園
Irigaike Koen
長久手古戦場
Nagakute Kosenjo
芸大通
（トヨタ博物館前）
Geidai-dori
公園西
Koen Nishi
万博会場
Bampaku Kaijo
(Expo Site)
陶磁資料館南
万博八草
数字は当駅からの
標準的な所要時間です。
Number is time required.
13分/min
9分/min
7分/min
5分/min
4分/min
2分/min
当駅
You are here
1分/min
3分/min
万博会場
Bampaku Kaijo (Expo Site)
公園西
Koen Nishi
o Site）
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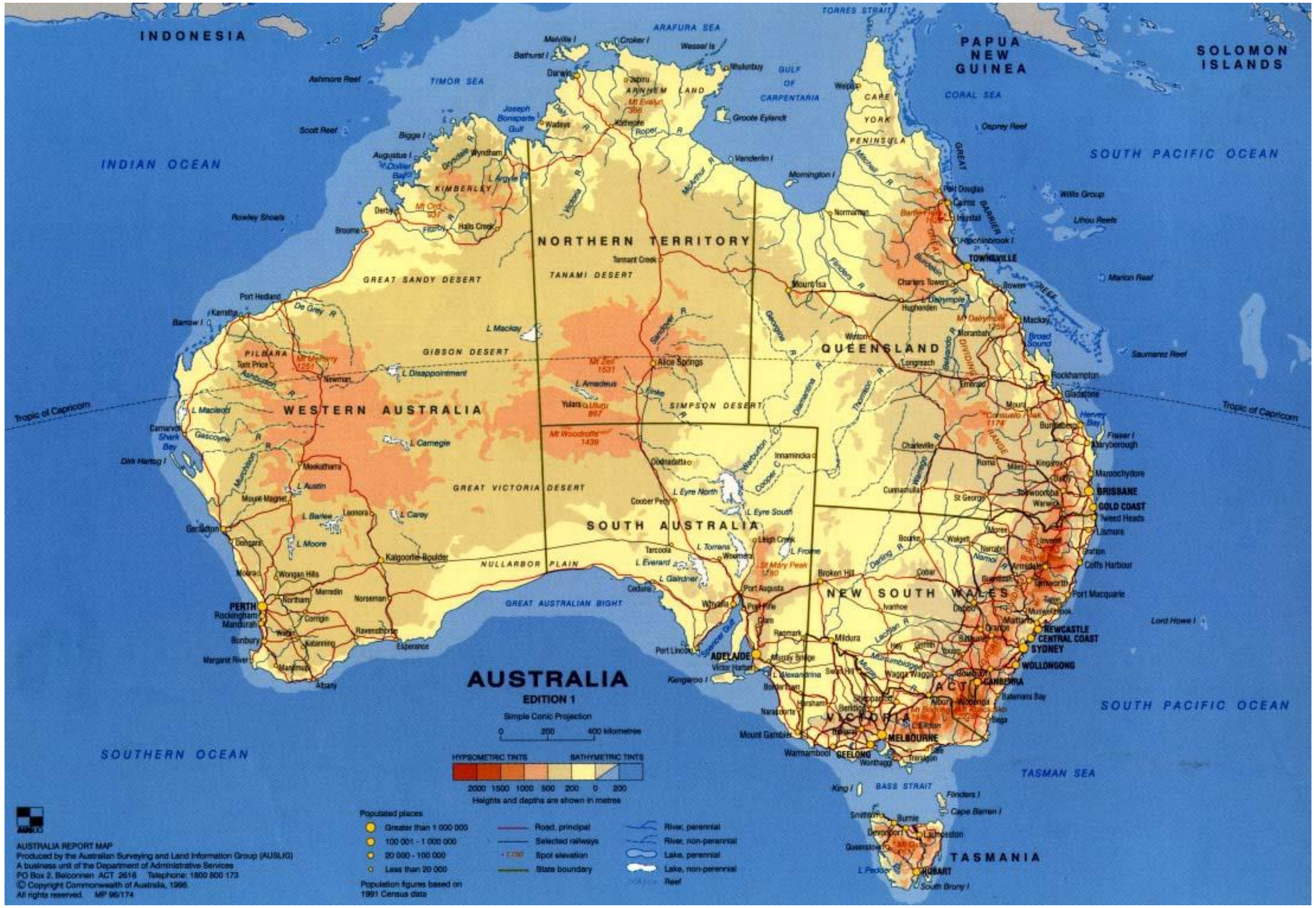
07
万博会場 Bampaku Kaijo (Expo Site)

Globální mapy - Global Map (GM) (http://www.iscgm.org)

- **Hlavním cílem: spojit úsilí všech zemí a zainteresovaných organizací a vytvořit a poskytnout snadný a otevřený přístup ke globálním geografickým informacím (GI) v měřítku 1:1 mil.**
- **GI pro implementaci globálních dohod a konvencí pro ochranu životního prostředí, monitorování hlavních jevů ovlivňujících ŽP a povzbuzení ekonomického růstu v rámci kontextu trvale udržitelného rozvoje.**
- **Projekt už realizován.**
- **Verze 1.0 GM demonstrována na Global Mapping Forum v Hirošimě, Japonsko,v listopadu 2000. Využita data pěti zemí: Japonska, Laosu, Nepálu, Srí lanky a Thajska. Koncem r. 2000 se přidaly Filipíny, v květnu r. 2001 pak Kolumbie a červnu Austrálie.**

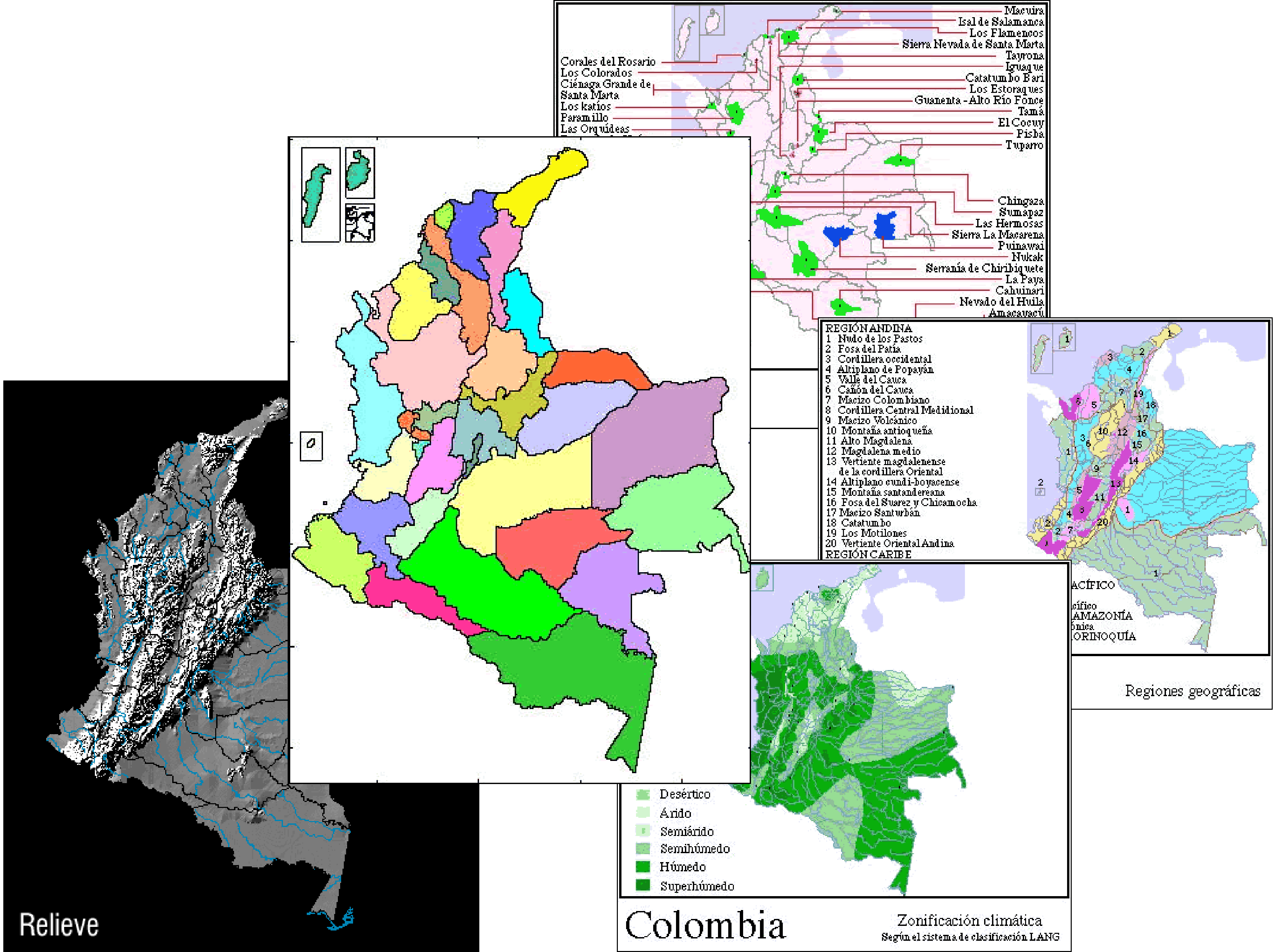
UN – Global Mapping Poject – sample of accessible data



Tematické vrstvy.

- Hranice: politické resp. pobřežní čáry; dopravní síť: silnice, železnice, letiště; vodstvo; sídla (data vektorová).
- Data výškopisná, údaje o půdním pokryvu, využití země a konečně vegetaci (data rastrová).

- Skutečně první pokus vytvořit infrastrukturu z datových vrstev Mapu světa:
- Albrecht Penck
- 5. mezinárodní geografický kongres v r. 1891
- Projekt nikdy dokončen a oficiálně ukončen v r. 1986.
- Euro Global Map
- MapBSR
- ČÚZK?????



Macuira
Isal de Salamanca
Los Flamencos
Sierra Nevada de Santa Marta
Tayrona
Iguaque
Catatumbo Barí
Los Estoraques
Guanenta - Alto Río Fonce
Tamá
El Cocuy
Pisba
Tuparro
Corales del Rosario
Los Colorados
Ciénaga Grande de Santa Marta
Los katíos
Paramillo
Las Orquídeas
Chingaza
Sumapaz
Las Hermosas
Sierra La Macarena
Puinawai
Nukak
Serranía de Chiribiquete
La Paya
Cahuinarí
Nevado del Huila
Amacayacú
REGIÓN ANDINA
1 Nudo de los Pastos
2 Fosa del Patía
3 Cordillera occidental
4 Altiplano de Popayán
5 Valle del Cauca
6 Cañón del Cauca
7 Macizo Colombiano
8 Cordillera Central Mediodional
9 Macizo Volcánico
10 Montaña antioqueña
11 Alto Magdalena
12 Magdalena medio
13 Vertiente magdalenense de la cordillera Oriental
14 Altiplano cundi-boyacense
15 Montaña santandereana
16 Fosa del Suarez y Chicamocha
17 Macizo Santurbán
18 Catatumbo
19 Los Motilones
20 Vertiente Oriental Andina
REGIÓN CARIBE
Regiones geográficas
Desértico
Árido
Semiárido
Semihúmedo
Húmedo
Superhúmedo
Colombia
Zonificación climática
Según el sistema de clasificación LANG
Relieve

Global Map Project

Global Map is a set of basic geospatial information at the scale of 1:1 million, which was developed and verified by National Geospatial Information Authorities (NGIAs) in the world so that it is considered as “authoritative data.”

Global Mapping Project is a collaborative international project of developing Global Map for sustainable development, environmental protection and disaster mitigation.

Global Map Project

The **International Steering Committee for Global Mapping (ISCGM)** was established to implement the Project. The Geospatial Information Authority of Japan (GSI) served as the Secretariat of ISCGM for the whole duration of the Committee from February 1996 to March 2017, and supported the Project activities.

Global Map Project

Recognizing that the objective of Global Mapping Project was mostly achieved by the collective efforts of ISCGM and the participating NGIAs, the 23rd ISCGM meeting held in August, 2016 adopted the resolution of dissolving ISCGM and transferring the Global Map data to the Geospatial Information Section of the United Nations. Thus, **Global Mapping Project came to end**.

Global Map Project

Access to Global Map data and relevant information

Global Map data and relevant information, which had been published on ISCGM website, are available on “Global Map Data Archive (external link)”.

“Global Map Japan” and “Global Map Global version” are available on this website (GSI).

2. Digital Earth; A European Perspectives - SWOT Analysis

Digital Earth Concepts

History of the origin of the Digital (planet) Earth:

Fathers:

Al Gore

(Bill Clinton)

First international conferences:

1999: Beijing, P.R. China

2001: New Brunswick, Canada

2003: Brno, Czech Republic

Digital Earth Definitions

Technological:

Gore: A multi-resolution, three-dimensional representation of the planet, into which we can embed vast quantities of geo-referenced data.

Chen Shupeng, Fukui, Foresman, Guo, Goodchild

Sustainable development oriented:

Beijing Declaration, Brno discussions, Global Society Dialogue, Global Marshal Plan)

Digital Earth

Digital Earth is a concept that aims to incorporate maps and data – ranging from topography and population to weather patterns and migration – into a seamless geospatial system accessible
worldwide.

www.digitalearth.gov
www.digitalearth.net.cn
http://digitalearth03.geogr.muni.cz

Digital Earth Concepts

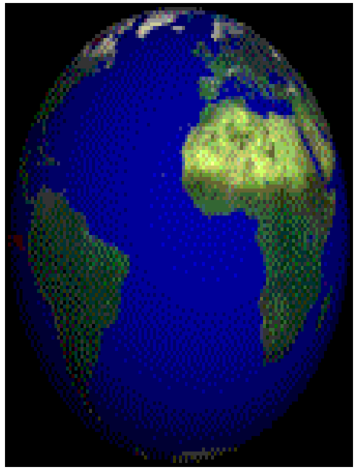
www.digitalearth.gov

www.digitalearth.net.cn

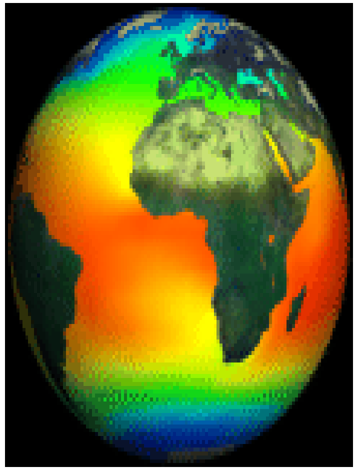
http://digitalerth03.geogr.muni.cz

Understanding Digital Earth

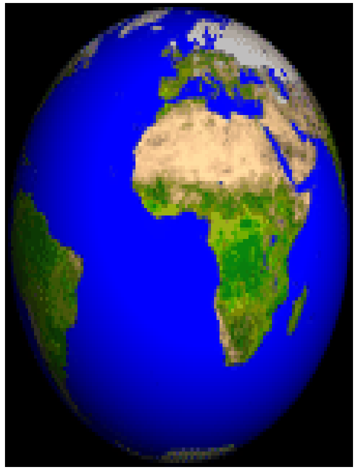
Clo



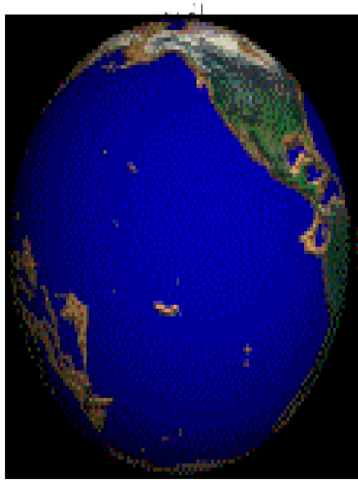
El



Sea water temperature



Vegetation



Earth Surface

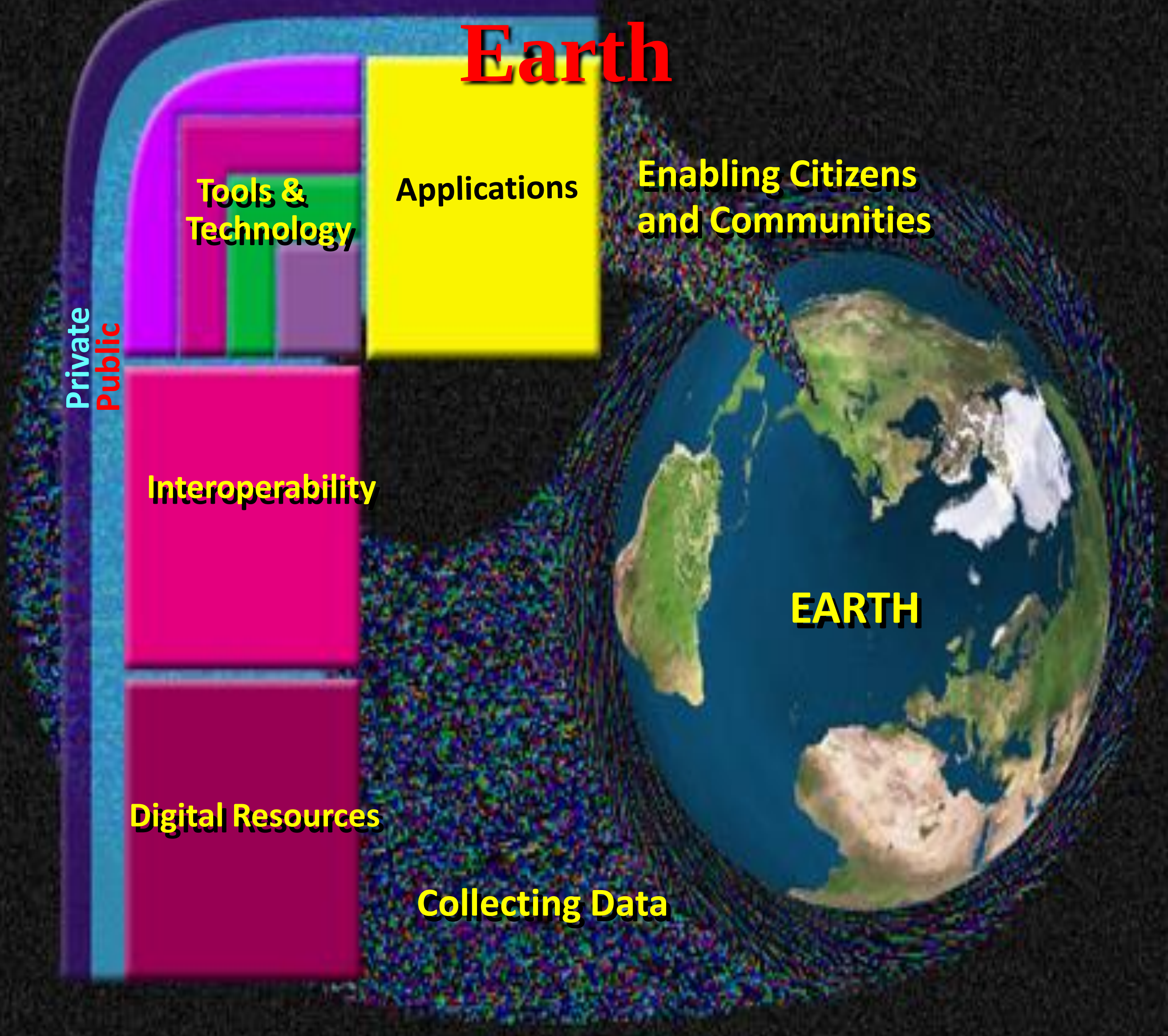
Earthq uake

Volcano

Plate Boundary

(http://www.nasm.si.edu/EarthToday)

Understanding Digital Earth



The Digital Earth: Understanding our planet in the 21st Century *by Al Gore*

- A new wave of **technological innovation** allows us to collect, store, process and display an unimaginable amount of information about our planet and a wide variety of natural and cultural phenomena. Most of this information is "georeferenced", meaning that it is related to a specific place on the earth's surface.

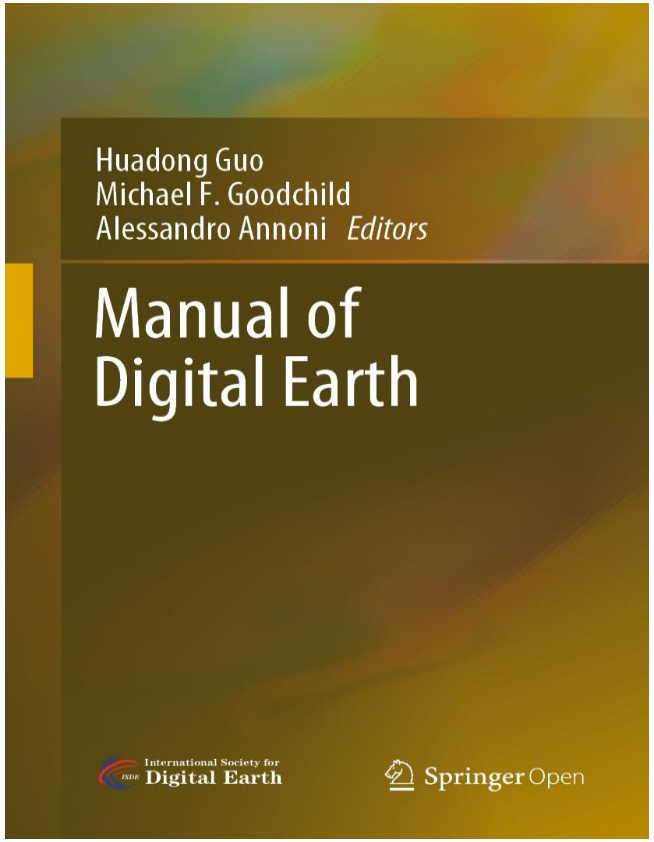
- A difficult part of using these advantages is the flood of geospatial information - the problem is the conversion of raw data into understandable information.

- **Digital Earth:** multiple views, three-dimensional representations of the planet, in which we use a large amount of georeferenced data.

The 3rd International Symposium on Digital Earth – Information Resources for Global Sustainability.

Knowledge, Networks, Technology, Economy, Society, Natural and Human Resources, Policy and Strategy.

Major Challenges for Digital Earth



- Big Data Management
- DE Platforms implementation and construction
- Developing an Ecosystem for DE
- Addressing Social Complexities
- Diversified curricula toward DE Education

My present for you: *[Manual of Digital Earth | SpringerLink]*

Conclusions

- No single definition of Digital Earth. **DE is an evolving concept** to adapt to social and technological changes
- Its main characteristic is to promote the use of digital the technology to study and safeguard our planet and the people that live in
- Mastering Technologies, Understanding social changes and Addressing societal challenges should be the raison d'etre of the DE community
- Advances in science will be relevant if and only if we can demonstrate their value for big issues of our society

3° ISDE Digital Earth Summit, June 12-14, 2010, Nessebar, Bulgaria

A European Perspective on Digital Earth - SWOT Analysis

Alessandro Annoni

Spatial Data Infrastructures Unit
Institute for Environment and Sustainability
Joint Research Centre
European Commission

DE Vision – a SWOT analysis - STRENGTHS

- DE is a very useful metaphor
- DE displays some of the characteristics of “magic concepts”
- DE has a global dimension, inclusive of multiple applications and themes
- DE has a strong political backing since the beginning
- DE has a strong technological component
- DE provides a flexible framework to adapt to evolving technologies

Magic Tricycle - Car Design News™ 2008

DE Vision – a SWOT analysis – WEAKNESSES (1/2)

- DE encapsulates many different concepts
  - e.g. information system, infrastructure to visualise and access geo-information, a virtual model of the Earth (or parts of it), an approach to explore the Earth system…

- The DE Vision has
  - Ambiguities on its nature: political, vs. academic, vs. a technological initiative
  - Ambiguities on main target audience: policy-makers and planners vs. scientific community or the general public
  - Unclear research focus, which may reduce interest in the scientific community

- DE has uneven visibility in different regions of the world

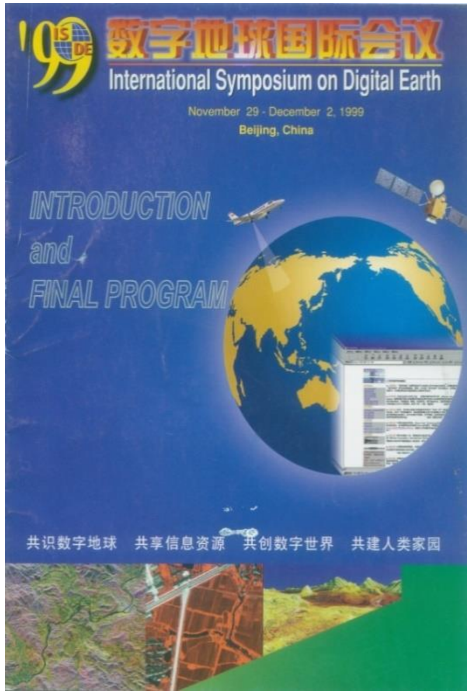
National Center for Supercomputing Applications
University of Illinois

DE Vision – a SWOT analysis – WEAKNESSES (2/2)

- Unclear relationships and added value of DE in relation to other initiatives such as GEOSS, SDIs, Eye on Earth,..
- Original DE vision does not properly reflect recent changes in society including
  - major role of the private sector (Google, Microsoft), and
  - emergence of social networks (Facebook) at the global level
- Because of the uncertainties above, it is difficult to communicate clearly what DE is, and how it will be put into practice
- This difficulty in communicating the concept makes harder to consolidate links and collaborations with other initiatives and to develop a DE community with active members from different disciplines

DE Vision – a SWOT analysis –OPPORTUNITIES (1/2)

- The increased availability of digital content from public, private sectors and citizens supports the vision of DE
- Developments in technology and policy foster increased data access and sharing
- ISDE with 10 years of history, strong political backing, and the support of the Chinese Academy of Science provide a sustainable platform for achieving the vision
- Increasing profile of DE within the scientific community through symposia and the inclusion of the IJDE in the scientific citation index
- Increasing recognition of the need to build bridges across different related initiatives, as witnessed by the membership of the ISDE in GEO
- Multiple research and government funding opportunities available to develop components and applications of DE

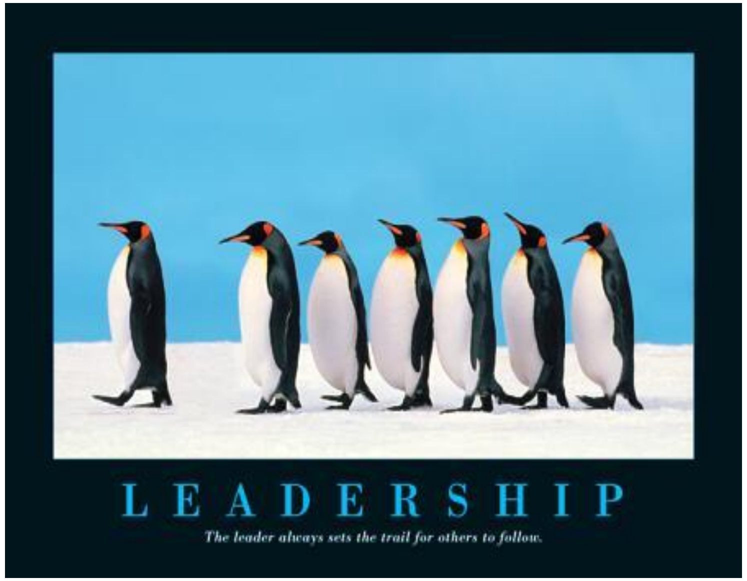


DE Vision – a SWOT analysis –OPPORTUNITIES (2/2)

- Profiling DE as a central vision space where ‘Geo-Imagineers’ can think out-of-the-box:
  - where they can extend and modify the vision of DE by incorporating innovative ideas and edge-cutting technologies, combining disciplines, and
  - ultimately feeding new ideas and requirements into research projects and more practically oriented initiatives

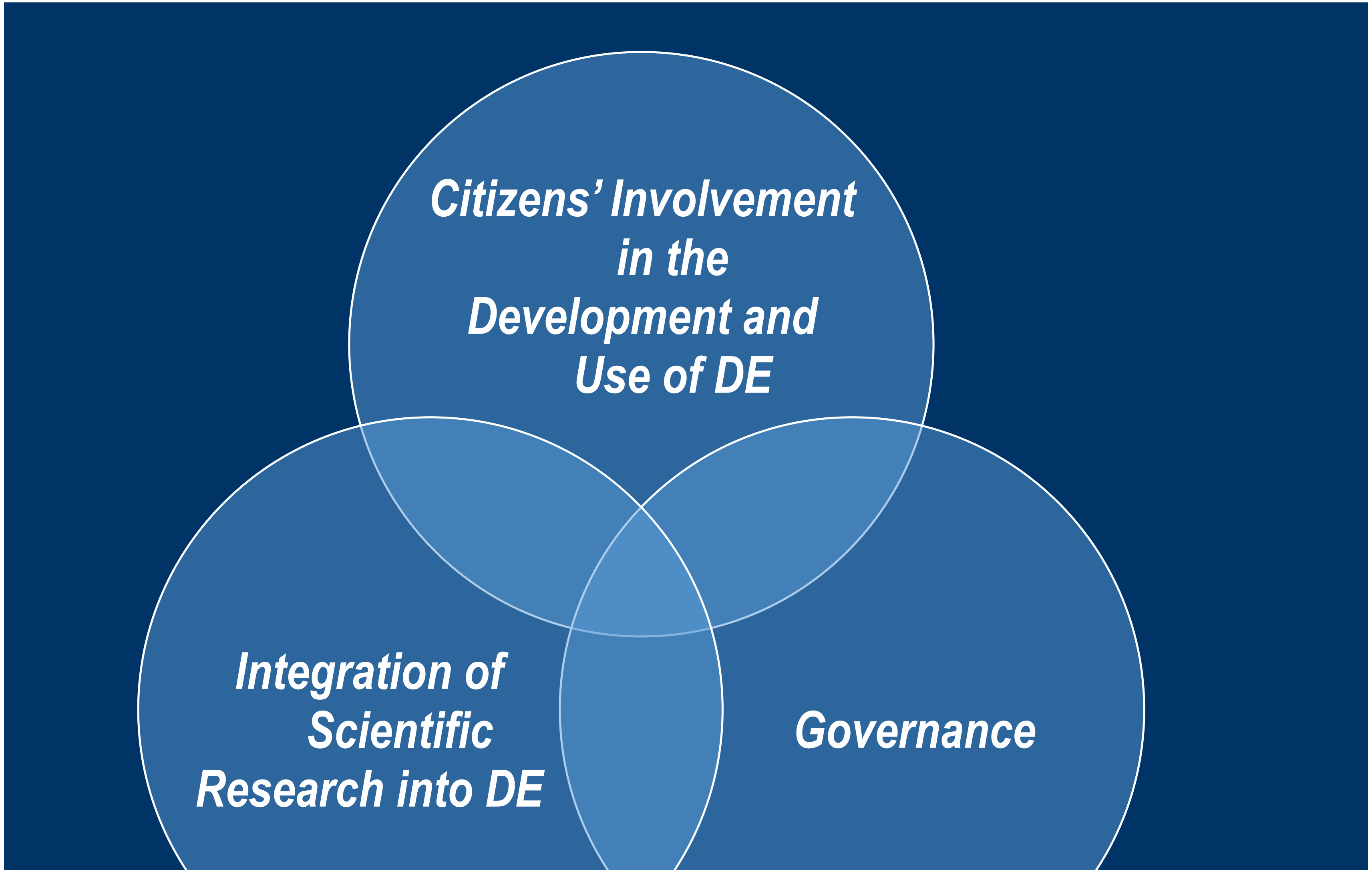
DE Vision – a SWOT analysis - THREATS

- No shared ownership over the vision of DE
- Existing leaderships do not always recognize the importance and power of the DE vision as a mechanism to advance the realisation of DE
- Initiatives are sometimes competing for resources rather than exploiting synergies



- Private sector’s own vision and interpretation of DE, and the resources at its disposal, may overshadow and make irrelevant governmental or academic efforts in this area
- Because the success of the private sector’s mass market applications, the need for research and development in the area of DE may become less evident to the funders of public sector research programmes

Topics of European Interest



Citizens’ Involvement in the Development and Use of DE

- DE involves multiple stakeholders. While the roles of environmental and social scientists, technologists, and decision-makers are widely acknowledged, <u>those of individual citizens have yet to be articulated</u>

  - we suggest giving priority to the following three:
    1. **contribution of individuals as providers of data**
    2. **role of individuals as users of DE**
    3. **impacts of DE on individuals and society at large**

Integration of Scientific Research into DE (1/2)

- Two perspectives are important and must be clearly integrated in DE:
  1. framework for undertaking the research necessary to achieve DE
  2. contribution of DE to science (see for example 1999 Beijing Declaration

by supporting the **integration of environmental and social sciences models** at multiple scales addressing issues such as global change, climate change, land use change and environmental degradation, sea level rises, natural resource depletion, and the impacts of these phenomena on society and the economy at global,

Integration of Scientific Research into DE (2/2)
European perspective

- Important role of DE in representing and understanding cultural heritage (including multi-lingual aspects)
  - **Information integration** (multi source and heterogeneous, multi-disciplinary, multi-temporal, multi-scale, multi-media, and multi-lingual);
  - **space-time analysis and modelling**
  - **Intelligent descriptions** (automatic, user driven) of data, services, processes, models, searching and filtering;
  - **visualisation of abstract concepts in space**
  - **computational infrastructures** to implement the vision of DE and
  - **trust, reputation and quality models** for contributed information and services

Governance (1/3)

- governance is crucial for future development of DE

- **need to build connections and synergies** with the many related developments at national, continental, and global levels
  - *e.g. GEOSS, the United Nations activities on Global Geographic Information Management, the Earth System Governance Project of the International Human Dimensions Programme on Global Environmental Change,etc..*

- **need to work with the private sector to exploit the platforms and technologies currently available** and utilised by hundreds of million of users, **and to involve the public** in the development of DE.

Governance (2/3)
European perspective

- stronger integration of DE with INSPIRE, GMES, and SEIS, as well as GEOSS.
- other initiatives need to be monitored and exploited:
  - e.g. Digital Cities, European Institute of Innovation & Technology, funding opportunities available under the Framework Research and Development programme of the EU,..
- all of these initiatives must be targeted to address the innovation and sustainable growth challenges identified in the **Europe2020** Communication which for example also earmarks a **Digital Agenda for Europe** as one of its flagship initiatives.

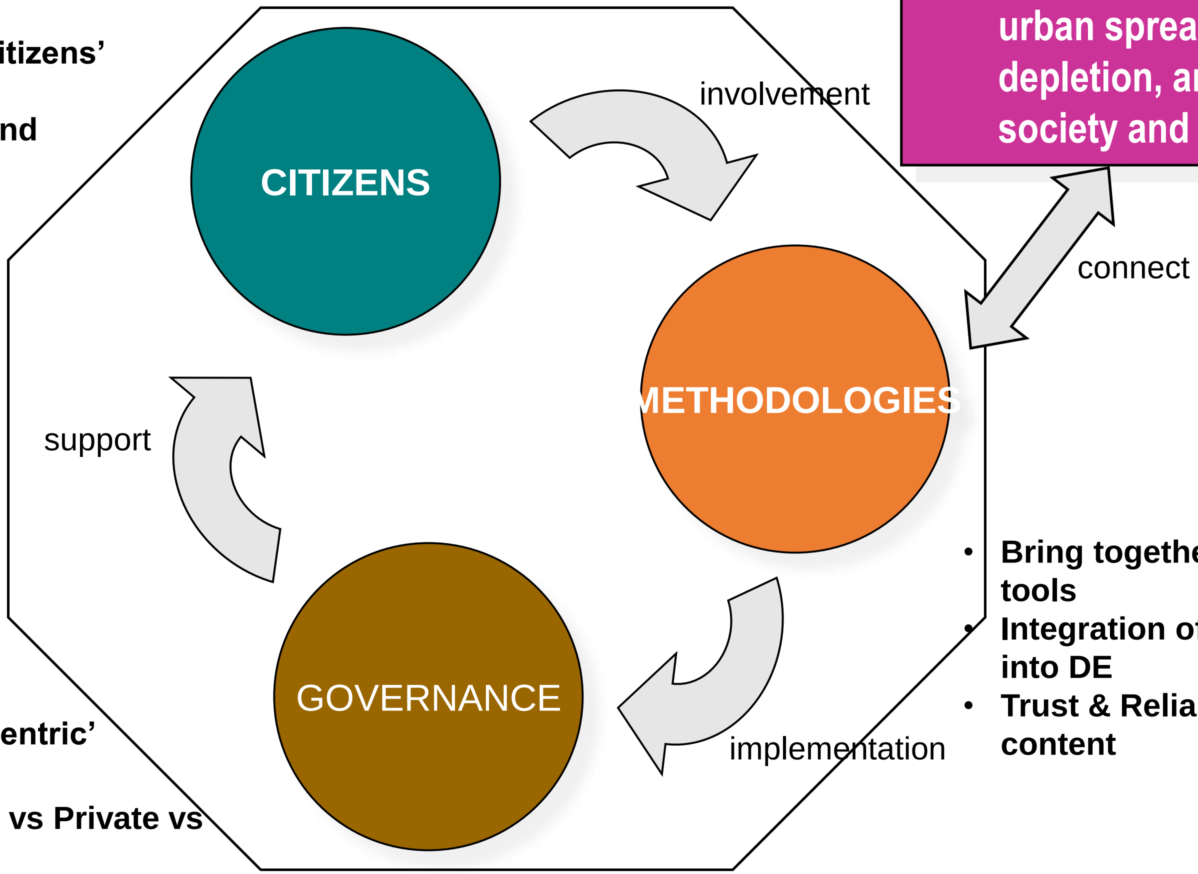
Governance (3/3)
European perspective

- ***Embedding DE as a driver for science but also for innovation and growth will make it possible to flourish in Europe and contribute more strongly to the global objectives of the ISDE***

European Perspective

global change and climate change, land-use change, sea level rise, environmental degradation, urban spread, natural resource depletion, and their impacts on society and economy

The role of private citizens' involvement in the development, use, and management of DE



- **Bring together methods and tools**
- **Integration of scientific research into DE**
- **Trust & Reliability in information content**

- **Distributed' vs. 'centric' approaches**
- **Multifacet: Public vs Private vs Citizens**
- **Multilevel**
- **Link to innovation and growth**

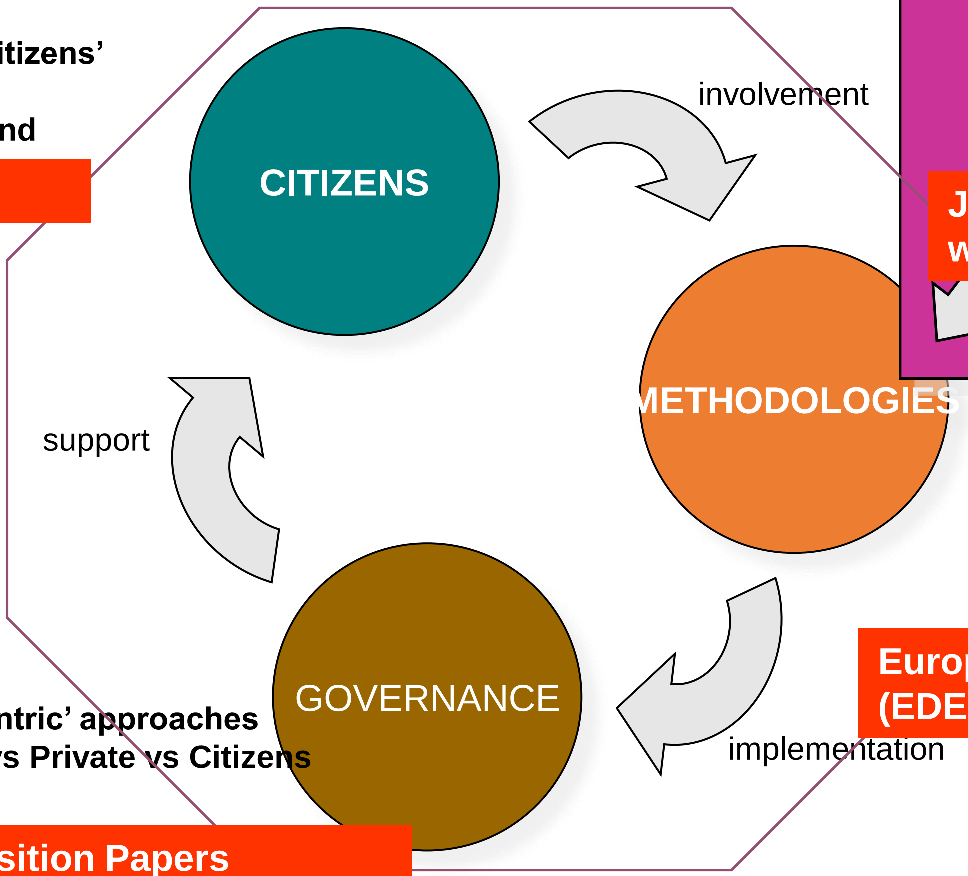
European Proposals

global change and climate change, land-use change, sea level rise, environmental degradation, urban spread, natural resource
impacts on society and economy

Joint conferences and workshops

The role of private citizens' involvement in the development, use, and

Pilots and Events



- Bring together methods and tools
- Integration of scientific research into DE
- Trust & Reliability in

Pilots & Projects

European DE research Network (EDEN)– technological component

- Distributed' vs. 'centric' approaches
- Multifacet: Public vs Private vs Citizens
- Multilevel

•Research & Position Papers
•European Special Interest Group

European DE research Network (EDEN)– socio-economic component

4. Digital Earth in Australia

D. Serikbayev East Kazakhstan Technical University

"Digital Earth" in Australia

Performed by: Suleimenova A.
Tleubekova A.
Shakenov R.

Group: 21-MGT-2p

Checked: Konecny M.

Ust-Kamenogorsk
2021

Introduction

In our work we want to talk about the following things:

- geographical initiatives
- lessons learned
- next steps for Australia

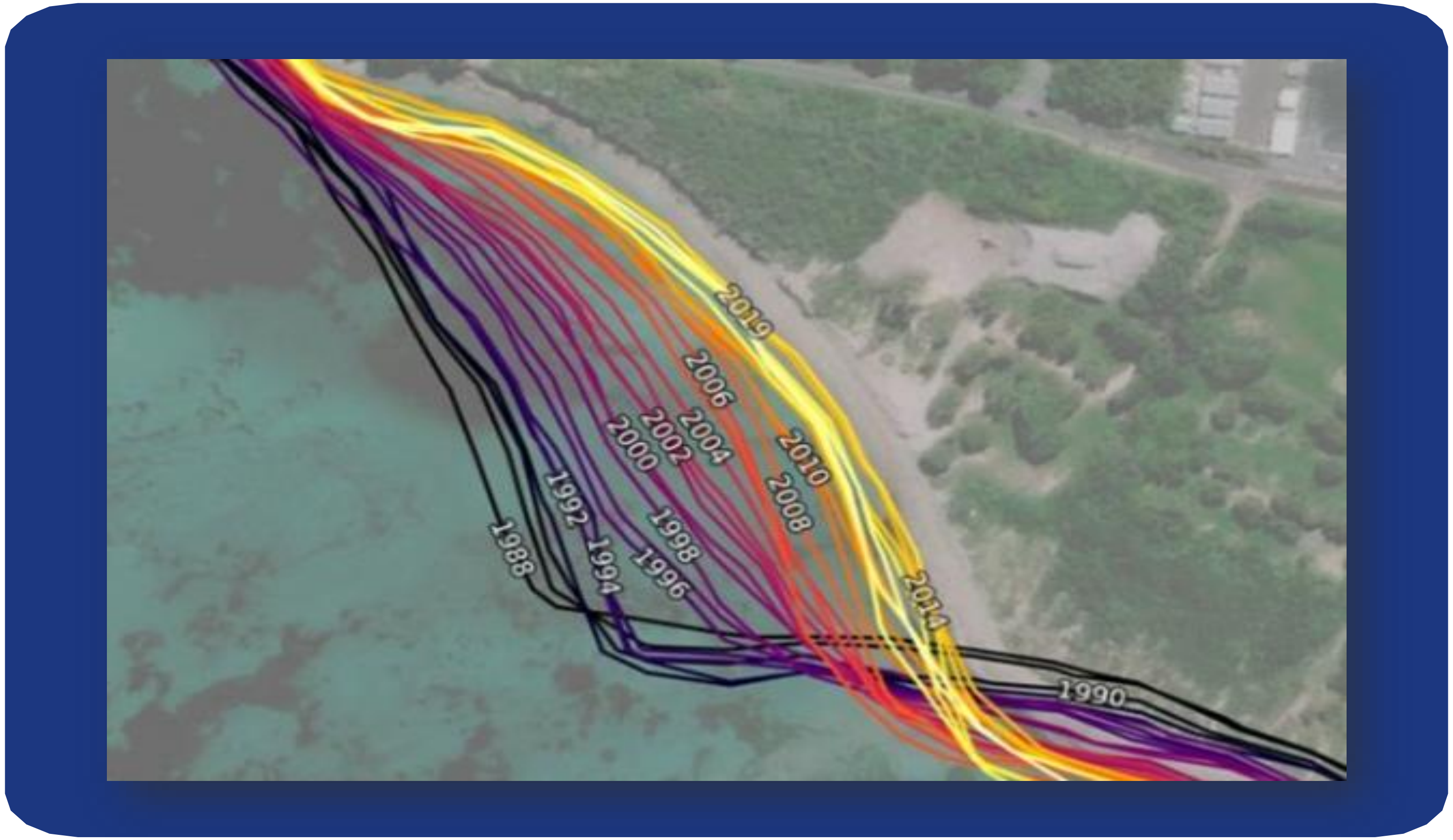
To reach the international level, Australia has set itself the following goals:

1) Creating an active context for data usage;
2) Building capacity beyond "show and tell“
3) Determination of the labor market and market demand.

Looking ahead, Australia has identified its most promising growth sectors for the spatial industry:

1. transport
2. agricultural industry
3. healthcare
4. defense and security
5. energy
6. mining and the environment

Digital Earth in Australia



LANDSCAPE CHANGES IN 30 YEARS

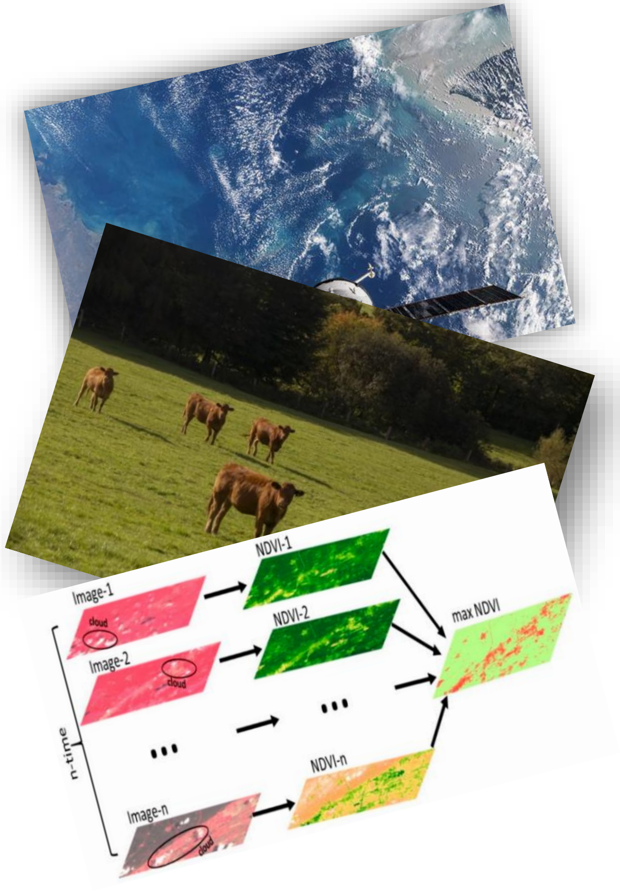
Product development for extended access

✓Water observations from space (WOFS) help to understand where flooding may have occurred in the past, allowing for consideration of mitigation measures to reduce future impacts, including proper disaster planning and initiatives supporting community preparedness and resilience to natural disasters.

✓The fractional coating (FC) product can give land use managers an idea of which parts of the property are experiencing more intensive grazing.

✓NDVI changes over time can be used to identify areas where there has been a sudden decrease or increase in the amount of vegetation.

The DEA provides a set of information products to the government and businesses of Australia



Implementation of projects to expand coverage

Product	Description summary	Key References
Surface Reflectance (Landsat and Sentinel 2)	• Starting point for many analyses, translating information recorded by an Earth-observing satellite into a measurement of the characteristics of the surface of the earth	Li et al. (2012); Geoscience Australia (2018e), (2018f)
Fractional Cover (FC)	• Identifies areas of dry or dying vegetation and bare soil, and allows for mapping of the living vegetation extent (e.g., where animals spend time grazing). • Informs a broad range of natural resource management issues	Scarth et al. (2010); Geoscience Australia (2018b)
Water Observations from Space (WOfS)	• The world's first continent-scale map of the presence of surface water. • Provides insight into the behavior of surface water over time. • Highlights where water is normally present, seldom observed, and where inundation has occasionally occurred	Mueller et al. (2016); Geoscience Australia (2018a)
Normalized Difference Vegetation Index (NDVI)	• Assesses the extent of living green vegetation. • Provides valuable insight into the health and/or growth of vegetation over time. • Supports the mapping of different land cover types across Australia	Geoscience Australia (2018c)
Intertidal Extents Model (ITEM)	• Information regarding the extent and relative elevation profile of the exposed intertidal zone (between the highest and lowest tide). • Complements existing data with a more realistic representation and understanding	Sagar et al. (2017); Geoscience Australia (2018d)
High and Low Tide Composites (HLTC)	• Mosaics produced to allow for visualization of the Australian coastline and reefs at high and low tides	Geoscience Australia (2018g)
Dynamic land cover dataset	• Nationally consistent and thematically comprehensive land cover reference for Australia	Geoscience Australia (2018h)

Usage examples in Australia

Agricultural industry

The industry is one of the most important, represented in almost all countries of the world. About 1 billion economically active population (EAN) are employed in world agriculture

Education

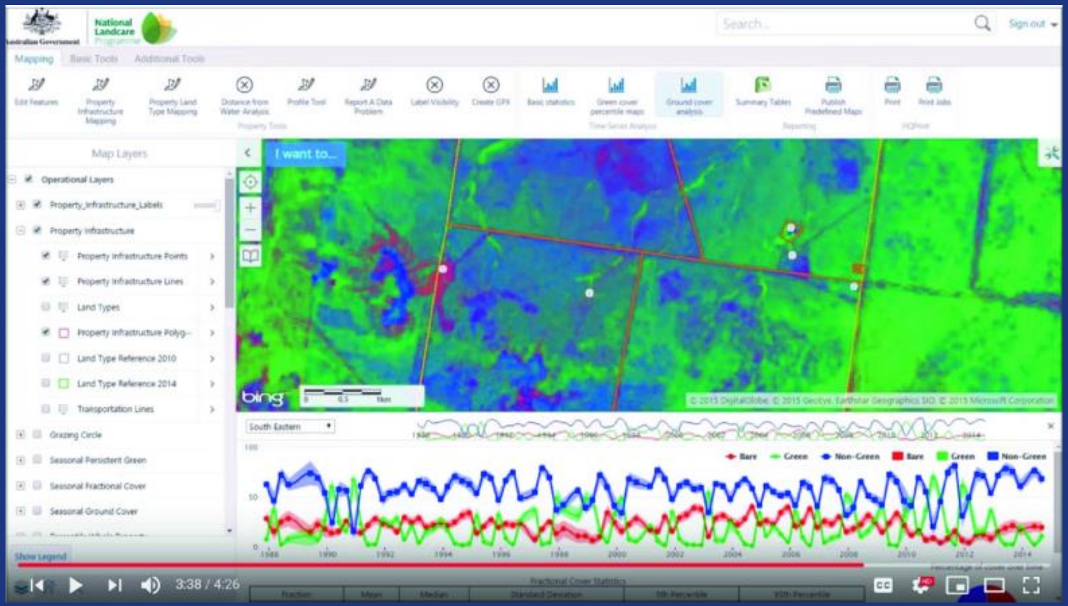
Drawing on research and expertise in sustainability and engineering, researchers draw on a strong interdisciplinary research capacity and strengths in education pedagogy, rapid capacity building and education for sustainable development

Disaster management

Disaster management is the organization and management of resources and responsibilities to address all humanitarian aspects of emergencies, in particular preparedness, response and recovery to reduce the impact of natural disasters

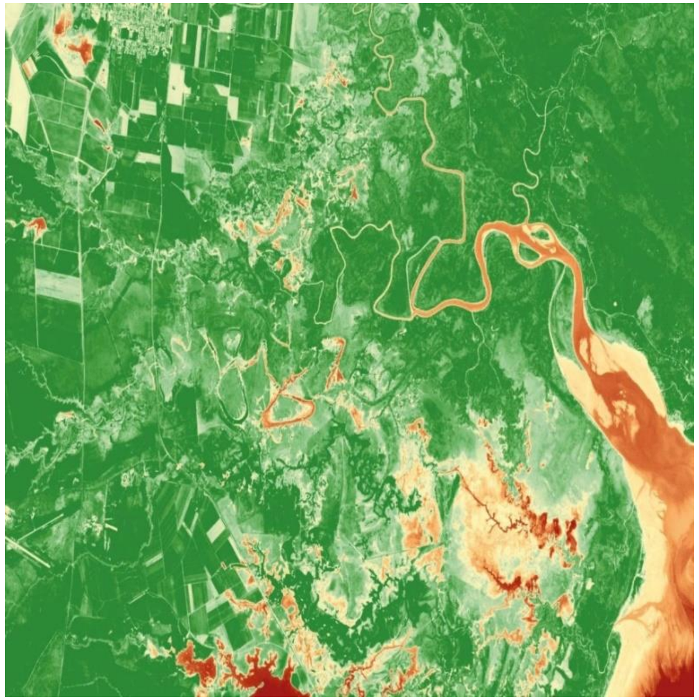
Agricultural Sector - FarmMap4D

The FarmMap4D (formerly known as the NRM Spatial Hub) property management planning platform demonstrates how world-leading time-series remote sensing of ground cover through an online interface can optimize grazing pressure and land conditions, and allow for land managers to make better, more informed decisions. Managers can use the product to view and overlay map layers and generate maps and reports to support more effective land management and planning.



Screenshot of the FarmMap4D interface

Big data for a big country



Satellites have been capturing the stories of Australia's rural sector for decades, watching as innovations in science and technology have fed industry growth. Now graziers and farmers are in prime position to reap the rewards of these observations from orbit.

Our imagery and data products enable land managers and agricultural producers to track drought conditions, vegetation, water quality and availability, and flood and bushfire patterns over time.

We're working with agritech innovators, universities, government and communities to see satellite insights better adopted by Australia's agriculture sector.

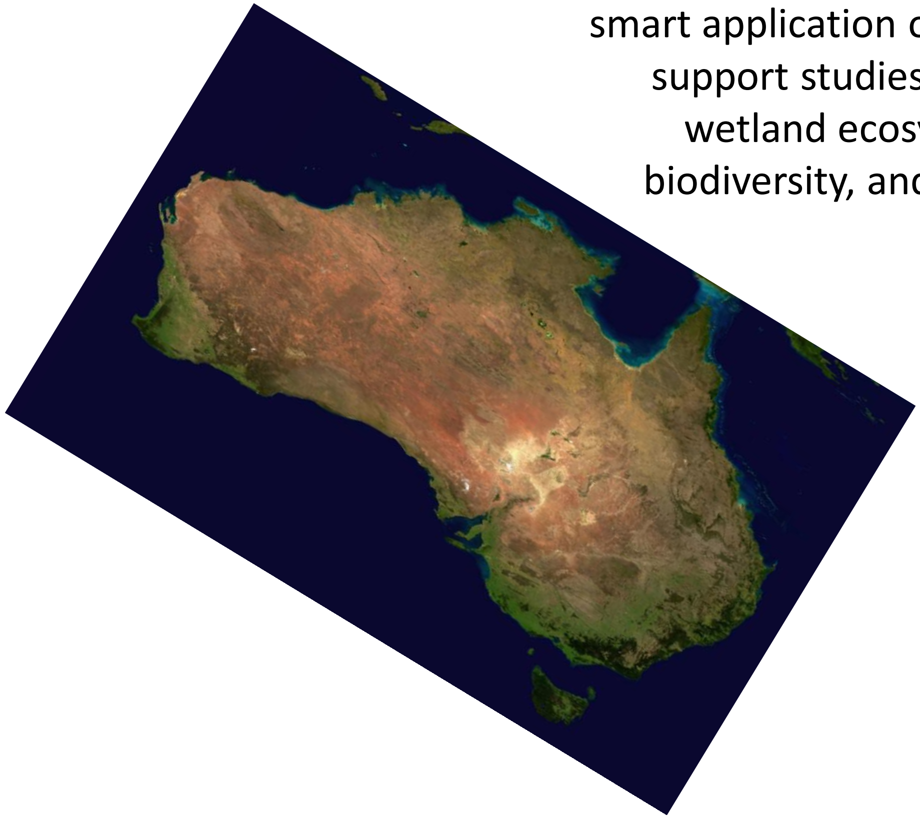
The Australian agriculture industry has grown by 20% (inflation adjusted) over the past two decades, with much of the productivity growth having been fuelled by the adoption of innovations in science and technology. Moreover, the agriculture sector, which operates over more than half of Australia's landmass and contributes ~2.2% of our GDP, needs to continually evolve technologically to remain competitive in the global marketplace. Agriculture is thus an attractive and growing market for technology-focused Australian companies.

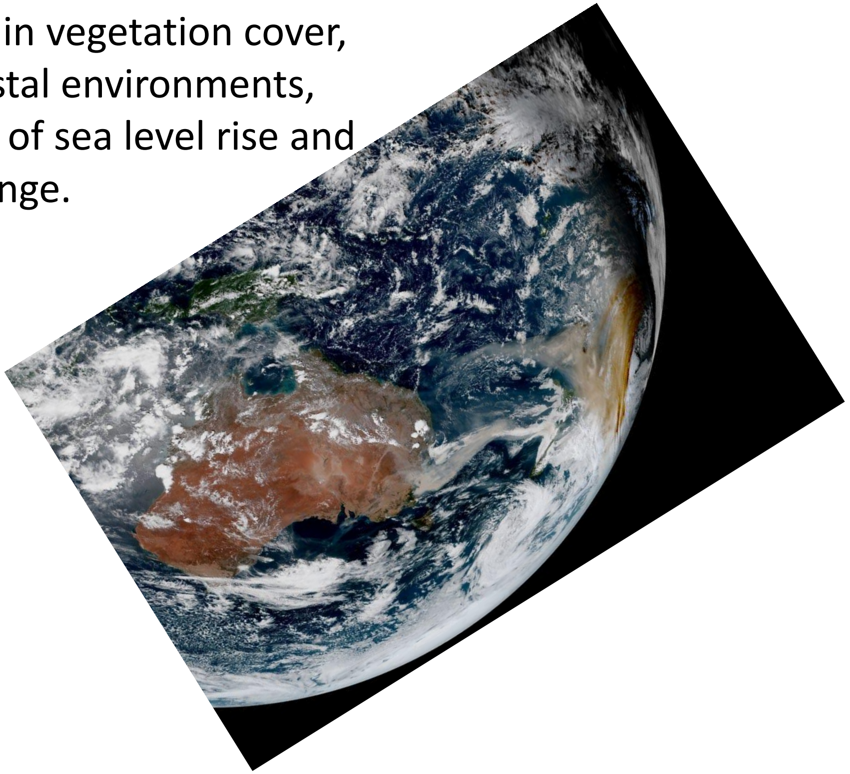
Education Sector—Research Group (ISDE Research Node, Australia)

Griffith University's researchers (in Queensland) are working to connect digital-spatial ('place based') design and decision-making enquiry for resilient and regenerative cities, building capacity to collectively address planning and governance for future resilience in the face of unprecedented pressures (see Smith et al. 2010; Steffen et al. 2011), including climate change, population dynamics and resource scarcity. Building upon research and experience in sustainable development and engineering, the researchers draw on a strong multidisciplinary research capacity and strengths in educational pedagogy, rapid capacity building and education for sustainable development. The group includes educational and behavioral psychology researchers, industry-facing laboratory technical and management staff, and a growing team of doctoral (PhD) candidates.

Satellite images about the environment

Today, satellite images continue to reveal new knowledge about our lands and waters, and Australian scientists, environmentalists and environmental managers prove that they are natural leaders in the smart application of Earth observations. The data can support studies of changes in vegetation cover, wetland ecosystems, coastal environments, biodiversity, and the effects of sea level rise and climate change.





Emergency management

The research team is connecting with colleagues in international chapters of the International Society of Digital Earth (ISDE) to ensure that best practices are shared around the planet with other emergency management response teams. Thus, professional international expertise to fix unsolved or permanent challenges will reach remote areas of Australia. Ultimately, everyone, everywhere should have access to a fully comprehensive system that allows for our ‘local heroes’ to save more lives and provides them with the best safety approach during their high-risk activities.

Australia's current and future priorities have been summarized through a textual analysis of the Geoscience Australia roadmap, and two examples from the Australian ISDE chapter highlight the urgent need to increase end-user use of Digital Earth technology through strategic capacity building initiatives. The topic discussed the mechanisms and problems of using compatible information in the form of geospatial data and using systems and processes to increase the value of information.

The benefits of open data and data exchange are realized through careful planning, design and integration with an emphasis on pre-iterative design and end-user engagement. Releasing valuable data is an iterative process that requires collaboration and communication with agencies to show the benefits of open data and support useful data exchange.

5. FUTURE EARTH

https://futureearth.org/about/our-work/

Future Earth is a network of scientists, researchers, and innovators designed to provide the knowledge needed to support transformations towards sustainability.

Our focus on systems-based approaches seeks ***to deepen our understanding of complex Earth systems and human dynamics across different disciplines.*** We use this understanding to underpin evidence-based policies and strategies for sustainable development.

Our mission

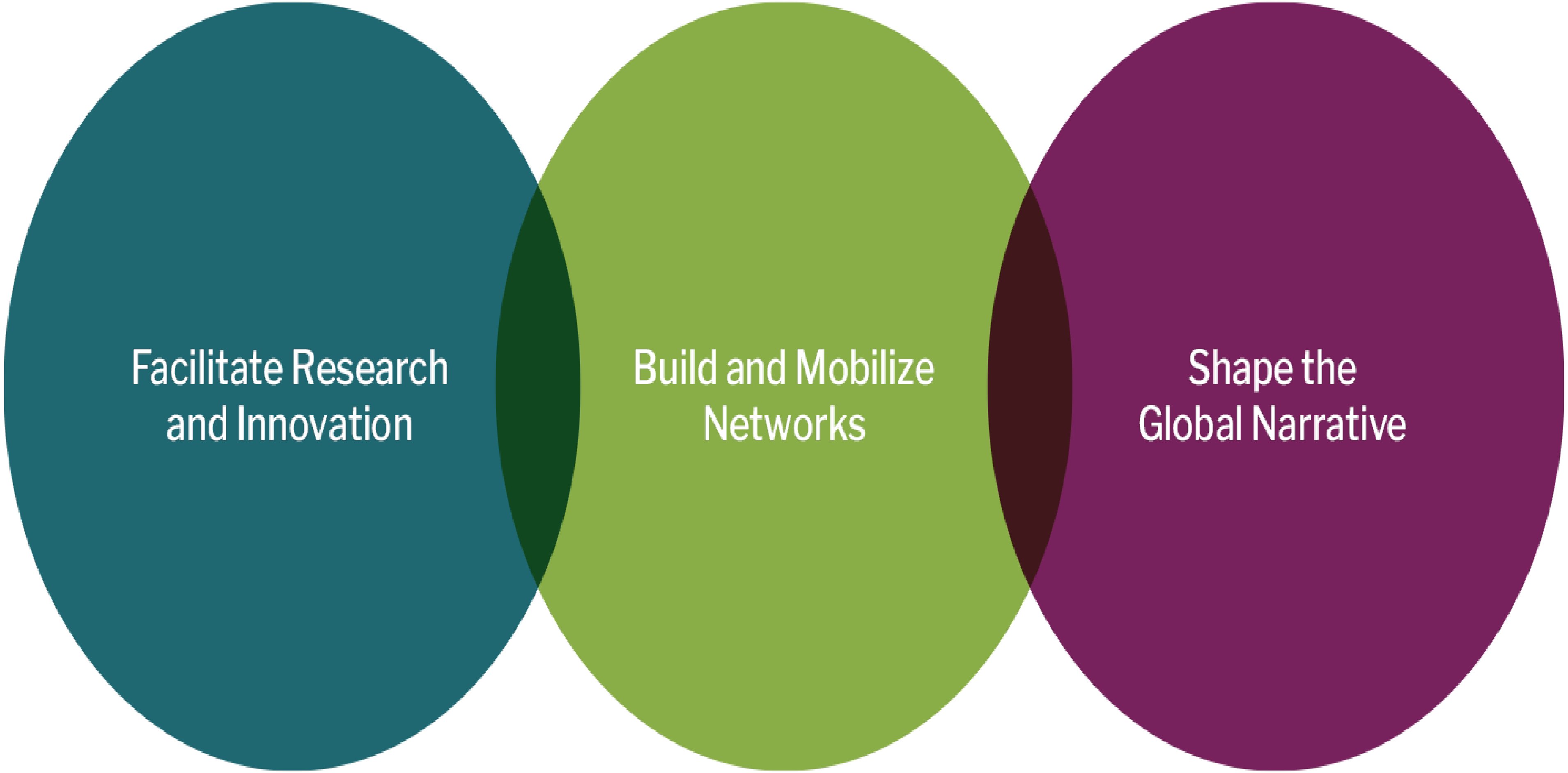
Future Earth's mission is to accelerate transformations to global sustainability through research and innovation.

Our vision

The vision of Future Earth is for people to thrive in a sustainable and equitable world.

Our Strategy

Future Earth develops the knowledge and tools that government, communities, and companies need to meet the United Nations’ 17 Sustainable Development Goals. By understanding connections among environmental, social and economic systems, Future Earth works to facilitate research and innovation, build and mobilize networks and shape the narrative, turning knowledge into action.


Facilitate Research and Innovation
Build and Mobilize Networks
Shape the Global Narrative

Facilitate research and innovation
Our 20 Global Research Projects explore interactions among humans and the planet's land, air, water and biodiversity. We develop and partner on initiatives that experiment with technology, data, media, and new ideas.

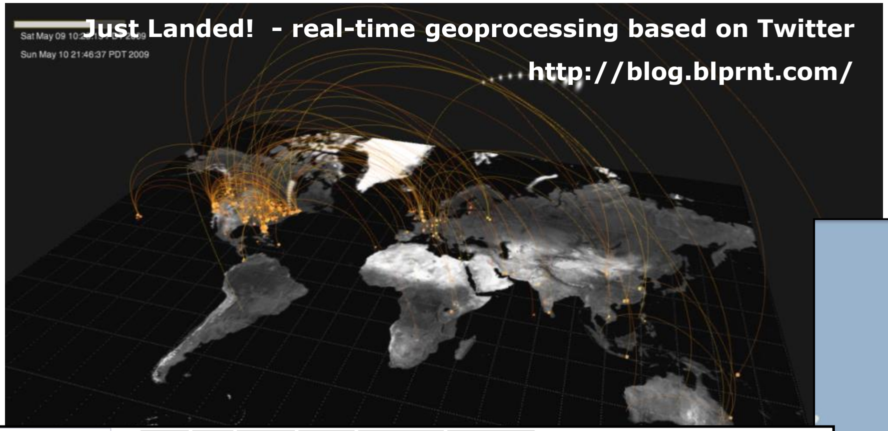
Build and mobilize networks
Our networks link policy, business and civil leaders with researchers to address themes like health, urbanization, natural assets and more.

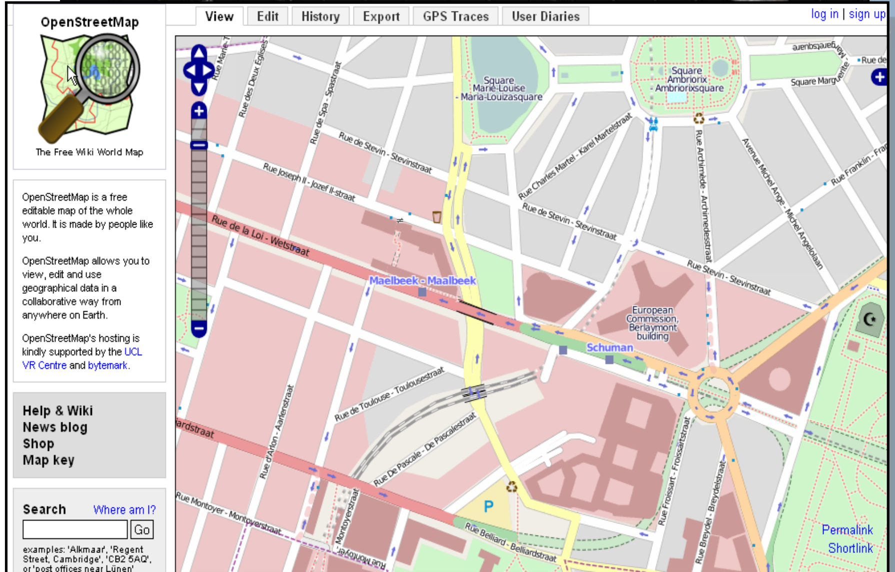
Shape the narrative
We help incorporate the latest science into global decision-making and engage in conversations on sustainability solutions. See our 10 New Insights in Climate Science and award-winning Anthropocene Magazine for more.

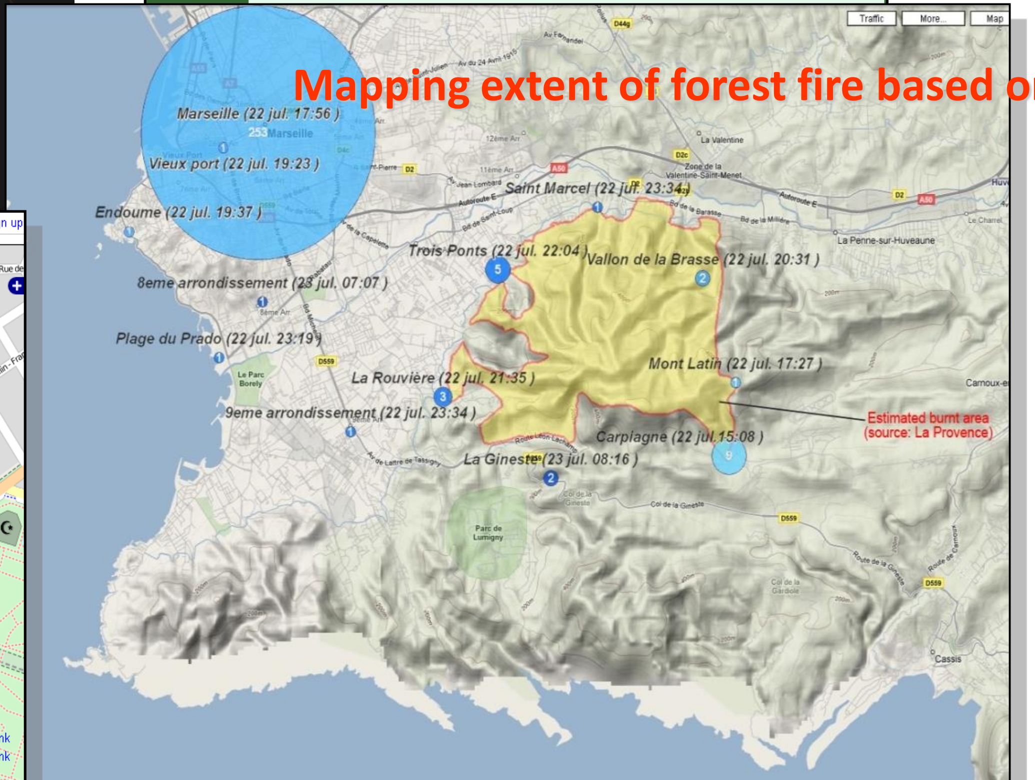
6. How Can Help Cartography?

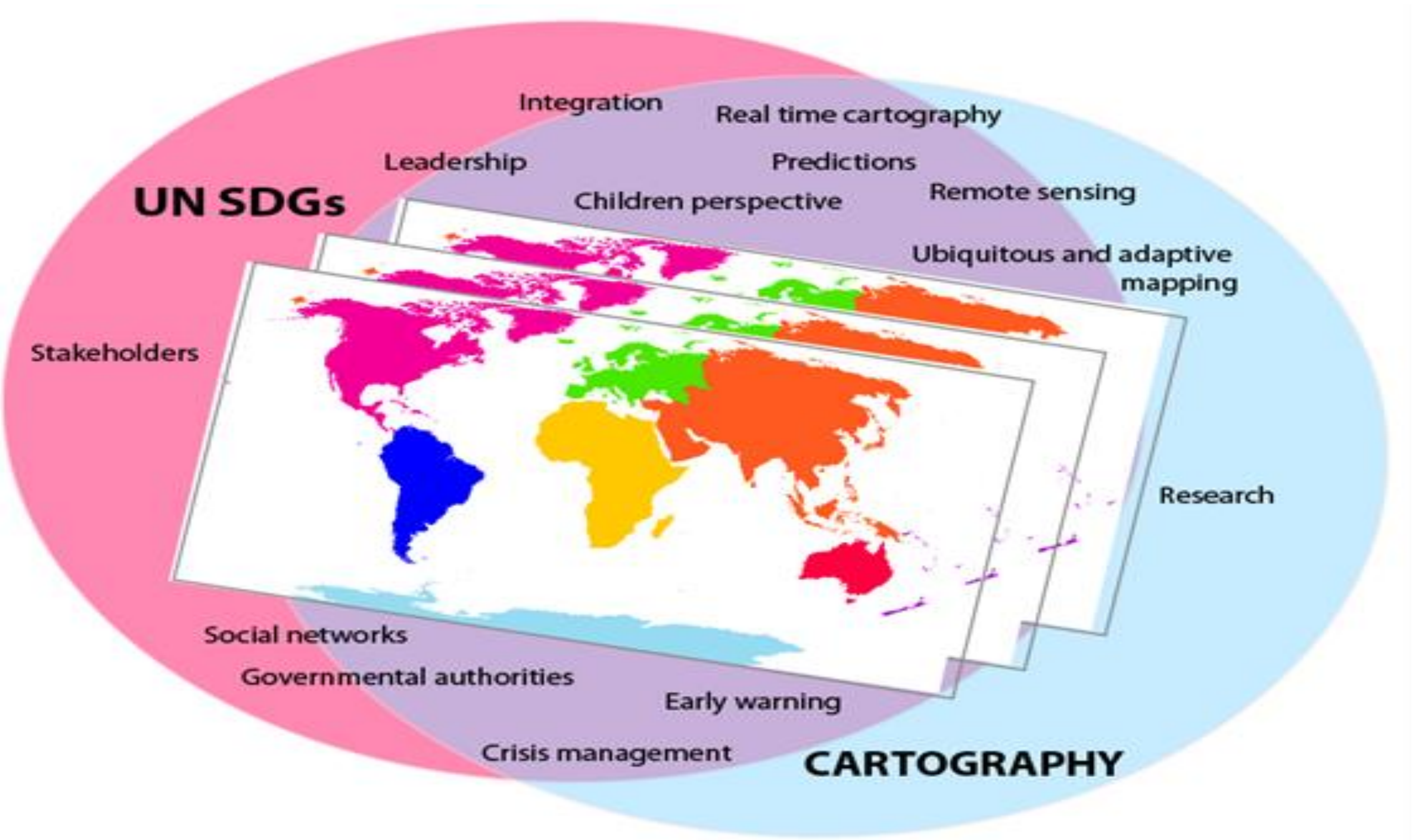
Cartographic Potentials

Citizens as Providers of Voluntary Geographic and Environmental Data









KONEČNÝ M. et al., 2020, Vol. 1, 8th Cartography and GIS Conference, Nessebar,…

The GI scientists and cartographers provide the support for DRR on several levels.

At first, there are ***methods and activities providing the spatial data.***
Secondly, the tools for ***spatial analysis*** and last but not least, the ***cartographic visualisation.*** E.g.

Goal 1: End poverty in all its forms everywhere
Provide data about the spatial distribution of poverty, social protection, etc.
Visualise the most vulnerable areas.

Goal 11: Make cities inclusive, safe, resilient and sustainable.
Identify the unsafe zones in the cities.
Visualise the spatiotemporal patterns of inhabitants.

MISSING MAPS

China-Czech Intergovernmental Science and Technology Cooperation Project 2017.4-2019.12

Dynamic mapping for risk and crisis management in big data era

Heterogenous data

- Different characteristics
- Different density of sensor network
- Different time intervals of mesurements
- Different formats (CSV, XLS, XML, TXT…)
- Different ways of data providing

- **Data collected by volunteers (VGI data)**
  - Data verification needs to be solved

Anomalies

- Anomalies in data are identified and visualised.
  - It allows **identification of abnormal phenomenon** which could trigger a crisis situation (e.g. extreme rainfall).
  - This is possible way how to deal with amount of Big data.
  - To **identify** values that are possibly important.

- Anomalies are represented:
  - by color of symbols,
  - by red line in charts.

SIno-EU Soil Observatory for Intelligent Land use Management

SIEUSOIL PROJECT INTRODUCTION

Very first information

Tomáš Řezník, Masaryk University (MU)

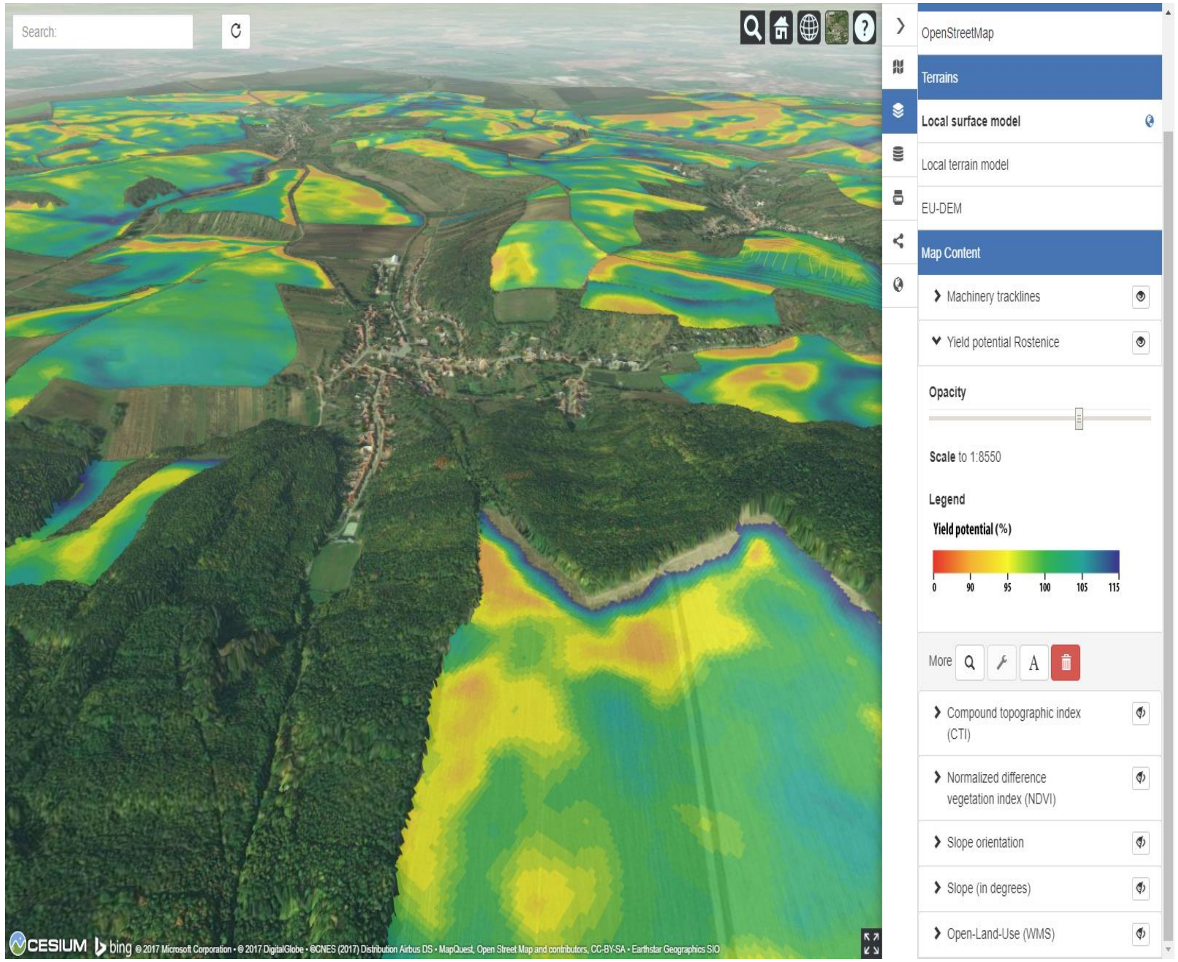
OGC technical meeting
(Leuven, Belgium, 24/06/2019)

www.SIEUSOIL.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 818346

European Commission

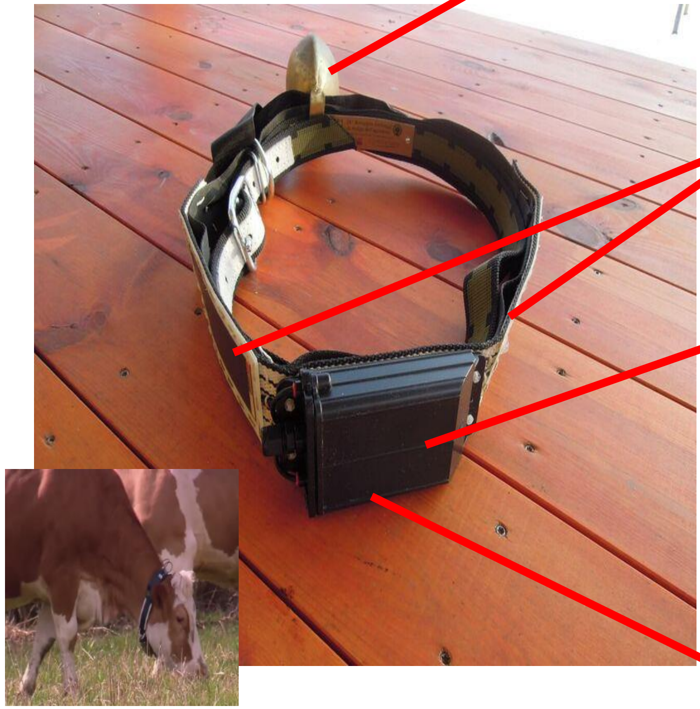
3D vizualization



Cattle tracking

- A true tailor-made solution

bell (delivered by the farmer; 0, - €)



elastic solar panels (80,- €)

GNSS (GPS) receiver (120,- €)

RFID chip (automatic check when passing through the enclosure; 5,- €)

Social Media Geographic Information (SMGI)

Michele Campagna, Cagliari, Italy:

Social Media Geographic Information (SMGI)

the opportunities offered by the ***analysis of social media data*** for ***knowledge building and decision-making*** support in Geodesign.

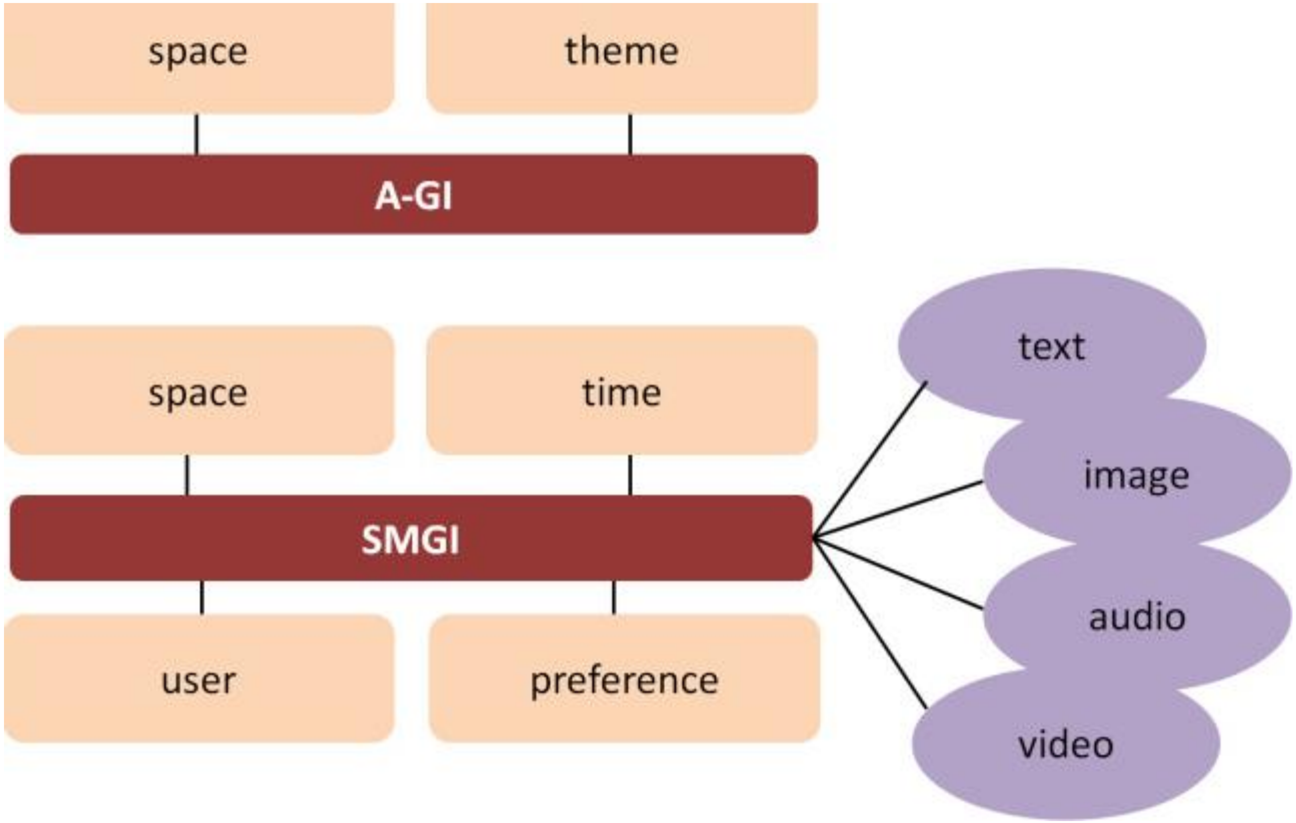
Geodesign: term identifying an approach to planning and design deeply rooted in geographic analysis and able to inform collaborative decision-making.
(in GWF, Hyderabad, 2017)

Currently, two major categories of spatial data resources may be considered suitable for Geodesign approaches, namely

Authoritative Geographic Information (A-GI) from Spatial Data Infrastructures (NEBERT 2004) and

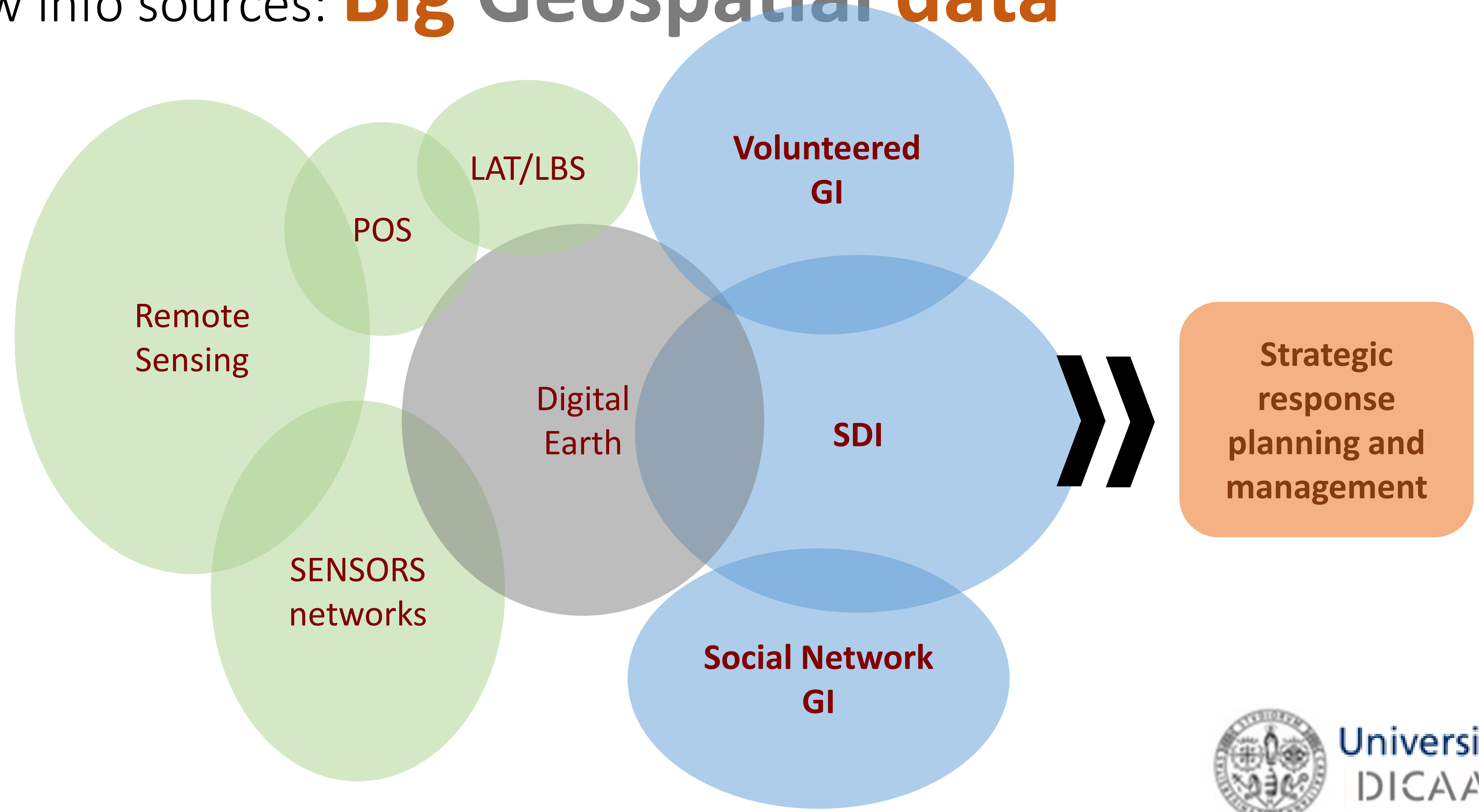
spatial **User Generated Contents (UGC),** commonly referred
to **as Volunteered Geographic Information (VGI)** (GOODCHILD 2007).

Fig. 1: Differences between A-GI (up) and SMGI (down) data models



Michele Campagna, Pierangelo Massa, Roberta Floris, The Role of Social Media Geographic Information (SMGI) in Geodesign.
p. 164, 2016

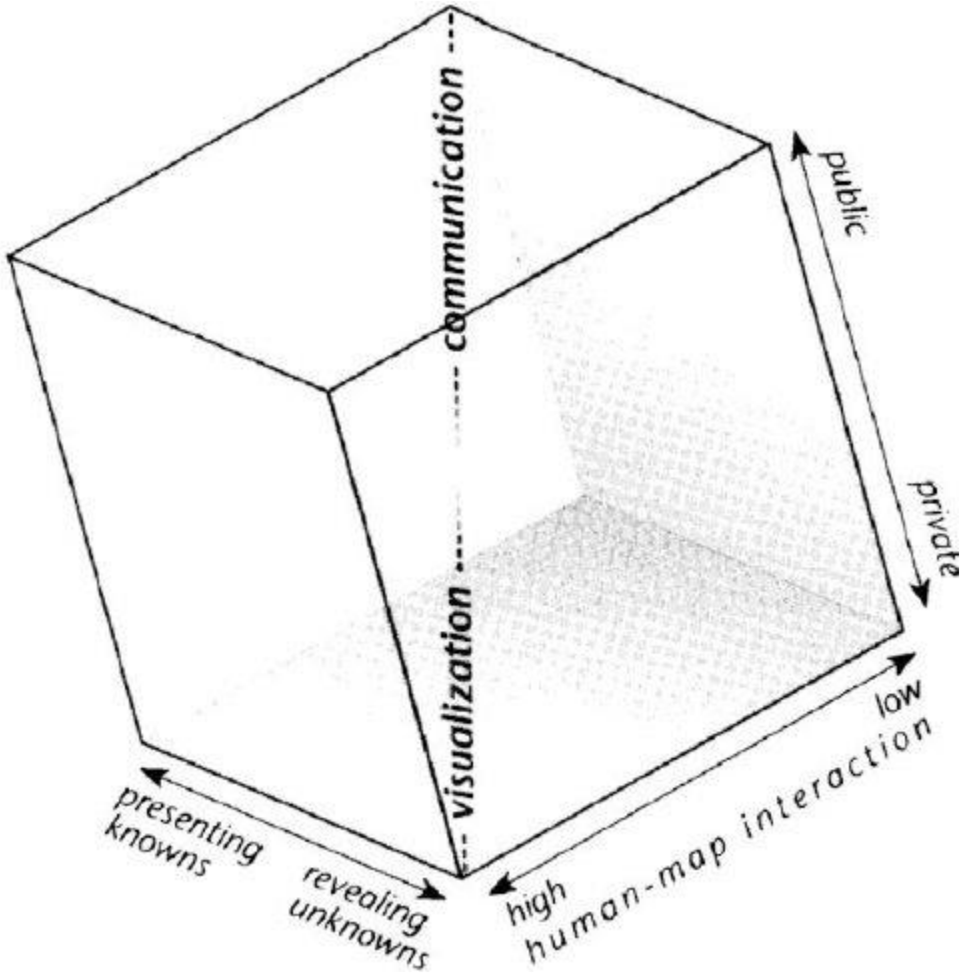
New info sources: Big Geospatial data



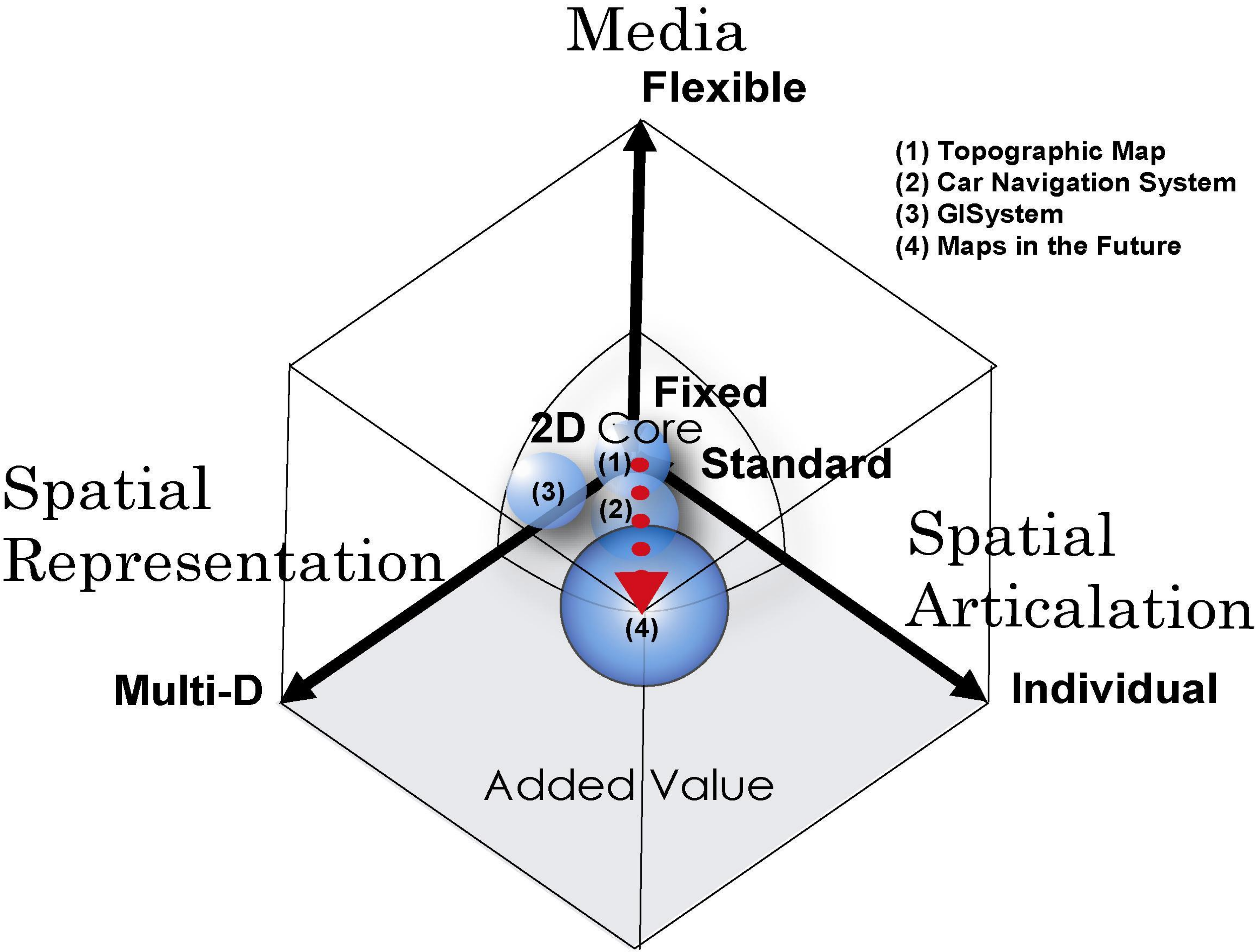
Michele CAMPAGNA
Università di Cagliari
DICAAR

M. Campagna, GWF 2017, Hyderabad

CARTOGRAPHIC POTENTIALS



MacEachren's cube diagram representing key dimensions related to visualisation and communication.



Takashi MORITA, 2005

Basic definition

Cartography is the art, science, and technology of mapping, including their study as scientific documents and works of art. in this context, all types of maps can be considered as maps, as well as plans, sketches, proportional models and globes, depicting the Earth or the celestial sphere at any scale.*1973, Multilingual Dictionary of Technical Terms in Cartography, ICA, Wiesbaden*

M. Konečný (former ICA Presiden: **Cartography is Science, Technology and Art…..**

Cyber cartography (F. Taylor)

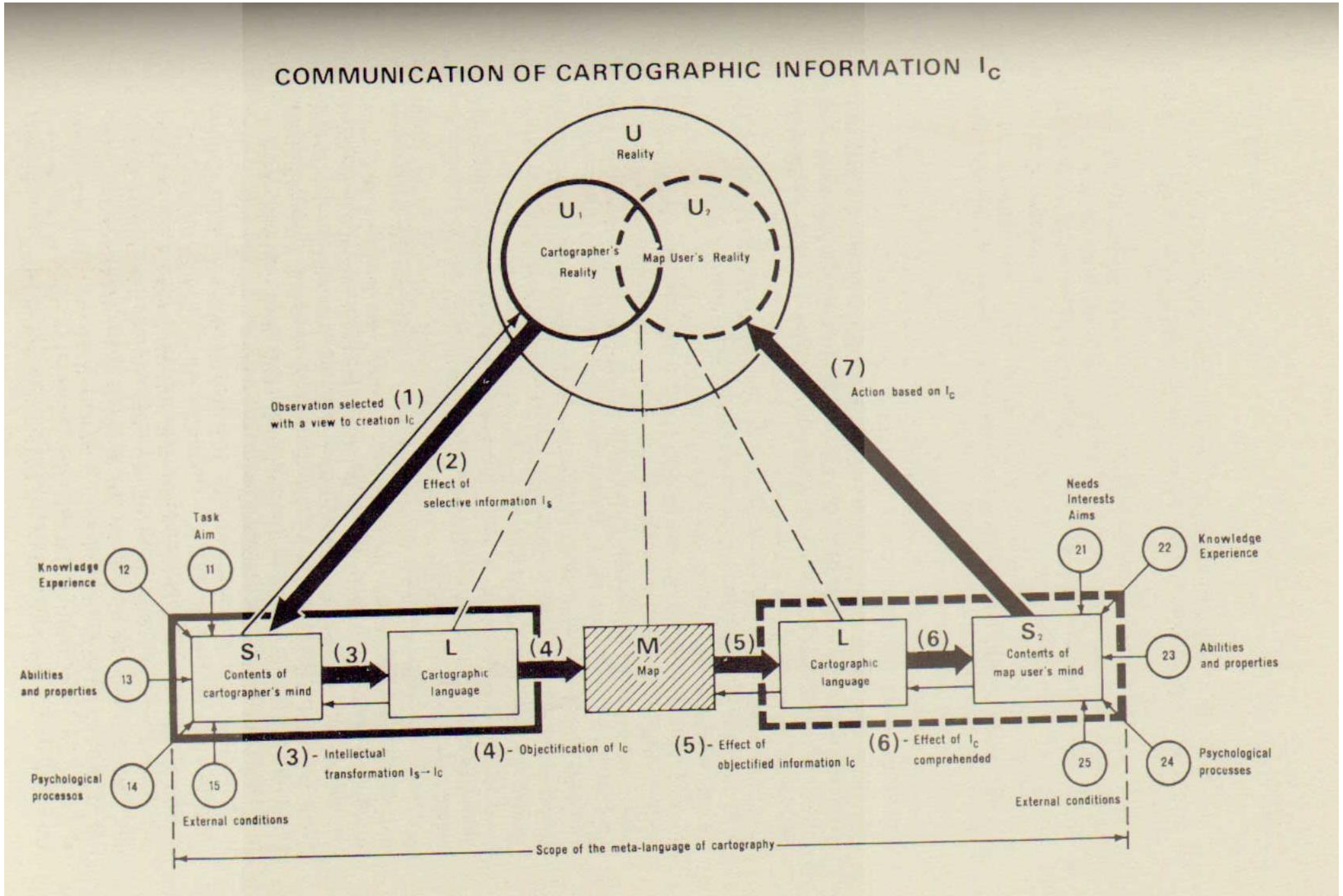
Application of geographic information processing to the analysis of topics of interest to society and the display of results in ways that people can easily understand

Using the latest Information and Communication Technologies - ICT.

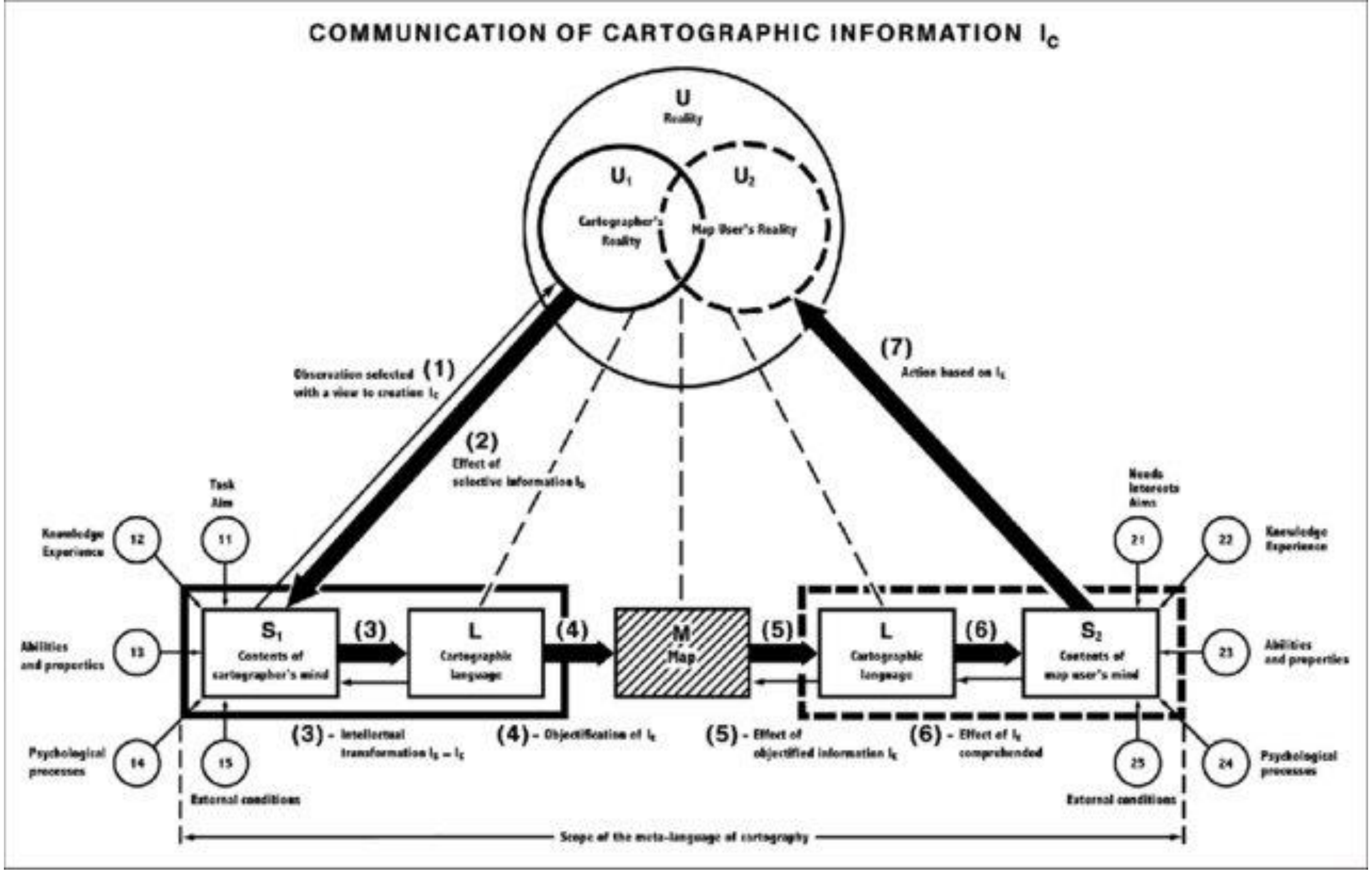
.

Language of Map

- **Cartographic symbol**
- Cartographic **word**
- Cartographic **sentence**
- Cartographic **text**



Antonín Koláčný - 1969



Koláčný's (1969) diagram of the map communication model

Intelligent access to databases and interactive user support can be used not only for the location of suitable maps on the Internet, but also according to

specific and individual requirements.

Instead of just *using maps* created by someone else in advance, these new research technologies allow individuals

to use cartography *interactively, on the basis of individual user's requirement*, to study and present spatial information.

ADAPTIVE CARTOGRAPHY
in Current Emergency Management:

- **Analogue maps or static digital sources.**
- **No real time cartographic support in emergency situation.**
- **Insufficient cartographic legibility for particular emergency situation.**
- **Maps for user needed (not user for maps)=personalisation of cartographic output.**

ADAPTIVE CARTOGRAPHY

Adaptability of Cartographic Representation

1. **User level–operational units, dispatching units and stakeholders need different scales, themes and map extent, but over the same data.**

2. **User background–different educational and map use bias.**

3. **Theme importance – different features in map content and variable significance with changing emergency situation.**

Context-Based Cartography

The subject-matter of adaptive cartography is **automatic creation of correct geodata visualization with regard to situation, purpose and the user.**

Adaptive maps are still maps in the conventional sense – they are correct and well-readable medium for transfer of spatial information. The user controls map modifications ***indirectly via modification of context***.

The term **CONTEX** ***refers to a set of characteristics*** providing answers to the following questions:

Who is the map reader – information on abilities of the user to read maps, their visual preferences, level of knowledge and/or education. This information forms the user profile.

What is the purpose of the map – information on solved problems, spatial extent of the problem and information on hierarchy of map content items depending on the given problem.

Where is the map used – information on place, time, orientation and natural conditions influencing map perception (e.g. light conditions)

What is the device displaying the map – set of information related to parameters of the display, transmission capacity and software characteristics of client application.

Adaptabile Geovizualization

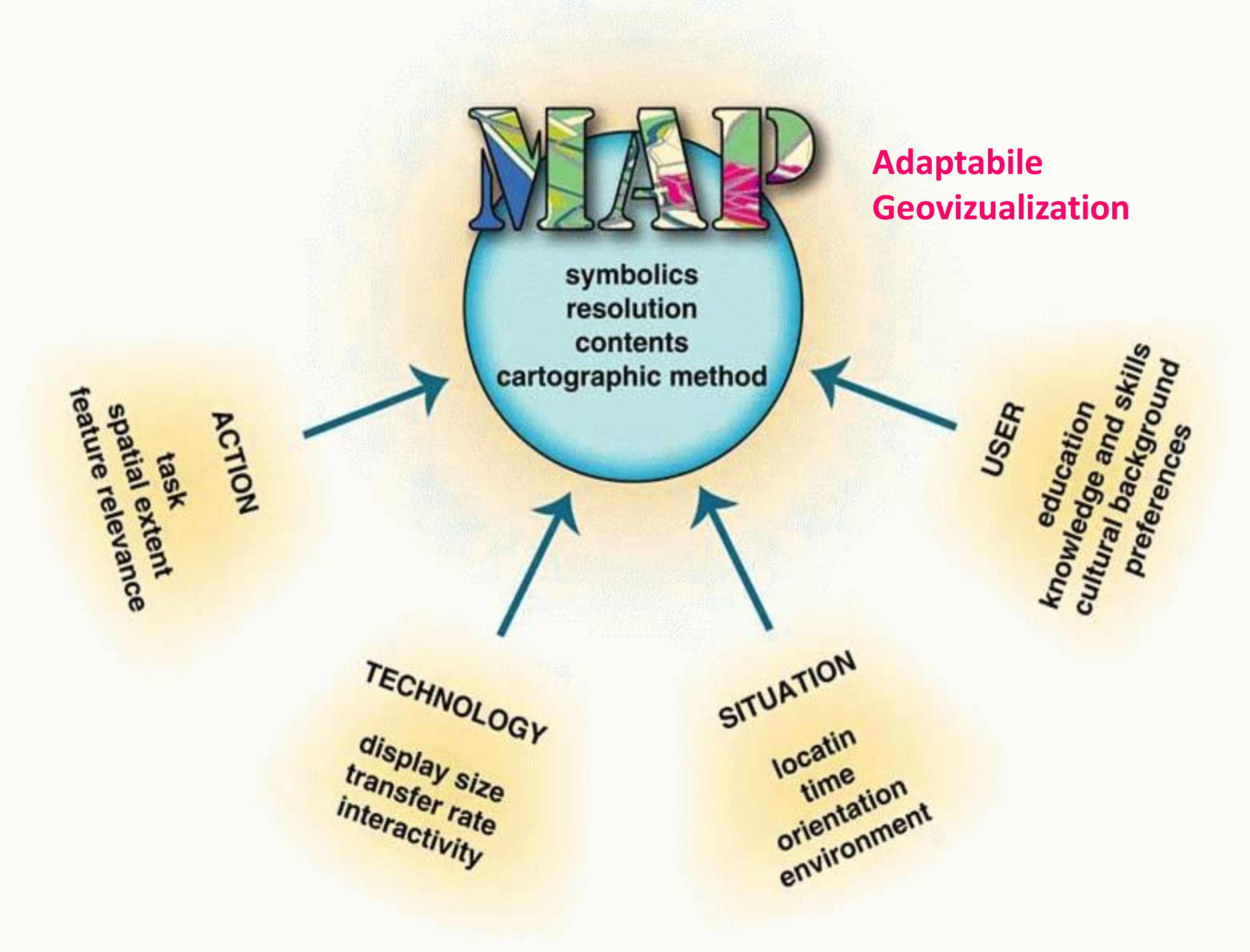
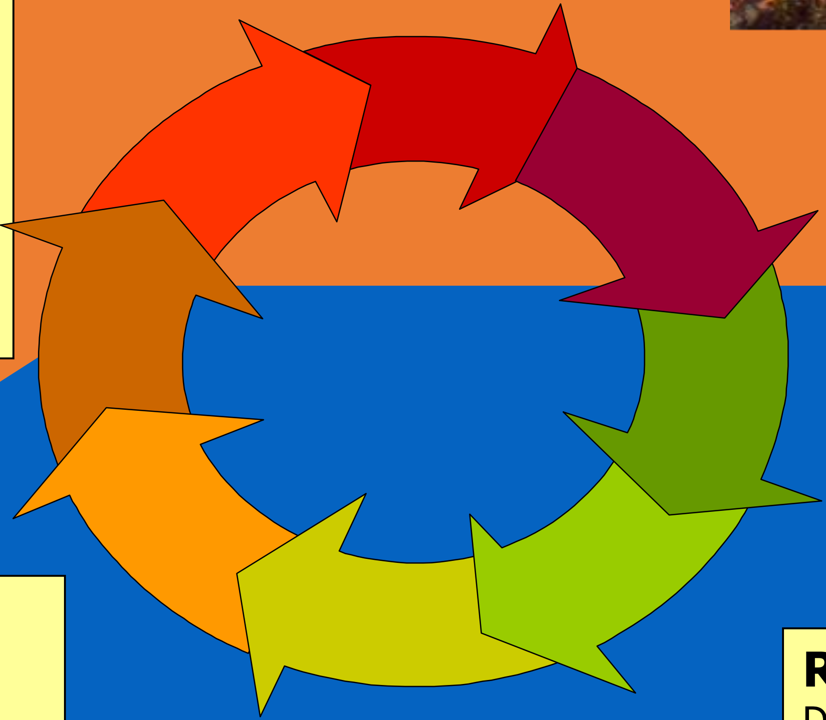


Figure: Examples of changes in visualization according to change of context (Friedmanová, Konečný and Staněk 2006)

Disaster Management Cycle

Prevention and Mitigation
Hazard prediction and modeling
Risk assessment and mapping
Spatial Planning
Structural & non structural measures
Public Awareness & Education..

Preparedness
Scenarios development
Emergency Planning
Training



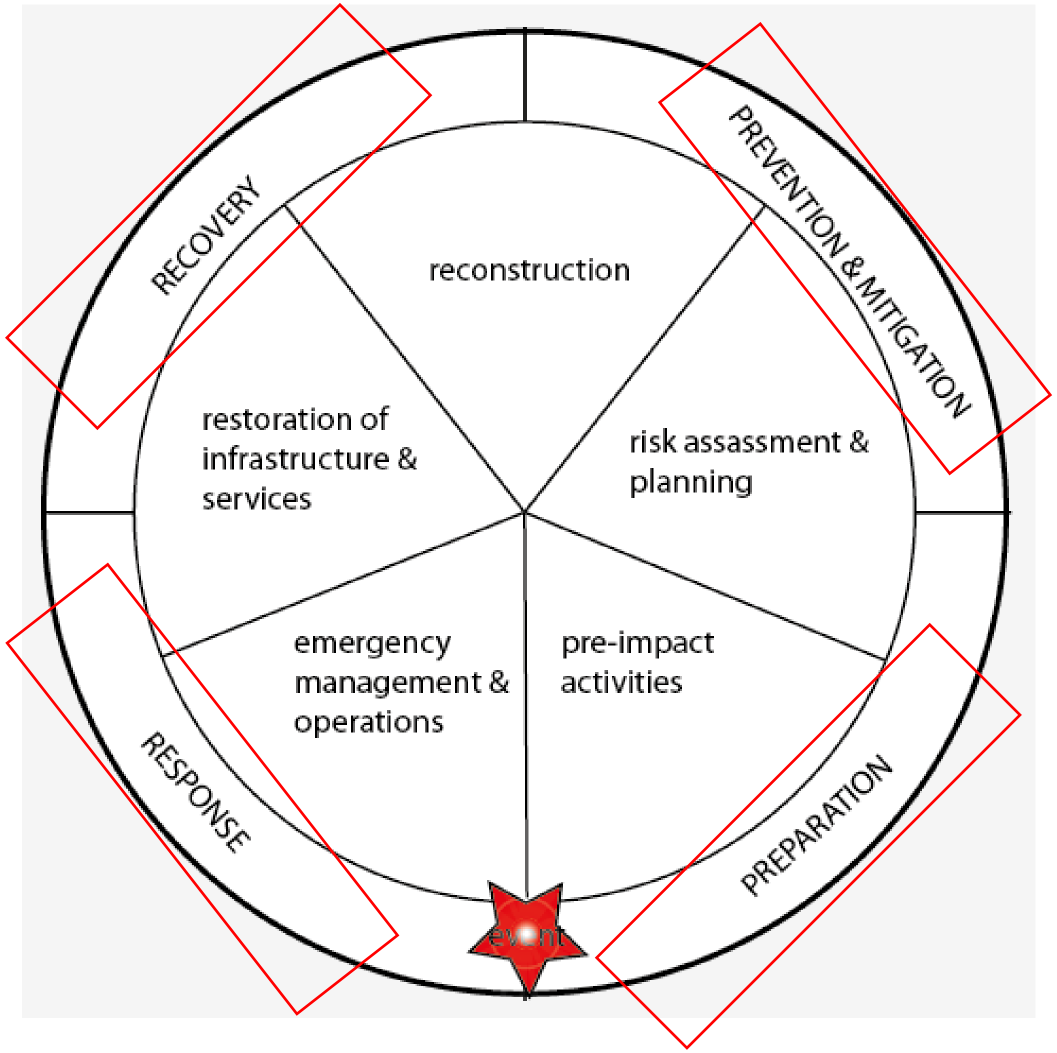
Alert
Real time monitoring
& forecasting
Early warning
Secure &dependable telecom
Scenario identification
all media alarm

Post Disaster
Lessons learnt
Scenario update
Socio-economic and environmental impact assessment
Spatial (re)planning

Recovery
Early damage assessment
Re-establishing life-lines transport &communication infrastructure

Response
Dispatching of resources
Emergency telecom
Situational awareness
Command control coordination
Information dissemination
Emergency healthcare

Disaster management cycle

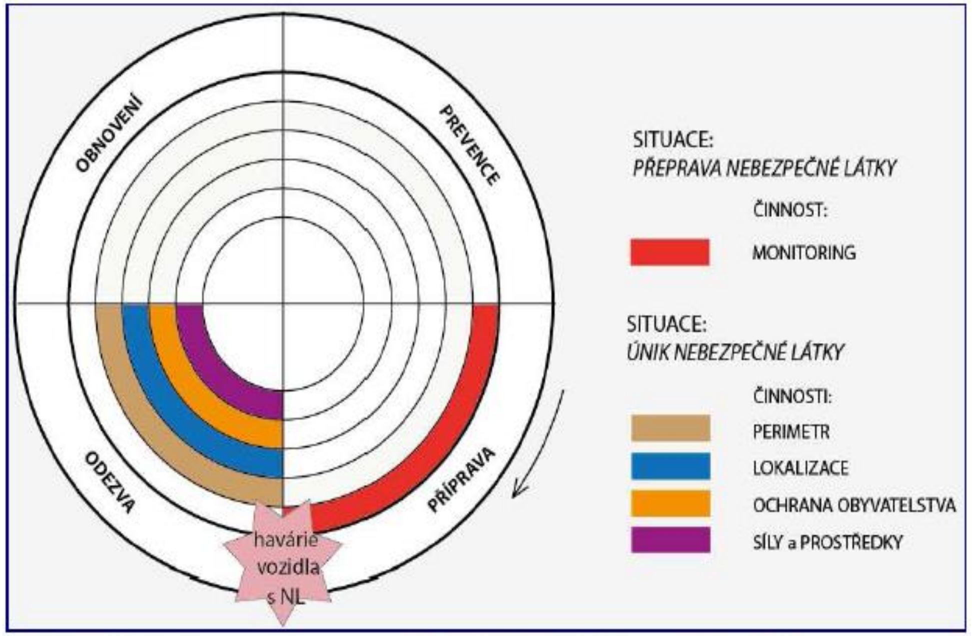


- User requirements and specifics differ within EM cycle
- Better cartographic support in all stages
- Consequences: minimizing of losses

Geoinformation support of crises management

- Crises processes
- Metadata and data
- Geografic support of CM
- Safety/Security systém an CM

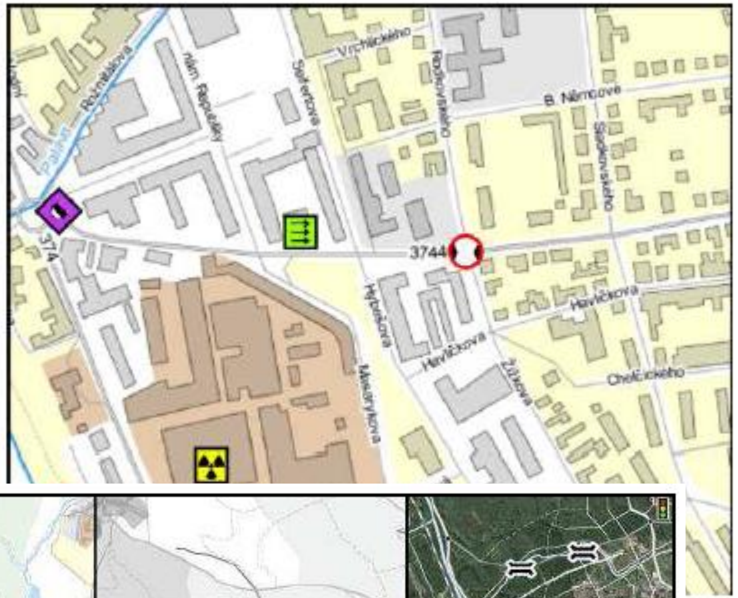
•Quality and uncertainity of data

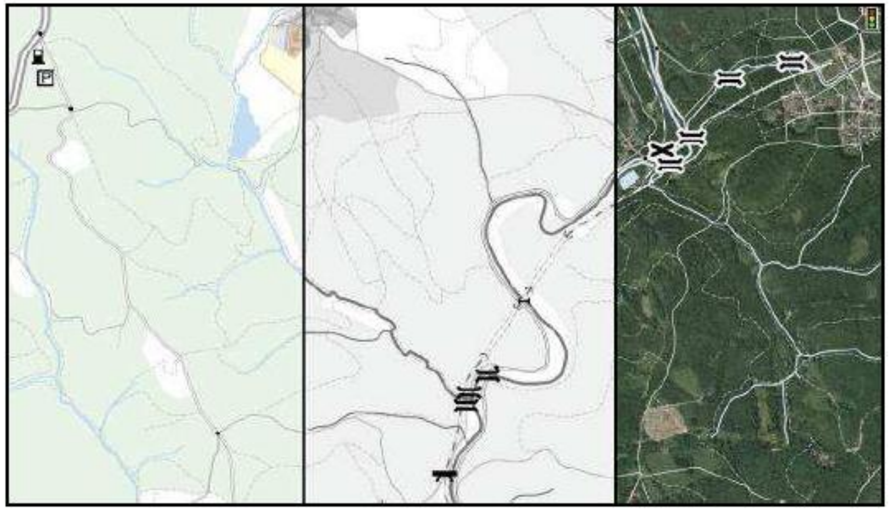


Obr. 5.10: Vymezení činností v jednotlivých fázích krizového cyklu – situace PŘEPRAVA NEBEZPEČNÉ LÁTKY a ÚNIK NEBEZPEČNÉ LÁTKY

Cartographic models and cartographic infrastructure

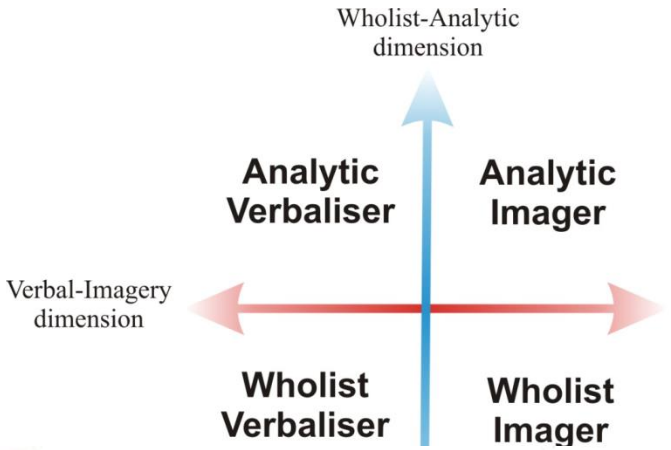
- **Adaptation of map content.**
- **Adaptation of map symbols according to context.**
- **Evaluation of cartographic outputs according to personal charakteristics of user.**



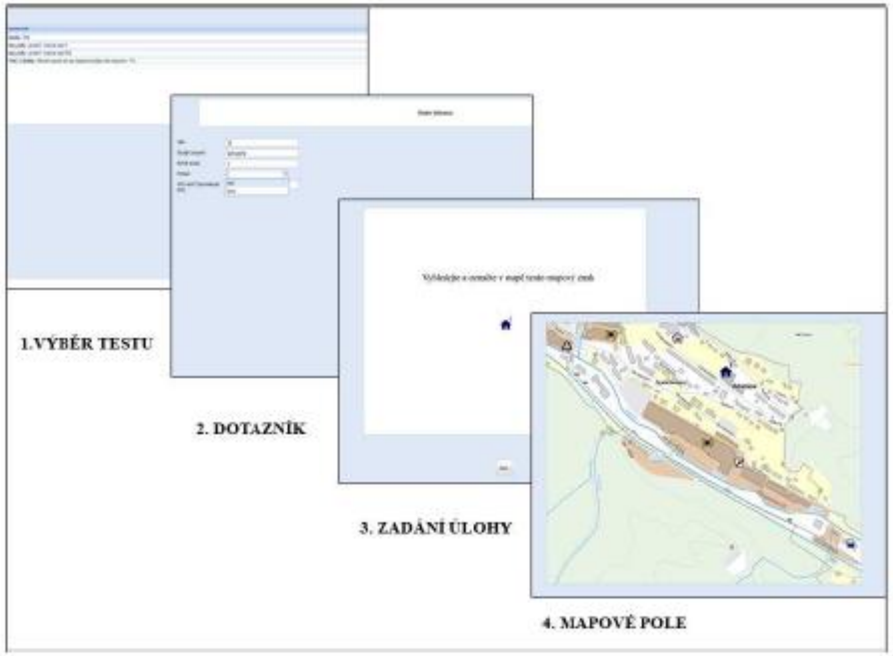


Obr. 10.10: Ukázka variantní vizualizace topografické báze BASETOPO v úrovni detailu MAX

Cognitive aspects geovisualization



- Interdisciplinary research
- (psychologists, etc.)
- Theory of cognitive styles
- Concept and design of a testing environment (MuTeP).
- International cooperation



Obr. 11.7: Posloupnost jednotlivých snímků testu v programu MUTEP – výbě testu, dotazník, zadání, úkol (upraveno podle ŠTĚRBA et al., 2011)

Usability of Selected Base Maps for Crises Management - Users Perspectives

COGNITIVE STYLE

GI4DM, Torino 2010

Personality of map users

Cognitive style

Cognitive style or "thinking style" is a term used in cognitive psychology to describe the way individuals think, perceive and remember information, or their preferred approach to using such information to solve problems. Cognitive style differs from cognitive ability....

(Konecny et al., 2011 Usability of selected base maps for crises management – users perspectives. Applied Geomatics, DOI 10.1007/s12518-011-0053-1. Springer JW. 2011, pp. 1-10. ISSN 1866-9298.)

5. How to manage volunteer geographic information? Chaos or help?

Volunteer geographic information **VGI**:

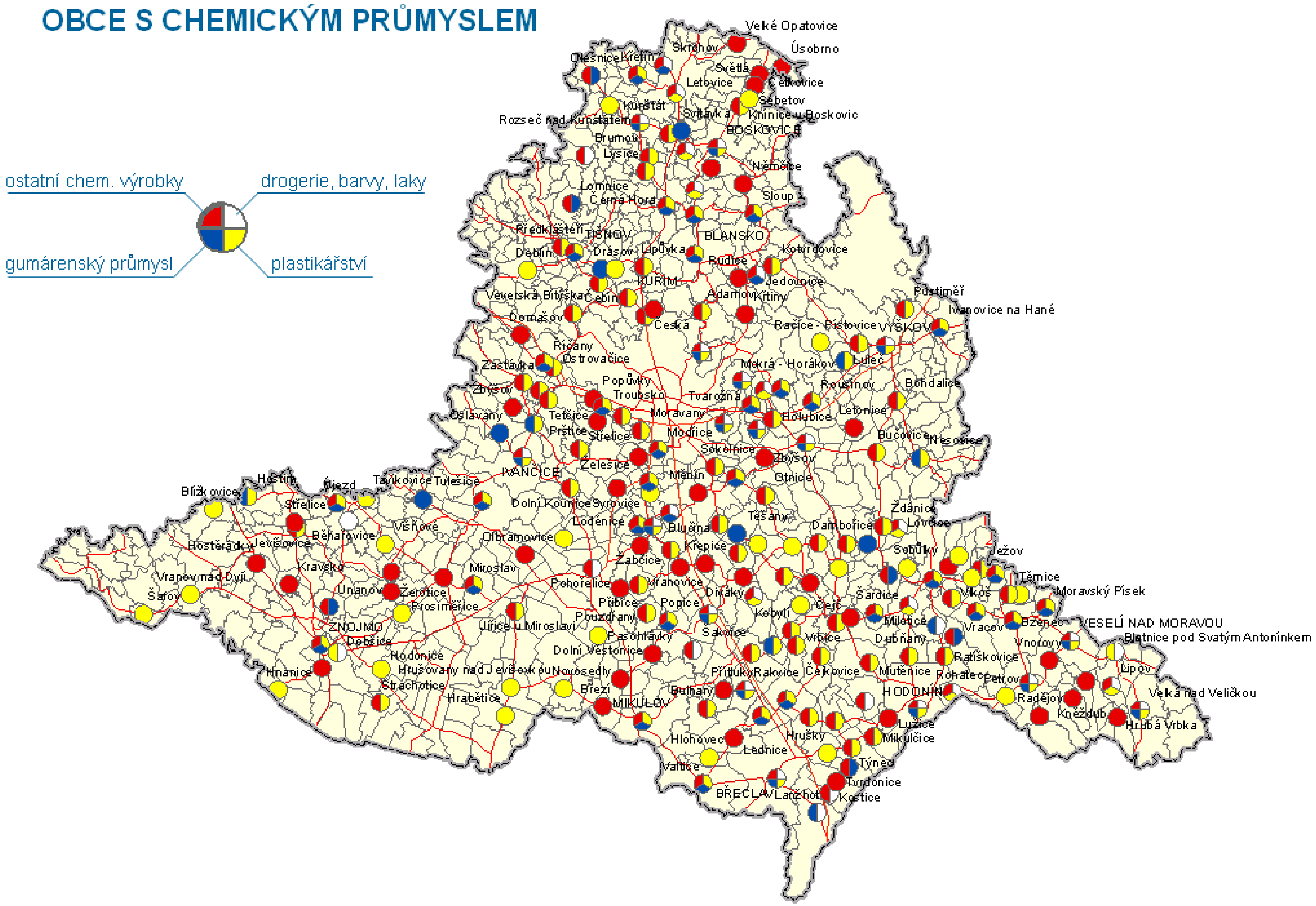
"The terms, *"crowdsourcing" and "collective intelligence"* draw attention to the notion that the collective contribution of a number of individuals may be more reliable than those of any one individual.

The term VGI refers specifically to geographic information and to the contrast between the actions of amateurs and those of authoritative agencies."
Goodchild (2009, p. 18)

The term asserted that geographic information draws attention to the fact that *such information is not subject to the normal checks and quality control mechanisms of those agencies*,

while neo-geography emphasizes the contrast between the grass-roots phenomenon and the current state of the academic discipline of geography.

Chemical industry in Jihomoravský district



Targets of Pilot experiment

- Test of the functions of ICTs proposed as a components of GEOKRIMA system
- Test of various categories of GPS receivers
- Coordination with Department of crises management and defence of JmK and others departments of JmK úřadu (GIS,…)
- Test of performance team members and ability of coordination of project activities

Proposal of Basic Functionality

1) Normal traffic

1a) Monitoring of the substantials movement (general view)

- Present location of vehicles
- Route identification
- Identification of cargo (symbol)
- Potencial risks of transported ES

Proposal of Basic Functionality - 2

1b)Information about surroundings of moving vehicle (possibly of all transport route)

- geographical characteristics of surroundings
- critical transport infrastructure

  Infrastructure

  Settlements and big concentration of people

  Limitations (opening hours, trafic)

  Social structure (schools, hospitals, petrol stations)
- Presence of others vehicles transporting emergency substanties.

Proposal of Basic Functionality - 3

2) In the case of vehicle crash – context visualization

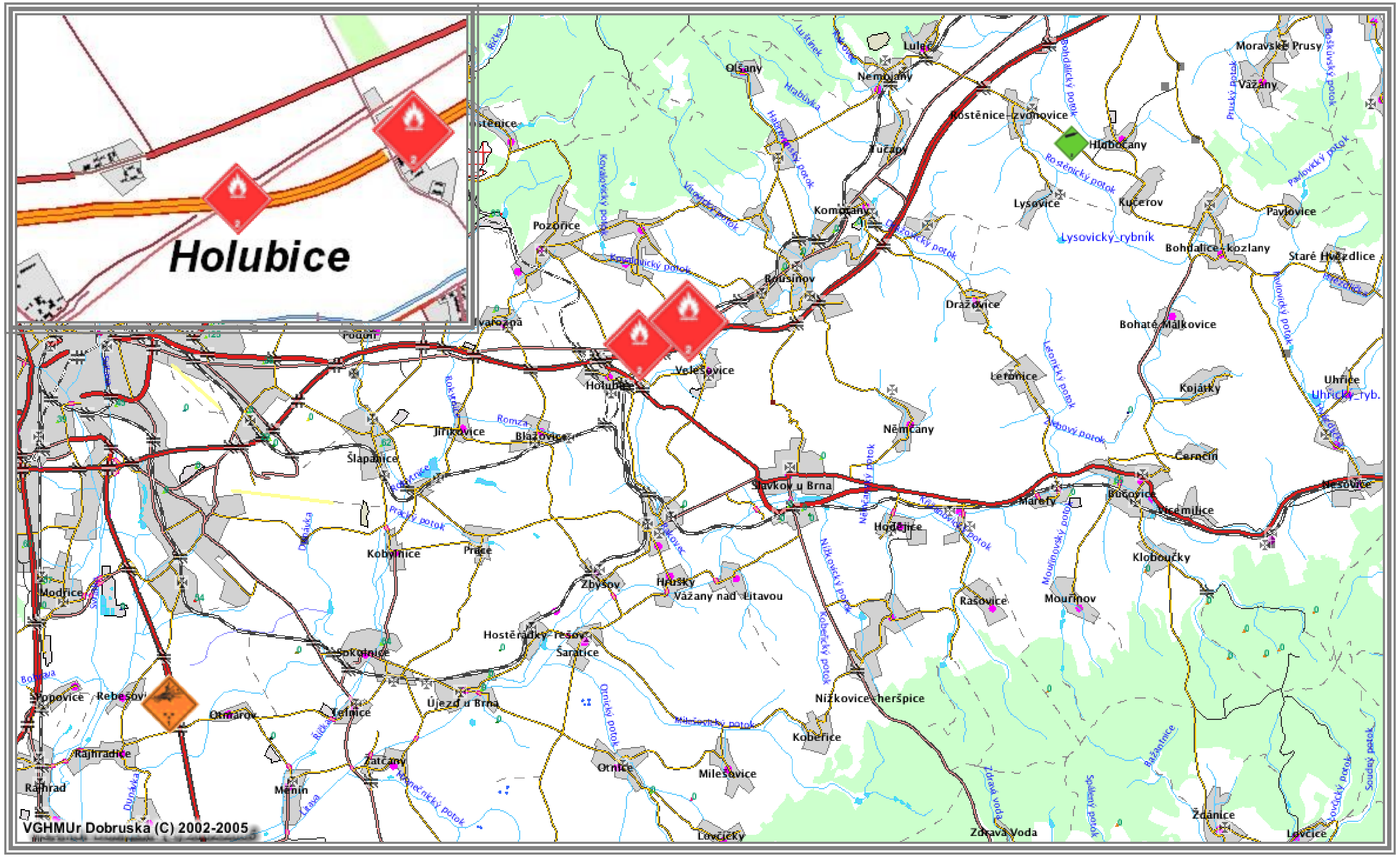
Starting point are prepared scenarios of solutions – interview with other participants

- Overview of the roles in the crash solutions
- Overview of cartographic groundworks of information necessary for managment of certain actions - scenarios, portrayal of the context according to needs of decion makers, users profiles.

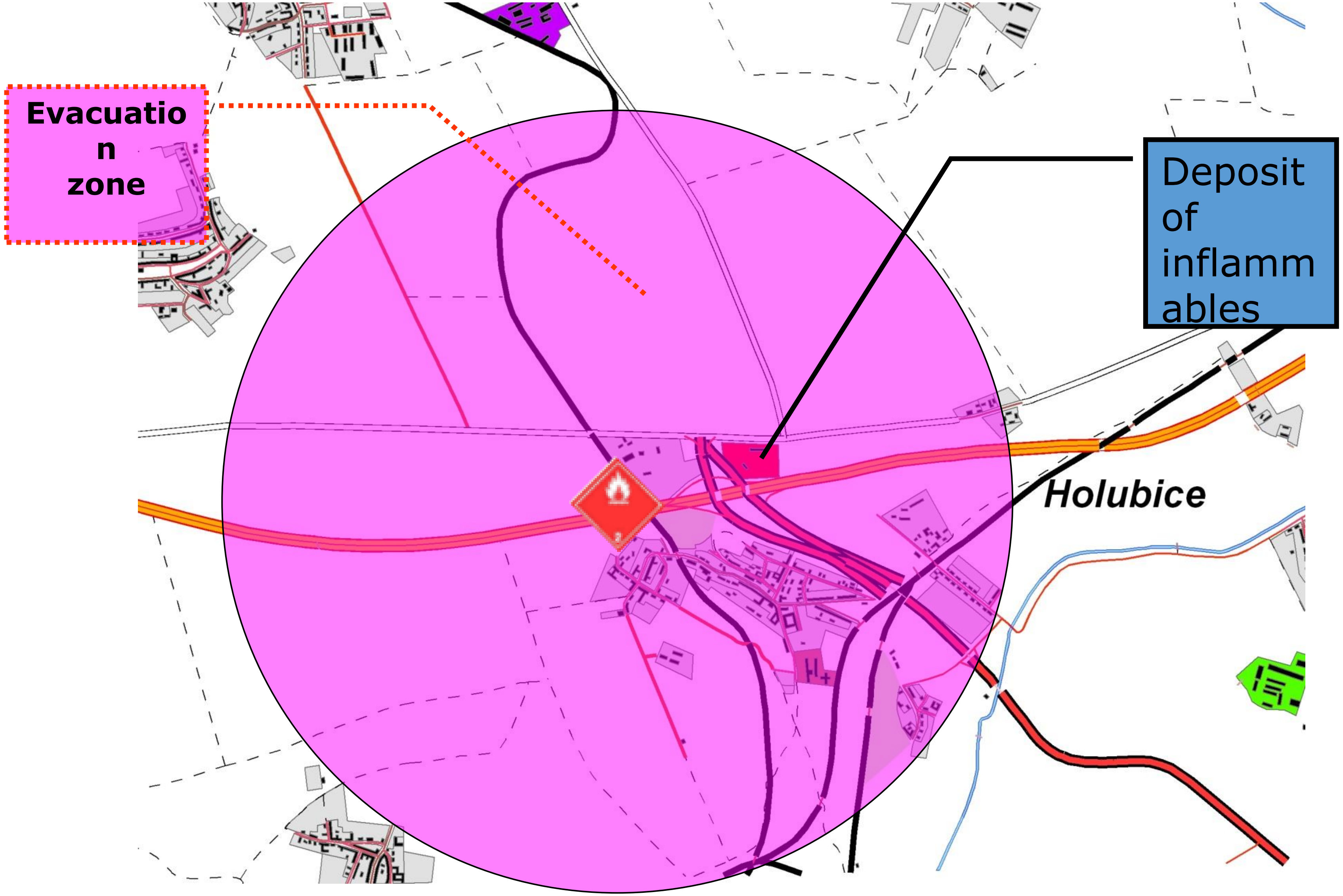
Basic Data

- **geodetical reference system – WGS84**
- **Cartographic projection – UTM**
- **topographic groundworks – DTM, RETM**
- **special levels - shp**
  - HSZ, PČR, ZZS acts areas
  - critical locations on the routes
  - ecological levels
  - chemical manufactures
  - other critical transport infrastructure

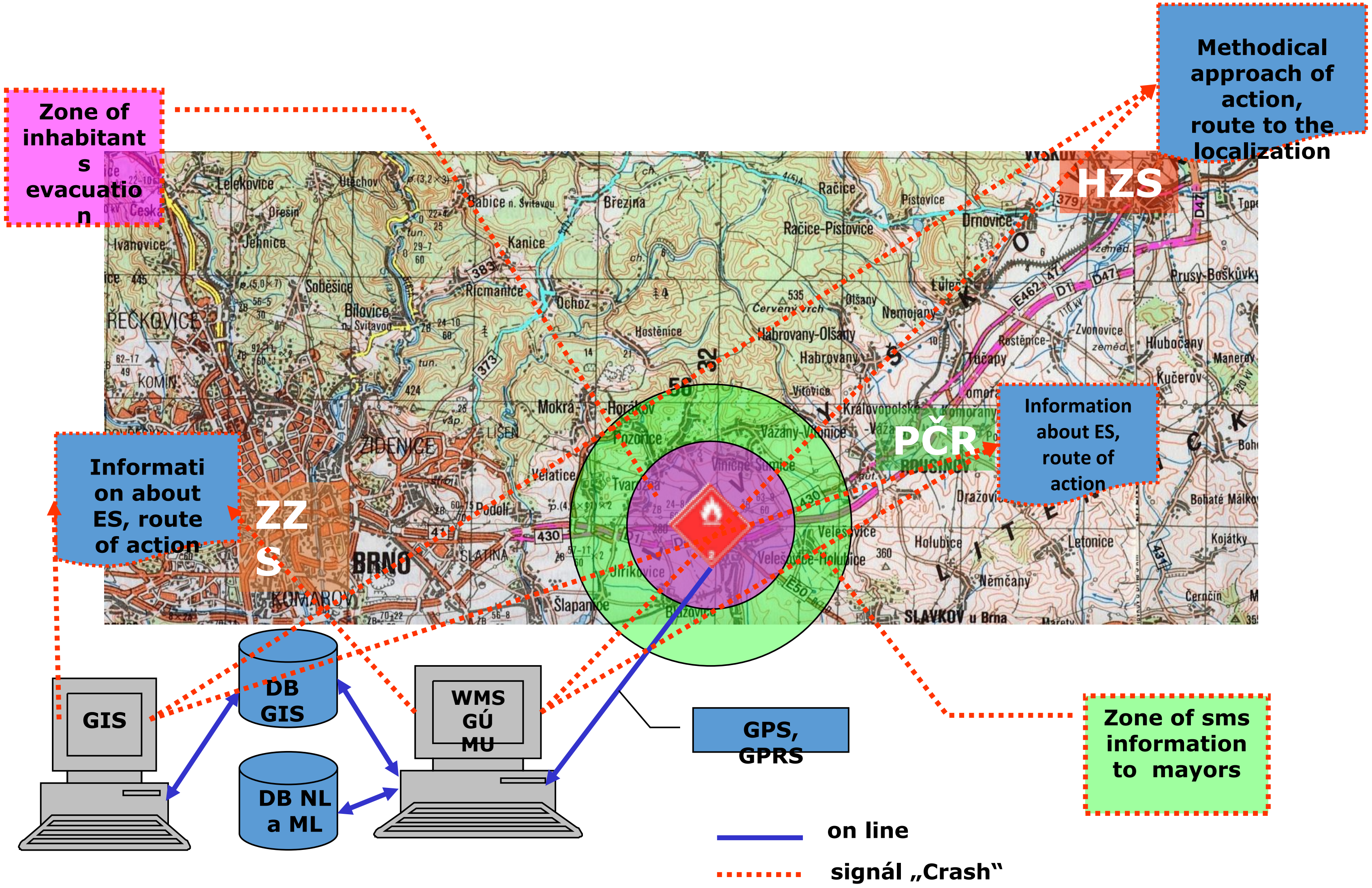
Standard situation – monitoring of vehicle with emergency substitute movement



„CRASH“



Used procedures



4. How to deliver information? Decision makers and Children

reduce their fears.

Different international organizations, such as United Nations and ISDR (International Strategy for Disaster Reduction), publish books and information brochures about education in risk and disaster situations and explain reasons for appearing and consequences of them, as well as how to behave and manage in situations of floods, volcanoes, or storms.

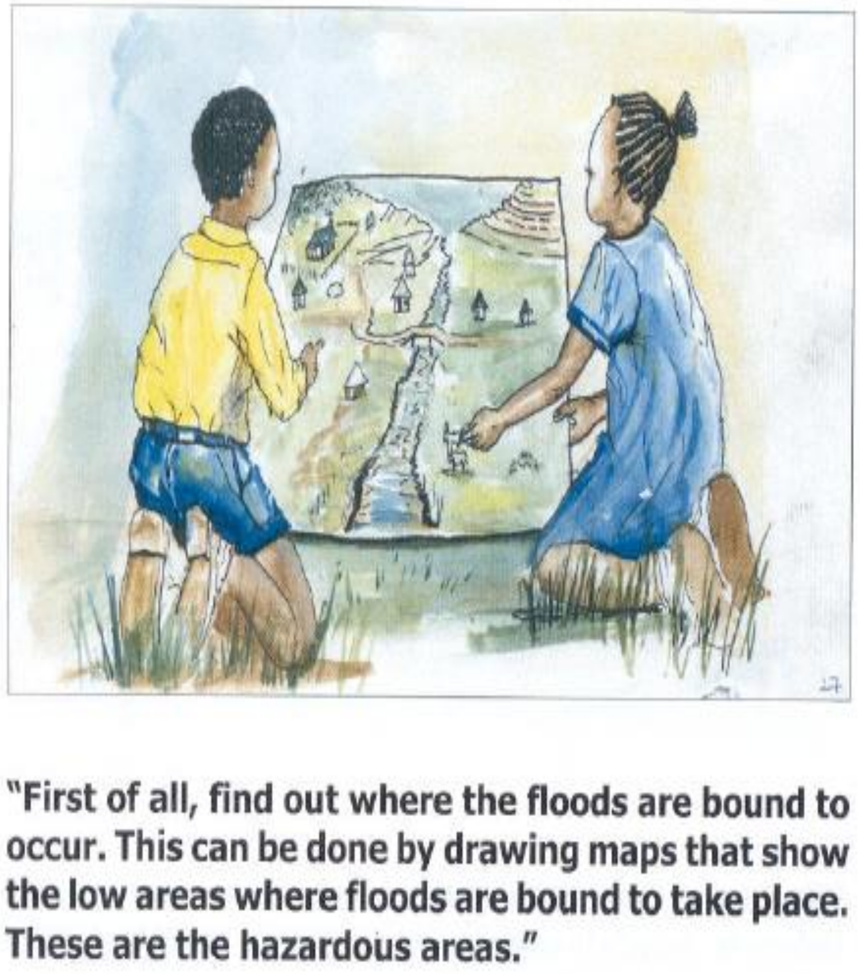


Figure 3 A page from "Safari's Encounter with Floods"

In Safari's Encounter with Floods, the authors tell a story about a visit of family with children in place with a danger of floods. They explain nature and climate details for appearance of floods; different kinds of floods (flash and river or lake), reasons of flood occurrence and destruction of infrastructure. The story is interesting for children because it is created as a tale. In one part, a child's

Children and navigation maps

Children are using mobile phones and are playing games from very early ages.

These activities do not mean that they know how to behave and how to use their equipment (as mobile phones), and what to do in crises situation.

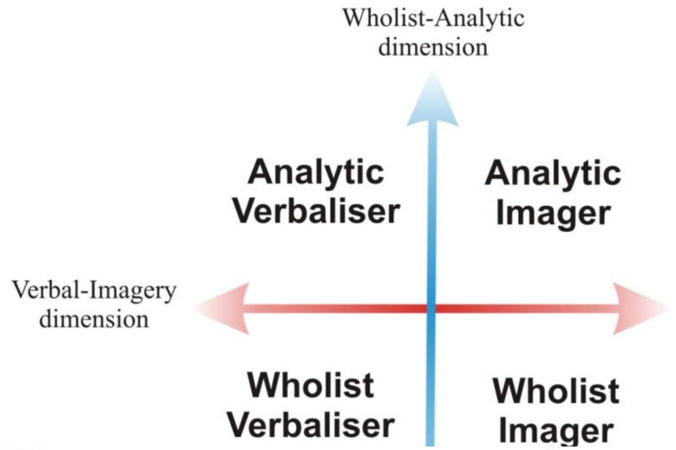
Blogger Eirik Solheim writes about how he used a Nokia N95 to entertain his kids in the car: *“I simply connected it to my son’s small DVD screen. Wow! Seven inches of pure joy for the small ones in the back. Changing view, colors and the language of the navigation voice keeps them happy…”*

- If we have a navigation map, produced by this special technology, we can simply use it in crises management for children. Children can react after receiving the necessary information, for example sms.

- What is the possible behaviour and children instruction if they are supplied with mobile phone, GPS, navigation maps?

1. A child receive sms for dangerous situation (for example: flood is coming; you should follow your navigation system;
2. Activation of crises situation management by receiving of point (coordinates: latitude and longitude) where the child should go;
3. Navigation of child by voice; an alarm informs if the child is going in wrong direction;
4. Sms instruction what to do when the child get to a safety place.

Cognitive Aspects of Geovisualization



- Interdisciplinary research.
- Theory of cognitive styles.
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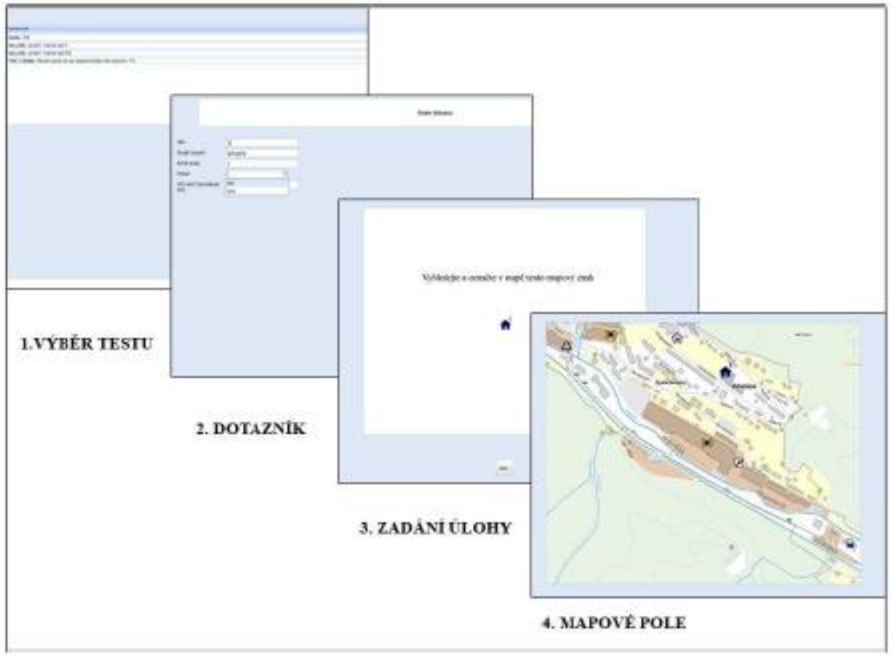
- International cooperation.



Obr. 11.7: Posloupnost jednotlivých snímků testu v programu MUTEP – výbě testu, dotazník, zadání, úkol (upraveno podle ŠTĚRBA et al., 2011)

7. CONCLUSIONS

COMMUNICATION WITH PEOPLE

And

SOCIETY

How do *people* think about space?

- Not in terms of latitude, longitude, polygons, precise distances and directions
  - not as GIS does
  - GIS is difficult to learn because it requires a change of thinking
- Places
  - often vaguely defined, without precise boundaries
  - often context-dependent
  - with imprecise distances, directions
  - places identified by name

  (Goodchild M., Brno, May 2016)

8. CONCLUSIONS

Too **many indicators**, but who other than geographers, geoinformatics and cartographers aligns them to move the result forward in the field of SDGs and SF.

Except our elaborated scientific and research methods, let´s go **to communicate with people,** our costumers, youths and seniors by understandable ways for them.

We should **include them to our deals and use also their opinions** in VGI, new types of Missing maps, OSM and others.

We already developed **dynamic mapping from heterogenoues sources**, like mobile phones, statistical data and many others.

Let's try to do that !!!

Present for my Budapest Erasmus+students:

All book:

https://library.oapen.org/bitstream/handle/20.500.12657/49450/9781000402926.pdf

My (our) Chapter: p.393-398

GIFTS for students – Free Publications

KONECNY Milan, BANDROVA Temenoujka, KUBICEK Petr., MARINOVA Silvia., STAMPACH Radim, STACHON Zdenek and REZNIK Tomas (2020) ***Digital Earth for Disaster Mitigation,*** pp. 495-526. In: **Manual of Digital Earth Ed. Guo H., Goodchild M.F., Annoni,** A. DOI https://doi.org/10.1007/978-981-32-9915-3, 2020, Publisher Name Springer, Singapore, Print ISBN 978-981-32-9914-6, Online ISBN 978-981-32-9915-3, , https://link.springer.com/book/10.1007/978-981-32-9915-3#editorsandaffiliations. 852 p.

KONEČNÝ Milan, Temenoujka BANDROVA, Petr KUBÍČEK, Zdeněk STACHOŇ, Radim ŠTAMPACH, Jie SHEN, Irina ROTANOVA, Jan BRODSKÝ and Pavel ŠPULÁK: ***Strategies of Disaster Risk Reduction on The Background of U.N. GGIM and Digital Belt and Road Efforts, pp. 572-588.*** Proceedings Vol. 1, 2020, Nessebar, Bulgaria © Editors: Temenoujka Bandrova, Milan Konečný, Silvia Marinova. © Publisher: Bulgarian Cartographic Association. ISSN: 1314-0604. 760 p. https://iccgis2020.cartography-gis.com/proceedings-vol-1/

AND if you WISH, also:

First textbook of GIS in the World from 1985

(via Dr. Jesus Reyes)

THANK YOU

SPASIBO
RACHMED
Muchas Gracias
O Brigada
Kammsa Hamida
Aligator
SHUKRAN
BLAGODARJA

DĚKUJI, Ďakujem

PRAGUE


BRNO