Cartography and SDI World: the role, place and potentials.

Milan KONECNY

President; International Cartographic Association (ICA)

Institute of Geography, Faculty of Science, Masaryk University,

Kotlarska 2, 611 37 BRNO, Czech republic

konecny@geogr.muni.cz

International Cartographic Association

www.icaci.org

Commissions of ICA

- *Commission on Cartography and Children*
- Commission on Education and Training
- Commission on Gender and Cartography
- Commission on Generalisation and Multiple Representation
- Commission on the History of Cartography
- Commission on Incremental Updating and Versioning

- Commission on Management and Economics of Map Production
- Commission on Mapping from Satellite Imagery
- Commission on Map Projections
- Commission on Maps and Graphics for the Blind and the Partially Sighted
- Commission on Maps and the Internet
- Commission on Marine Cartography
- Commission on Mountain Cartography

- Commission on National and Regional Atlases
- Commission on Planetary Cartography
- Commission on Spatial Data Standards
- Commission on Theoretical Cartography
- Commission on Ubiquitous Mapping
- Commission on Visualization and Virtual Environments

- Working Group on Mapping Africa for Africa
- Working Group on Spatial Data Uncertainty and Map Quality
- WG on Use and User issues
- WG on Geospatial analysis
- WG on historical geometrical analysis
- Publications Committee

ICA and ESRI

Children Map the World

Selections from the Barbara Petchenik Children's World Map Competition

Jacqueline M. Anderson, Jeet Atwal, Patrick Wiegand, and Alberta Auringer Wood, editors

1. Information/Knowledge-based Society
2. European Challenges
3. Position of Cartography (geotechnology)
4. GMES and INSPIRE
5. State of the Art of Cartography
6. SDI and Cartography
7. Geospatial Information & the Knowledge Economy
8. Early Warning, Disaster mnagement and cartography: Nobody is Perfect?

„Information Society” is the term that is used to capture the increasing contemporary influence of information and communication technologies (ICTs).

Knowledge-based society enhances content of the processes based on data, information and knowledge.

Information Society

Sustainable Information Society

The linkage between sustainability
and information society development
is still poorly understood.

2. European Challenges

“i2010 – A European Information Society for growth and employment”

COM(2005) 229 final
COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS
Brussels, 31.05.2005
(Text with EEA relevance)

i2010 Content:

A single European information space

Inclusion, better public services and quality of life

Conclusion: i2010 within the new Lisbon governance cycle


0
500 km
AÇORES (P)
MADEIRA (P)
CANARIAS (E)
GUADELOUPE (F)
MARTINIQUE (F)
RÉUNION (F)
Paramaribo
SURINAME
GUYANE (F)
BRASIL
Reykjavík
ÍSLAND
SVERIGE
SUOMI
FINLAND
NORGE
Oslo
Helsinki
Helsingfors
Stockholm
Tallinn
EESTI
Riga
LATVIJA
Moskva
RUSSIJA
UNITED KINGDOM
IRELAND
ÉIRE
Dublin
Baile Átha Cliath
DANMARK
København
LIETUVA
Vilnius
R.
Minsk
BELARUS
NEDERLAND
London
Amsterdam
Berlin
Warszawa
QAZAQSTAN
BELGIË
Brussel
Bruxelles
BELGIQUE
DEUTSCHLAND
POLSKA
LUXEMBOURG
Luxembourg
Kyiv
Praha
ČESKÁ REPUBLIKA
UKRAÏNA
Paris
SLOVENSKO
Wien
Bratislava
FRANCE
SCHWEIZ
SUISSE
SVIZZERA
LIECHTENSTEIN
ÖSTERREICH
Budapest
MAGYARORSZÁG
MOLDOVA
Chişinău
Bern
SLOVENIJA
Ljubljana
Zagreb
HRVATSKA
ROMÂNIA
SAKARTVELO
Tbilisi
AZƏRBAYCAN
Beograd
București
BOSNA I HERCEGOVINA
Sarajevo
SRBIJA I CRNA GORA
HAÏASTAN
Yerevan
PORTUGAL
ANDORRA
MONACO
SAN MARINO
BÂLGARIJA
Sofija
Madrid
Lisboa
ESPAÑA
ITALIA
Roma
Skopje
IRAN
Tiranë
PORANEŠNA JUGOSLOVENSKA REPUBLIKA MAKEDONIJA
SHQIPËRIA
Ankara
TÜRKİYE
ΕΛΛΑΔΑ-ELLADA
Αθήναι
Athinai
IRAQ
Alger
Rabat
Tunis
SOURIYA
ΚΥΠΡΟΣ
KYPROS
KIBRIS
Λευκωσία
Lefkosia
Lefkosa
EL MAGHREB
EL DJAZÂIR
TOUNIS
Valletta
MALTA
LIBNAN
Beyrouth
Dimashq

Connecting the UK: the Digital Strategy

Cabinet Office
Prime Minister's Strategy Unit

March 2005

UK Approach
Contents

Section 1: A ‘digitally rich’ UK – progress to date
Section 2: The ‘digital divide’: problems with low take-up
Section 3: Why should the Government intervene to promote take-up?
Section 4: How can we close the digital divide and become a world leader in digital excellence?

- ***Raising our game: Making the UK a world leader in digital excellence***

Action 1: Transform learning with ICT
Action 2: Set up a “Digital Challenge” for LAs
Action 3: Make the UK the safest place to use the Internet
Action 4: Promote the creation of innovative broadband content

- ***Constructing a robust strategy to achieve our vision***

Action 5: Set out a strategy for transformation of delivery of public services

Action 6: Ofcom's strategy should consider improving competition and take-up in the broadband market

- ***Tackling social exclusion & bridging the digital divide***

Action 7: Improve accessibility to technology for the digitally excluded and ease of use for the disabled

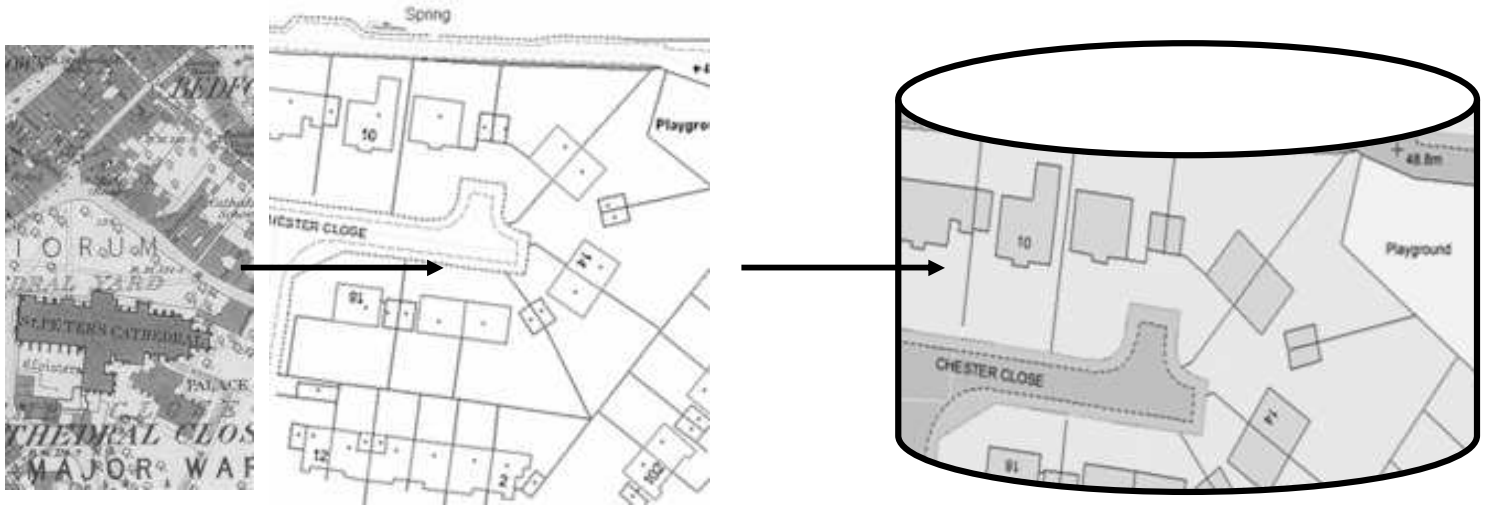
Action 8: Review the digital divide in 2008

OS MasterMap:

a definitive digital map of Great Britain, providing detailed geographic information for a wide range of business and government purposes.

OS MasterMap underpins a huge range of commercial services used by millions of people every day.

Changing models of geographic information



Paper map Digital data file Spatial database

Layers of OS MasterMap

Topography

Addresses

Integrated Transport Network

Imagery

Tony Blair, Patricia Hewitt:

….. We now have a world-leading position in digital TV…. the most extensive – and one of the most competitive broadband markets in the G7.

Virtually all households in the UK are within easy-reach of a UK online centre where they can access the internet in a safe, secure and supportive environment.

We cannot…think the job is done. We must harness the power of ICT to modernise public services so they are as personalised, efficient and responsive as the most successful companies.

We must be in the forefront of new technologies to remain globally competitive.

And most important of all, we must make sure the whole of society can experience the benefits of the internet.

Too many people still don’t enjoy the advantages of that ICT offers. We are committed to ending the digital divide for families with children by the end. ….

Strategy to make the UK a world leader in digital excellence and the first nation to close the digital divide.

How is reacting and what will do cartographic and geoinformatics community?

GI in IT?

3. Position of Cartography (Geotechnology)

Mapping

opportunities

Nature, January 2004

Scientists who can combine geographic information systems with satellite data are in demand in a variety of disciplines.

In start of 2004, the US Department of Labor identified **geotechnology as one of the three most important emerging and evolving fields**, along with nanotechnology and biotechnology.

The demand for geospatial skills is growing worldwide, but the job prospects reflect a country's
geography, mapping history and even political agenda.

4. GMES and INSPIRE

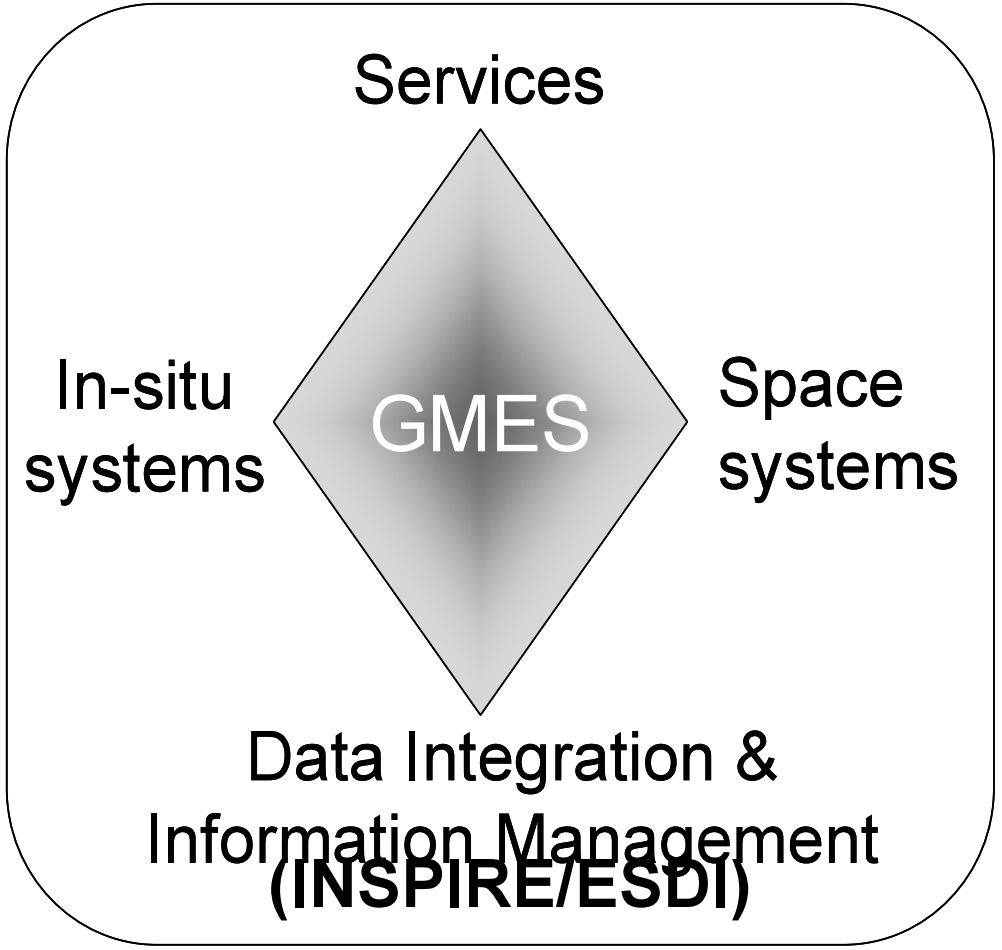
Global Monitoring for Environment and Security (GMES)

seeks to bring together the needs of society related to the issue of environment and security with the advanced technical and operational capability offered by terrestrial and space born observation systems.

GMES relevant policy areas:

- *Sustainable Development*
- *Global Climate Change*
- *Common Defence and Security Policy*
- *European Research Area*
- *European Strategy for Space*

Global Monitoring for Environment and Security



INSPIRE

Infrastructure for Spatial Information in Europe

The INSPIRE concept:

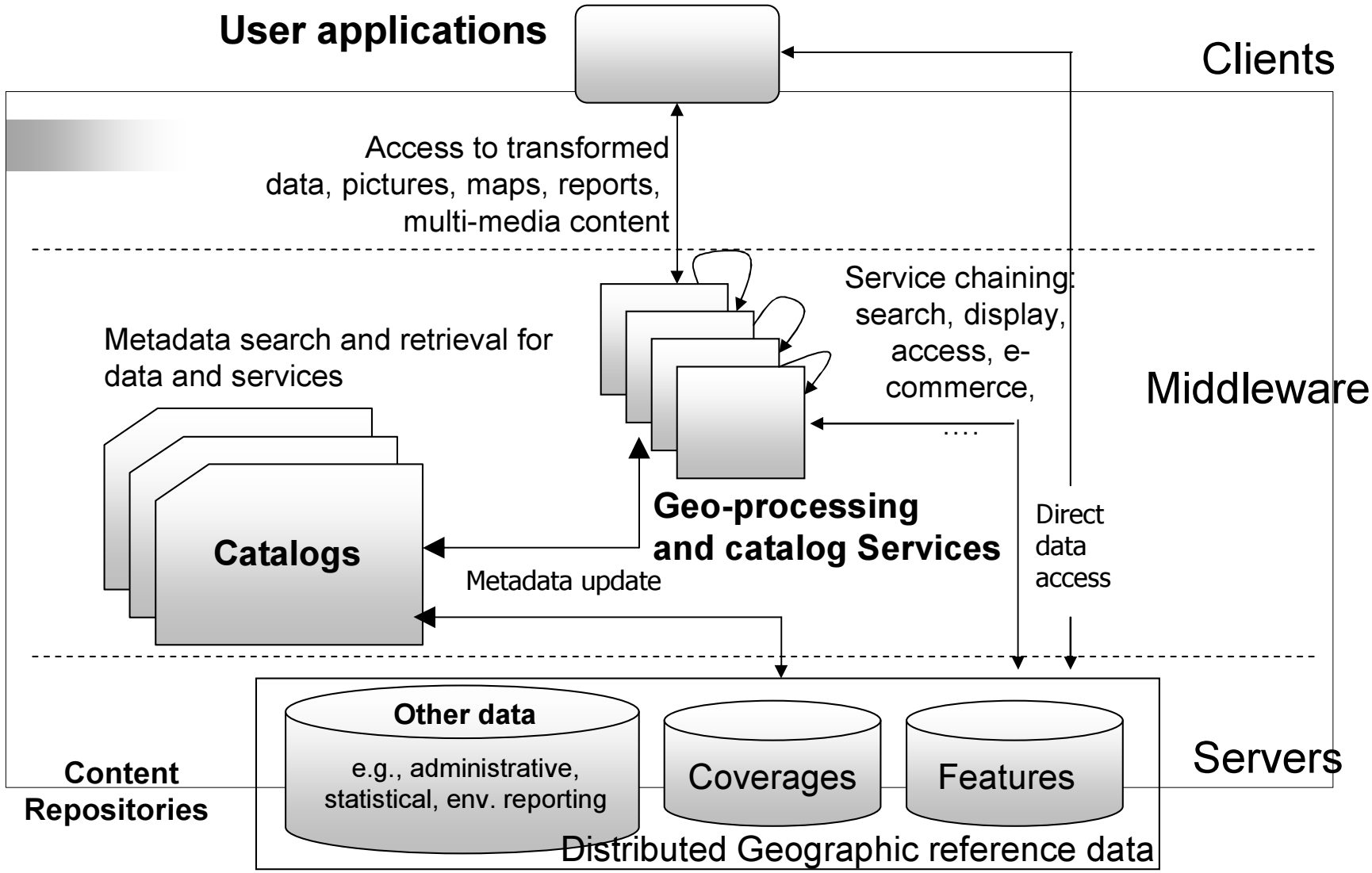
Availability

Accessibility

Legislation rules.

Current status

Architecture model



After the Digital Earth Reference Model

INSPIRE Scope: 17 Themes-1

- 1. Geographical location
- 2. Administrative units
- 3. Properties, buildings and addresses
- 4. Elevation
- 5. Geo-physical environment
- 6. Land surface/land cover
- 7. Transport
- 8. Utilities and facilities
- 9. Society and population
- 10. Spatial planning/ Area regulation

INSPIRE Scope: 17 Themes-2

- 11. Air and climate
- 12.Water/
- hydrography
- 13. Ocean and seas
- 14.Biota/biodiversity
- 15. Natural resources
- 16. Natural and technological risks and natural disasters
- 17. Areas under anthropogenic stress

The term *Spatial Data Infrastructure (SDI)* is used to *encapsulate the technologies, policies, institutional arrangements, financial and human resources that facilitate the availability, access and effective usage of geographic data.* Start: Clinton 1994.

The SDI provides the means for *discovery, access and application* of spatial data for policy-makers, planners and managers, citizens and their organizations.

SDI technologies consist of *a set of data services* that provide geographic data and their attributes.

Services and data are documented with *meta-data* which that subsequently offer the means

to discover, visualise and evaluate the data through the Web. Additionally, methods are provided to access the data. Applications are built to solve specific needs on the data service layer.

Santiago Borrero (PAIGH SG): importance of *non-technical variables* in SDI building in Developing Nations.

“Culturally speaking, particularly, there is a problem of attitude and a history of isolation, ill-defined ideas, language barriers, and financial challenges. In every country SDI will reflect local social and economic conditions, cultural aspects and elements related to national identity“.

GEOSS and GNSS Activities

G-8 Conference 2003 in Evian:

the Ad hoc „**G**roup on **E**arth **O**bservation“ (**GEO**) were created with intention to design Global Earth Observation System of Systems (**GEOSS**).

Earth Observation Summit 2005 in Brussels **decided about permanent GEO** activities (based at WMO, Geneva, Switzerland).

The 10 Years Implementation Plan, so called - **10YIP was adopted.**

Purpose of GEOSS (ref. 1st EOS in 2003)

1. to achieve comprehensive, coordinated, and sustained Earth observations for the benefit of humankind.
2. to improve
   - **monitoring** of the **state** of the Earth,
   - increased **understanding** of **dynamic Earth processes**,
   - enhanced **prediction** of the Earth system, and
   - further implementation of international environmental treaty obligations.

Nine Societal Benefit Areas of GEOSS have been formulated

- Disasters
- Health
- Energy
- Climate
- Water
- Weather
- Ecosystems
- Agriculture
- Biodiversity

GLOBAL SPATIAL DATA PROJECTS

Global Mapping

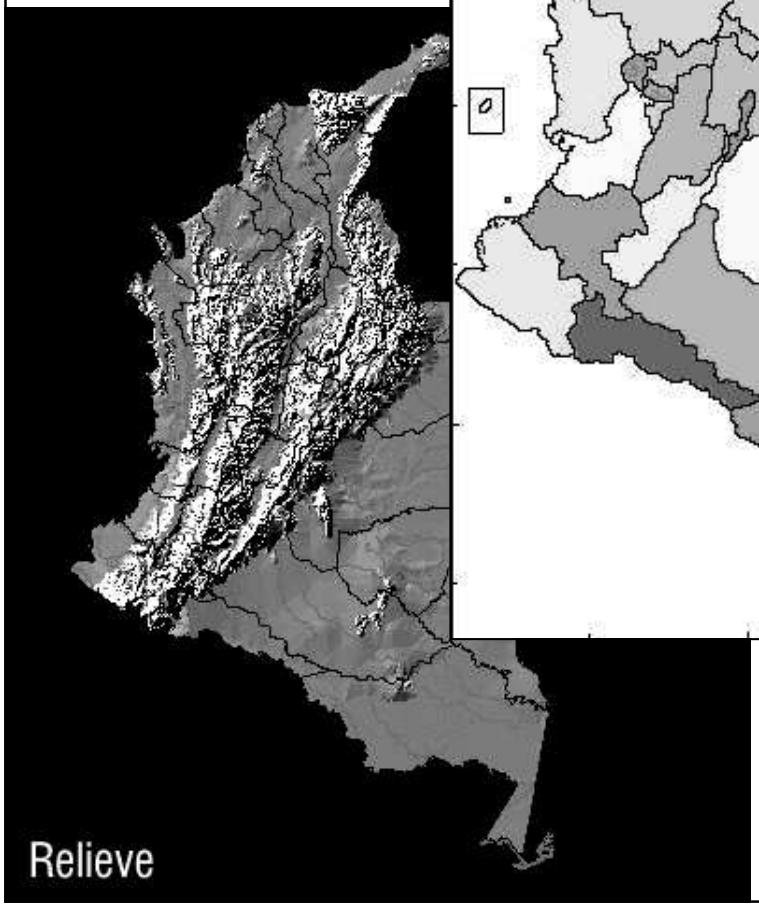
Global Spatial Data Infrastructure (GSDI)

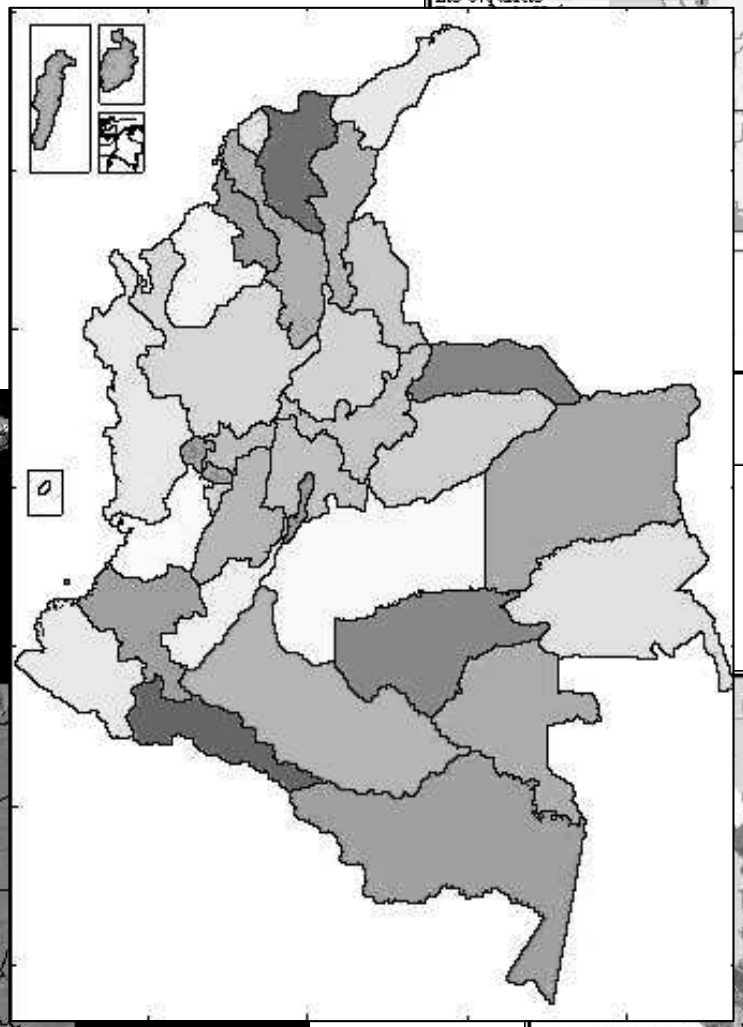
Digital Earth

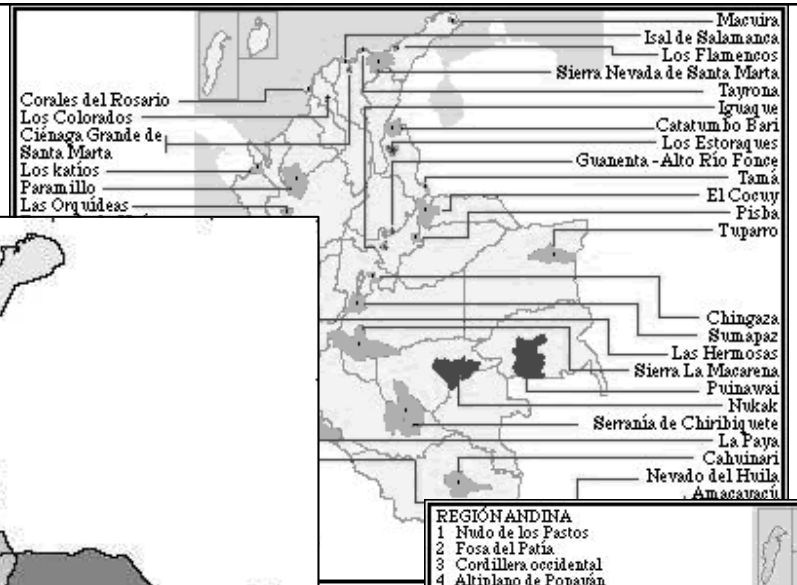
U. N. Geographic Data Base

GI for Sustainable Development (GISD) (OGC)

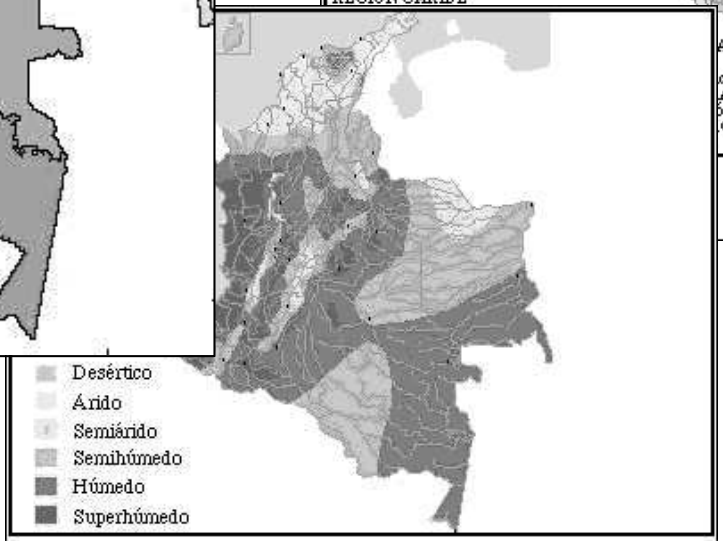
GNSS (EOS, GEOS, GEOSS), FAO..







Regiones geográficas

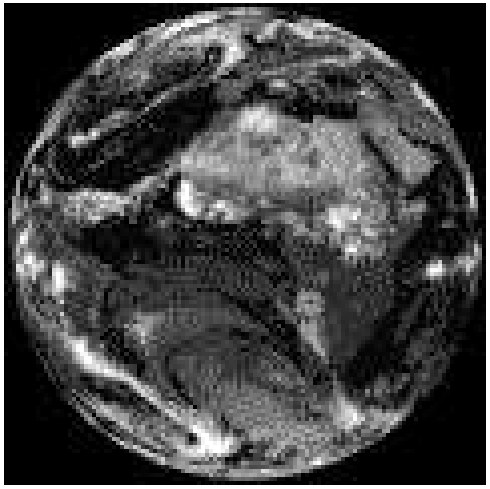


Colombia

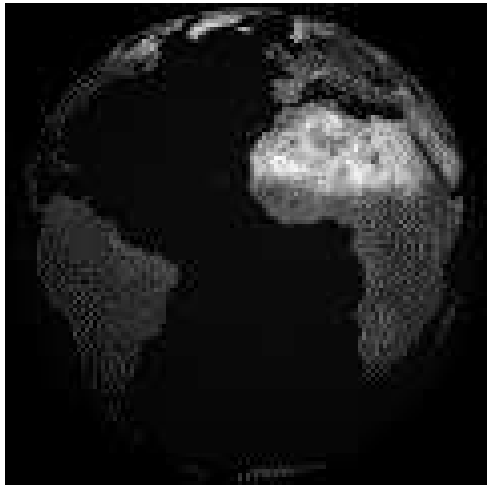
Zonificación climática

Según el sistema de clasificación LANG

Understanding Digital Earth



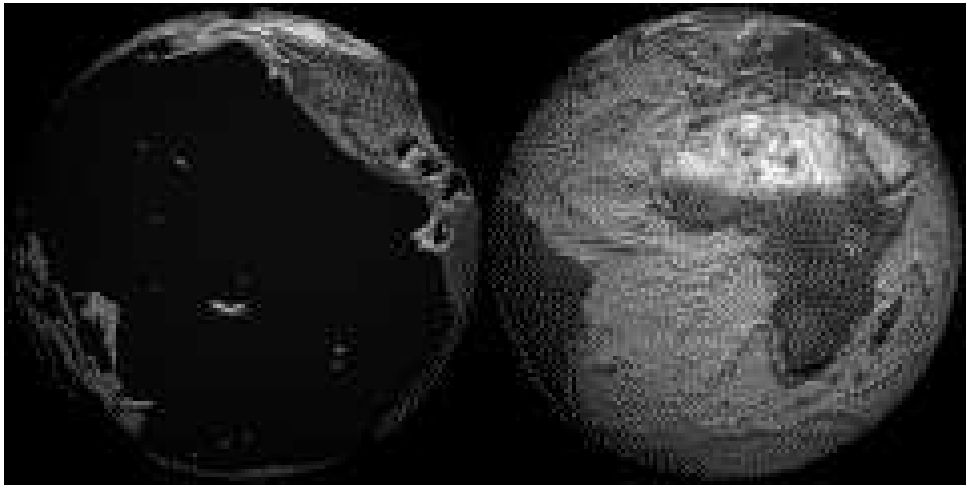
Cloud



El Nino

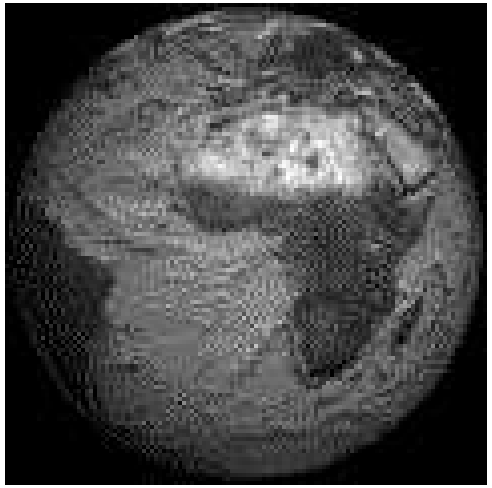
Sea water temperature

Vegetation



Earth Surface

Earthquake



Volcano

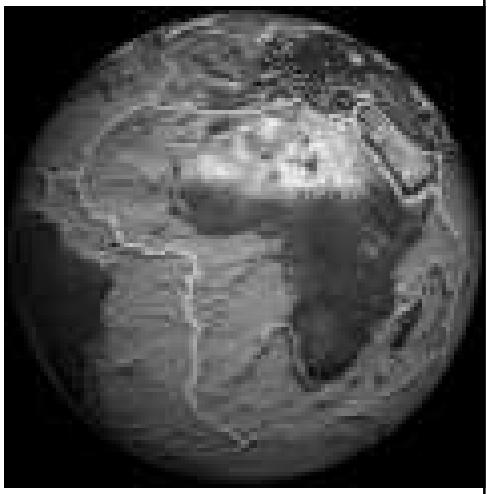
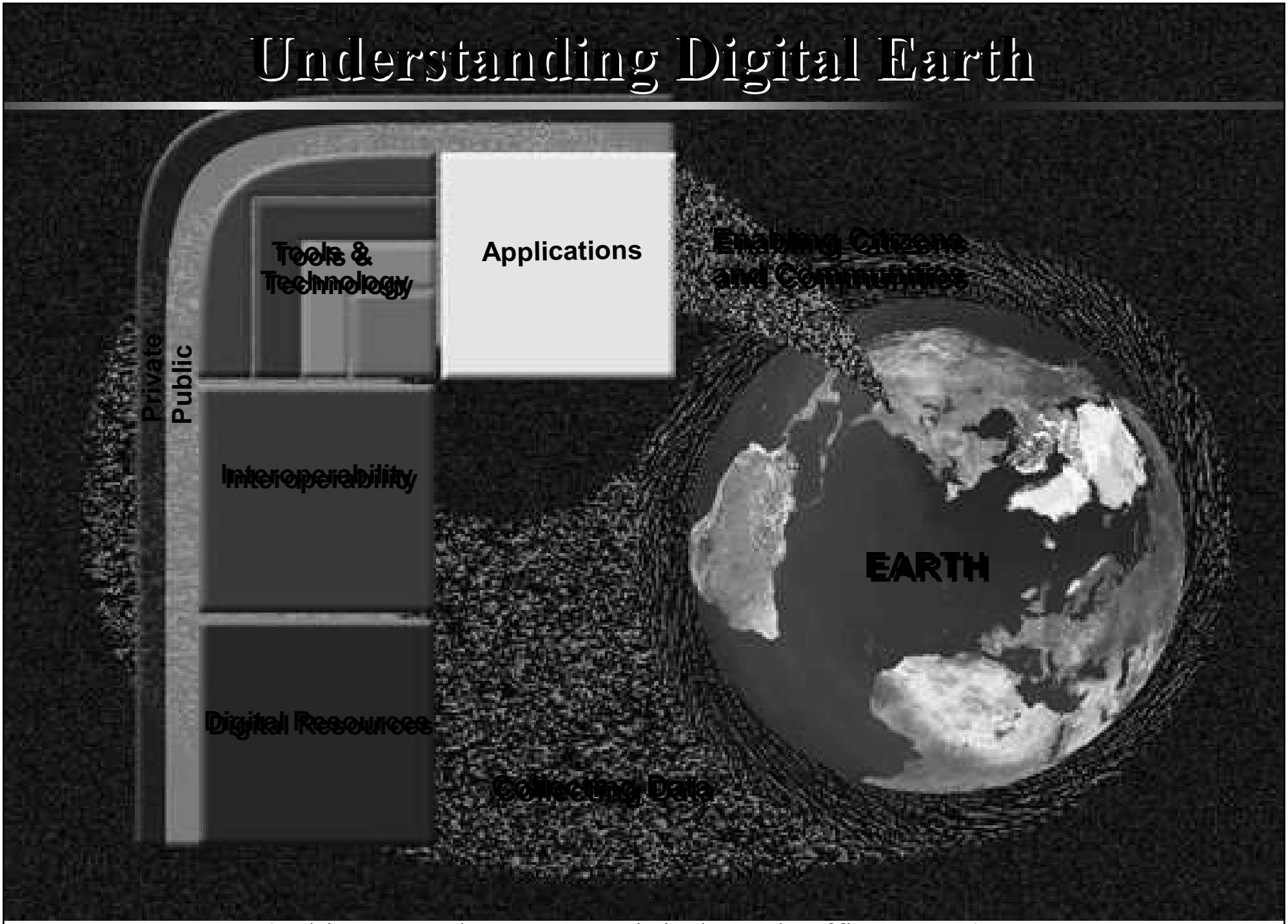


Plate Boundary

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



(White paper by NASA Digital Earth office, 2000)

U.N. department of Outer Space in Vienna:

GNSS (Global Spatial and Navigation Systems) – harmonization of data and information from NAVSTAR, GALILEO, GLONASS and other systems for everyday users needs.

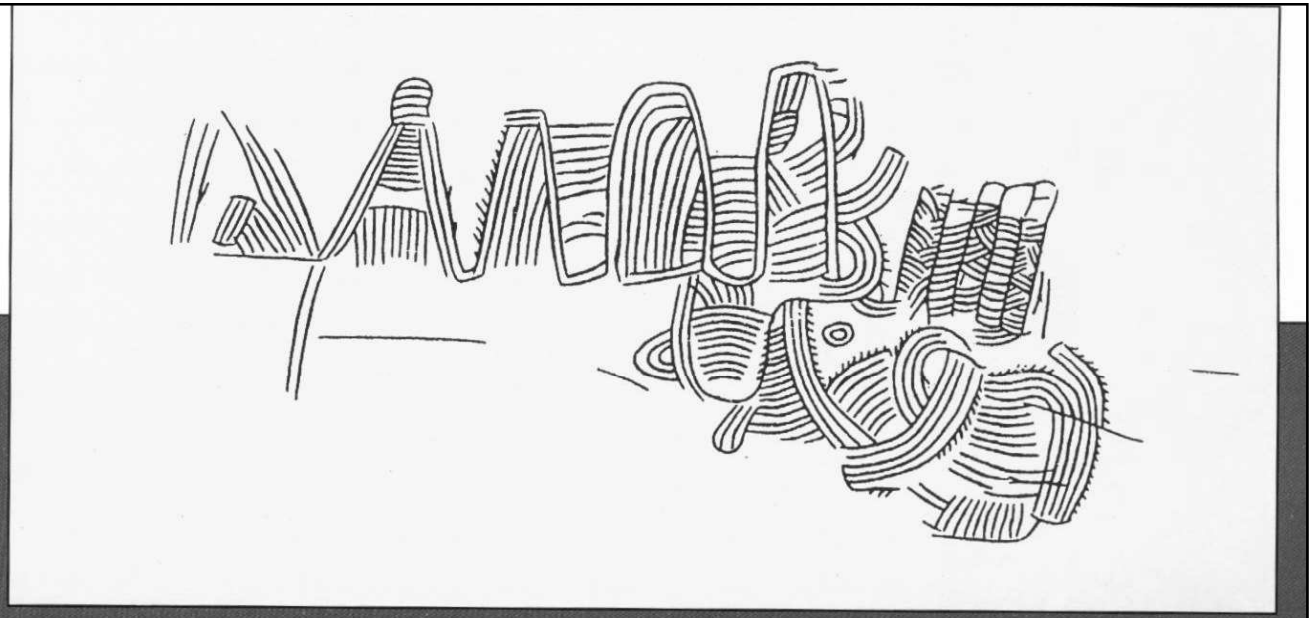
LBS


F. ARIAS
M. HAUBOLD
M. CAPORALE

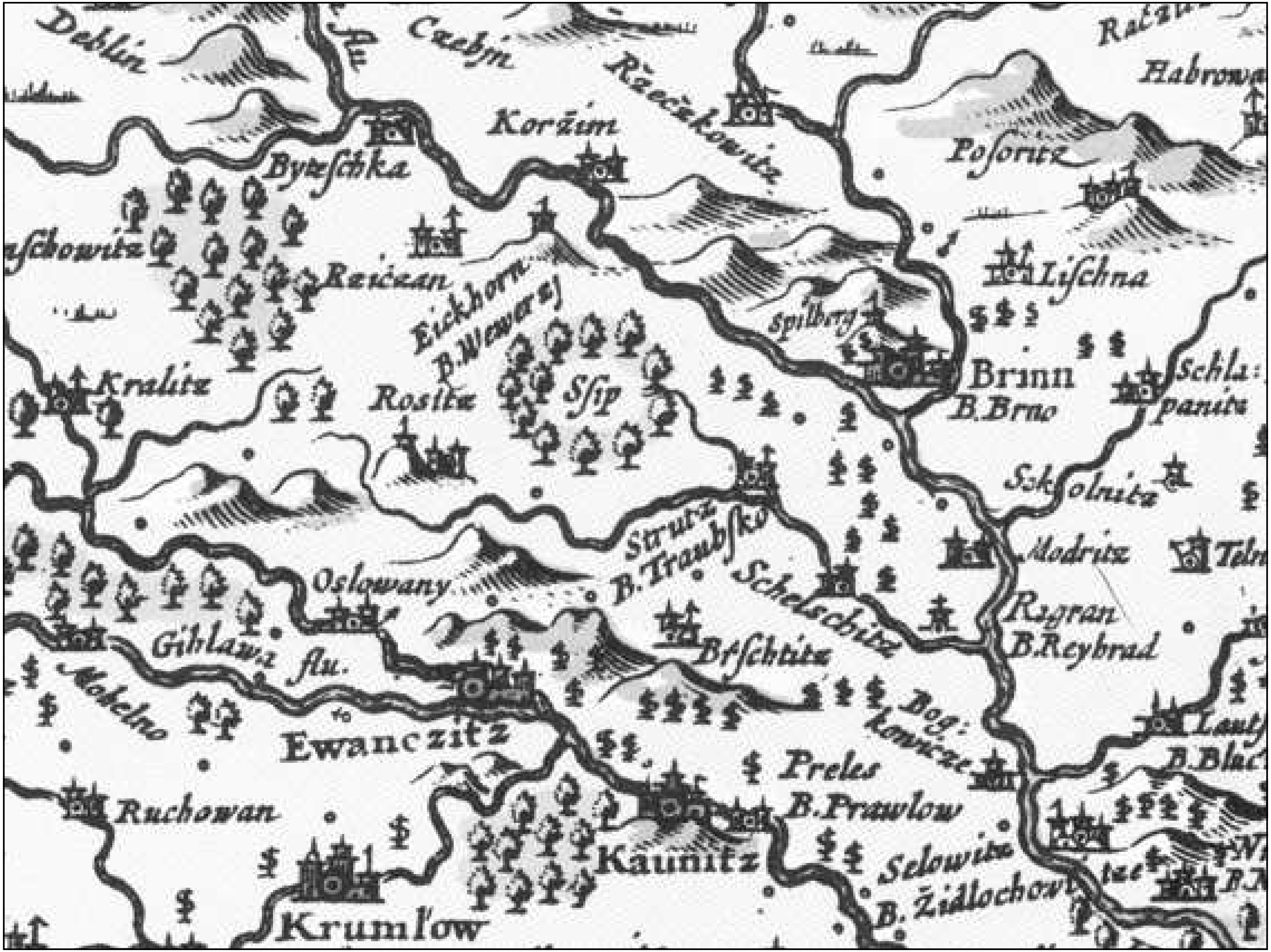
5. State of the Art of Cartography

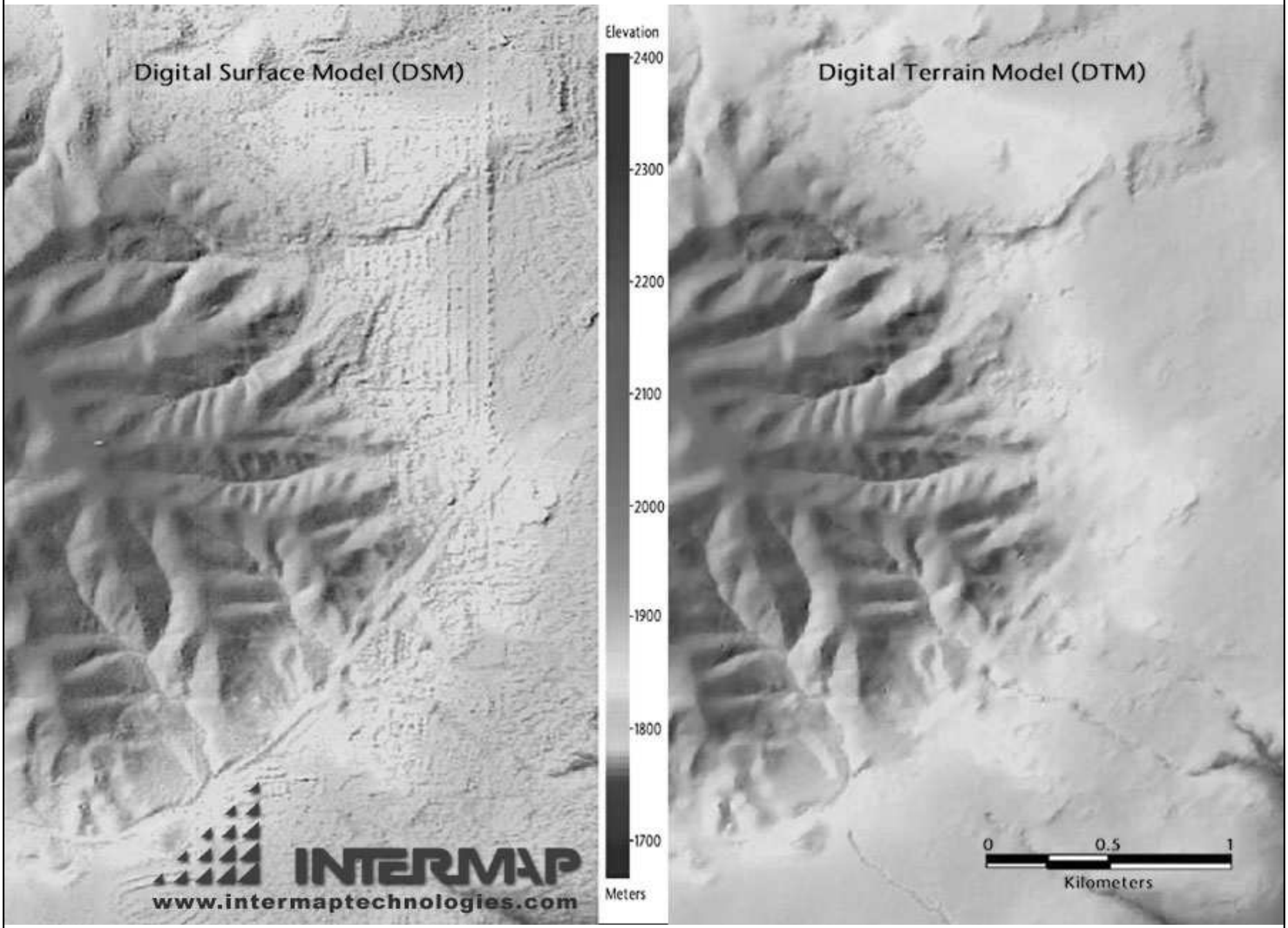
Cartography needed

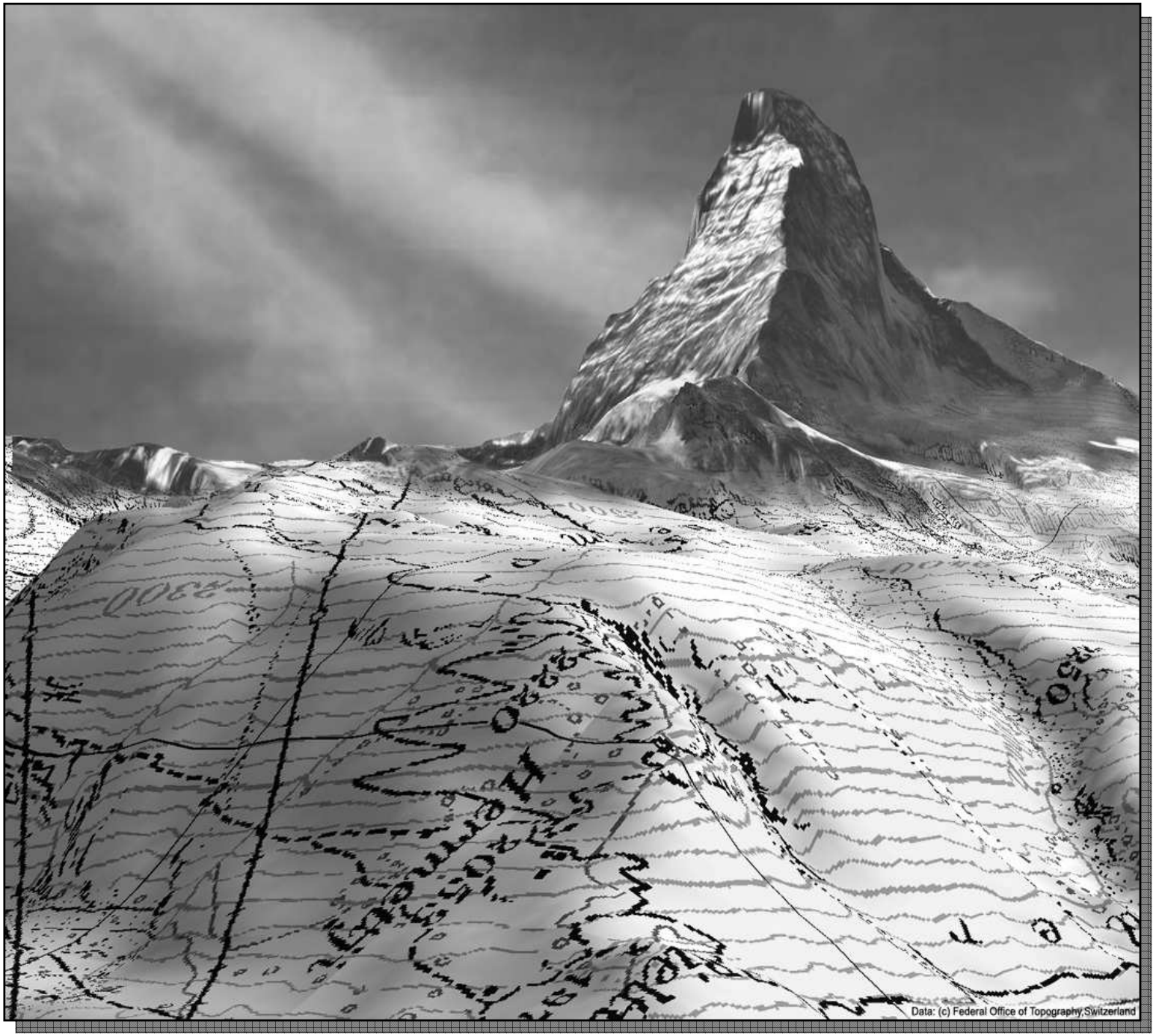
Cartography offer its help



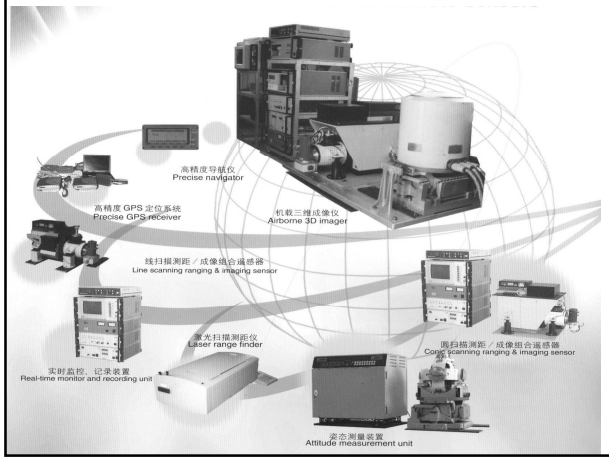
Prehistoric Map,
Pavlov Hills, South
Moravia, **24 000 B.C.**


Deblin
flu.
Czebin
Rzecžkowitz
Habrowa
Korzim
Bytzschka
Posoritz
Rziczan
Eickhorn
B.Wewerzj
Lischna
Spilberg
Brinn
B.Brno
Kralitz
Rositz
Ssip
Schla:
panitz
Sokolnitz
Strutz
B.Traubsko
Modritz
Schelschitz
Oslowany
Rzigran
B.Reybrad
Gihlawa flu.
Brschitz
Boß:
kowicze
Ewanczitz
Preles
B.Prawlow
Ruchowan
Kaunitz
Selowitz
B.Židlochow
Krumlow


Digital Surface Model (DSM)
Elevation
2400
2300
2200
2100
2000
1900
1800
1700
Meters
Digital Terrain Model (DTM)
INTERMAP
www.intermaptechnologies.com
0
0.5
1
Kilometers


Data: (c) Federal Office of Topography,Switzerland

3-D Image of Pudong Area, Shanghai



Elevation Map of Buildings Produced from 3-D Imager

It is *not enough* to build a nice technical infrastructure without teaching the population how to use the maps (analog or digital one).

We have to provide:

-the concepts with which the population is able *to deal* with geospatial information,

-to provide maps from which the population is able *to derive* the information they need: information that is *up-to date and tailor* made for solving the problems.

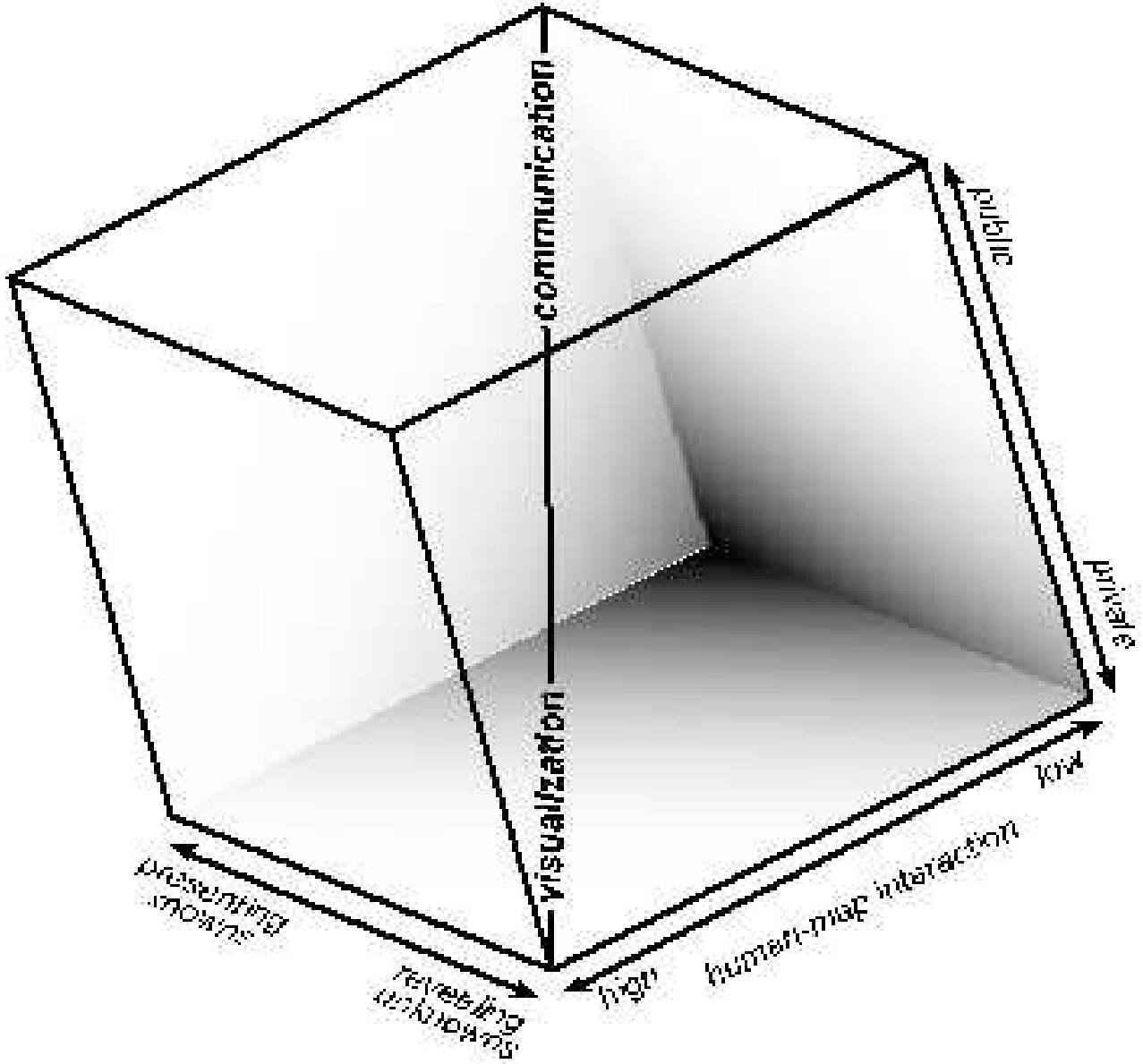
Cartography is originally an instinctive science, which nowadays enters a new, revolutionary period of its development.

In a modern approach, mapping is understood as the ability to create a knowledge frame of an environment in space.

The creation of maps and the use of maps, have evolved separately for centuries.

A new generation of electronic maps and atlases, mainly on the Internet, resulted in the definition of multimedia cartography.

Multimedia, global communication systems, and global publishing offer possibilities for the production of dynamic and interactive visualizations, which utilize mainly virtual environments (developed originally for the computer games industry).



The Map use cube showing four forms of visualization for exploration.
Analysis and Presentation A.M. MacEachren)

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

Four most dynamic streams

in cartography:

1. Cartographic visualization (ICA Commission on Visualization and Virtual Environments).
2. Ubiquitous mapping
3. Internet maps
4. Map Use

Cyber Cartography???

Geographical Information is going mobile

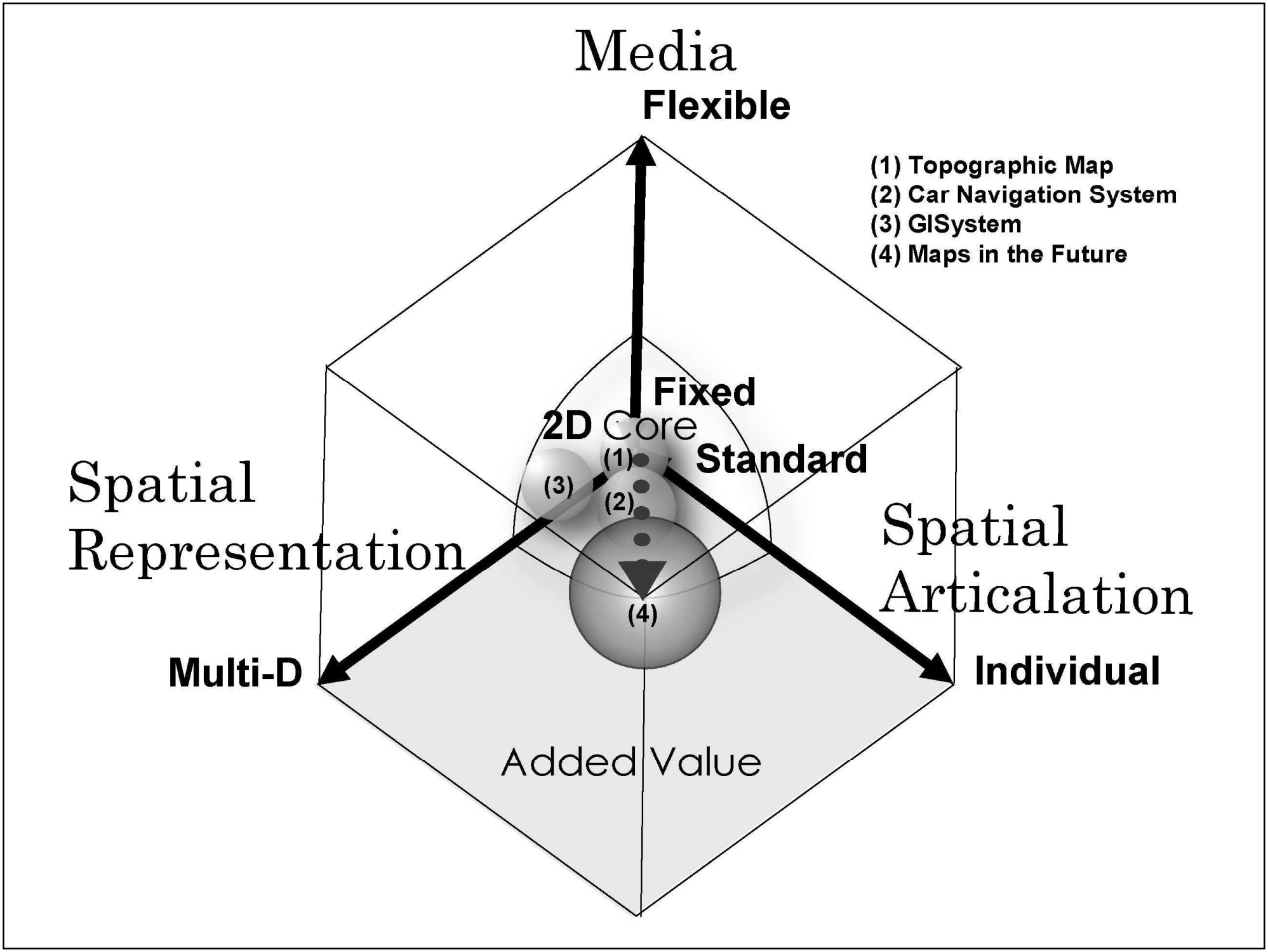
Differences between GIS and Maps (Morita).

GIS means data input, database building, data analysis and data output for spatial information.

Mapping includes not only map making, but also map use and map communication, as it considers the interaction between map, spatial image and the real world.

GIS is system *function oriented*, whereas

Map is human-oriented, including spatial cognition, decision making and communication.


Media
Flexible
(1) Topographic Map
(2) Car Navigation System
(3) GISystem
(4) Maps in the Future
Fixed
2D Core
Standard
(1)
(2)
(3)
(4)
Spatial Representation
Spatial Articalation
Multi-D
Individual
Added Value

Where SDIs end, cartography begins?

Geographer Ptolemy first developed the idea of atlases: how to subdivide the world into 26 parts, how to portray the world in its entity and in parts. We are still using his ideas of subdividing the world, in parts from north to south and from west to east.

Ortelius Atlas

Mercator Atlas


VITA
A Ω
PAX
SCOPVS
Spectandum dedit Ortelius mortalib. orbem,
Orbi spectandum Galleus Ortelium. Pagius

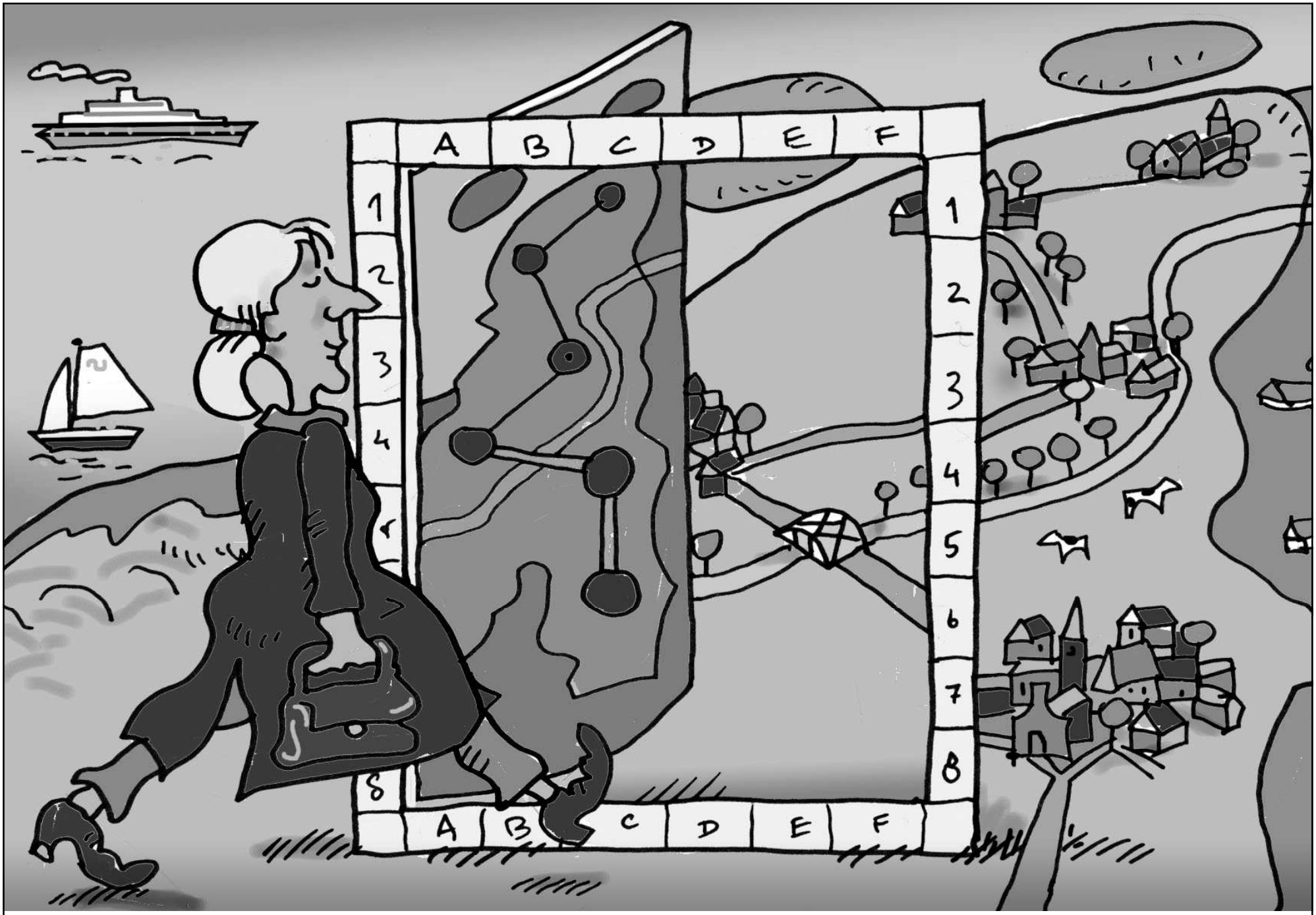
Opus nunc tertio ab ipso Auctore recognitum, multisque locis castigatum, & quamplurimis nouis Tabulis atque Commentarijs auctum.

We are refining these ideas;

In another geodata revolution, in the 19th century, we used national atlases;

The next geodata revolution at the end of the 20th century led us to digital atlases.

But still we keep these cartographic ideas of making sense of the world.


A B C D E F
1 2 3 4 5 6 7 8

Without guaranteed access (in sensu lato meaning) to the geospatial data and information also

the cartographical ambitions to be part of the game will be hard to reach. So there is much at stake for us cartographers as well.

7. Early Warning, Disaster mnagement and cartography: Nobody is Perfect?

Praha – Vltava river

PRAHA – capital of Czech Rep.

57 districts

- **Area** 496 km^2
- **Amount of Inhabitants** 1,16 mil

.

KOBE - Hyogo Declaration:

it was recognized that a **culture** of disaster prevention and resilience,

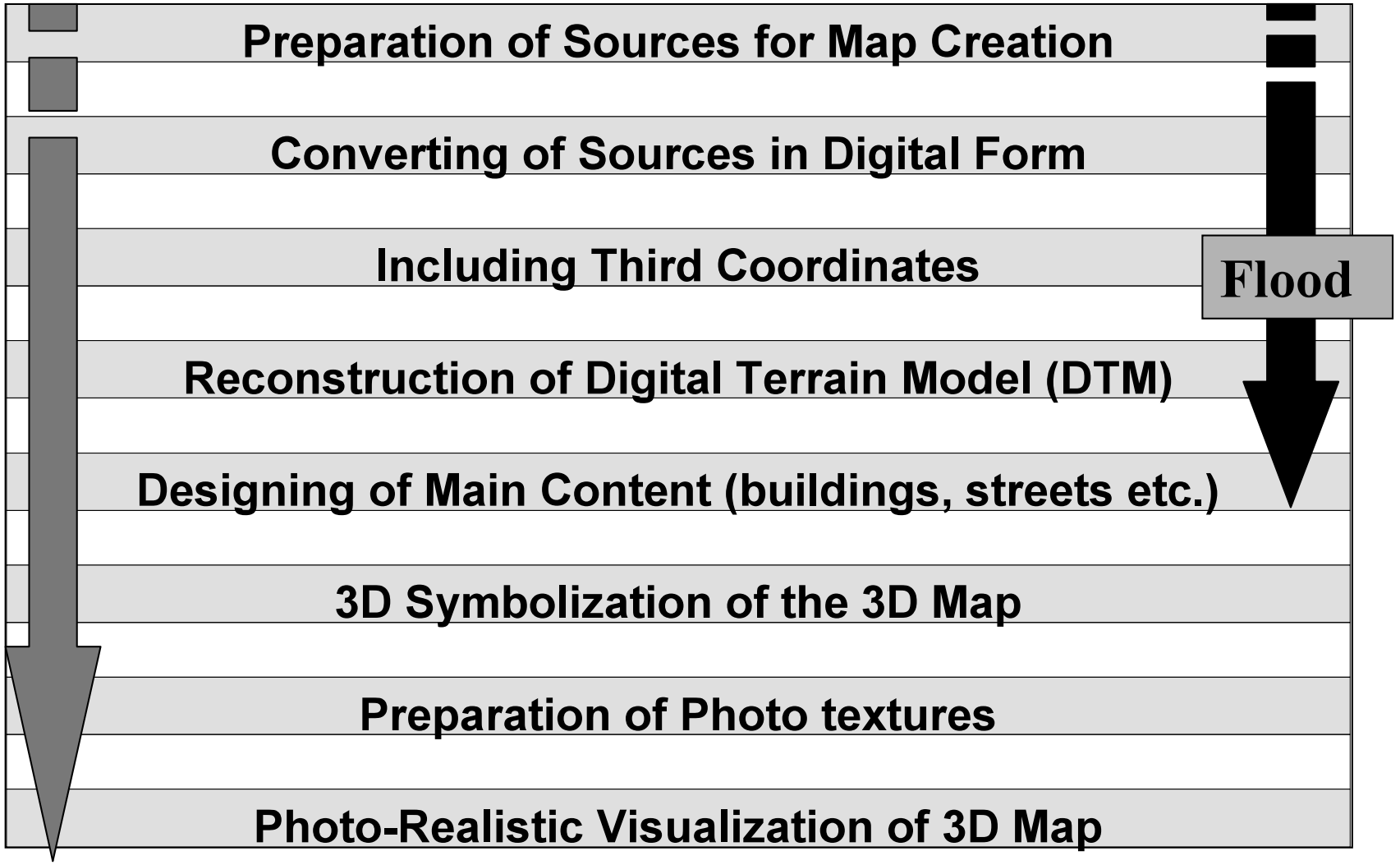
and associated pre-disaster strategies, must be fostered at all levels, ranging from the individual to the international levels. Human societies have to live with the risk of hazards posed by nature.

Examples of the atlas concept – atlases as ways of storage of geospatial information we have learned to deal with – are for instance *emergency-atlases.*

Here in the first place atlases allow us access to the area involved, the atlas *opens the door to that area, and allows also people faraway to understand its problems.*

Maps are prepared and elaborated knowledge!!!!

A technology for designing of 3D maps

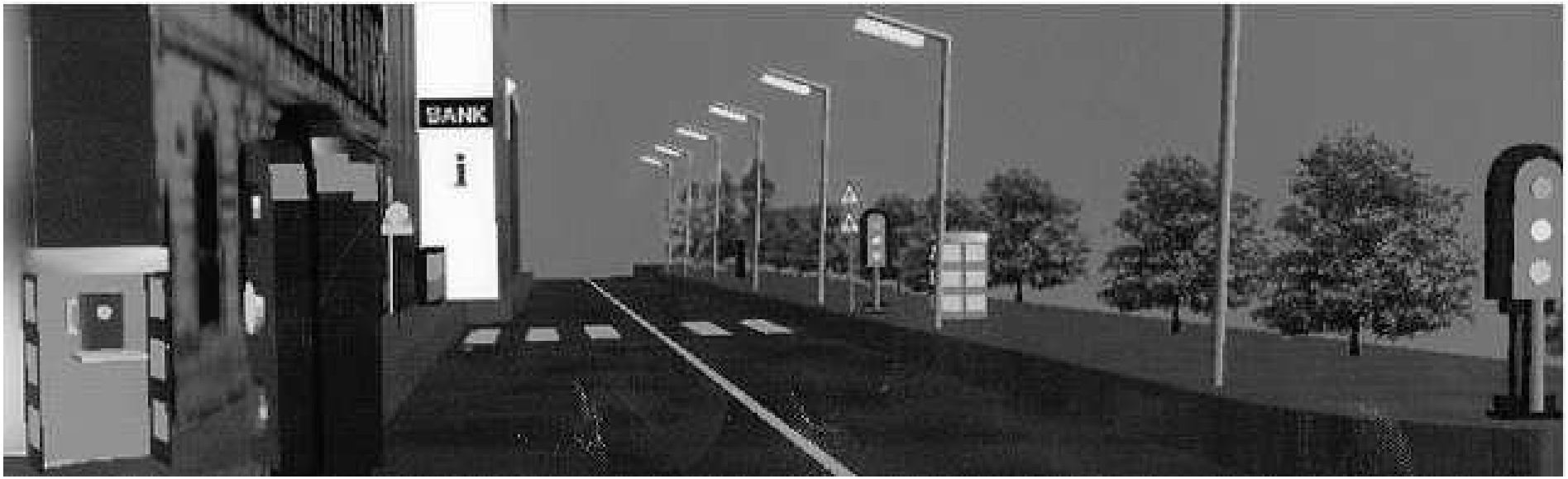


3D Main content -
in flood mapping

- **large topographic or landscape objects – relief bodies**
  - **roads**
  - **buildings**

Secondary content

- **traffic signs**
- **facilities**
- **transport elements**
- **information signs**
- **trees**
- **geodetic points**

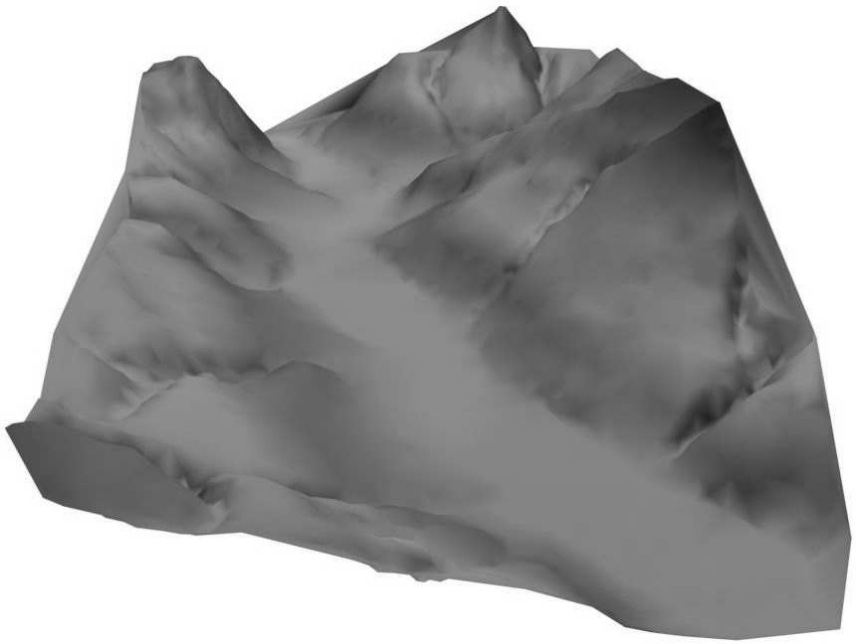


3D map “a street in Vienna”, created by ICG, TUGraz and 3D symbols created by T. Bandrova

Additional content

- **quality and quantity information about objects**
  – fence, roof, street, parcel
- **created as a textural database**

Sources for 3D map



- **paper topographic or cadastral maps**
- **photogrammetric or surveying data**
- **digital 2D map**
- **topographic information, measurements, architecture drawings etc.**
- **digital or paper photos**
- **3D symbol system**

VIEW from OUTSIDE

Kobe:
GSDI potential and the Global Mapping potential are not enough visible, at least in conference documents.
QUESTIONS:
Is it some kind of *ignorance* or simply the fact that we are *insufficiently able to offer our results* in a way which will be a part of the culture of disaster prevention and resilience, and associated pre-disaster strategy (using the words of Hyogo Declaration)?

Are we still *too much concerned with the technological aspects* and not enough with developing approaches towards *people* who needs all of our data for their everyday life, but also need to get them in a form they *can understand?*

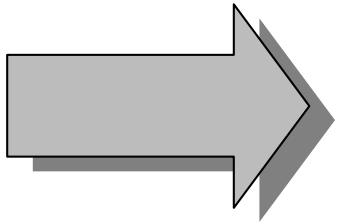
Unfortunately, lessons from recent disaster management show that the decision makers that needed the geospatial information *did not have access to it in time*, nor *in a form* they were taught to deal with.

5. Geospatial Information & the Knowledge Economy

Contributions

According to
D.Coleman,Dubai,2005

Geospatial Information



The Knowledge Economy

Contributions of GI to the Knowledge Economy

Criteria **Contribution**

Knowledge Jobs

High tech employment in remote sensing, mapping and surveying hardware; software development; IT consulting; application development; geospatial data collection; and project/program management.

Globalization

Companies in Europe, North America and Australia are partnering with IT and mapping firms in India, China and elsewhere to take advantage of a highly qualified workforce prepared to work at very competitive rates of pay.

Contributions of GI to the Knowledge Economy

Criteria **Contribution**

Economic Dynamism and Competition

SDI evolution encourages creation and growth of new high-technology companies:

Stage 1 and **Stage 2** -- New hardware, software and data collection firms to support government mapping and data collection projects.

Stage 3 -- Focus shifts to IT consulting firms as interest increases in data maintenance, enterprise GIS; data distribution and interoperable systems.

Stage 4 -- Emphasis on applications development, specializ. data collection, LB services.

Contributions of GI to the Knowledge Economy

Criteria **Contribution**

Transformation to a Digital Economy

Real property information component now driving applications in **E-Government**.

Data related to address-matched road networks driving applications in **Location-Based Services and E-Commerce**.

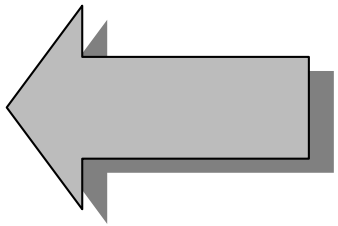
Technological Innovation Capacity

New capital investments and returns from intellectual property tend to be focused on geospatial firms involved in hardware / software development, location-based services, and situations where the firm has a monopoly on management and distribution of key datasets.

Contributions

According to
D.Coleman,Dubai,2005

Geospatial Information



The Knowledge Economy

Generation Title	Born between…	Characteristic	Comments
GI Generation	1901 - 1924	Civic	Responded to social crisis (WW2); Focussed on common good, community, and "rebuilding the world".
Silent Generation	1925 - 1942	Adaptive	Flexible; sensitive to diversity (told by parents during WW2 'Stay out of the way, we're busy').
Baby-Boomers	1943 - 1960	Idealistic	Spiritual awakening; Beginnings of global awareness; Aiming to 'carry things forward'
Generation X	**1961 - 1981**	**Reactive**	**Cynical, pragmatic, questioning**
Millennials	**1981 - 2000?**	**Civic**	**Optimistic, success-oriented, conservative**

- from work by Neil Howe and William Strauss

The “Millennial Students” now moving into the Workplace

- Based on the research of Neil Howe and William Strauss.
- Newest books –***Millennials Rising – the Next Great Generation*** and ***Millennials Go to College: Strategies for a New Generation on Campus***
- *“The Millennials say they want to use technology. They want to use the web as a means to access information and one another.They want to work on solving problems that matter and they want to do this in collaborative teams.”*

Implications to Future Geospatial Services?

Must be…

- Quick
- Anonymous
- Authoritative
- Delivered “Just-in-Time” (“Use it and lose it”)
- Easy to share on-line with friends and colleagues.

According to
D.Coleman,Dubai,2005

Geospatial Information & the Knowledge Economy

- Are current SDI services oriented to continue affecting Knowledge Economy Indicators?
- Will the “look and feel” of SDI services change as expectations of Millennial Generation begin to dominate the market?
- What indicators will determine the success or failure of SDI over the next 10 years?
- Roles of Government as SDI evolves?

According to
D.Coleman,Dubai,2005

NATURE again….:

AN EXPANDING MARKET

All indications are that the US$5-billion worldwide geospatial market will grow to $30 billion by 2005 - a dramatic increase that is sure to create new jobs.

NASA says that 26% of its most highly trained geotech staff are due to retire in the next decade, and the National Imagery and Mapping Agency is expected to need 7,000 people trained in GIS in the next three years.

References:

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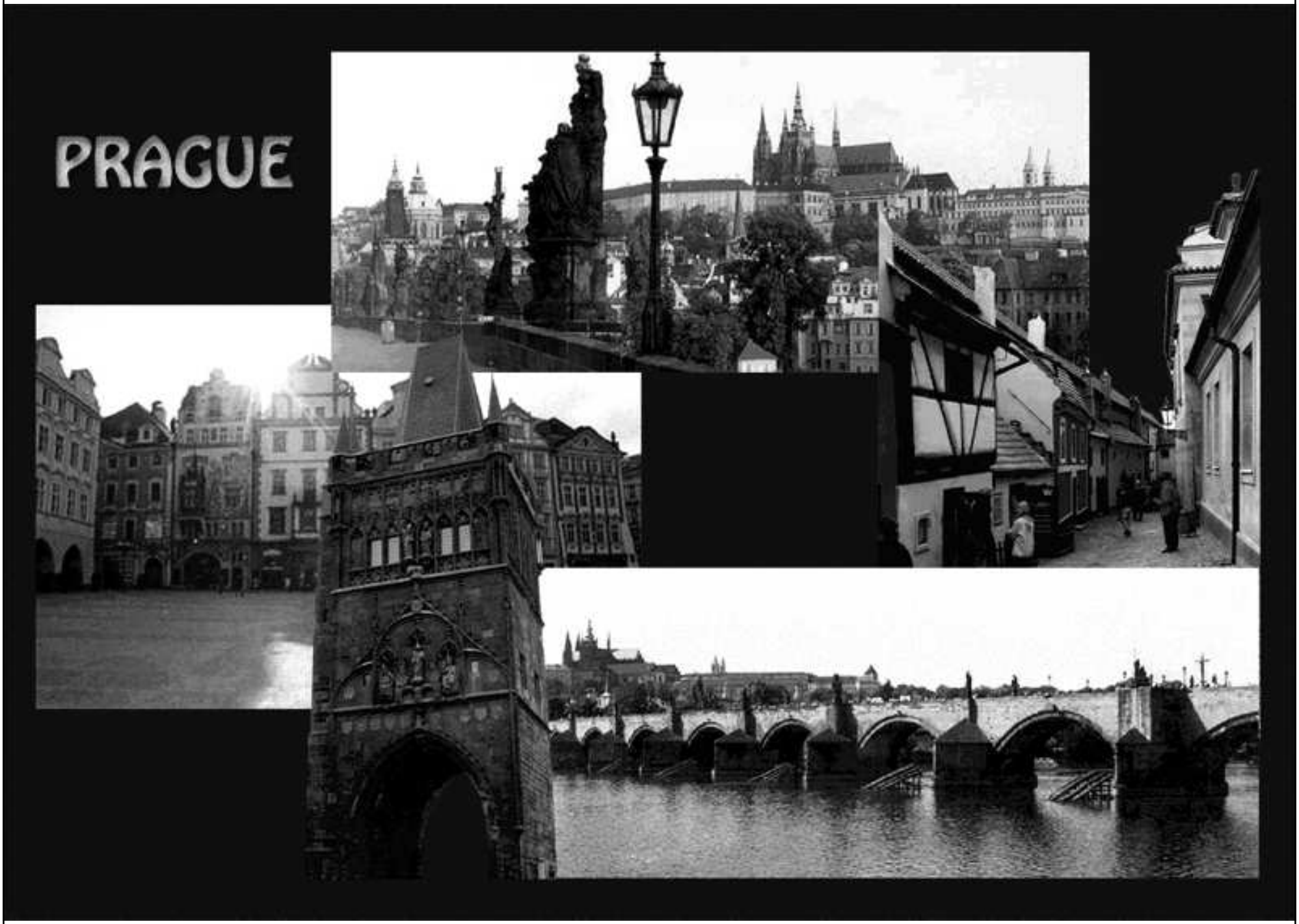
Next ICC

Moscow 2007

Next after Next

Chile 2009


PRAGUE


BRNO


PALAVA
UNESCO
BIOSPHERE
RESERVE

Bardzo dziekuje

Aligator

Xie, Xie

THANK YOU

VERY

MUCH !!!!!

DĚKUJI (in Czech)