MAPOVÉ ZDROJE
PŘEDNÁŠKA 2 - 15.10. 2020

Milan Konečný

Overall GMES objectives

to provide information services to policy-makers and other users

EARTH OBSERVING SYSTEMS (space, airborne

Information

Needs (policy driven)

PUBLIC POLICIES (Environment & Security)

Space Agencies
In-situ Observing systems
Scientific Community
EO Value Adding Industry

National Governments and Agencies
European Union Institutions
Inter-Governmental Organisations (IGOs)
Non Governmental Organisations (NGOs)

Virginia PUZZOLO, EO DG Enterprise-GMES Bureau, Prague Symposium, 2009

Former GMES – Global Monitoring of Environment and Security)

The Copernicus programme **supports** the **protection of the environment and the efforts of Civil Protection and civil security, and contributes to European participation in global initiatives.**

Copernicus offers **six different service lines**:

Emergency Management, Atmosphere Monitoring, Marine Environment Monitoring, Land Monitoring, Climate Change, and services for Security applications.

The Copernicus Emergency Management Service (EMS) provides actors

with **timely and accurate geo-spatial information** derived from satellite-based remote sensing complemented by available *in situ* (non-space) or open source data.

As an EU service, the EMS's **first priority** is responding to national or cross-border disasters in Europe and large-scale disasters outside of the EU.

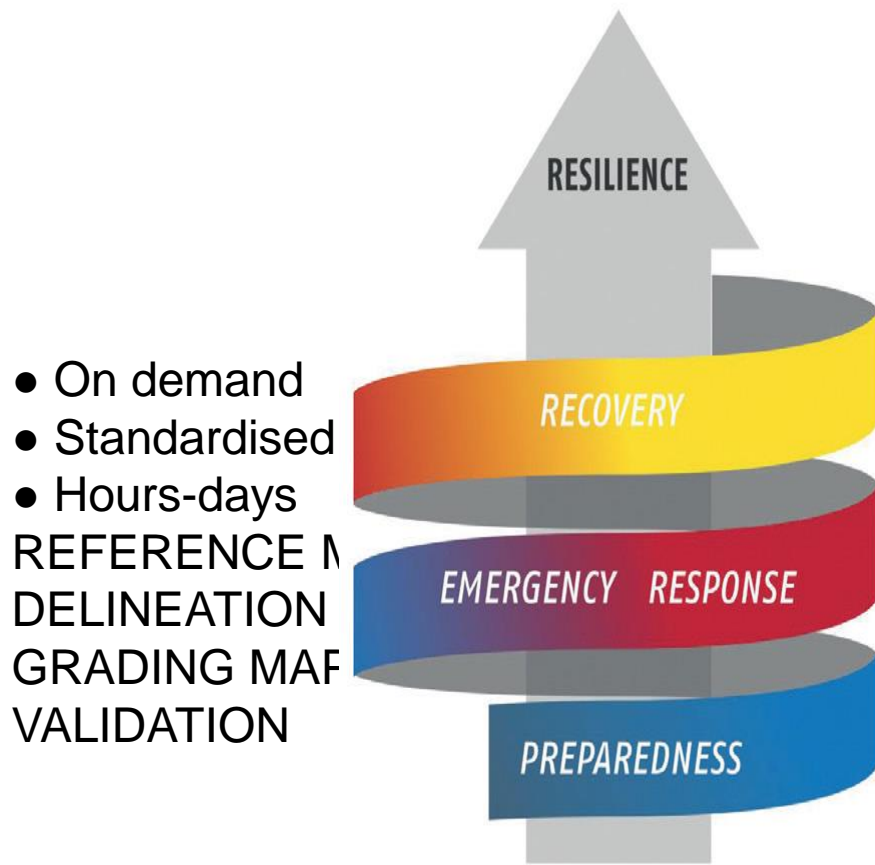**The Copernicus Emergency Management Service (EMS) has two main components:**

- *Early Warning,* EW component strengthens the preparedness of national and local authorities for floods and forest fires, and

- *Mapping*, as well as a dedicated component for the validation of the mapping products.

The EMS Mapping Service

is provided in *two modules*:

-**Rapid Mapping,** for rapid service delivery during the response phase of crises, and

-**Risk & Recovery Mapping**, which is designed for pre- or post-crisis situations in support of recovery, disaster risk reduction, prevention, and preparedness activities.
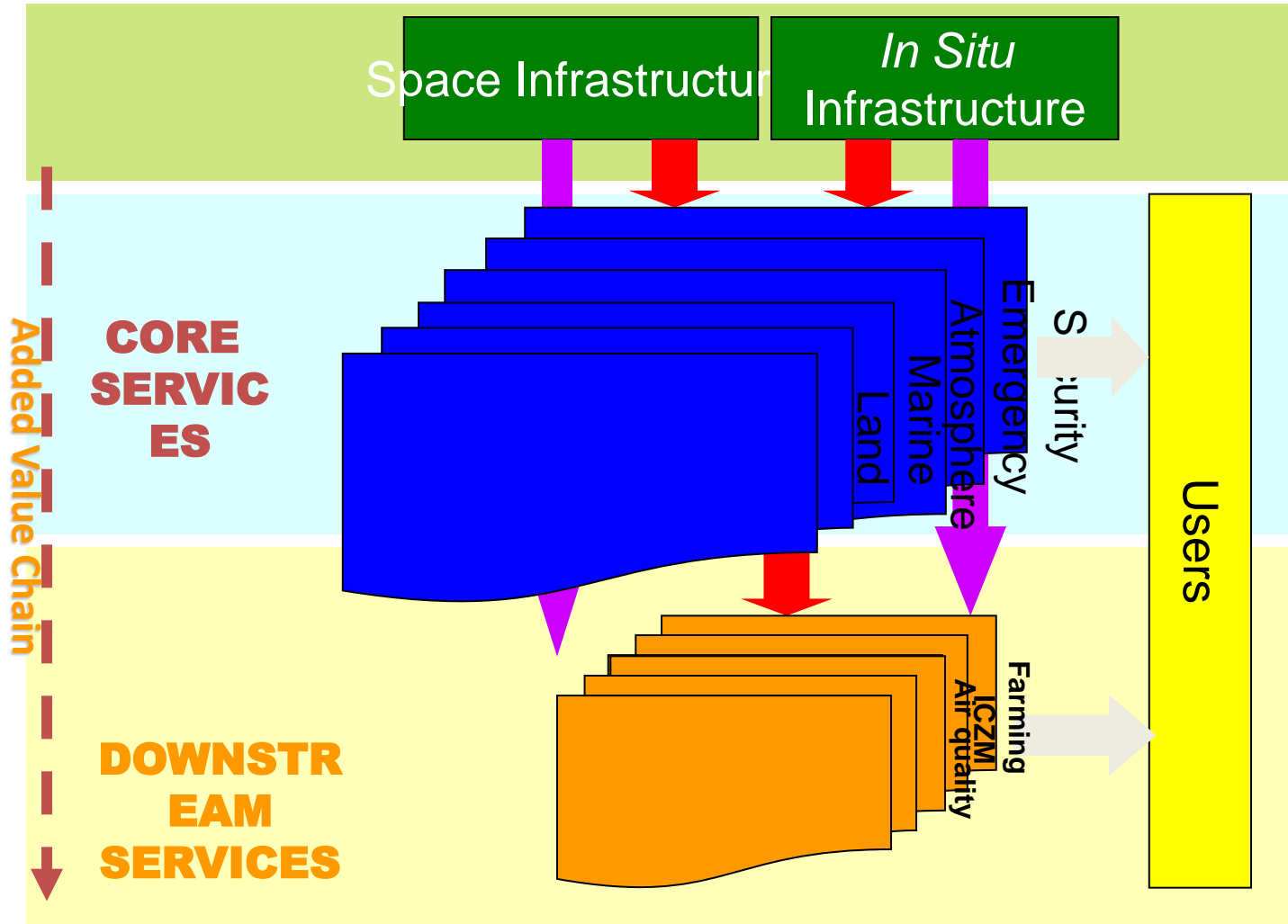
RISK AND RECOVERY MAPPING

● On demand
● Tailored to user needs
● Weeks-months
REFERENCE MAPS
PRE-DISASTER SITUATION MAPS
REFERENCE MAPS
POST-DISASTER SITUATION MAPS
VALIDATION

● On demand
● Standardised
● Hours-days
REFERENCE M
DELINEATION
GRADING MAF
VALIDATION

EARLY WARNING

● Floods: EFAS
● Forest Fires: EFFIS
CONTINOUS ALERTS

Overall architecture

Space Infrastructure

In Situ Infrastructure

Added Value Chain

CORE SERVICES

DOWNSTREAM SERVICES

Emergency
Atmosphere
Marine
Land
Security

Farming
ICZM
Air quality

Users

The Forum GMES 2008 held in Lille on 16-17 September 2008 marked the launch of the first GMES services in pre-operational mode:

Marine Environmental Services
Atmospheric Environmental Services
Land Environmental Services
Support to Emergencies and Humanitarian Aid
Support to security -related activities

The development of these services is supported by **implementation groups** put in place in the context of the Action Plan 2004 - 2008.

Marine Environmental Services

MyOcean is a project granted by the European Commission within the 7th Framework Programme, with the objective to define and to set up a concerted and integrated pan-European capacity for Ocean Monitoring and Forecasting.

The areas of benefit are:
Maritime Security
Oil Spill combat
Marine Resources management
Climate Change
Seasonal Forecast
Coastal Activities
Ice Survey
Water Quality and Pollution.

MyOcean is the last step toward the GMES Marine Core Service after many Europe founded programmes such as [POLARVIEW](#), [ECOOP](#), [MARCOAST](#), [MERSEA](#), …

Atmospheric Environmental Services

The prototype atmospheric services of GMES are currently provided by two cooperating consortia that operate the **PROMOTE** GMES Service Element project funded by the European Space Agency, and the GEMS project funded by the European Commission as part of the 6th Framework Programme for Research, Technical Development and Demonstration.

The focus of PROMOTE is the delivery of services to support informed decisions on issues related to stratospheric ozone depletion, surface UV exposure, air quality and climate change. Services are based both on products derived directly from satellite data and on products from established data assimilation and modelling systems. Services can be accessed from PROMOTE website.

The focus of GEMS is to develop new integrated systems for monitoring the global distributions of atmospheric constituents important for climate, and for monitoring and forecasting constituents affecting air quality and surface solar radiation, with a focus on Europe. Trial versions of these systems are currently being operated, and the products can be accessed from GEMS website.

From mid-2009, the core services of the atmospheric component of GMES will be delivered by a new consortium comprising most of the partners of the GEMS project and core production partners from PROMOTE,

following the conclusion of a grant from the European Commission under the 7th Framework Programme. These services will continue and rationalize the provision of the main sets of data products provided currently by PROMOTE and GEMS. It is also expected that the Framework Programme

will support development of a set of **downstream services that provide user-oriented information based on the core-service data products.**

Land Environmental Services

Land Environmental Services operationally provide sound, reliable and affordable land related geo-information products on the regional, European and global scale. Their aim is to effectively support public authorities of the European Commission and the EU Member States in the implementation of the new European Environmental Directives as well as international treaties towards adaptation to Climate Change.

By the combined analysis of data received from Earth Observation satellites and ground based measuring networks theses services provide wide-area and cross-boarder harmonized geo-information products for a multitude of thematic areas,

like land use / land cover change, soil sealing, water quality and availability, spatial planning, forest management, carbon storage and global food security. Selected examples of products from various European regions can be viewed and tested on the Land Information Services portal.

Fast Track Service / CORINE Land Cover 2006

Based on previous consolidation results, the European Environment Agency (EEA) has added the first Pan-European High-Resolution Land Cover Data to its data service: a Sealing Layer and a Forest Layer covering entire Europe. In addition, the CORINE Land Cover database, existing since the 1990s, was updated for the third time for the year 2006.

The ambition is to add further high-resolution layers during the coming years during the implementation of the Land Information Core Services

Urban Atlas

Quality of Life in Europe's cities is being recorded by the Urban Audit initiative of DG Regional Cohesion and DG Environment. The Urban Atlas Core Service Element is to add a spatial dimension, e.g. to show the accessibility to green urban areas or to enable the localization of abstract statistical parameters (e.g. population density).

Forest Monitoring

Forest Monitoring Services provide innovative, timely, cost-effective and quality-assured forest information to support reporting on national and international policies such as the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, the UN Convention on Biological Diversity (UNCBD), the Ministerial Conference on the Protection of Forests in Europe (MCPFE) and processes related to Streamlining European Biodiversity Indicators by 2010 (SEBI 2010). Making use of Earth Observation methodologies allows retrieving spatially explicit information on the state and development of forests from continental to regional scale in a cost-efficient way and at proven high quality.

Water Quality

Water Quality Services address the Water Framework Directive (WFD) obligating the EU Member States to manage, monitor and report the status of the water resources on river basin scale. The services focus on identification and management of nutrient and pesticide inputs into the water cycle resulting from diffuse and point sources.

Spatial Development

The Spatial Development Service provides spatially referenced and consistent geo-information for monitoring of urban structure, urban growth and soil sealing in support of reporting obligations. Products describe the pressure, state and impact of urban land take for integrated spatial planning.

Environmental Resource Management in Africa

The Service for Environmental Resource Management in Africa ensures permanent access to high quality pre-processed data for all African countries by using advanced satellite telecommunication infrastructures. Products of the service comprise advanced environmental parameters (in particular related to vegetation conditions), processed according to standard procedures, as well as maps such as land cover maps, forest maps, etc.

Support to Emergencies and Humanitarian Aid Services

Support to Emergencies and Humanitarian Aid services target three main application domains:
Civil Protection: National Civil Protection Services of Europe, DG ENV (European CP Unit), and more globally all risk management actors in Europe at different territorial scales

Humanitarian Aid: DG RELEX, DG ECHO, NGOs
Security crises: European Council, Member States
It addresses all types of disasters: natural disasters (floods, fires, landslides, storms, earthquakes, etc.), technological accidents, humanitarian crises (for instance after a severe drought period), civilian-military crises.

Data Portal

The Connecte@sy portal offers access to products delivered by the [PREVIEW](#) and [RISK-EOS](#) projects. The goal of this common portal is to provide a unified access to the products in order to facilitate the information exchange and sharing between the service providers and the risk user community.

In complementary with the existing delivery means held by the service provider for specific users, the Connecte@sy portal proposes the following functionalities at a global level:
The consultation of the available products,
The on-line visualisation and combination of data,
The possibility to retrieve and visualise data in Google Earth.

Four main types of products:

Early warning

SEVIRI MIR 070825_0945 UTC
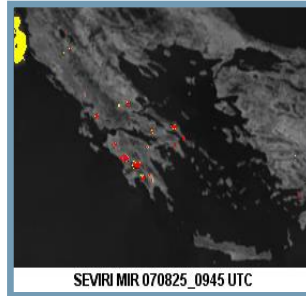
Reference maps

Assessment maps
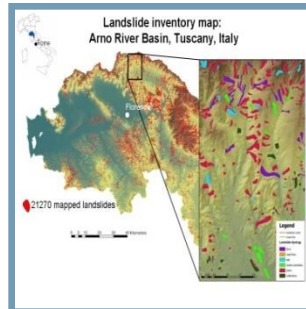
For headquarters, decision-makers and in-field operatives In Europe and worldwide

Thematic maps

ERCS 1st priority

Rapid mapping on demand in case of humanitarian crises, natural disasters, and man-made emergency situations within & outside Europe

- ➤ **Reference maps** available within 6 hours over crisis area

- ➤ **Damage assessment maps** available within 24 hours & daily updated

- ➤ **Situation maps and forecasts** of evolution of situations within the few days-weeks after crisis

INSPIRE

Infrastructure for Spatial Information in Europe

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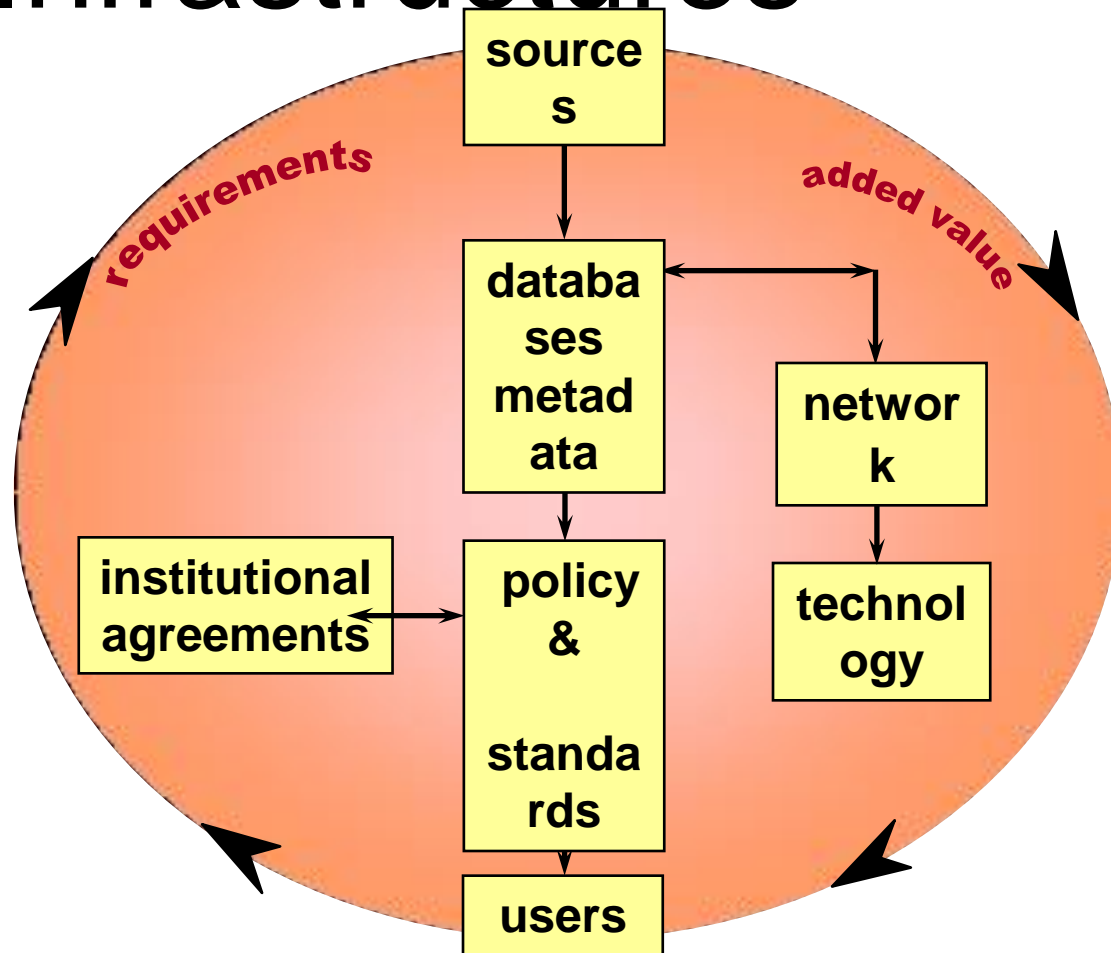
The term *Spatial Data Infrastructure (SDI)* is used to *encapsulate the technologies, policies, institutional arrangements, financial and human resources that facilitate the availability, access and effective usage of geographic data.*

The SDI provides the means for *discovery, access and application* of spatial data for

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.

The INSPIRE de facto begun in September 2001, than the first INSPIRE, or at that time the E-ESDI Expert group, was convened in Brussels.

The most important step: on 11 April 2002 Memorandum of Understanding between Commissioners Wallstróm, Solbes, Busquin titled *Infrastructure for Spatial Information in Europe (INSPIRE)* has been signed

Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) was published in the official Journal on the 25th April 2007.

…into force on the 15th May 2007, implemented in various stages, fully by 2019.
Appendixes 1-3 with obligatory Data Themes for all EU Member States (MS).

INSPIRE is based on common principles:

- Data should be collected only once and kept where it can be maintained most effectively.

- It should be possible to combine seamless spatial information from different sources across Europe and share it with many users and applications.

- It should be possible for information collected at one level/scale to be shared with all levels/scales; detailed for thorough investigations, general for strategic purposes.

- Geographic information needed for good governance at all levels should be readily and transparently available.

- Easy to find what geographic information is available, how it can be used to meet a particular need, and under which conditions it can be acquired and used.

The INSPIRE concept:

Availability

Accessibility

Legislation rules.
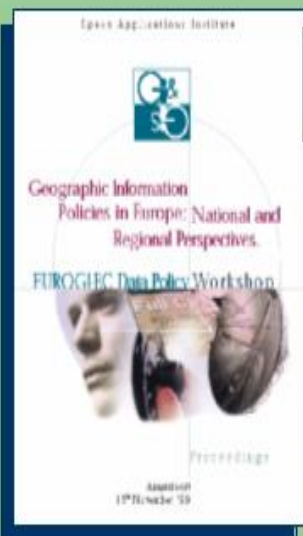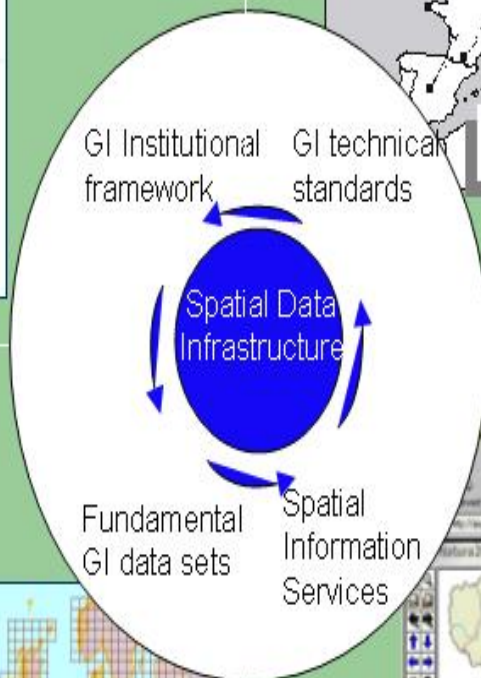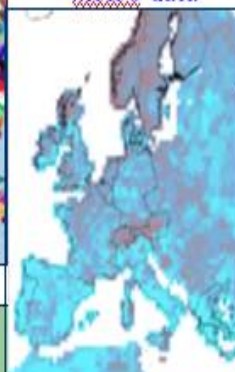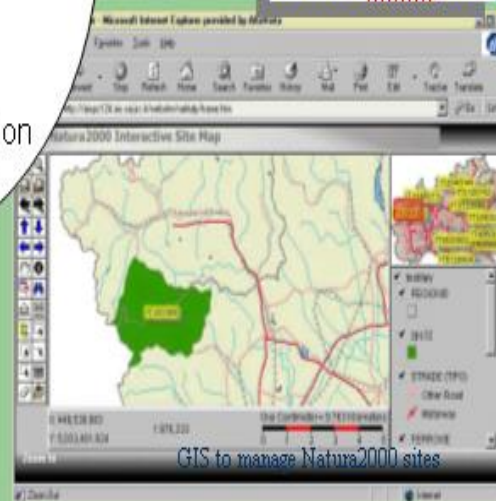
Towards an Infrastructure for Spatial Information

From discovery to Full Interoperability

Standardisation

- Metadata
- Discovery Service
- Data Policies
- Licensing Framework
- Coordinating structures
- …

Harmonisation

- Geodetic Framework
- Seamless data
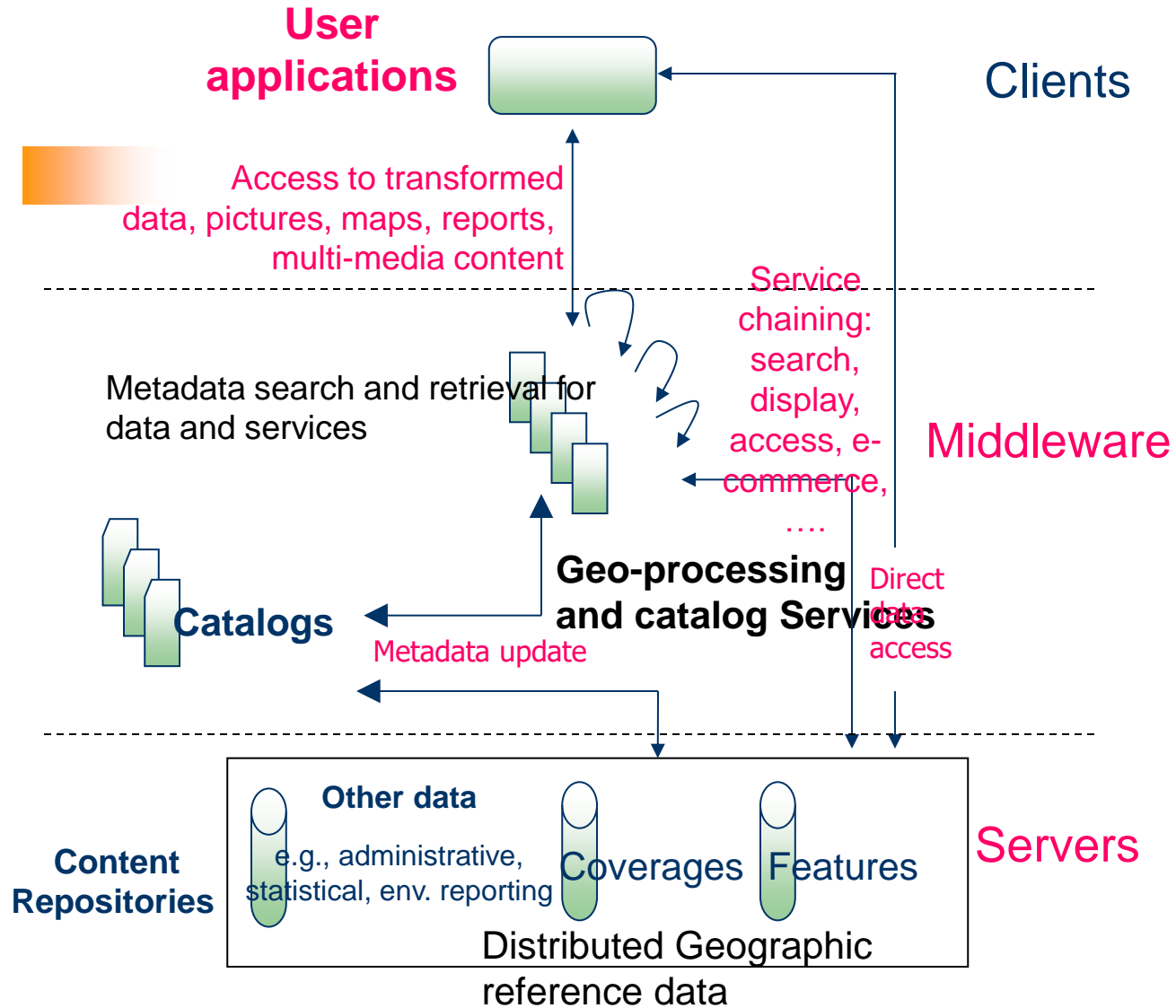- Quality insurance
- Certification
- Updating
- Data model
- …

Integration

- Catalog Services
- View Service
- Query Service
- Object Access Service
- Generalisation Services
- Geo-Processing services
- …

Current status

Architecture model

After the Digital Earth Reference Model

A new strategic approach

- Comprehensive set of policies covering surface and ground water quality, flood assessment, marine and coastal areas, soil, etc.

- Right geographical scale i.e. river basin for water quality and floods

- Sound knowledge based on timely, accurate, easily accessed, harmonised / interoperable geospatial and environmental information, shared across European, national, and local jurisdictions.

- Increasing shift from sector-based (silos) policy making towards more integrated, cross-sectoral approaches.

Two Examples:

- **Directive on the Assessment and Management of Floods**

- **Water Framework Directive for the protection of all waters**

In summary the situation in Europe

- A lot of data but difficult to find because they are poorly documented

- Even if you find data, it is often not possible to access because of policy restrictions

- Lack of co-ordination across borders and between levels of government

- Lack of standards and incompatible information and information systems

- Even if these barriers are overcome, the data is often not re-usable or difficult to integrate with other data

LEGAL FRAMEWORK NEEDED

Directive establishing an infrastructure for spatial information in the Community - INSPIRE

INSPIRE Directive 2007/02/EC

The INSPIRE Directive lays down general rules to establish an Infrastructure for Spatial Information in Europe for the purposes of Community environmental policies and policies or activities which may have an impact on the environment

This infrastructure shall build upon infrastructures for spatial information established and operated by the Member States.

Which data/services?

     Existing spatial data held by or on behalf of a public authority operating down to the lowest level of government when laws or regulations require their collection or dissemination.

Annex I
1. Coordinate reference systems
2. Geographical grid systems
3. Geographical names
4. Administrative units
5. Transport networks
6. Hydrography
7. Protected sites

Annex II
1. Elevation
2. Addresses
3. Cadastral parcels
4. Land cover
5. Orthoimagery
6. Geology

Harmonised spatial data specifications more stringent for Annex I and II than for Annex III

Annex III
1. Statistical units
2. Buildings
3. Soil
4. Land use
5. Human health and safety
6. Utility and governmental services
7. Environmental monitoring facilities
8. Production and industrial facilities
9. Agricultural and aquaculture facilities
10. Population distribution – demography
11. Area management/restriction /regulation zones & reporting units
12. Natural risk zones
13. Atmospheric conditions
14. Meteorological geographical features
15. Oceanographic geographical features
16. Sea regions
17. Bio-geographical regions
18. Habitats and biotopes
19. Species distribution
20. Energy resources
21. Mineral resources

From Commission proposal to Community Directive implementation

- **Preparatory phase** (2004-2006)
  - Co-decision procedure
  - Start of preparation of Implementing Rules
- **Transposition phase** (2007-2009)
  - **Directive entered into force 15 May 2007**
  - INSPIRE Committee starts its activities **26 June 2007**
  - Continuation of preparation of Implementing Rules
  - **Transposition into national legislation 15 May 2009**
  - Adoption of Implementing Rules by Comitology
- **Implementation phase** (2009-2013)
  - Implementation and monitoring of measures
  - Continuation of preparation of Implementing Rules
  - Adoption of Implementing Rules by Comitology

INSPIRE Components

- Metadata

- Interoperability of spatial data sets and services

- Network services (discovery, view, download, invoke)

  – Made available trough the European geo-portal

- Data and Service sharing (policy)

- Coordination and measures for Monitoring & Reporting

Interoperability and harmonisation of spatial data sets and services

The development of INSPIRE Implementing rules for the interoperability and, where practicable, harmonisation of spatial data sets and services follow a two-step approach:

1) Development of conceptual framework and specification methodology:
   - DS-D 2.5 *Generic Conceptual Model* (GCM),
   - DS-D 2.6 *Methodology for Specification Development*…

2) Development of data specifications for each data theme
   - Based on the conceptual framework and specification methodology, and based on the INSPIRE roadmap.

The Copernicus Emergency Management Service (EMS) provides actors

with **timely and accurate geo-spatial information** derived from satellite-based remote sensing complemented by available *in situ* (non-space) or open source data.

As an EU service, the EMS's **first priority** is responding to national or cross-border disasters in Europe and large-scale disasters outside of the EU.

Scope INSPIRE Directive

- General rules to establish an infrastructure for spatial information in Europe
  - Community environmental policies
  - Policies or activities which impact on the environment
- To be based on SDIs established and operated by the Member States
- Does not require collection of new spatial data

Types of documents produced by INSPIRE

- INSPIRE Directive
- Implementing Rules Legislative Acts
- Draft Implementing Rules and Guidelines
- Technical reports and supporting material

Metadata

- INSPIRE Metadata Regulation published 4th December 2008
- Two years for Member States to create metadata for Annex I and II, 5 years for Annex III.
- Maintenance of Technical Guidelines based on user feedback
- Metadata editor publicly available as part of prototype INSPIRE geo-portal
  - to test technical coherence and compliance with ISO standards
  - to support MS in creating metadata compliant with regulation
  - plan to assess the need for a Multilingual Open Source version so that it can be downloaded by users and extended by thematic communities
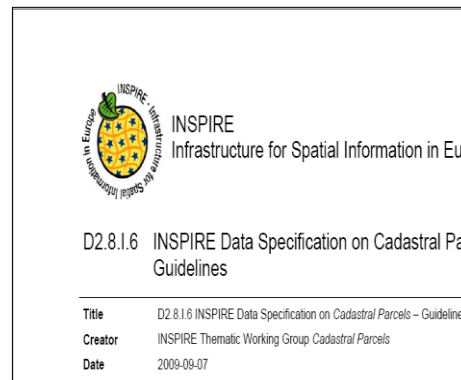
Network Services

- **Discovery and View Services**
  - Draft Commission Legislation: Draft Regulation on INSPIRE Discovery and View Services
  - Finalization and publication expected by the end of the year
  - Initial Operating Capability foreseen as part of the regulation
- **Transformation Service**
  - Network Services Drafting Team has finalised the next version of their proposal for Transformation service Implementing Rules and the accompanying Technical Guidelines for the coordinate transformation.
  - Taking into account the comments received from the SDICs and LMOs
  - The Draft Legislation is currently being prepared by the European Commission for submission to the INSPIRE Committee.
  - The Draft Implementing Rules, the Technical Guidelines and the comments resolution document are publicly available as of 25 September 2009.

Network Services

- **Invoke Services**
  - Technical Report on the state of play for service invocation.
  - Network Service Drafting Team will start activity on this service
  - As more and more geo-processing services become available, the issues of how to chain them is increasingly important to move from a data-centric to an information-centric SDI, able to respond to much wider user base.
  - Several important research issues to address including better documentation of services, quality and trust, dependencies, rights management, etc.

Annex I data specifications

- Developed by 8 Thematic Working Groups since 2008-12

- Intermediate documents subject to consultation and testing by stakeholders

- V3 of data specifications for Themes of Annex I published on 2009-09-07

- The Draft Legislation is currently being prepared by the European Commission for formal submission to the INSPIRE Committee (meeting 2009-12-14)

INSPIRE
Infrastructure for Spatial Information in Europe

D2.8.I.1 INSPIRE Specification on Coordinate Reference Systems - Guidelines

Title	D2.8.I.1 INSPIRE Specification on Coordinate Reference Systems – Guidelines
Creator	INSPIRE Thematic Working Group Coordinate Reference Systems and Geographical Grid Systems
Date	2009-09-07
Subject	INSPIRE Specification: Coordinate reference systems
Status	n/a
Publisher	INSPIRE Thematic Working Group Coordinate Reference Systems and Geographical Grid Systems

INSPIRE
Infrastructure for Spatial Information in Eu

D2.8.I.6 INSPIRE Data Specification on Cadastral Pa Guidelines

Title	D2.8.I.6 INSPIRE Data Specification on Cadastral Parcels – Guideline
Creator	INSPIRE Thematic Working Group Cadastral Parcels
Date	2009-09-07

INSPIRE
Infrastructure for Spatial Information in Europe

D2.8.I.3 INSPIRE Data Specification on Geographical Names – Guidelines

Title	D2.8.I.3 INSPIRE Data Specification on Geographical names – Guidelines
Creator	INSPIRE Thematic Working Group Geographical Names
Date	2009-09-07
Subject	INSPIRE Data Specification for the spatial data theme Geographical names
Publisher	INSPIRE Thematic Working Group Geographical Names
Type	Text
Description	This document describes the INSPIRE Data Specification for the spatial data theme Geographical names
Contributor	Members of the INSPIRE Thematic Working Group Geographical Names

Data specifications – Content

- Application schema in UML
  - spatial object types
  - attributes & attribute values
  - relationships between spatial objects
  - constraints
- Rule for geographical referencing
- Rules for unique identifiers for spatial objects, derived from national identifiers
- Theme specific metadata (including data quality)
- Simple portrayal rules for the INSPIRE View Network Service
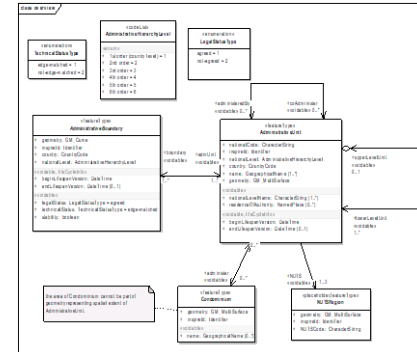
Data and Service Sharing between Member States and Community Institutions and Bodies

- Member States to adopt measures for the <u>sharing of data and services</u> between public authorities for public tasks relating to the environment without restrictions occurring at the point of use. Such measures are open to international bodies and Community institutions and bodies

- Public authorities may charge, license each other and Community institutions provided this does not create an obstacle to sharing.

- When spatial data or services are provided to Community institutions for reporting obligations under Community law relating to the environment then this will not be subject to charging.

- Member States shall provide the institutions and bodies of the Community with access to spatial data sets and services in accordance with harmonised conditions.

- The regulation on these harmonised conditions has now been approved by the INSPIRE Committee. Best practice and guidelines allow to identify measures that are successful in ensuring and maintaining quality of data as well as increasing access and us

Monitoring and Reporting

- Monitoring and Reporting IR approved by INSPIRE Committee in December 2008, published in OJ 11th June 2009.

- Quantitative indicators on the progress of the SDI in the member states and qualitative reports about implementation experiences and benefits will enrich our collective knowledge in SDI assessment.

- Workshop with Member States Contact Points for INSPIRE focusing on Monitoring and Reporting scheduled on 2009-11-16

Interoperability of spatial data sets and services
Annex II, III

- Principles of process:
  - Open, participatory and transparent process
  - Involvement of stakeholders and relevant thematic experts and communities at all steps
  - Call for manifestation of interest was launched on 05/11 on http://inspire.jrc.ec.europa.eu/index.cfm/newsid/4140
    - Closing date for nominating experts 14/12/2009
    - For submitting reference materials 31/01/2010
  - Prior registration as SDIC required

Call for participation in Annex II&III data specification development

- Renewed EC INSPIRE website
- Web 2.0 INSPIRE Forum website
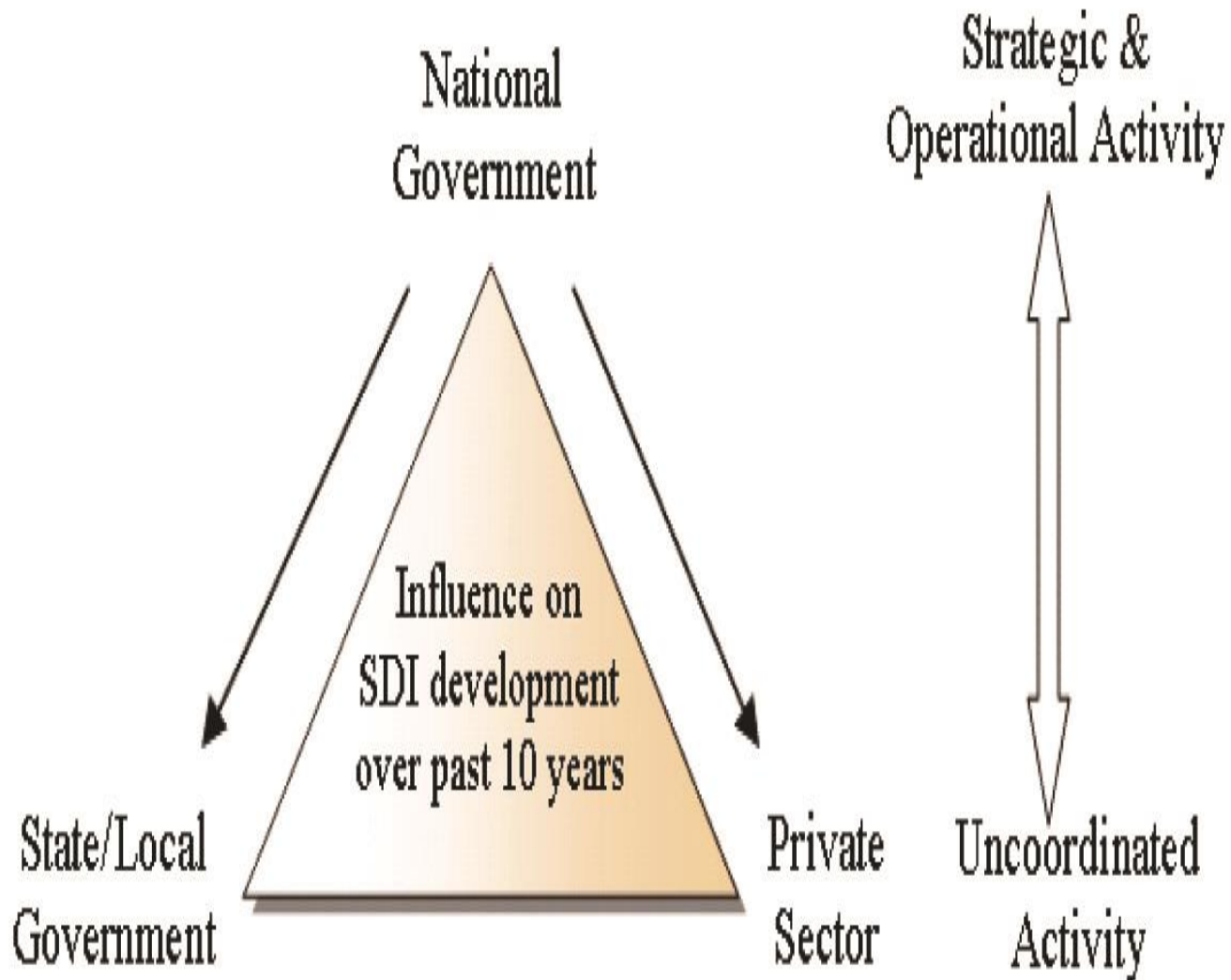
    http://inspire-forum.jrc.europa,

- Bring national and thematic workshops addressing INSPIRE aspects under Forum umbrella

    – Organizing an event relevant for INSPIRE development or implementation? Apply for it to be recognized as an INSPIRE Forum event!

1st Generation | **2nd Generation**

Countries begin developing SDI anytime along the continuum

Continuum of SDI Development

Product-Based SDI development model
- Definition of data
- Collection of data
- Integration of data
- Database creation
- More implementation

Process-Based SDI development model
- Knowledge infrastructure
- Capacity building
- Communication
- Coordination

Relationship between the first and second generations of SDIs.
(by Williamson Rajabifard, Binns, 2007, reprinted from

National Government

Strategic & Operational Activity

Influence on SDI development over past 10 years

State/Local Government

Private Sector

Uncoordinated Activity

Roles of national governments, subnational governments and the private sector in SDI development over the part decade.(by Williamson Rajabifard, Binns, 2007 reprinted from Rajabifard at al.2006 with permission of the International Journal of GIS)
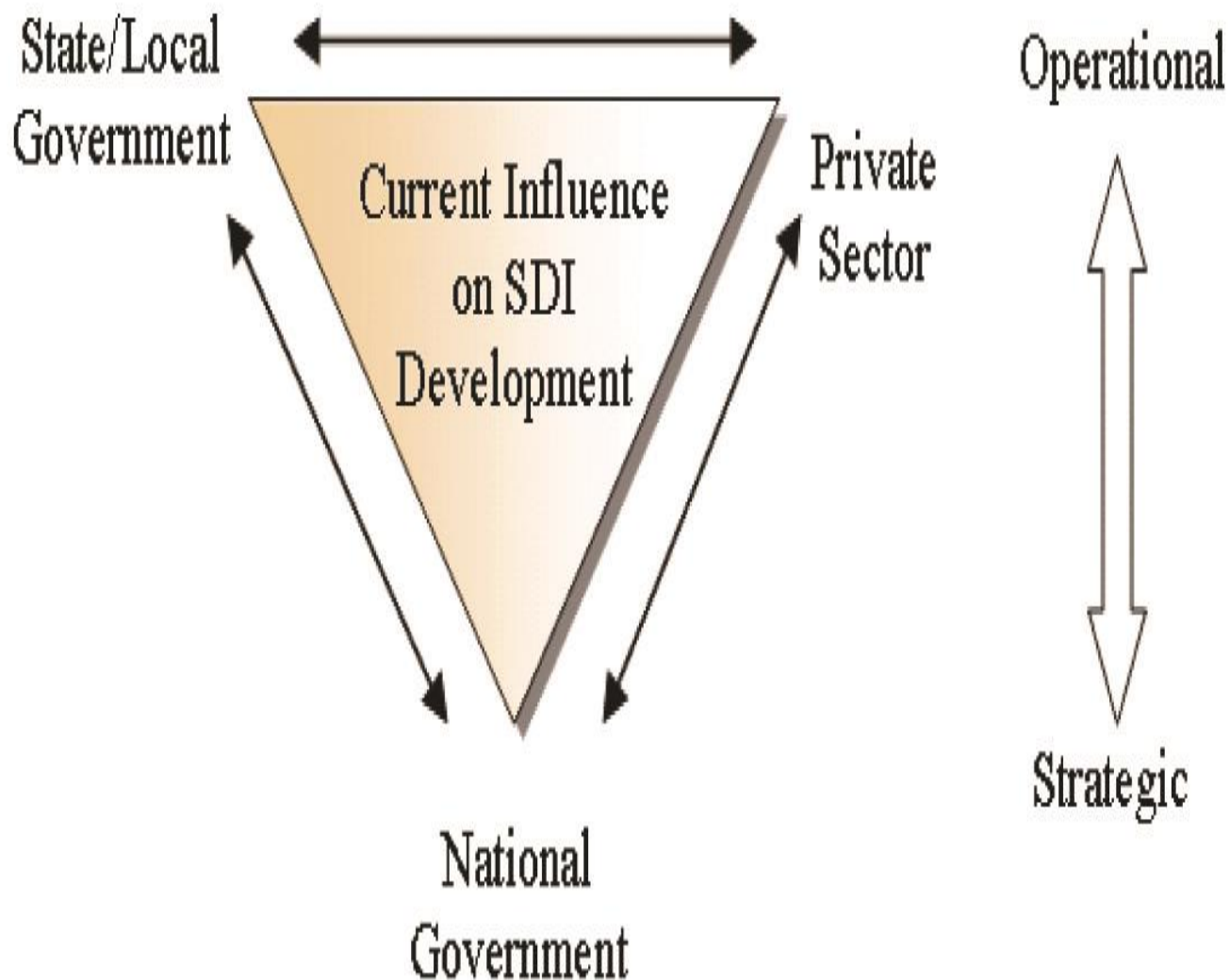
*Current roles of national governments, subnational governments,
and the private sector in SDI development (by Williamson
Rajabifard, Binns, 2007, reprinted from Rajabifard at al.2006
with permission of the International Journal of GIS).*

Media

Flexible

(1) Topographic Map
(2) Car Navigation System
(3) GISystem
(4) Maps in the Future

Fixed

2D Core

Standard

Spatial
Representation

Spatial
Articalation

(3)

(1)

(2)

(4)

Multi-D

Individual

Added Value
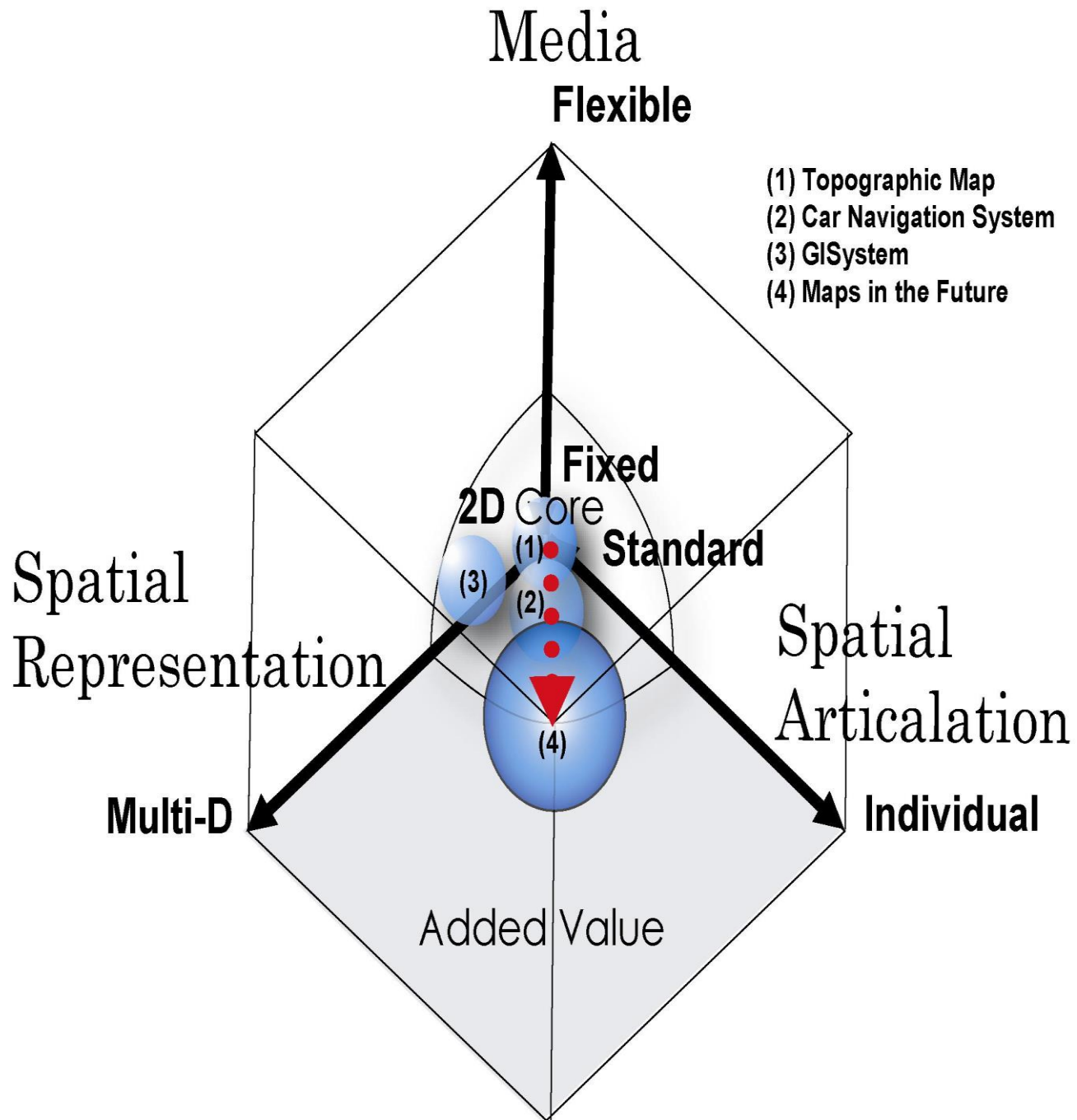
DĚKUJI ZA POZORNOST

ĎAKUJEM ZA POZORNOSŤ