Spatial Information Management: Knowledge, Organizations and Tools

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State of the art

MERGERS – PARTNERSHIPS – COOPERATIONS - DATA INTEGRATION - SEAMLESS PRODUCTS

(global village approach- exchange of information - at the information society almost everything is linked up)

Economies (countries in transition, Euro, etc),

Cultures / Countries (global and regional relationships, links)

Policies (common European policies, P-P-P)

Technologies, Methods, Tools, Scientific fields (product oriented projects, from method-centric to data-centric)

Professions /Specialties (i.e. technical – legal - financial – business - administrative issues)

Spatial Data (various sources / agencies / accuracy /Scales)

What are the emerging "Mergers"? Metadata bases- NSDI

***what HAS to be linked up* in order to create a NSDI?**

No commonly applicable rules, poor help of guidelines

How this is achieved somewhere else and to what level

From the Whole to the Part approach

- **Global level (coordination of RSDIs - or NSDIs): facilitates the environmental monitoring, natural resources protection, sustainable economic development (rapidly increasing population, increasing demands for agricultural and water resources protection)**

  GSDI initiatives, Global Mapping (1992 Japan)- International Steering Committee for Global Mapping (ISCM)
- **Regional level (NSDIs / NMAs of a geographical region) : PC-IDEA (Permanent Committee on SDI for the Americas, PCGIAP (Permanent Committee on GIS Infrastructure for Asia and the Pacific), Europe (EuroGeographics, EUROGI, E-ESDI), Africa (the Nairobi Statement, introducing the Permanent Committee for NSDI for Africa, Africa Data Dissemination Service- ADDS)**
- **National level (spatial data: NMAs,main organizations, Public-Private sector)**
- **Local level**

Is it necessary? YES- no one doubts the benefits

How easy is that?

Very difficult to achieve (frequently it is underestimated)

- The need for Global & Regional SDI came after the full development of national spatial data (mainly by the NMAs)
- The need for National SDI came after the full development of the various organizational structures of the data providers : NMAs / other main public organizations / main private sector initiatives
- Structures within a region are varied as the cultures, economies, and politics in which they operate (the same happens also within a nation-different models, budgets, policies, between different main spatial data providers)

What is needed? (1)

(initial strategies & activities)

Regional level : (experience from Europe: European plans & policies have affected the broader region's NMAs activities, yet NMAs and moreover NSDIs activities vary greatly in terms of tasks & responsibilities & customization of their products)

- Participation to **international & regional projects**
- **Knowledge & experience sharing**
- customer-oriented approach (the **real needs** of those most in need should drive developments)
- **Governments need help to understand** what their societies require of SDI & to **introduce changes of policy** that will affect both users and suppliers
- **Continual Professional Development** (Universities' & local Survey Associations' task)

What is needed (2)

National level: (Athens 2000 com3, Nairobi 2001 Statement on SI for Sustainable Development)

- **Establishment of NSDI Steering Groups to formulate policy and institutional frameworks and facilitate co-operation amongst stakeholders**
- **Clarification of the role and responsibilities of the mergers, to avoid conflicts**
- **Parallel development of bottom-up pilot projects-define the problems and potential values and benefits/ gain experience**
- **Clear, short-term, realistic objectives with simple solutions**

What is needed (3)

- Establish cooperation between public and private sector and amongst the variety of professions involved
- Success criterion: delivery of reliable products & services that are accepted and desired by the end-users. The users should be involved in testing products and services.
- Cost benefit analysis: adopt information as an asset and manage it appropriately (capture, maintain and disseminate data that are needed and can be proved cost effective)
- Improve a data sharing culture within the country (easy access, low cost availability, recovering profit for the suppliers)

What is needed (4)

- NSDI **policy should be flexible** to address rapidly changing needs and wishes of the users and adapt to changing technologies
- Cadastral, topographic and thematic data sets should adopt the **same philosophy and data model** to achieve multi-purpose data integration
- In order to integrate and share data we need to focus on **research to understand and resolve different semantics in data**
- To be able to adapt to the e-market rethinking of **pricing, rights and access to data is necessary**

FUNTAMENTAL SUCCESS FACTORS

- General ideas/statements/guidelines derived from experience/emphasis on the value of NSDI
- Theoretical/academic knowledge-education
- Continuous professional development
- Monitoring of modern trends/policies-methods
- Technical facilities/infrastructure/equipment
- Financial support/ budgets
- Short term time schedules-cost effective approaches
- Combination of all the above mentioned together with: administrative, legal, political, economic/business knowledge and experience
- Willingness of interdisciplinary cooperation
- Share best-practice knowledge and experience

State of the Art SIM

Objectives & Actions (1)

- to raise awareness
- to work towards capacity building & transfer of knowledge providing information easily accessed, simply structured and annually updated
- to facilitate the development of NSDIs

Target:

a. To create an **Inventory/metadata base** with information about best practice of such activities at national level and to maintain it up to date at **web site**

b. To provide **brief information** about regional and global initiatives -short review

Objectives & Actions (2)

STANDARTIZED NATIONAL REPORTS

Proposed Information Content (to be discussed):

- **Description of the state of the art in Spatial Data & Information Infrastructure (definition, progress in establishing a NSDI agency, strategic plan/policy, participation to international projects, future plans/ strategies and research activities)**
- **Legal framework (responsibilities, operation, economic/financial policy, privatization, cost recovery, performance improvement and e-commerce, pricing, costing and marketing spatial data products, rights/access/protection/copyright/e-services)**

Objectives & Actions (3)

- **Organizational issues (administration, plan, human resources/personnel)**
- **Cooperation alternatives (mergers, partnerships, organizational P-P-P, customers)**
- **Brief technical issues (types of data included, main map series-scales-coverage, data modeling, existing data bases, metadata, clearinghouse, updating policy, delivery mechanisms, standards and technical specifications, products)**

BENEFITS OF PUBLISHING THIS INFORMATION ON THE WEB SITE CONNECTED WITH THE MAP

Why using internet mapping in a NSDI metadata base?

- Integrates various type of information
- Provides better visualization of information
- Provides a much more dynamic tool than a static text display
- Improves and supports better analysis of information and facilitates the creation of new information

Values of providing GIS-structure data through the web site

- Allows real-time integration of data from around the world
- Provides a common platform for this exchange
- Cost-effective method for reaching a vast audience
- Simple (everyone can use the Web to access maps)

WebGIS other features

- **Web-enabled GIS lets you deliver interactive query capabilities such as**
  - ✓ Searching for specific site locations (location service)
  - ✓ Displaying and viewing multiple data sets
  - ✓ Conducting queries for specialized analysis
- **Scalable environment from the smallest Intranet to meeting the demands of worldwide Internet access.**
- **Posting edits to the server, or include notes and revisions for others to review.**
- **Print layout capabilities**

Proposal for using ArcIMS (ESRI's Web enabled GIS)

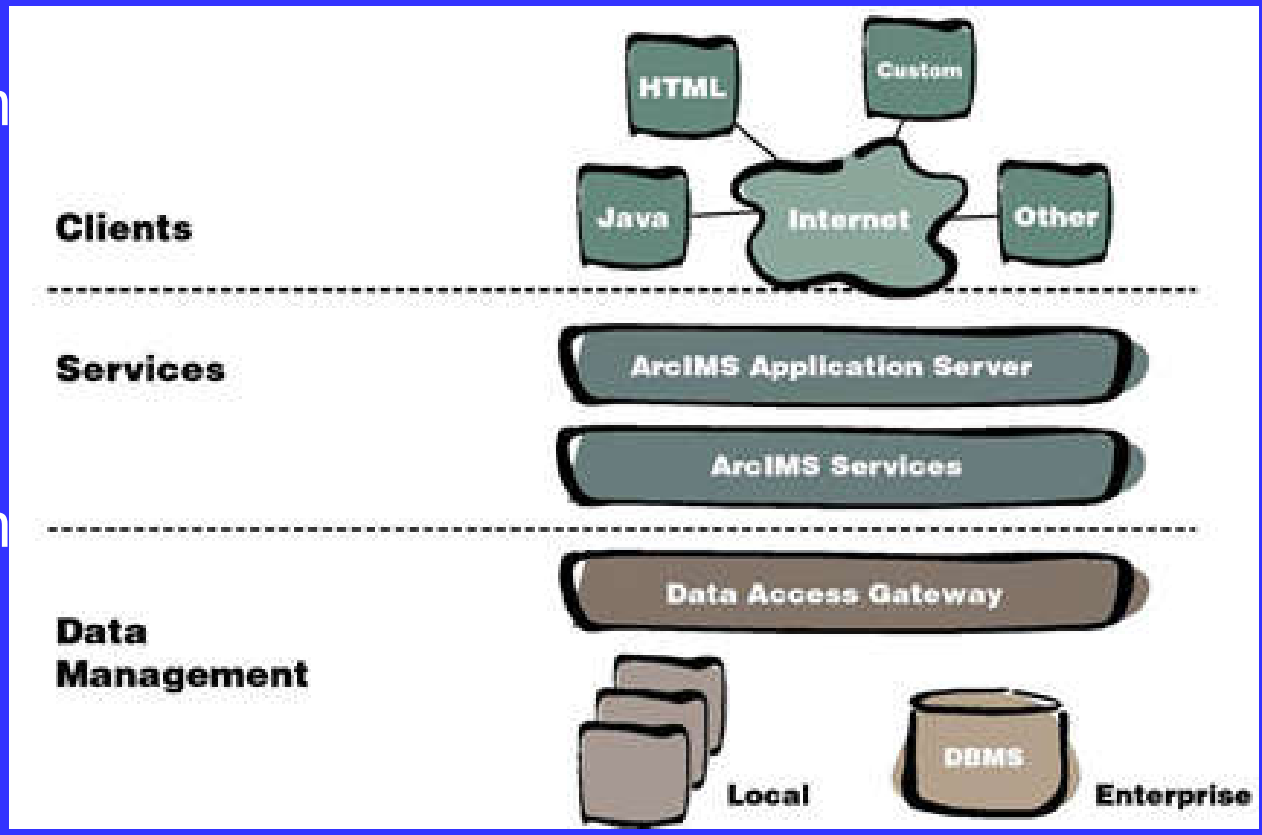
ArcIMS operates in a distributed environment that consists of both client-side and server-side components. Typically, the client requests information from an Internet or Intranet server. Then the server processes the request and sends the information back to the client viewer.

Integrating data from multiple sources

- **Integration of local data sources with Internet data sources**
- **Support capability for various industry-standard GIS formats including:**
  - ✓ ArcView
  - ✓ GIS shapefiles
  - ✓ ArcInfo coverages
  - ✓ Spatial Database Engine (SDE) layers
  - ✓ DWG
  - ✓ DXF
  - ✓ DGN
  - ✓ Graphic images

System Architecture

ArcIMS is a common platform for the exchange of Web-enabled GIS data and services and is more than just an Internet mapping solution; **it's a framework for distributing GIS capabilities over the Internet**



NSDI Metadata table

Field	Type	Width	Filename	Definition
Area	N	10	-	-
Population	N	10	-	-
People	C	12	popnotes.txt	Growing rate – distribution
Education	C	12	edunotes.txt	Engineers/Technicians/Administrative – Surveyor employment
NSDI	C	12	status.txt	Existence – progress, standards, training, equipment, infrastructure
Laws	C	12	legislat.txt	Existing/relative legislation
Infrastructure	C	12	infrastr.txt	Geodetic parameters, Databases
Pricing	C	12	policy.txt	Pricing policy
Future	C	12	planning.txt	Strategy, research
International	C	12	abroad.txt	Co-operations, support
References	C	12	source.txt	Contact person / correspondent, NSDI report, bibliography

We can see that, most of the above Fields have a descriptive content through a linked text file, while only two of them are numeric. Evidently, the system contains data that cannot be geographically represented and evaluated - comparatively to each other. In order to be able to use the above information, to reach conclusions and to make decisions, the descriptive data we mentioned above, should be converted to more definite quantities. Thus, a scale of 0-5 (“coming” from a series of standardized criteria and factors) is proposed, assigning accordingly a grade to every Field (that could be represented) of each Country or Region.

NSDI Metadata table (updated)

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Edu_rank	N	1	-	Level of relevant education (0-5)
NSDI	C	12	status.txt	Existence – progress, standards, training, equipment, infrastructure
NSDI_rank	N	1	-	Level of existing NSDI (0-5)
Laws	C	12	legislat.txt	Existing/relative legislation
Infrastructure	C	12	infrastr.txt	Geodetic parameters, Databases
Infra_rank	N	1	-	Level of relevant infrastructure (0-5)
Pricing	C	12	policy.txt	Pricing policy
Future	C	12	planning.txt	Strategy, research
Futu_rank	N	1	-	Estimation of future evolvement (0-5)
International	C	12	abroad.txt	Co-operations, support
References	C	12	source.txt	Contact person / correspondent, NSDI report, bibliography

Looking ahead

- Agreement for standardization of national reports
- Definition of the content of the metadata base
- Construction of the metadata base
- Collection of information
- First version available on the web site
- Use of Internet mapping tools for better editing, visualization, dissemination and updating of available information