



Vrije Universiteit Brussel



# Introduction to SDI impact and performance assessment

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# Outline



- Overview performance and impact assessment of SDI
- Overview of performance and impact assessment approach SPATIALIST

# SDI assessment



## ■ Why SDI assessments?

- **There might be several reasons**
  - Motivate budgets, describe a specific status, assess certain choices, because of legislation, ...
- **The demand for assessment might be <>**
  - Internal, external

# SDI assessment



## ■ List previous SDI assessment activities

### ■ Research

- Ian Masser (1999), Rajabifard et. al. (2003): generational
- Steudler et al. (2003): Evaluation and Performance indicators
- Van Orshoven & Vandenbroucke (2003/4/5): INSPIRE State of Play
- Kok & Van Loenen (2004): Organisational/Institutional
- Delgado et al. (2005): SDI-Readiness
- Rodriguez Pabon (2005): Theoretical framework to assess SDIs
- Crompvoets (2006): Clearinghouse Suitability Index
- Lance et al. (2006): SDI control evaluation
- Giff (2006): Performance based management
- Grus et al. (2007, 2008): CAS, Multi-view framework

**Different assessment orientations, different approaches, different sampling methods, different levels, different definitions**

# SDI assessment



- List previous SDI assessment activities
  - Projects & activities
    - GSDI survey (Onsrud): assessment of SDI at global level
    - Impact assessment at NSDI level (e.g. CH)
    - SDI Observatory (IDEE)
    - Monitoring implementation of regional SDI (e.g. AGIV, including use of indicators)
    - C/B at local levels (e.g. City of Leuven)
    - ...
  - Other
    - Proposal for a European observatory (Annonni and Salvemini)

**Quite new field, very few operational set-ups**

# Multi-view assessment



- Readinex Index
  - Clearinghouse suitability
  - INSPIRE SoP
  - Organisational perspective
  - Legal Approach
  - SDI effectiveness from user perspective
  - ...
- ☞ Tatiana Delgado
  - ☞ Joep Crompvoets
  - ☞ Danny Vandenbroucke
  - ☞ Bastiaan Van Loenen
  - ☞ Katleen Janssen
  - ☞ Zorica Budovic

**Book edited by Crompvoets, Delgado, Rajabifard and van Loenen  
University Press Melbourne**

# C/B and ROI workshop



## ■ Workshop organised by

- JRC (EC), FGDC (US), Geoide and GeoConnections (CA) – January 2006
- “Assessing the impact of SDIs”
- 25 invited experts from Europe, US, Canada

## ■ Objective

- Look into the social, political and economic impacts of SDI with focus on how

## ■ Starting point

- Some approaches and studies exist, but still a lot to be tested

# C/B and ROI workshop



## ■ Focus until then on

- Set-up costs, and short term efficiency benefits which are relatively easier to assess
- Than wider measures including indirect and organisational costs, and longer term social, political and economic benefits

# C/B and ROI workshop



## ■ Recommendations of the workshop

- To develop a shared portfolio of studies at different levels of granularity
- To develop a clearer and shared definition of SDI components and their interactions
- To give priority to longitudinal studies of SDIs in progress,
- To develop a theoretical framework underpinning the identification of SDI benefits
- To pay particular attention to identifying user communities, and eliciting their assessment of value deriving from an SDI

# C/B and ROI workshop



## ■ Recommendations of the workshop

- To pay particular attention to regional SDIs, and to application-driven approaches
- To regularly exchange experiences with related fields, particularly in the GI technology, and utilities sectors, and e-government
- To develop greater understanding of total geo-spatial investments across government programmes

# C/B and ROI workshop



- Extended Impact Assessment INSPIRE
  - Very difficult, maybe not the best example
  - Effort to quantify at regional level, the costs and benefits (Delphi Panel approach)

Table 4: Summary Quantified benefits  
Initial Estimates (all figures €m per annum)

Type of benefit	Quantitative estimates
More efficient EIAs and SEAs <sup>1</sup>	100-200
More efficient environmental monitoring and assessment	100
More cost-effective expenditure on environmental protection	300
More cost-effective implementation of the environmental <i>acquis</i>	50
More effective implementation of EC projects	5-15
More effective expenditure on Trans European Networks	140
Reduced duplication of spatial data collection	25-250
Improved delivery of risk prevention policies	120-400
Improved delivery of health and environment policies	350
<b>Total</b>	<b>1190-1800</b>

# C/B and ROI workshop



- Return on Investment study NASA
  - Booz-Hamilton
  - Focus on interoperability issues and set-ups
  - GeoVMM process (Value Measurement Method)

Table 5: Weights Assigned by Experts to GeoVMM Value Factors

<b>Direct User Value</b>	<b>26.5%</b>	
Data Availability	36%	10.1%
Ease of Use	37%	9.9%
Broad Data Sharing Capabilities	25%	6.5%
<b>Social Value</b>	<b>28.7%</b>	
Better Decision Making Ability	27%	7.8%
Extra-Governmental Coordination	20%	5.8%
Minimal Barriers	20%	5.7%
Institutional Effectiveness	20%	5.6%
Efficient Use of Taxpayer Resources	13%	3.7%
<b>Government Foundation/Operational</b>	<b>24.4%</b>	
Ease of Integration	23%	5.6%
Intragovernmental Collaboration	17%	4.1%
Public Participation and Accountability	15%	3.7%
Interagency Collaboration	14%	3.4%
Reuse, Adaptation, and Consolidation	14%	3.3%
Mainstreaming of GIS	11%	2.7%
IT Performance	6%	1.5%
<b>Government Financial Value</b>	<b>11.6%</b>	
Total Cost Savings	62%	7.2%
Total Cost Avoidance	38%	4.4%
<b>Strategic/Political Value</b>	<b>8.8%</b>	
Close Working Relationship	30%	2.7%
Supports Improved Decision Making	30%	2.7%
Supports NSDI	28%	2.4%
E-Gov Support	12%	1.0%
<b>Total</b>	<b>100%</b>	

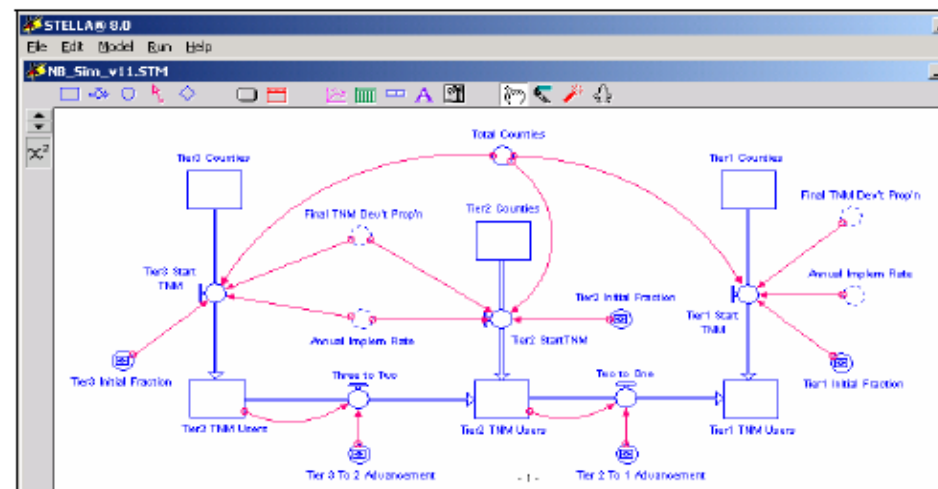
Source: Booz Allen Hamilton 2005, pg. 16

# C/B and ROI workshop



- The benefits of the National Map (US)
  - The improved net benefits of applications
  - The spurring innovation of new applications
  - The growing user community for applications

Figure 3: Modelled Dynamics of adoption of The National Map



NOTE: As counties become users of The National Map, some advance upward through the tier system. The rates of these transitions are determined by the annual implementation rate (Annual Implem Rate) and final development proportion (Final TNM Dev't Prop'n).

Source: Helsing, Theissen and Bernknopf, 2004.

# C/B and ROI workshop



- C/B in framework of eGovernment (EU)
  - eGEP framework

Figure 19: Comparison of Key Benefits

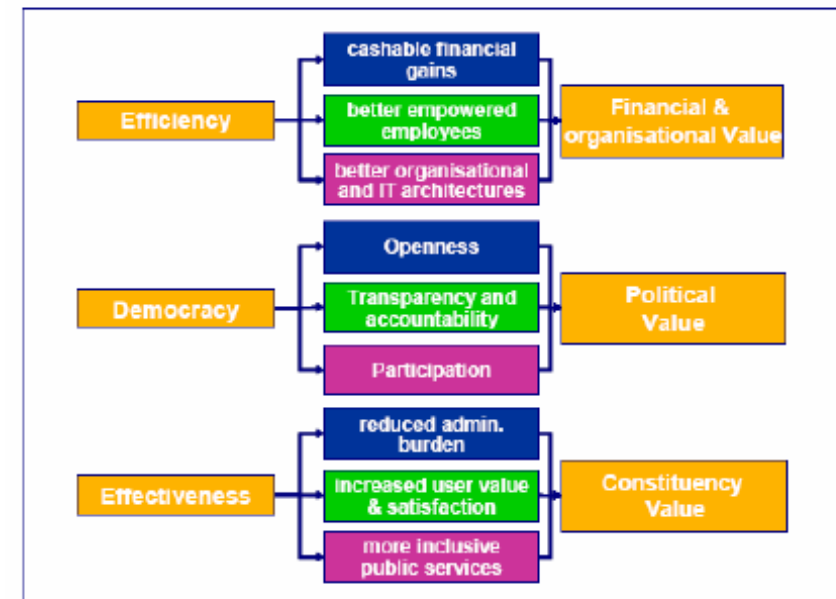
	Comparison of Key Benefit Areas				
	Cost Reduction		Added Value / Service Improvement		Strategic Intangible Benefits
	Transactional / Process	Other Cost Reduction	Increased Revenue	Service Improvement	
CRM	● Reduced cost per resident transaction	● More cost effective service delivery		● More effective production and use of management information ● Improved quality of activities and responsiveness	● Improved public perception and confidence of services ● Changes in organisational change
Workflow	● Reduction in time to service and to send applications to court	● Reduction in paper costs, storage space and other space required	● Faster processing of court payments	● Better organisation design ● Reduction in errors and rework ● Customer satisfaction ● More responsive systems ● Reduced liabilities	● Consistency of service quality ● Transparency of processes
LAWs		● More efficient document management of individual categories		● Reduction in web development costs ● Increased availability of online services	● Consistency and connectivity of services ● Enabling software made for businesses ● Active compliance with DPA
NOMAD	● Increased field office productivity time ● Greater awareness of international services		● More effective revenue collection	● Increased data quality ● Customer satisfaction ● Local media attention	● Changes to internal processes ● Increased staff satisfaction
PARSOL	● Access to info/services out of hours ● Greater self-empowerment	● Reduced application and maintenance costs (for IT and applications)		● Reduction in error and rework ● Greater accuracy of info ● Customer satisfaction ● Lower response time to applications	● Transparency of info ● Greater monitoring of applications
Valuebill	● More proactive beneficiaries of financial benefits ● Improved internal services		● More accurate identification for revenue and cost/credited value	● Improved accuracy of LPS data and property valuation cycle ● Reduction in number of relative enquiries, better response to queries	● Increased reliability of information ● Increased staff confidence in data

KEY ● Size of benefit

Source: National Projects: Page 2

<http://www.localgovnp.org/webfiles/Benefits/Benefits%20Guide%20Folder%20web.pdf>

Figure 20: eGEP Measurement Framework Benefits



Source: Codagnone, Boccadelli and Leone, 2006, pg. 15

# Approach SPATIALIST



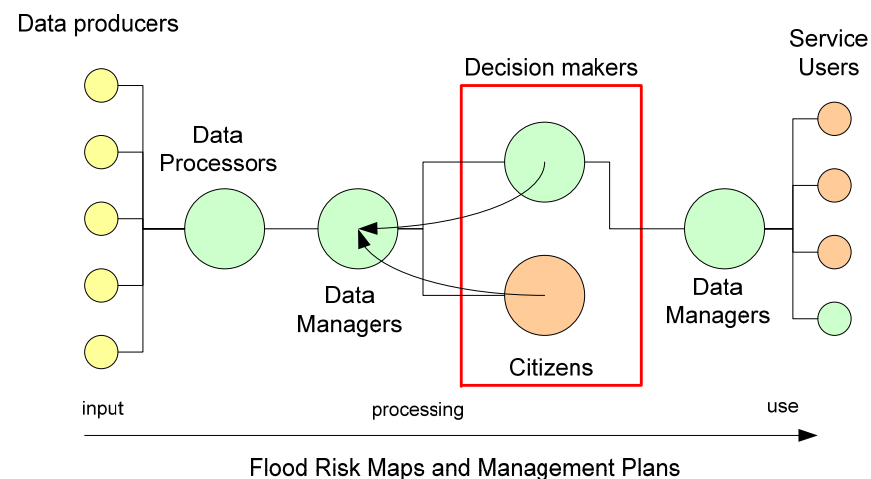
- Review scientific literature and practices
  - Of existing SDI assessment approaches
  - Of practices and approaches in eGovernment
- What do we want to assess?
  - Does the SDI reach its objectives?
  - Level of granularity – overall SDI, business processes, organisations and their relations
    - SDI seen from a network perspective

# Approach SPATIALIST



- The definition of SDI as starting point
  - Many definitions exist

An SDI is a set of organisational and technical set-ups [what is it?] within and between organizations [network] to facilitate access, exchange and use of spatial data [narrow objectives], *and thereby contributing to the business, policy making and service provision process [broader objectives].*



# Approach SPATIALIST



## ■ SDI set-ups

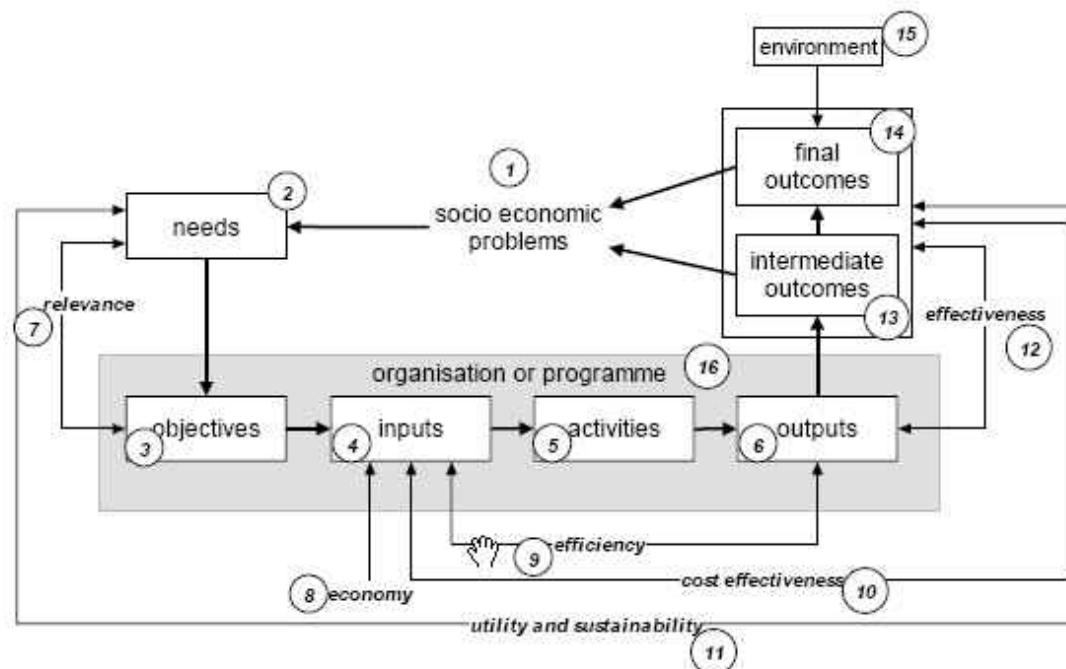
- Different set-ups are analysed and compared regarding their performance

<b>Non technical set-ups</b>	<b>Technical set-ups</b>
Arrangements between organizations	Data with their specifications
Coordinating structure	Metadata
Organisational set-up within organization	Services, tools and applications
Pricing mechanism	Technical and Semantic Standards
Organisational guidelines	Technical guidelines
Funding model	Infrastructure
Strategic plan	Geo-Portal
...	...

# Approach SPATIALIST



- Performance and impact assessment
  - Framework used in eGovernment
  - Applied on SDI as well (e.g. Lance, Giff)



# Approach SPATIALIST



## ■ Looking at

- Input, Output, Outcome (short term), Impact (long term outcome)

Input	Output	Outcomes	Impact
Technical and non-technical set-ups	Effect on the access, use and sharing of data	Effect on the process	Broader effect on policy making, citizen

- Look into efficiency and effectiveness by comparing input, output and outcome

# Approach SPATIALIST



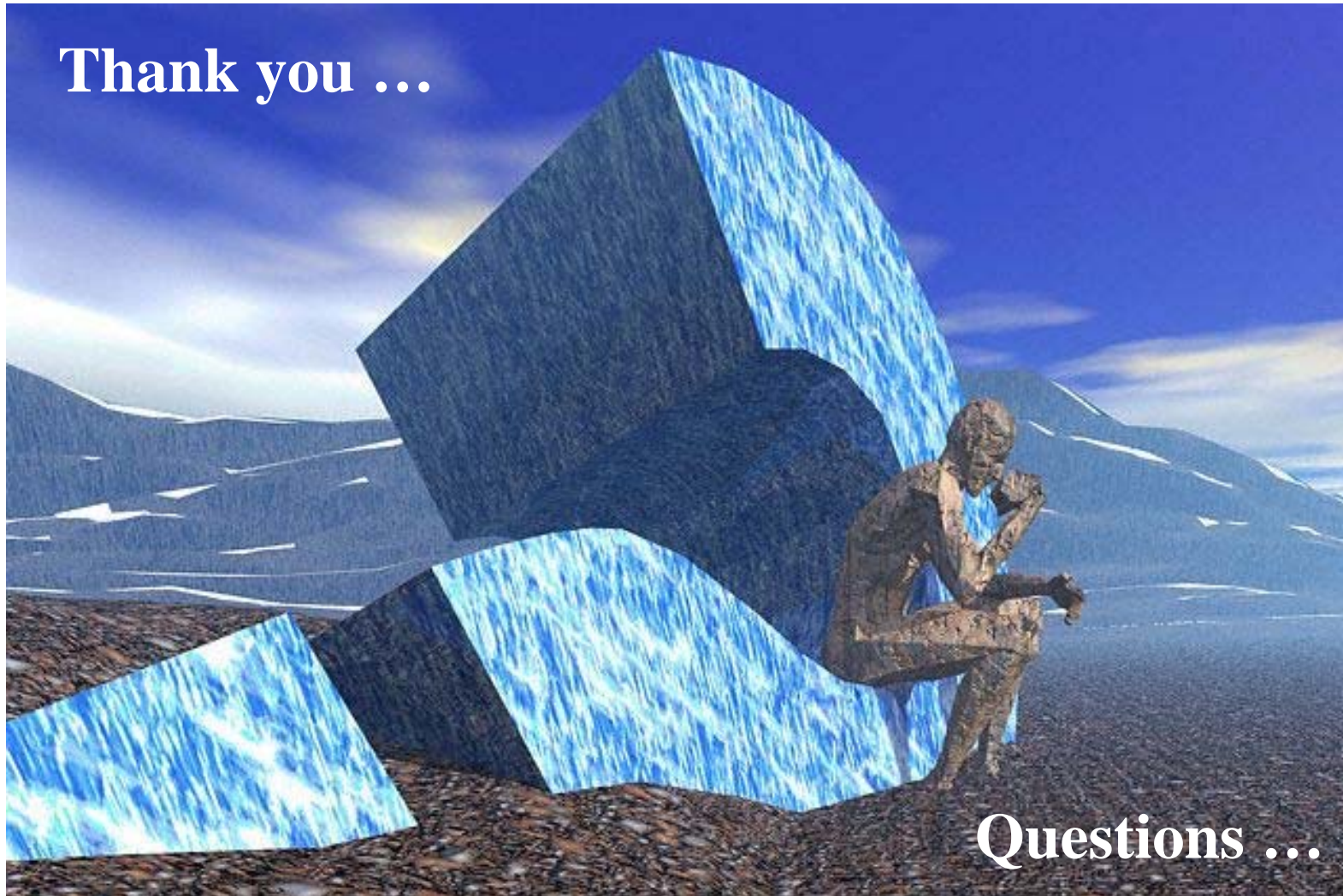
- In a second iteration – bringing in the stakeholders perspective
  - MAMCA
- In conclusion
  - Analysing the narrow and broader objectives of the SDI
  - Looking into input (set-ups), output, outcomes and impact
- Apply this further from the point of view of the different disciplines

<http://www.spatialist.be>



Spatial Data Infrastructure and  
Public Sector Innovation

Thank you ...



Questions ...



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# SDI-performance from a technological perspective

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# Assumptions



- SDI set-ups are treated within a network context
  - Business processes
- We look into the performance of SDI set-ups in the 'narrow' sense
  - Impact on access, use and sharing of data
- Others will look into the performance of the SDI set-ups in the 'broader' sense
  - Impact on the process, policy making & service provision
  - Performance from the stakeholders point-of-view (MAMCA)

# 3 sequences



1. Characterise the SDI set-up(s)
2. Measure the effectiveness of the SDI set-up(s)
3. Measure the efficiency of the SDI set-up(s)

# Characterise the SDI



- **Characterisation – at which level?**
  - The organisations (nodes)
  - The relations between organisations (links)
  - The processes (chains)
- **Which components are in place?**
  - Technological: data, metadata, services, standards, ...
  - Non-technological: legislation, organisational, ...
- **How are components put in place?**

# Characterise the SDI



- Example on standardisation set-ups
  - Standardisation chosen because it is deemed key to reach interoperability
  - Distinction is made between
    - Semantic/technical standards
    - De jure/de facto standards
  - Standards can be defined at level of
    - Business process (e.g. a data model to support a specific policy field, use of a common portal giving access to the data)
    - Organisation (e.g. a data model developed by a municipality)
    - Link (e.g. connection to a data provider – WFS for downloading data)

# Characterise the SDI



- Example on standardisation set-ups
  - But ...
    - It is not because standards have been defined that they are applied (the same way)
    - Therefore: look also into qualitative elements on how they are applied and the reasons why
  - How to capture and ‘translate’ the information?
    - Quantitative and qualitative descriptions through interviews
    - Translate the information into categories
      - E.g. Applying the LISI (or SCOPE) model to assess the degree of technical interoperability (US DoD, EIF 2.0)

# Measure the effectiveness



- How are the SDI set-ups contributing to the goals of the SDI – outcomes/outputs
  - “An SDI is (...) to facilitate access, use and sharing of spatial data (...)”
    - What means access?
    - What means use – better ‘instant use’
    - What means exchange or sharing
    - ... seen within business processes
  - It means we have to make a clear inventory of how the business processes are working from this perspective – data flows, activities

# Measure the effectiveness



## ■ How are the SDI set-ups contributing to the goals of the SDI – outcomes/outputs

### ■ Access

- Search for the required data using (or not) a geo-portal, a data catalogue, ... with search functions.
- Ask for the data in order to use them within the process (letter, phone, e-mail, meeting, ... or a combination of these)
- Prepare an agreement regulating fees, conditions of use, ...
- Physical transfer of the data by means of FTP, DVD/CD, online access (or downloading), ...
- Pre-processing the data at the side of the data provider and/or the recipient in order to be able to use the data within the process

# Measure the effectiveness



- How are the SDI set-ups contributing to the goals of the SDI – outcomes/outputs
  - Use – within the process / outside the process
    - Visualizing the data
    - Interpret the data in view of the process: e.g. looking to Natura 2000 sites and take the border into account to decide on (part of) the border of a RUP
    - Reading the legend and related information to understand the data
    - Querying the data to obtain answers on particular questions
    - Processing the data and related information to obtain new data/information
    - Creating new spatial features (e.g. delineation of a RUP), and/or descriptive information

# Measure the effectiveness



- How are the SDI set-ups contributing to the goals of the SDI – outcomes/outputs

- **Share**

- Giving back data that have been enhanced with new information (as a new data set or as part of an update process of existing data sets).
- Bring into a common basket newly created or derived data (based on other data).
- Publish these data, or at least publish metadata in order to make the broader GI community and end users aware of its existence
- Make the data usable for external users of the process

# Measure the effectiveness



- How are the SDI set-ups contributing to the goals of the SDI – outcomes/outputs
  - How to capture and ‘translate’ the information?
    - Quantitative and qualitative information through interviews
    - Translate the information into indicators – potentially
      - Degree of access: human resources (#PD) needed for obtaining the data; time lapse (#PD or #MM) to obtain the data
      - Degree of use: # users that make use of the digital data in the process; # users that make use of the digital data outside the process; time needed for using the data (for certain activities within the process)
      - Degree of exchange/sharing: # stakeholders you share the results with

# Measure the efficiency



- How do the different set-ups relate to the efforts needed
  - Applying standards can help reaching the objectives ... But at which cost?
    - More human resources needed, more complex operation
    - Investment needed
    - Additional timeframe before being able to make use of the data
  - How to capture and 'translate' the information?
    - Quantitative and qualitative information through interviews
    - Translate the information into indicators – potentially
      - E.g. Compare input needed for different set-ups
      - E.g. Compare input needed for different set-ups against output

# Going one step beyond



- Taking into account the stakeholders perspective – see also MAMCA
  - What is feasible (implications)
  - What is important (priorities)
  - ...
  
- ☞ Coming up with different standardisation strategies for different types of stakeholders

# Conclusions



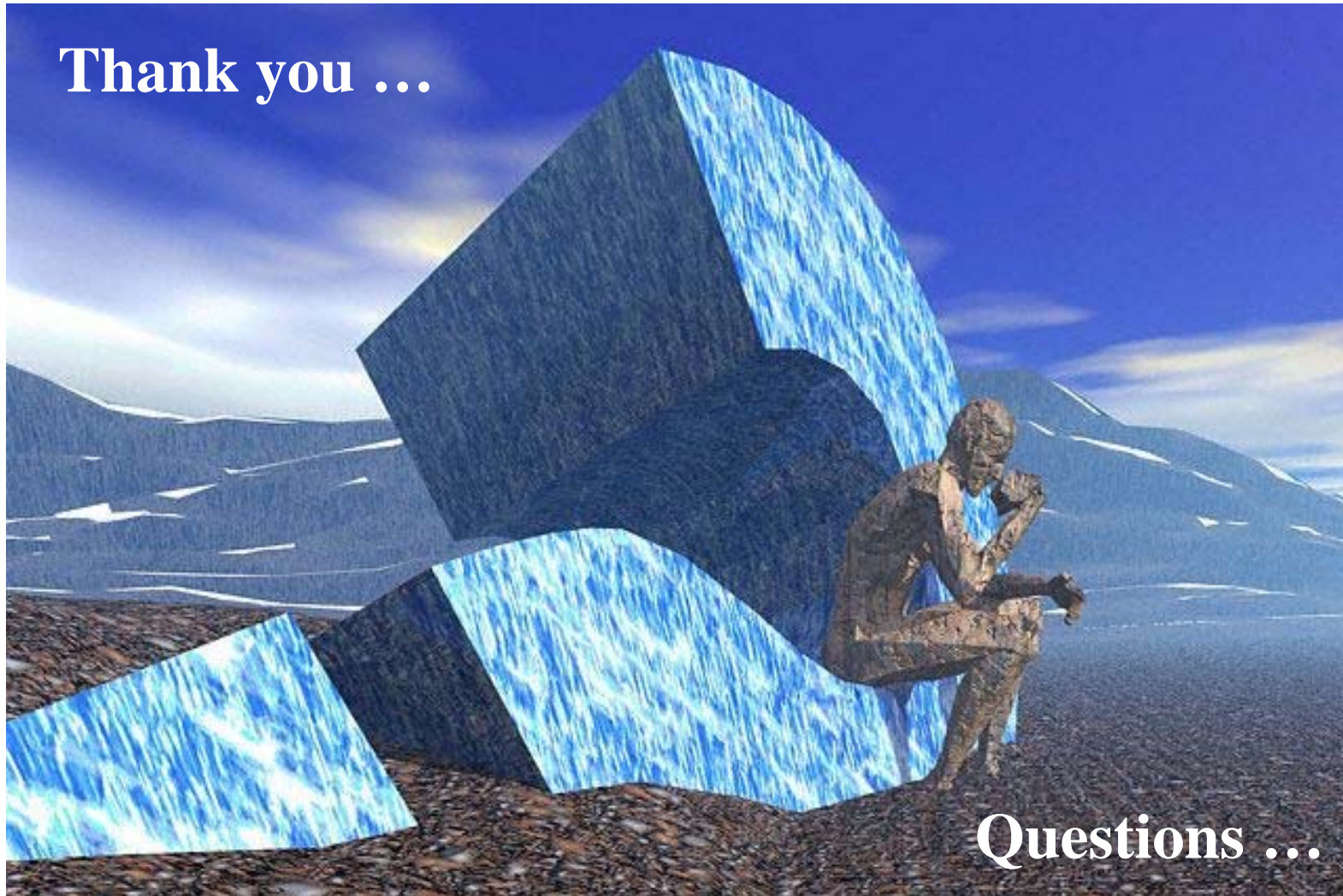
- We looked into PM with some assumptions in mind
  - We looked at PM in the framework of business processes
  - PM from a technological perspective should be part of a broader approach
- We looked into PM according to a sequential approach
  - Characterising the SDI set-ups
  - Looking into how the set-ups help reaching the ‘narrow’ objectives of the SDI
  - Looking into the efficiency of the different set-ups

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Questions ...