

Assessing the impacts of SDIs: the story so far

Max Craglia

European Commission
Joint Research Centre
Spatial Data Infrastructures Unit
<http://sdi.jrc.ec.europa.eu>



Background

- We know very little about how much money and other resources are actually being expended on maintenance of the existing national Spatial Data Infrastructures, let alone on creation of enhanced versions of them or who is providing these resources. In broad terms, we do not know whether these resources are being applied wisely. It would seem helpful therefore to carry out some sound accounting of this expenditure: arguments for adding to it or for using it more effectively or efficiently are unconvincing if we do not know the present practice.

(David Rhind, 2000)

Since then

- 2003: INSPIRE extended impact assessment (prior to adoption)
- “SDI Cost-Benefit/Return on Investment Workshop”, 12-13 January 2006, JRC- Ispra, <http://sdi.jrc.it/ws/costbenefit2006/>
- “Exploring Spatial Data Infrastructures”, 19-20 January 2006, Wageningen University, <http://www.grs.wur.nl/UK/Workshops/Exploring+Spatial+Data+Infrastructures/>
- “Multi-view framework to assess National Spatial Data Infrastructures”, Wageningen University 23-25 May 2007. <http://www.grs.wur.nl/UK/Workshops/Multi-view+framework+NSDIs/>
- Economic Value of Geoinformation Workshop, Hanover, 2/6/2009
- Several projects and studies in between, including Space for Geoinformation programme, e-SDInet plus, MOTIIVE, RISE, etc.

Today

Clearly an opportunity today to share experiences and assess where we are

I'll tell you our side of the story, and look forward to listening to yours

INSPIRE Assessment

- Very little published at the time, no guideline on how to do an extended impact assessment
- Made a series of transparent assumptions and tested with expert panel and public hearing, for example:
- Europe has more than 100,000 local authorities
- Assumed that INSPIRE in the first place will be implemented by cities larger than 100k inh. (450) + local-medium level authorities rather than all the very small ones (as an assumption NUTS3 i.e. provinces type = 1200). Hence we measured impacts over 1700 potential units (1 every 250-300k inhabitants)

On data harmonisation

Evolutionary process over 10 year period in cycles of 18 months each delivering early results

Starting with objects of most frequent use first and refining as we go along

INSPIRE about **generic** specs because detailed applications fall under other legislation (e.g. WFD)

Harmonisation = € 750,000 X 6 super themes X 6 data harmonisation projects = **€27 m over a ten year period (i.e. €2.7 m per annum)**

On metadata

At national level most data of relevance held by mapping, cadastral, geology and environmental agencies

Assumed 2-3 people full time for each organization for 1 year to update metadata based on INSPIRE profile= 250-300 people = € 25-30 m

At local level $1700 \times 2\text{FTE} = 340\text{m} + 10\% \text{ p.a}$ over 10 years because need to build capacity to document resources

Coordination costs

Include coordination, portals, and publication processes

European : 30 people = 3m

National: 2-3 small countries up to 10 big ones = 20m

Local: 0.5-1 FTE X 1700 units= 100-170m

Assuming 1 person/year = 100k Initial assessment was in the order of 200m per annum, revised assessment with change of scope (3 annexes) and reduced labour costs reduced overall investment to 100-140 million per annum for EU 25 (as was then)

Summary costs/investment (rounded figures) (€m. p.a.)

Table 4: Summary of investments for the reduced scope of INSPIRE, including the revised basic assumptions

Blocks of INSPIRE policy measures	EU-level	National Organisations	Regional/local
Harmonisation	0,6	1,2	0,5
Metadata	0,2	1,9-2,2	33
Data Policy Framework		0,4	
Coordination and implementation including outreach	1,1	9,6	44-88
Total investment per annum over 10 years (€m) (rounded)	1,9	13	77-122

And the benefits??

Always the most difficult to quantify

Worked on principle that if we can justify the benefits in the environmental sector, all other sectors will add at no extra cost

Some benefits we are reasonably sure of , others have greater degree of assumption

Just one example

Survey of organisations (public and private) undertaking EIA and SEA across Europe 2002

Some 20,000 undertaken every year

Average cost is €75,000 and last 6 months

5% of cost and 8-10% of time is finding the data needed

**IF YOU REMOVE THESE COSTS YOU WOULD SAVE OVER €
100-200 m. p.a.**

Environmental monitoring and assessment

Cost of monitoring the environment in England and Wales is approximately €160m per annum

Most EU countries undertake similar functions although the organisational arrangements are different (centralised federated, decentralised)

The approximate cost across EU(15) is €1bn.

Estimates from of greater efficiency from both well organised metadata, harmonised data, and improved data management can add up to 10% of total cost as an average = € 100m per annum

THESE TWO EXAMPLES AND OTHER POTENTIAL BENEFITS WERE ALSO REDUCED IN THE REVISIONS

Assumed benefits (after revisions)

Table 6: Summary of benefits when reducing the scope of INSPIRE

Type of benefit	Quantitative estimates
More efficient EIA's and SEA's	60-121
More efficient environmental monitoring and assessment	64
More cost-effective expenditure on environmental protection	192
More cost-effective implementation of the environmental acquis	32
More effective implementation of EC projects	3-8
More effective expenditure on Trans European Networks	90
Reduced duplication of spatial data collection	25-160
Improved delivery of risk prevention policies	77-256
Improved delivery of health and environment policies	224
Total (in m€ per annum)	770-1150

- Still benefits assumed to be 6-7 times greater than costs
- So what do we know 5 years on ?

Summary Ispra: Background

- So far very few studies of SDI impacts, mainly ex-ante but no verification afterwards
- Lack of comparability and opaque assumptions
- No understanding of total geo-spatial investment in government, so SDI costs cannot be related to total investment
- Some GIS studies, mainly at organizational level, but complexity increases as we move from GIS to SDI, and from a data centric to a service-centric view
- Workshop organised in Ispra Jan 2006 to gather available evidence and move field forward.

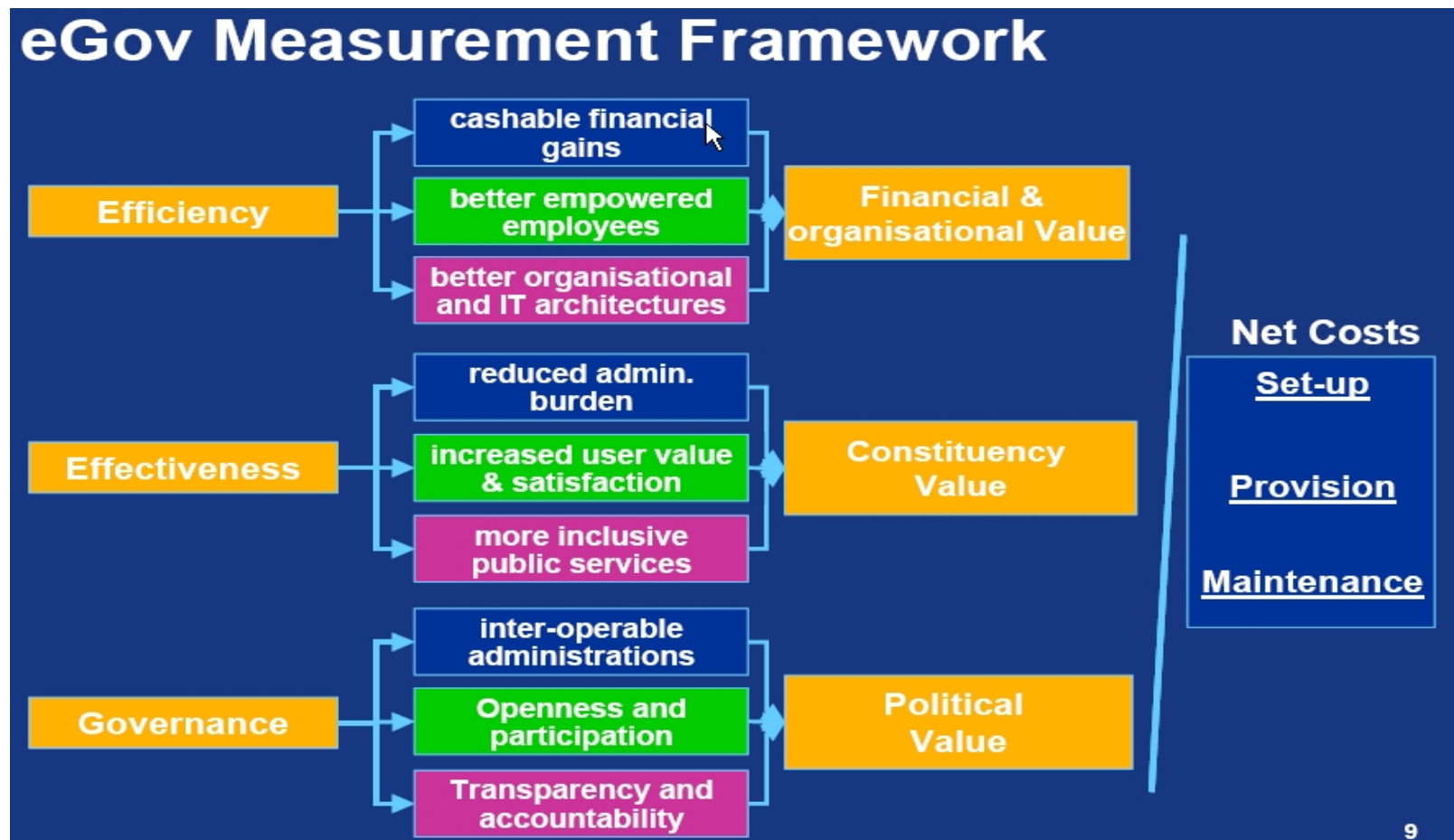
Ispra workshop 2006: Summary of Findings 1

- Review of key relevant experiences in US, Canada, Europe. Most work ex-ante, range of methods but sometime opaque assumptions.
- Recommendations:
- Costs to consider:
 - Costs encompass hardware, software but also personnel, staff time, and organizational costs resulting for internal reorganization, and training,
 - Particularly important to consider not only set up costs but also on –going maintenance and adaptation between older and newer systems.
 - Cost in relation to recurrent investment (Big issue)

Summary of Findings 2

- Benefits:
 - Efficiency benefits (e.g. time saved in searching, retrieving, and integrating data)
 - Effectiveness benefits (e.g. reduced uncertainty due to higher quality or more up-to-date data, more targeted policies, increased applications, more user value),
 - Wider socio-economic benefits (e.g. better governance, greater accountability, reduced risks, increased innovation and new business opportunities)

Similarities with e-gov



Source: eGEP project

Summary of Findings 3

- **Analysis of costs and benefits does not replace policy-making:** Most studies reviewed have positive benefits/cost ratios but all have front loaded investments which maybe politically unpalatable compared to education, health, law and order.

Ways Forward

- Need to develop shared portfolio of studies at different scales (organisational, cross-agency, regional, national)
- Develop clearer and shared definition of components of SDI and their functional relationship Give priority to longitudinal studies of SDIs in progress
- Focus on identification of user communities and specific applications
- Develop understanding and measurement of total geo-spatial investment.
- Cross-link with e-gov measurement studies with specific SDI issues
- Study at regional levels (Catalonia) launched by JRC + comparison with Lombardia Region.

Catalonia Study: Key findings

Costs: €1.5 million over 4 years (2002-06)

- Human resources account for 76% of total cost during launch period (2002-03) and 91% during operational period (2004-05)

Benefits: assessed for 2006 with a focus on local government level

- Efficiency savings account for 500 hours per month = €2.6 m
- Effectiveness savings account for another 480 hours per month
- Wider social benefits are not quantifiable but clear narrowing of digital divide between small local authorities and larger ones
- Benefits to private sector visible but not outstanding yet

Four years of investment recovered in 6 months

Full report published on www.ec-gis.org/inspire.

Lombardia regional SDI: key findings

COSTS ~ 4 m. € for 2006-2008 (including technology set-up and maintenance, training)

MD costs: 4 hours per record (full ISO). 400+ records = 26-28 man months = less than 100k

BENEFITS: focus on external users. Repetition of 2002 European survey on EIA/SEA. 350 EIAs/SEA per annum in Lombardy

Survey of 60 companies: 27 responded, average size dedicated to EIAs/SEAs = 7.6FTE, average turnover 700k per annum

Average cost: 60-90 k each study

Average time: 3 months

Average saving due to SDI: 11% time, and 17% on cost

Benefits ~3 Mio. €/year savings on EIA/SEA only

Lessons learned

Possible to measure impacts, with detailed studies

Methodology appropriate for spatial data infrastructures or e-gov initiatives once operational

It is too early to evaluate the original estimates of the costs of implementing INSPIRE: 100m p.a. For Europe 25 (approx 400m people)

Studies in 2 regions with pop 7-10m indicates they have spent 0.5-1m per annum i.e. 20-40m p.a. for Europe pro rata excluding data collection costs. However the costs will depend also on the arrangements made at national level, and the degree of centralisation/decentralisation, prior development, etc.

Therefore we will be able to make a better assessment after seeing how the MS intend to organise the implementation of INSPIRE in their country

Costs for data harmonisation seem to be in the order of 2-3 man-months per theme but still needs to be verified.

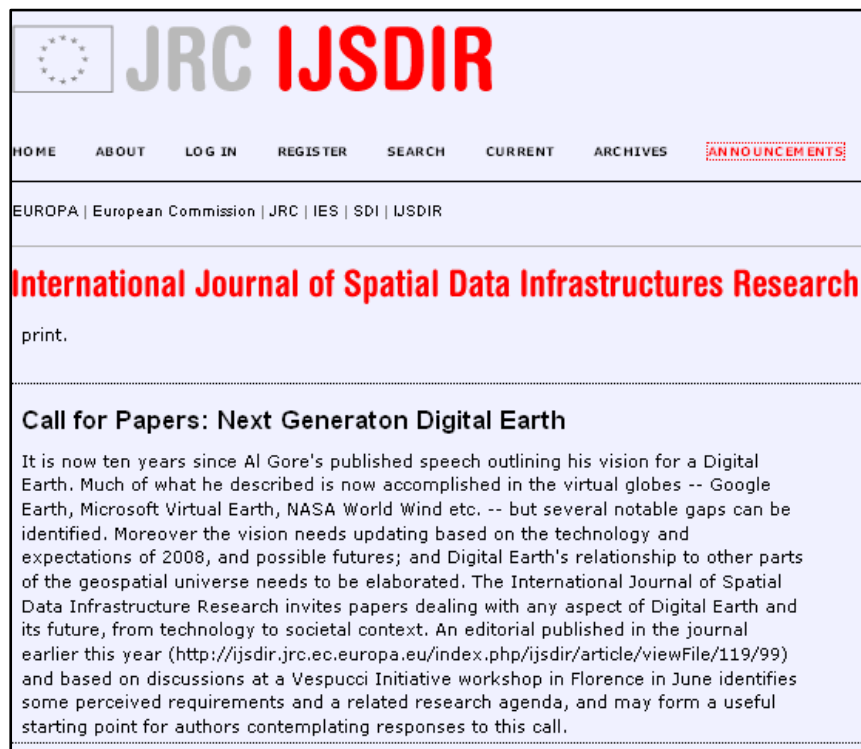
60% of testers reported no significant costs

Evidence of benefits confirmed for EIA/SEA. Figures very similar to those of survey in 2002. Likely alone to repay the investment made in SDIs. Now plan to repeat across Europe in the framework of the SEIS-BASIS study we are doing for DG ENV which aims to get a better understanding of the monitoring programmes in the MS (similar to the ERFF work in the UK), evaluate gaps and barriers, and propose policy options.

Conclusions

- Still work to be done but we start having some real evidence
- We need to keep at it, gather as much evidence as we can, and share it by publishing the results!

<http://ijsdir.jrc.ec.europa.eu/>



The screenshot shows the homepage of the International Journal of Spatial Data Infrastructures Research (IJSDIR). The header features the JRC logo and the text "JRC IJSDIR". Below the header is a navigation menu with links for HOME, ABOUT, LOG IN, REGISTER, SEARCH, CURRENT, ARCHIVES, and ANNOUNCEMENTS. The main content area includes the text "EUROPA | European Commission | JRC | IES | SDI | IJSDIR", the journal title "International Journal of Spatial Data Infrastructures Research", and a "Call for Papers: Next Generation Digital Earth" section. The call for papers text discusses the progress of Digital Earth since Al Gore's 2001 speech and invites authors to submit papers on various aspects of Digital Earth and its future.