Some priorities for SDI related research

Ian Masser

Context

- *My forthcoming book - GIS worlds: creating spatial data infrastructures -* examines the development of the field as a whole
- This presentation considers some of the issues that emerge from this analysis for SDI related research

Main findings

- The emergence of an SDI phenomenon over the last 10 to 15 years
  - As many as 120 countries involved in some SDI related activities
- Marked shifts in emphasis in SDI development during that time
  - From first to second generation SDIs
  - Emergence of a hierarchy of SDIs

Some emerging trends

- Shift from product to process model
  - From data producers to data users
  - From database creation to data sharing
  - From centralised to decentralised structures
- Shift from formulation to implementation
  - From coordination to governance
  - From single to multi level participation
  - From existing to new organisational structures

Towards a hierarchy of SDIs

- Global and regional SDIs
  - Global and regional forums for collaboration and the exchange of ideas and experiences
- National SDIs
  - Strategic initiatives concerned with the management of national information assets
- Local SDIs
  - Municipal and provincial initiatives concerned with the operational needs of day to day decision making
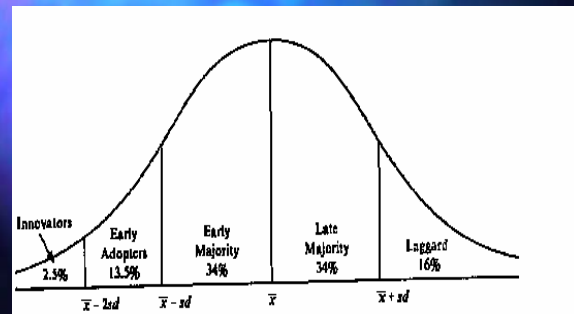
Four main research themes

- Diffusion over time and space
- Evolution over time
- Implementation in a multi stakeholder environment
- Hierarchical relationships within this environment

- Note – all these themes are the subject of theoretical and applied research in the natural and social sciences

The diffusion of SDIs

- Rogers's diffusion of innovations model provides a useful analytical framework for SDI diffusion research
- Diffusion as
  - ' the process by which 1) an innovation 2) is communicated through channels 3) over time 4) among the members of a social system'

Categories of adopters

Innovators 2.5% | Early Adopters 13.5% | Early Majority 34% | Late Majority 34% | Laggard 16%

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Research questions arising in connection with SDI diffusion

- Need for factual evidence of SDI diffusion
  - Claims must be rigorously assessed
    - Leuven study – only a handful of European countries have full blown SDI initiatives
- Most obvious success establishment of clearinghouses and portals
  - But these need to be maintained and updated over time to be useful

Other diffusion research issues

- Diffusion model criticised for pro-innovation bias
  - SDI claims need to be systematically examined in future research
- More attention also needs to be given to possible negative impacts of SDIs
  - The Big Brother effect
- More attention also needs to be given to the extent to which cultural factors influence SDI adoption

The evolution of SDIs

- The creation and management of SDIs will take a long time
- Necessary for SDIs to reinvent themselves to take account of changing circumstances
- Two levels of reinvention
  - Initial adaptation of the form of SDI development to the local/national context
  - Subsequent adaptation to changing political institutional and technological circumstances

SDI evolution – the UK case

- 1987 Chorley report recommendations not accepted by Government
- 1995 National Geospatial Data Framework set up
- 2001 Association of Geographic Information takes over residual functions from NGDF
- Regional GI strategies come into being in Northern Ireland, Scotland and Wales

The evolution of the UK SDI

NGDF	Wales	Northern Ireland	Scotland	England
Product	Process	Process	Process	Process
Ordnance Survey	AGI Cymru	DCAL NI	AGI Scotland	IGGI/AGI/ I&DeA
Passive	Facilitator	Facilitator	Passive/ Facilitator	Passive
Advisory Council	GI Strategy preparation	Important participant	Pressure group	GI Strategy preparation

Evolution research needs

- Longitudinal studies to monitor the evolution of specific SDIs
- Requires establishment of data archives documenting developments over time
  - Major problem because of over reliance on websites and lack of interest in preserving 'out of date' materials

The implementation of SDIs

- Multi stakeholder participation presents major challenge to SDI implementation
- At least 80,000 separate agencies in the US have an interest in SDI matters
- Limits to consensus building model
  - Lack of powers to impose sanctions on unwilling participants
- Need to explore new types of governance structures for participatory multi level SDI implementation
- And new forms on institutional structure

Restructuring

Within government structures	Creation and maintenance of an integrated land information database	Land Victoria
External to government structures	Delivery of wide range of eGovernment services	Service New Brunswick

Joint ventures

Consortium of data producers	Integration of datasets held by state and commonwealth agencies	Public Services Mapping Agencies Consortium
Joint venture by key data users	Maintenance and dissemination of core data sets	Spatial Data Warehouse
Joint venture by wide range of data producers and users	Creation and sharing of core data sets	MetroGIS

Data sharing research

- Data sharing on an unprecedented scale required to exploit SDI benefits
  - Need to examine its impacts on the organisational cultures involved
- Some examples
  - Uta Wehn's study of data sharing in South Africa utilises theory of planned behaviour from social psychology
  - Francis Harvey uses actor network theory

The hierarchy of SDIs

- Two important research areas

  - The nature of hierarchies and the relationships between different levels
  - The extent to which hierarchical structures promote capacity building at all levels

The nature of hierarchies

- Properties of hierarchies include
  - The part - whole property - describes the degree to which higher level entities can be subdivided into lower level parts,
  - The Janus effect - the relationships that an element has with the levels above and below it, and
    The near decomposability property - describes the nesting of systems within larger systems and the extent to which the interactions between the different systems decrease in strength with the distance between them.

The nature of capacity building?

- Confusion about the nature of capacity building
- Much more than training and awareness raising
- Potentially includes
  - Human resource development
  - Organisational change
  - Societal transformation

Capacity building for SDI development

- Capacity building within the hierarchy of SDIs. This includes
  - Managing change
  - Resolving conflicts
  - Enhancing coordination
  - Promoting data sharing
- All these topics are important issues for research (see data sharing above)

Conclusions

- Presentation has considered some of the issues that emerge from this analysis in my forthcoming book for SDI related research
- Focussed attention on four main research themes
  - Diffusion over time and space
  - Evolution over time
  - Implementation in a multi stakeholder environment
  - Hierarchical relationships and capacity building needs within this environment