INTEGRATING NATURAL AND BUILT ENVIRONMENTS

SDI as Holistic Framework

Monitoring and controlling the environment requires its natural and built components to be integrated within an inclusive model. Integration of multi-sourced spatial data plays an important role here. However, fragmentation among the institutions involved results in inconsistency in data co-ordination and makes integration costly and time-consuming. The remedy is to address all the issues, institutional, legal, social and policy, within a holistic framework. The authors argue that a Spatial Data Infrastructure (SDI) can provide this.<P>

Human life affects nature through land consumption, habitat disruption and replacement of natural cover with impervious surfaces. On the other hand, nature affects social, economic, political and institutional aspects of human life. Natural hazards, water and air quality, climate change and depletion of natural resources are examples of change which heavily impact people, cities, institutions, economy, culture and built environment policy. Policy-makers, aware that their decisions on the built environment impact the natural one, are trying to incorporate natural environment protection considerations. Environmental protection, together with economic growth and social cohesion, are the major objectives of sustainable development, the highest priority for most developed and developing nations.

Environments
The built environment continually changes and develops. To balance the mutual interaction between built and natural environments the latter needs to be protected from human activity and this requires monitoring and control of the mutual interaction. Spatial services may aid management of this interaction in urban planning, resource management and emergency-mitigation services. Spatial services rely heavily on multi-sourced spatial data. For example, emergency-management services imply situations involving an amalgamation of built and natural components including transport networks, structures and vegetation. The management of these components is carried out by different organisations each of which has its own priorities and needs. The resulting fragmentation leads to heterogeneity and inconsistency of approach and strategy in data co-ordination. Resolution requires an enabling platform, for which Spatial Data Infrastructures (SDI) are being developed.

SDI Platform
A SDI provides a platform offering spatial-data stakeholders interaction with spatial data through, among other things, networks, standards and policies (Figure 3). This framework can then be used to develop institutional arrangements, legal and policy tools and social capacities to facilitate integration of spatial data and its maximal potential use. For this a channel is needed involving data providers, Value Added Resellers (VARs) and users, helping them interact with technical, policy and standardisation tools to properly co-ordinate and use data. SDIs offer a time and cost-saving way of integrating multi-sourced data; however, this aim has not yet been achieved. More research is required into effective data integration within the context of SDI design; the results may assist development of technical tools, policies, institutional and management tools. When well established, data integration facilitates sustainability.

Case-studies
Technical integration has received most attention as the most straightforward perception of spatial data integration; however, many non-technical issues are also important. To investigate (non-)technical issues and develop a framework for integration case-studies were designed and conducted in the Asia-Pacific region, including Australia, New Zealand, Malaysia, Indonesia, Japan and Thailand. Support came from the UN-sponsored Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP). Regardless of national particularities such as integration of marine and land information in Indonesia, general findings and observations identified many (non-)technical issues. The technical issues requiring further consideration include computational and semantic heterogeneity, reference system and scale inconsistency, poor metadata, data quality inconsistency, format, data models, and attribution. Collaboration between stakeholders, together with funding models and data management approaches, are key issues in the institutional arrangements. On the policy side, national priorities, pricing and legislation have been found to be major drivers. In the social category, cultural differences, capacity building and spatial-date stakeholder social background are paramount. From a legal perspective the prominent issues are rights, restrictions and responsibilities, and copyright and licensing.

Concluding Remarks
If not co-ordinated within a holistic framework, diversity of approach causes huge problems that entail much time, effort and cost. A holistic integration framework would address the issues and inconsistencies associated with integrating multi-sourced data. This being said, SDI as an enabling platform can facilitate interaction between spatial-data stakeholders with data to share, helping them to access and integrate spatial datasets. SDIs also provide technical components, including access networks, standards and policies, into which data integration can be built.

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Further Reading

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