ESSENTIAL ROLE FOR GI AT ALL LEVELS

Good Governance, Good Geo-info

Where just two decades ago spatial data was mainly carried on paper maps, map and three-dimensional topographic data is now accessible via Google Earth. Where accurate positioning was once the professional pride of highly trained geodesists, we now see such services provided by GPS-based consumer products. This revolution in technological developments and demand for information implies the need for continuous upgrading of professionals: â€˜lifelong learningâ€™.

Lifelong learning is relevant not only for the professionals concerned but also for their organisations. These are in a permanent state of flux in order to adjust to their continually changing envir-onment. This may flow from the changing role of government, globalisation of the economy and provision of services, the global scale of processes that have to be dealt with, or ever accelerating technological developments. All affect the geo-information community as much as any other sector of society.

GI for Society
Spatio-temporal information is produced and used by organisations and institutions involved in the management of environment and resources. These monitor and manage natural or human-induced processes with geo-spatial aspects relating to urban development, sustainable land use, biodiversity, water-resource management, disasters, land management, land tenure etc. Government, but also civil society at large, is involved in monitoring, analysing, understanding and managing these processes. Earth observation and geo-information represent essentially relevant data for professionals, decision and policy-makers in this context. The buzzword â€˜sustainabilityâ€™ and â€˜securityâ€™ play a dominant role on international agendas. The connection between earth observation, geo-information, sustainability and security is also manifest in the European programme for Global Monitoring for Environment and Security. This is the European contribution to the development of the Global Earth Observation System of Systems (GEOSS), for which a ten-year implementation plan has been accepted.

International Agendas
Geo-information and earth observation will be of great importance for monitoring progress made with respect to these international agendas. An important prerequisite is thus the specification of indicators. Such specifications require profound knowledge of the technology for Earth-observation and geo-information processing, as well as those processes affecting issues like poverty reduction, biodiversity, land-use development etc. Information can be extracted from data only if this is done within the context of conceptual models with a profound theoretical basis. This means specialised mapping experts have to work in close interaction with professionals and scientists from other relevant disciplines.

We should be aware that good governance requires good information and, because almost all of human activity leaves a spatial footprint, this to a large extent implies geo-spatial information. It is evident that the provision of earth-observation and geo-information are essential for the monitoring of processes and that this should be done at different levels of aggregation. Furthermore, the management of such processes requires power of decision-making at various administrative and political levels ranging from local to global.

Real-world Dynamics
SDI development implies the GI-sector will have to deal with the fact observed by Friedman: that we live in a world where services and service supply chains are provided within a â€˜globalisingâ€™ setting. National geo-information industries will have to accept this fact and redefine their roles and mandates within this changing context. Information components of Geo-Data Infrastructures (GDIs) are still largely based on the paradigm of the traditional map. The old concept of maps evolved into digital maps, and from there into seamless databases, and we now see the emergence of scale-less databases. Current delivery mechanisms support the development of location-based services and mobile GIS. Developments are presently moving towards object-structured approaches allowing other spatial representations that go beyond the old map
paradigm.

The evolution of spatial database dimensionality from 2D to 2.5D and to 3D will allow new types of representation of spatial complexes where we can travel through space and through objects. Based on the integration of images within these 3D-database models, VR and augmented reality representations have been developed in the form of, for example, city models, street models and buildings. New media allow us also to handle the temporal aspect. There are still many problems to be solved with respect to spatio-temporal representations, but we can trust that in due course the solutions will become available. Scientific interest is shifting from the devel-opment of more advanced re-
presentational models to information content, understanding the dynamism of real-world processes.

Topics for Discussion

When talking about governance we should keep in mind that this implies decision making at different levels, i.e. local, regional, national, supra-national, and even global. This is because the dynamics of our living environment are generally the result of interacting geo-spatial processes at different levels of spatio-temporal aggregation:

- floods in the Lower Rhine basin are mainly due to changing land use in the upper Rhine basin, one effect of land-development policies of recent decades
- reduction in agricultural subsidies in the north should provide chances for southern producers to participate in the global market, but awareness is needed of possible growing pressure on marginal production systems which might have effects contrary to ambitions regarding sustainability
- development of urban land use should be understood in the context of urbanisation processes due to changing national or continental economic conditions which cause depopulation of rural areas; urban change also results from intercontinental migration due to uneven global distribution of wealth and economic opportunities
- mineral deposits occur in regional or continental geological formations the origin of which can often be understood properly only within the context of processes that formed the present continents.

These examples demonstrate the complexity of some problem areas within which geo-information should play a role in monitoring, understanding and management. The same examples confirm the observation that within the context of governance, several important aspects of policy implementation can be identified. Bressers and Kuks mention the multi-level and multi-actor aspects of policy implementation, and the multifaceted character of problems and objectives.

Impact on GI Science

The provision of geo-information requires knowledge of technology, sensor systems, information technology and data acquisition, information extraction and management. But understanding of the spatial processes is equally important in specifying the information needs for their monitoring and management. Further, understanding is required of the different aspects of governance. These problems imply some areas for the further development of geo-information science:

- spatio-temporal issues: modern technology can handle dynamic presentations but conceptual developments in geodata handling have to date dealt mainly with thematic and spatial aspects only. Concepts for modelling time-related issues require more attention before we can model and represent the dynamics of our environment. We also need to distinguish between different types of dynamics, such as analysis of the history of processes, simu-
  lation of future process development, projection of scenarios within the context of planning land use or urban development
- multi-scale issues: dealing with interacting processes at different levels of aggregation implies that methods should be further developed to manage data at multi-scale levels. Semantic definitions at all levels should be mutually consistent and harmonised. Levels should be linked to different levels of policy implementation, as might be identified within the context of relevant governance. Information transfer between levels should be possible and rules of consistency developed
- multi-theme data integration: monitoring and management of such complex processes requires interdisciplinary co-operation. Experts from different disciplines have to combine expertise and information, implying multi-theme data integration. Different actors within relevant areas of governance, representing multifa-ceted aspects and multi-objectives in dealing with these processes, should be able to interact and share their knowledge and views
- cross-jurisdictional problems: managing our living environment and geo-processes requires action at supranational level. This means cross-jurisdictional solutions have to be found for disparate institutional arrangements with respect to mandates and decision-taking power, but also to disparity between available information and information concepts and services
- third dimension: most representations today are still two-dimensional whilst our living environment is three-dimensional, so that we need three-dimensional representations.

The integration of different strands of geo-information requires a common reference. This might be through geodetic reference systems, but more often use is made of topographic core data. New concepts for (large-scale) topographic core-data provision must be developed, along with new delivery mechanisms. These should be based on the opportunities provided by new sensors for 3D-data acquisition, in combination with concepts developed for spatio-temporal object-structured representations in scale-less and seamless databases and virtual reality technology.

Institutional Aspects

Opportunities offered by modern technology, new concepts of the role of government, and the evolving new (global) economy will have a fundamental impact on the development of (national) geo-data infrastructures. Within the information society a new business and Geo-ICT environment is emerging which forces GI-providers to develop new business strategies. They have to adjust their Geo-ICT strategies and develop new Geo-ICT architectures, and to adjust their organisational structure. It requires the permanent capacity development of entire organisations. According to Georgiadou and Groot, the goal of education is to prepare professionals for the tasks ahead, while the goal of capacity development is to simultaneously shake up the organisation that employ them. The aim is to strengthen organisations so that they can assume responsibility for designing, managing and sustaining development. For this, not only are thematic professionals required, but also staff that can formulate, design, manage and negotiate with other organisations and central government in order to address organisational and institutional issues in support of the acceptance of technological solutions.

Concluding Remarks

Governments certainly have a regulatory role with respect to information provision, but should they also be providers, or even producers? Perhaps they should only facilitate the development of infrastructure through which geo-information is provided? But governments do not have only a regulatory role; they also have a direct interest in the use of information. Governments have an important part to play here in relation to international agendas and treaties for the sustainable development of our planet. Geo-information is a prerequisite for good governance, at all levels of aggregation.

Further Reading

- Bressers, H. Th. A. and S. M. M. Kuks, 2003, What does governance mean? From conception to elab-oration. In: Achieving Sustainable development: The Challenge of Governance Across Social Scales, H. Th. A. Bressers and W. A. Rosenbaum (Eds), Praeger Publishers, Westport Connecticut, pp 43-64.
- Friedman, Th., 2006, The World is Flat, Penguin Books Ltd, London, UK, page 593.
- Georgiadou, Y. and. R. Groot, 2002, Beyond Education: Capacity Building in Geo-informatics, GIM International, vol. 16, nr. 2, pp 40.
- Henderson, J.C., J. B. Thomas and N. Venkatraman, 1992, Making Sense of IT: Strategic Alignment and Organisational Context. MIT, Cambridge, Massachusetts.
- Molenaar, M. P., 2006, address given at 125th anniversary celebration, Department of Geodesy and Geoinformatics, Hanover University, Germany.

https://www.gim-international.com/content/article/good-governance-good-geo-info