



CARTOGRAPHY AT THE ENTERPRISE LEVEL: Sustainable Development in the Future

**Notes from a Public Panel Discussion at
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The public panel discussion of InterCarto-InterGIS 12, Berlin 2006 aimed at raising strategic issues with respect to the interdisciplinary scope of the conference. Here, a collection of the main discussion results as well as a set of recommendations are compiled. In addition to personal information of individual scientists these results also can be useful in innovation-related project definitions, for consideration in research framework programs, and in emphasizing new directions in the curricula for environmental sciences education on local, regional, national and international level.

Sustainable Development: Sustainable development or sustainability is a term that is constantly evolving in definition and application. It reflects the dynamic character of natural and human systems. Current literature seeks to define sustainable development as a paradigm that has distinct meaning but is flexible enough to apply to the broad base of sectors that it encompasses

[<http://www.iisd.org/sd/principle.asp?pid=42&display=1>]

Now, the ideology of sustainable development is becoming a universal social imperative with practically no alternative in modern society.

In this context *Development* is understood to mean a logical process of change in society which is examined inseparably from nature. Let us define *sustainability* as the

ability of a system (either natural or social) to keep its basic qualitative parameters during the process of development. According to G. H. Brundtland, the concept of *sustainable development* (SD) is, first and foremost, a compromise between the interests of the present and future generations. In reality this compromise can be achieved due to progressive (ascending) changes. The report "Our Common Future" produced by the World Commission on Environment and Development affirms: «Sustainable development is possible for the mankind - one that meets the needs of the present without compromising the ability of future generations to meet their own needs» [Our Common Future, 1989]. Thus, it is necessary to regard SD as an invariant process of reproducing the state of the social environment whereby the natural dynamics of social systems do not affect their structural and qualitative features.

However, in view of the issues discussed at INTERCARTO 12 in Berlin, this definition can be expanded as follows:

"Sustainable Development is the fundamental process by which society advances into the future, meeting the needs of the present without compromising the ability of future generations to meet their own needs. In practice sustainable development is understood, valued and communicated through science, public interaction and freedom"

Sustainable Development requires accurate education, research and knowledge transfer. Cartographic professionals and the geospatial industry are uniquely able to contribute toward these goals, since land, water, air and people are all located somewhere.

The common denominator of location transcends boundaries and borders, disciplines and individual culture and ideology, providing a context from which holistic and diverse communication, resources and finances can be converged and agreement achieved.

To meet these challenges several realities must be recognized and addressed:

Language: Multi-lingual products and services are becoming more important and should be supported. They allow greater cross-cultural awareness to occur, increase levels of participation and are likely to ensure longer-term support. Cartographic information related to sustainable development should strive to provide more multi-lingual options.

Cartography / Sustainable Development: Cartography is not solely about producing a map, but instead, is a form of communication. It is noteworthy that many individuals within the geospatial industry internationally are now beginning to understand and view cartography as a fundamental part of the business process – at the enterprise level. That is, cartography is viewed at the same level as human relations (HR), customer relations and management (CRM) and accounting systems. It is an integral component of 'doing business' – therefore fundamental to sustainable development.

Standardization: To meet the challenges of communicating information and knowledge, standardization is required on numerous levels, from context to metadata and from syntax to cartographic symbology. Hardware systems and data transfer protocols (i.e. GML, XML, ISO) are also necessary for achieving higher levels of conformity and understanding. Sustainable Development should necessarily consider, participate in and utilize geospatial standards. High levels of standardization are available in both proprietary and open source products and services. Sustainable development should consider 'best of breed' applications and resources that include standardized interfaces, supporting those with high levels of openness.

Communication: Communication may take several modes and types. A large number of people still utilize hard copy mapping products, which provide their only source of spatial information. While nearly 70% of households have a computer, the distribution is uneven and broadband services are not available throughout Europe and Asia. Products and services should consider all forms of communication including computer distribution, hardcopy products, DVD and radio. It would be worthwhile to consider more conferences regionally which educate and inform smaller communities about the value of sustainable development.

Critical Problem of Resources: Resources are not always available within the 'sustainable development' community to advance the goals and objectives outlined by the cartographic community nor the 'environmental' community. Since Sustainable Development involves economic considerations in the process, it should be recognized that private industry can contribute and would likely be willing to play a larger role. The agricultural and forestry communities, along with the wider geospatial community control and manage large amounts of both financial and land capital. Insofar as practical, sustainable development initiatives and the cartographic community should consider to involve corporate and private industry more closely, at the decision making level.

Usability: The usability of spatial information as data, products and services is highly related to cost, legal copyright and the ability to re-create information through analysis and development of new products. These factors must be considered so that people using products can achieve a sense of 'entrepreneurial spirit' in both participation and activity. A key factor that dictates high level of use is related to accuracy of the spatial data and information products. High quality products tend to be re-used. The current trend internationally is toward higher accuracy technologies. In all cases, the cartographic community must seek to maintain, and advance, the use and application of higher accuracy technologies.

Level of Users: The use of cartographic products and spatial information can be viewed on a '*continuum*' which ranges from those with little knowledge and interest through to professionals and executives. Use of cartographic products should not be viewed as a dichotomy, instead, level of use should recognize that current cartographic product research and availability is becoming increasingly object oriented, and users are becoming 'creators' of cartographic products – as a form of communication. High-level executives will continue to use varied types of documents for decision making, but sustainable development plans will occur within the real of many individuals communicating needs, ideas and strategies, using cartographic technologies as communicative elements.

Research / Social / Behavioral: Research in the domain of cartography should continue for both applied and basic research. As a domain, cartography is under change and adaptation as the internet and new publishing methodologies are being developed internationally. While sustainable development plans will require well-known cartographic services, the broader goal of understanding the role of cartography within the context of new programming, communication and behavior-oriented social strategies is not wholly known. Thus basic research remains a high goal for the discipline and that research should consider to venture more fully into the 'sustainable development' domain – including social and economic scientists as well as communication professionals.

European Commission: Over the years, a wealth of research has been conducted in the fields of ICT and Environment, in which the evolution of geospatial data had played a vital role in advancing the understanding of environmental processes, predicting environmental impacts and supporting environmental decision making and management. The European Commission is well positioned to interface other European agencies such as Eurostats, European Space Agency, Agriculture and forestry communities and to initiate and support cross border data use, harmonization and education goals related to cartography. During the course of FP6, the IST programme gave priority to promoting research related to ICT for disaster risk reduction and emergency management, where particular advances are being made in designing and developing open service oriented information architectures, and sensor networking for improved environmental monitoring. In FP7 the area of application will be widened to include general environmental risk management, the management of natural resources, and improved energy efficiency, in order to more effectively address *sustainable growth*.

Financial Resources: In principle, sustainable development, if properly developed and implemented should be self-sufficient financially. Strategies need to be developed which include sufficient financial support to sustain the very systems and structures that are being implemented. This is a key reason why cartographic and spatial information needs to be addressed at the enterprise level and implemented through alignment with the decision making process. It is not an add-on or after thought, spatial data and information is a strategic resource upon which decision making occurs.

Recommendations

Education is an essential tool for achieving sustainability. People around the world recognize that current economic development trends are not sustainable and that public awareness, education, and training are keys to moving society toward sustainability.

Improving the education for every citizen: Education directly affects sustainability plans in the following three areas:

Implementation: An educated citizenry is vital to implementing informed and sustainable development. In fact, a national sustainability plan can be enhanced or limited by the level of education attained by the nation's citizens. Nations with high illiteracy rates and unskilled workforces have fewer development options. For the most part, these nations are forced to buy energy and manufactured goods on the international market with hard currency. To acquire hard currency, these countries need international trade; usually this leads to exploitation of natural resources or conversion of lands from self-sufficient family-based farming to cash-crop agriculture.

Decision making: Good community-based decisions - which will affect social, economic, and environmental well-being - also depend on educated citizens. Development options, especially "greener" development options, expand as education increases. With a growing map awareness, maps are increasingly used as decision support tools in different spheres of human endeavor. Notable examples are map use

in car navigation systems for way-finding decisions and poverty mapping for poverty alleviation targeting purposes upon which the lives of millions of people depend. To better contribute to sustainable development, it is important to know where and how cartographic products are to be used. This will be pivotal in significantly contributing to sustainable development and further integrating the many disciplines involved in sustainable development as maps are increasingly used. Outside the spatial science disciplines, maps have proved very useful in generating hypotheses in understanding the problem at hand and in the presentation of research findings. The cartographic community must seek to engage other scientists, notably the social scientists in the use and application of spatial technologies. Cross-boundary applied research into map use, particularly in the area of map usage in the actor-specific information process chains for decision making is highly recommended.

Quality of life: Education is also central to improving quality of life. Education raises the economic status of families; it improves life conditions, lowers infant mortality, and improves the educational attainment of the next generation, thereby raising the next generation's chances for economic and social well-being. Improved education holds both individual and national implications.

Financial support and correlated activities: The European Commission supports the funding of international applied research projects through its Framework Programmes for Research and Technological Development. But in order to assure a better communication between different actors and actions in Sustainable development it is necessary to obtain a local support.

Other international bodies support also the projects having as target the SD: ICA, UN etc.

The problem is how to harmonize such kind of activities in order to respect the principles of Sustainable development at different levels. Sustainable development will focus on improving the quality of life for all of the Earth's citizens without increasing the use of natural resources beyond the capacity of the environment to supply them indefinitely. It requires an understanding that inaction has consequences and that we must find innovative ways to change institutional structures and influence individual behaviour. It is about taking action, **changing policy and practice at all levels, from the individual to the international.**
