

**Committee of Experts on
Global Geospatial Information Management**

Background document
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Item 4 of the provisional agenda

**Contribution of the Committee to Rio+20 –
United Nations Conference on Sustainable
Development – and implications of the outcomes of Rio+20**

**Monitoring Sustainable Development: Contribution of Geospatial Information
to the Rio+20 Processes**

Background Document Prepared by the Secretariat

The secretariat acknowledges with thanks the substantive contributions of our consultants:
Professor Fraser Taylor and Dr Carl Reed

**Background Document
Contribution of Geospatial Information to Rio+20 Processes
Executive Summary**

This paper provides background on the advancement of geospatial policies, practices, and technologies since Rio+10. This paper is provided in preparation for the Rio+20 UN Conference on Sustainable Development and suggests a central role for the United Nations Committee of Experts on Global Geospatial Information Management in the deliberations of that conference and in the implementation of subsequent actions determined at the conference.

As the world population continues to grow, the pressure on the earth to sustain and provide for this growth increases even more rapidly. Available resources – both non-renewable and renewable – are under increasing stress. **As never before, global environmental issues such as deforestation, desertification, climate change, and soil loss require not just local responses but global coordination and collaboration to address and ameliorate the environmental degradation that is impacting our ability to ensure sustainable development for all nations and communities.** At the same time, with more individuals and communities affected, the impacts of natural disasters are unprecedented. The ability of the global community to respond to and provide aid after a disaster is being stressed as never before. This problem is exacerbated given the unequal infrastructure of the global economy.

All of the issues impacting sustainable development can be analyzed, mapped, discussed and/or modeled within a geographic context. Whether collecting and analyzing satellite images or developing geopolitical policy, geography can provide the integrative framework necessary for global collaboration and consensus decision making. Ten years ago, the vast majority of spatial data infrastructure activity was focused on providing digital maps via web portal applications which were usually focused on national needs. The data provided was

typically maintained by one or two national agencies. There was no ability to easily integrate other spatial data sources. Regional or international collaboration was discussed but not implemented. **Neither the policies nor the standards were in place to provide for global spatial data infrastructures designed for local, national, regional, or international collaboration.** From a technical perspective, ten years ago many key technologies such as social networking, cloud computing, and smart phones did not exist. Cellular technology was just beginning to permeate the developing world.

In the last ten years, this situation has dramatically changed. There are now numerous regional and international activities that demonstrate the architectures and policy frameworks necessary to design, build, and deploy geospatially enabled IT infrastructures that meet the requirements for collaboration for decision support, policy discussions, and modeling required by the sustainable development community and policy makers. Examples include national spatial data infrastructure activities such as the Canada Geospatial Data Infrastructure¹, the Spain NSDI², and the Malaysian SDI³. At the regional level, the European INSPIRE initiative has defined the policy, governance, and technical guidance for a pan-European standards based spatial data infrastructure. At the global level, OneGeology, Global Map and GEOSS are examples of how SDI concepts can successfully be deployed as a global asset. There is now discussion of a Global Network of Networks. Each of the examples above has the following characteristics:

- Commitment at executive levels;
- Strong governance – but governance that does not hinder the use of new technologies or consideration of new ideas and approaches;
- Generally accepted content models;
- Strong commitment to best use of standards, including best practice guidance;**
- Ability to easily integrate new sources of geospatial data and services into the infrastructure;
- Policy support;

Perhaps most importantly, there is a strong belief that geography provides the integrative framework necessary to support the requirements of multiple information communities in a timely and effective manner – providing the right data at the right time to the right place. **The same geospatial content, re-purposed, can support applications ranging from agricultural management, to emergency planning and response, to scientific collaboration on climate change, to transportation planning. All of these applications have implications for sustainable development and livability.**

Within this context, this paper makes several recommendations. The UN Committee of Experts on Global Geospatial Information Management is in a unique position to implement these recommendations and to provide guidance on how geospatial information can be effectively used to help deliver sustainable development.

The recommendations include:

- Continued consideration and development of geography as an integrative framework for sustainable development applications, decision support, and policy development.
- Identification of new and emerging technologies and how these technologies can enhance our ability to better respond to sustainable development issues.
- Consideration of legal and ethical issues such as privacy, security, intellectual property and liability (www.spatiallaw.com)
- Engagement with the scientific and research community in the development of sustainability science (ICSU, 2010)
- Provide guidance and a discussion framework for how the numerous regional and global remote sensing portals and dissemination networks can be integrated to create a network of networks. Providing guidance on geospatial standards best practice

□ Facilitating cooperation among the major players involved with geospatial information at the global level (pp. 2-3)

...1.5 The Central Purpose of the Paper

The central purpose of this paper is to demonstrate that both the technology and the institutional frameworks have reached a level of maturity where location-based policies and the effective use of geospatial information can be powerful drivers for sustainable development. The paper will describe a range of these developments. It is argued that the United Nations Committee of Experts of Global Geospatial Information Management can make a significant contribution to Rio+20. As Prime Minister Kim Hwang-Sik of the Republic of Korea has recently argued “Geospatial information is the most fundamental tool to support the planet’s joint efforts in resolving global issues. By interconnecting information on natural disasters, poverty and the environment through location data, global issues such as sustainable development and poverty eradication can be effectively managed” (http://ggim.un.org/seminar_24Oct2011.html). **The contribution of the Expert Group will be both technical and institutional with the latter being of special importance. There are a number of global initiatives in the geospatial management field (e.g. GEOSS, Global Map, EyeOnEarth, OneGeology); the Expert Group provides an institutional mechanism which could help to link these into a distributed “system of systems” as suggested by Max Craglia et. al. (2012) and facilitate the use of geographic information to deliver effective sustainable development.**

(p. 5)

...3. Technological Trends Impacting Geospatial Technology and Sustainability

Over the last decade, information and computing technology have undergone significant changes. Ten years ago, there were no social media applications, no concept of cloud computing, very few deployed geospatial standards, GPS smart phones were just appearing. These dramatic technology advancements and shifts have significant implications for the procurement, deployment and use of geospatial technology. Further, they have even more significant implications for providing sustainable information infrastructures AND enhancing our ability to have positive impacts on sustainable development and economies.

(p. 11)

...3.17 Standards and data sharing, common services interfaces, and access

In the DOWN TO EARTH report there is the statement, “Data sharing, facilitated by all users adopting the same software, data formats, and file directory structure, and a metadata database has resulted in cost savings”. Using modern web service technology coupled with standards obviates the requirement to standardize on single hardware and software platforms. Standards when properly implemented enable plug and play, protection of legacy systems and data, lower risk, lower life cycle maintenance costs, and more. In the various reports, there is a consistent message of interoperability and a requirement for data sharing. However, the value of standards in achieving those visions is never stated. **We need to explore how the effective use of OGC and ISO standards can enhance the deployment and accessibility of geospatial resources into the UN community and Member nations. Further, there needs to be discussion and policy statements formulated that guide the use and procurement of standards based geospatial technology products by UN organizations.**

3.18 Content Models (data sharing, interoperability)

Content models can fulfill many of the requirements for data sharing in standards based technologies. Content models represent community agreements on the vocabulary, semantics, and elements, and their relationships for a given geospatial theme, such as land cover. There are many examples of content models, such as the new ISO Land Cover model, GeoSciML (geology), WaterML (hydrology), and the 34 theme content models being

developed for INSPIRE. These content models provide the ability to share information between and among many communities. This is because a common semantic understanding has been agreed upon.

If there is an accepted content model, then from a technical viewpoint there is the ability to map content from multiple geospatial repositories into the common model. These transformations can happen “on the fly”. As such, there is no need for all stakeholders to use the same database model or the same software.
(p. 32)

...3.22 Standards – again

Standards have been mentioned in numerous points in this position paper. Ten years ago, there were very few mature standards available for use by either the geo or the broader ICT communities. This situation has radically changed in the last ten years. **The OGC and ISO have defined a robust, mature standards baseline for enabling geospatial interoperability and for integrating geospatial data and content into any application or software environment. These standards are now broadly implemented in proprietary, open source and commercial open source software and applications.** For example, there are over 3,500 active OGC Web Map Service interface instances in the European community (<http://ijsdir.jrc.ec.europa.eu/index.php/ijsdir/article/viewFile/233/299>). The UN has also implemented a number of these standards in a variety of deployed applications. Relief Web is an example.

However, **the UN does not have a consistent policy and set of governance best practices for the use of OGC and ISO standards. The result can be a significant lack of interoperability even when implementations of are for the same version of a standard. There are a number of examples of best practice guidance and policies related to the use of OGC and ISO standards for SDI and other enterprise applications. These include The Canada Geospatial Data Infrastructure and the INSPIRE directives in Europe.**

In terms of sustainability, there are numerous reasons for a strong commitment to standards. **The Institute for Trade, Standards, and Sustainable Development states, “To achieve this paradigm (Sustainable Development), we emphasize the importance of economic growth, free markets, the rule of law, strong intellectual property rights, scientific discovery, technological innovation, and the establishment of balanced, science-based and cost-effective national regulatory and standards systems”. They go onto to say that when standards are not scientifically, technically and economically justified and are not developed in an open, inclusive and transparent manner, there is a real danger that standards may be utilized without accountability for ideological political purposes, as disguised protectionist barriers to trade and innovation, and as instruments of social change designed to circumvent the rule of law and to deny individuals their constitutional liberties and right to due process of law.** (p. 35)

[referenced from: <http://www.itssd.org/about-us.html>]

Recommendation: The UN community needs to define best practice guidance and develop the governance infrastructure for a UN geospatial standards platform. **Any standards considered by the UN need to have been developed in an open, consensus process.**

(p. 36)

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Report of the Secretary-General

...II. Preparatory Activities for Rio+20

5. **In line with the request of the Committee a background paper entitled “Monitoring Sustainable Development: Contribution of Geospatial Information to the Rio+20 Processes”⁴ [See http://ggim.un.org/ggim_committee.html] was prepared and is provided.** It elaborates on the advancement of geospatial policies, practices, and technologies since Rio+10, and suggested a central role for UN-GGIM in the implementation of the follow-up action plan, which would most certainly be determined by the conference. Within this context, the paper made several specific recommendations which include: (i) Continued consideration and development of geography as an integrative framework for sustainable development applications, decision support, and policy development; (ii) Identification of new and emerging technologies and how these technologies can enhance our ability to better respond to sustainable development issues; (iii) Consideration of legal and ethical issues such as privacy, security, intellectual property and liability; (iv) Engagement with the scientific and research community in the development of sustainability science; (v) Providing guidance and a discussion framework for how the numerous regional and global remote sensing portals and dissemination networks can be integrated to create a network of networks; (vi) Providing guidance on geospatial standards best practice; and (vii) Facilitating cooperation among the major players involved with geospatial information at the global level.
(par. 5, pp. 3-4)