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## Committee of Experts on Global Geospatial Information Management

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### Establishment and implementation of standards for the global geospatial information community

## Establishment and implementation of standards for the global geospatial information community

### Report of the Secretariat

#### Summary

The present paper contains the report for consideration on establishing and implementing standards for the global geospatial information community. At its second session, held in August 2012, the Committee of Experts on Global Geospatial Information Management took note of the suggestion by technical committee 211 of the International Organization for Standardization (ISO/TC 211) to put forward, jointly with the Open Geospatial Consortium and the International Hydrographic Organization, a proposal on the issues related to standard-setting in the international community (see E/2012/46, decision 2/103). A preliminary paper, prepared by ISO/TC 211, the Open Geospatial Consortium and the International Hydrographic Organization, was presented at the Second High Level Forum on GGIM, held in Doha, Qatar, from 4 to 6 February 2013. It provided background information on the organizations developing standards and their procedures; collaboration on the issue; future areas in standardization; and the trends in information technology that affect standards in the context of global geospatial information management. The report provides an overview of the range of standards that are available and applicable in the context of the Committee of Experts and highlights areas where contributions can be made to establish and implement standards in order to support the objectives of consistent, standardized and interoperable datasets in national contexts. The Committee of Experts is invited to take note of the report and to express its views on the way forward for the international geospatial information community, including in considering mechanisms to assist Member States in adopting the existing standards and implementing them in national legal and policy frameworks.

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\* E/C.20/2013/1

## **I. Introduction**

1. At its second session, held in August 2012, the Committee of Experts on Global Geospatial Information Management took note of the suggestion by technical committee 211 of the International Organization for Standardization (ISO/TC 211) to put forward, jointly with the Open Geospatial Consortium (OGC) and the International Hydrographic Organization (IHO), a proposal on the issues related to standard-setting in the international community (see E/20/2012/46, decision 2/103).

2. A preliminary paper was presented at the Second High Level Forum on GGIM, held in Doha, Qatar, from 4 to 6 February 2013, by ISO/TC 211. This provided valuable background information on the organizations developing standards and their procedures; collaboration on the issue; future areas in standardization; and the trends in information technology that affect standards in the context of global geospatial information management. The paper additionally described many of the standards used in geospatial information and proposed some potential future standardizations areas.

3. The present report provides an overview of the activities carried out by standards organizations, and the standards that are available and applicable in the context of the Committee of Experts. Drawing heavily upon a technical background paper provided by the three aforementioned standards organizations, the report raises the standardization challenges facing Member States, and highlights areas where contributions can be made to establish and implement standards in order to support the objectives of consistent, standardized and interoperable datasets in national contexts. The Committee of Experts is invited to take note of the report and to express its views on the way forward for the international geospatial information community. Points for discussion and decision are provided in paragraph 18.

## **II. The role of geospatial standards**

4. Standardization, the process of developing and implementing technical standards, brings uniformity, compatibility and interoperability to millions of processes, devices, and applications in all sectors of a global economy. By way of example; in telecommunications – the internet, mobile phone, and banking are all heavily reliant on standards in order for the various devices and applications to communicate with one another, and with such volume. This reliance on standards is just as relevant in the geospatial sector, where having the right standard-setting procedures and interoperability rules in place creates the means for geospatial information, devices, applications, data repositories, services and networks to all communicate as one.

5. Standardization is a key aspect to enhancing the integration processes of geospatial information into daily decision-making at all levels of society. Geospatial information, spatial data infrastructures and geospatial web services are now widely accessible, shared and reused in many contexts primarily because geospatial information, systems, and services are interoperable – that is, able to be integrated and shared. Standardization has contributed significantly to the evolution and development of the interoperability of geospatial information and services. Geographic components, such as fundamental data types for geospatial and temporal information, conceptual modeling rules, semantics of real world phenomena, metadata, services, encoding, etc. are developed into standards to set the foundation and building blocks that enable interoperability of geospatial information.

6. International geospatial standards have been in development since the early 1990s, mainly through the work of ISO/TC 211, the OGC and other organizations such as the IHO and the Unicode Consortium. While ISO/TC 211 is developing international standards to support the understanding and usage of geospatial information through a country-driven balloting process, OGC is an international industry consortium of more than 450 members (companies, government agencies and universities) developing standard specifications for a large number of geospatial and locational sectors and establishing common interfaces that “geo-enable” the Internet and mainstream information technology. Given the fact that the earth is mostly covered by water, IHO is working to establish and maintain hydrographic standards to support safety of navigation and the protection of the marine environment. The work of the standards organizations is complementary in the sense that the ISO and IHO standards form the foundation technical standards and OGC specifications implement the standards in open interoperable architectures.

7. There has been considerable technical progress made in the area of open standards and the role they play in enhancing the interoperability of diverse systems, helping organizations provide better services and ultimately facilitate easy access to geospatial data. The reasons organizations adopt and implement standards emanate from necessity because of issues that include: no common language to translate geospatial data or services; security issues relating to geospatial data exchange; the need to share maps and data on the Web, across devices or platforms; the need to deliver data to different systems; and the need to discover, acquire and integrate data from other, often automated, sensors.

8. At a policy level, mandating and widely implementing open standards provides Governments with the best possible assurance that products and technologies, present and future, will interoperate with previously deployed systems. When a significant number of systems implement open standards so that users can use the Internet to easily publish, discover, access, and use diverse sources of data and services, then government policy makers can establish policies that reinforce the purchase and use of these standards-based systems. Therefore, the widespread use of interoperable systems makes it easier for public and private sector institutions to reach agreements about data sharing that are based on institutional needs rather than technical limitations.

### **III. Standards adoption and implementation**

9. The technical background paper, prepared by ISO/TC 211, in collaboration with the OGC and the IHO, details the existing standards developed by the international organizations, the various standardization processes and procedures for developing these standards and the close coordination among these international standard organizations. It also details how many of these standards are applicable to issues pertinent to the Committee of Experts. In particular, those identified in its inventory of issues (see E/C.20/2012/5/Add.1) are described, along with the future areas of standardization that could contribute to resolve these issues. The paper also mentions some critical aspects with regard to the economic value of simplifying and exchanging geospatial data, including the issues related to the collection and exchange of hydrographic data.

10. The work carried out by ISO/TC 211, OGC, IHO and other organizations is valuable for all levels of the global geospatial information community. These organizations are developing consistent and precise technical geographic standards that form the core building blocks to enable interoperability and facilitate the integration and use of diverse sources of geospatial data and services. It is well recognized in all sectors of the economy that standards and standardization drive competitiveness, promote innovation

and benefit consumers. It is also known that Government policies that mandate open geospatial standards from the OGC, ISO/TC 211 and other standards organizations play a critical role in the development of national capabilities in geospatial data, software and services. Such policies have a 'capacity multiplier' effect, because open standards facilitate data sharing and promote geospatial technology market development, while also reducing the cost of geospatial solutions that can improve capacity in other market domains.

11. Despite much progress, many challenges remain with the adoption and implementation of these existing standards, especially in national legal and policy frameworks. Within the inventory of issues 'assuring the quality of geospatial information' was identified as a challenge by the national geospatial information authorities. Issues included: assuring the quality of geospatial information; determining agreed data quality assurance with consistent practices; increasing efforts to standardize and harmonize fundamental data models globally; and articulating the specific role national geospatial information authorities have in providing quality, current and authoritative national geospatial information as a valuable and critical enabler for effective decision-making. This topic was discussed in detail at the UN-GGIM Hangzhou Forum in China in May 2012. While some countries are adopting and implementing international standards<sup>1</sup>, many others are progressing very slowly or not at all, whether for a lack of resources, lack of knowledge of the standardization processes, or both. What are the reasons? Is it perceived cost, a data quality/consistency issue, or that the data integration and sharing model is not really working? What instruments or tools are needed to emphasize and support the adoption and implementation of global geospatial standards?

12. Assuring the quality of geospatial information should complement the use of existing international standards, and should be within the mandate of national geospatial information authorities. The purpose (creation and life cycle) of a geospatial dataset determines the appropriate level of data quality assurance. Determining the quality requirements of data – creation, validation, improvement, standard, maintenance and custodianship – is in essence a 'quality assurance framework' that is central to any SDI development and open data programme. In this regard, the Committee may consider looking at a similar activity, the development of a national quality assurance framework (NQAF), in the statistical field. The NQAF was endorsed by the forty-third session of the Statistical Commission in 2012 (E/CN.3/2012/13).

13. This experience could also be valid for national geospatial information authorities and all providers of geospatial data for the following reasons: (i) quality is a key element towards the goal of producing authoritative/official/credible information as an institutional asset; (ii) in a world of abundant information the communication of quality (metadata) becomes increasingly important; and (iii) an international framework is needed to establish a 'language' of quality - i.e. it enables us to communicate, compare and share experiences. The Committee may consider consulting with the statistical experts to learn from their experiences and whether developing such a framework is applicable in the geospatial information context.

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<sup>1</sup> The OGC WaterML 2.0 Encoding Standard, recently approved by the OGC membership, has been endorsed as an official component of the Civil Earth Observations strategy of the federal government of the United States.

## IV. Mechanisms for implementation

14. The challenge is how to encourage Member States to adopt and implement the international standards being developed by the relevant standards organizations. Some experts are of the opinion that the approach of implementing standards within Governments gain to be both top-down and bottom-up, based on a good understanding of the nature of the communities using the standards and their user requirements. A top-down approach would consider embedding standards into Government policy so that they are mandated as part of IT procurement across Government. There are some examples from INSPIRE (European Spatial data Infrastructure) and other national initiatives which are underpinned by their National Spatial Data Infrastructures. A bottom-up approach, supported by community use, would consist of a number of standards that are being developed outside the 'official' standards development process and which can be taken into consideration and ideally brought into the process to provide a framework for regulation and long-term development<sup>2</sup>.

15. As establishing standards is a common thread across the different issues being addressed by the Committee, there is a need to consider mechanisms or tools to allow simple implementation of different geospatial standards, and ways to monitor the implementation process across the topics as part of the road map for the implementation of the UN-GGIM framework. The Committee may wish to initially encourage and support Member States in their assessment of why, how and when to use standards. The Committee may then become more actively involved with Member States, through the national geospatial information authorities, to adopt and implement the standards needed for their communities of practice.

16. The Committee should also consider the best way to respond to the growing concern of quality assurance of geospatial data. Setting a general quality control process, meeting the international standards, would be helpful for the national geospatial information authorities to maintain the quality of their maps and data in pre- and post-production<sup>3</sup>. Some country experts consider that a national quality assurance process would be helpful for labeling the geospatial data produced by national geospatial information authorities as "authoritative" or "official". With this growing recognition of the importance of the quality assurance issue, the Committee should consider a programme review on the development of a quality assurance framework for geospatial information, through the lead of a country with expertise in this area.

17. The Committee of Experts is invited to take note of the report and to express its views on the way forward for the international geospatial information community, including in considering mechanisms to assist Member States in adopting the existing standards and implementing them in national legal and policy frameworks.

## V. Points for discussion

### 18. The Committee is invited to:

**(a) Take note of the report and work done by the international standards organizations;**

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<sup>2</sup> The OGC did this successfully with Google's KML and Open GeoSMS. More examples in the article: <http://mycoordinates.org/building-national-capacity-through-spatial-standards-policies/>

<sup>3</sup> NGII of the Republic of Korea recently completed a study on the data specifications of a global area map and the map quality assurance process based on the international standards (ISO/DIS 19157-data quality).

**(b) Express its views on the way forward for the international geospatial information community, including considering mechanisms for Member States to adopt and implement the existing standards in their national legal and policy frameworks;**

**(c) Consider the best practices in the statistical field in the development of the national quality assurance framework and discuss whether such a process may be applicable in the geospatial information community;**

**(d) Consider development of mechanisms and tools to monitor progress in the implementation of standards; and**

**(e) Provide guidance on the time frame within which a progress report should be submitted at a future meeting.**