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Implementation and adoption of standards for the global geospatial information community

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Note by the Secretariat

Summary

The present paper contains the the report, prepared jointly by the Open Geospatial Consortium, technical committee 211 of the International Organization for Standardization, and the International Hydrographic Organization, on the implementation and adoption of standards for the global geospatial information community for consideration by the Committee of Experts on Global Geospatial Information Management.

At its sixth session, held in New York from 3 to 5 August 2016, the Committee of Experts adopted decision 6/106, in which it welcomed feedback by Member States on their use of the "Guide to the role of standards in geospatial information management" and the "Technical compendium" documents on standards, as well as their experiences in their national implementation. The Committee of Experts noted that the Sustainable Development Goals were stimulating needs for new or modified geospatial standards, including with specific-domain working groups and the broader standards community, and encouraged Member States to review their standards and interoperability requirements in that regard and to consider how they could participate. The Committee of Experts also noted that there were enabling technologies, trends and standards in the geospatial industry that were creating possibilities for better measurement and monitoring of global efforts in sustainable development, and invited the standards organizations to provide regular updates on those developments. The present report also contains information on progress made in the initiatives and activities carried out by the international standards organizations in developing guidance for the use of geospatial standards to support the measurement and monitoring of global efforts in sustainable development and the implementation of the Sustainable Development Goals.

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I. Introduction

1. At its sixth session, held in New York from 3 to 5 August 2016, the Committee of Experts in its decision 6/106 noted that the Sustainable Development Goals were stimulating needs for new or modified geospatial standards, including with specific-domain working groups and the broader standards community, and encouraged Member States to review their standards and interoperability requirements in that regard and to consider how they could participate. The Committee also noted that there are enabling technologies, trends and standards in the geospatial industry that are creating possibilities for better measurement and monitoring of global efforts in sustainable development, and invited the standards organizations to provide regular updates on these developments.

2. The present report contains information on progress made in the initiatives and activities carried out by the international standards organizations in developing guidance for the use of geospatial standards to support the measurement and monitoring of global efforts in sustainable development and the implementation of the Sustainable Development Goals. The Committee of Experts is invited to take note of the report and to express its views on the way forward for the implementation and adoption of standards for the global geospatial information community. Points for discussion and decision are provided in paragraph xx.

II. Adoption and implementation of standards in geospatial information management

3. Since the second session of the Committee of Experts in 2012, the issues related to standards setting in the global geospatial information community have been extensively discussed and have been reflected in a number of the decisions brought about by the Committee. The work carried out by the Open Geospatial Consortium (OGC), technical committee 211 of the International Organization for Standardization (ISO/TC 211), the International Hydrographic Organization (IHO), and other relevant international organizations has been recognized as valuable to the global geospatial information community. These organizations are developing consistent and precise technical geographic standards that form the core building blocks to enable data and information interoperability and to facilitate the integration and use of diverse sources of geospatial data and services.

4. The benefits of developing and implementing technical standards have been recognized by the geospatial community as they bring uniformity, compatibility and interoperability to millions of processes, devices, and applications in all sectors of a global economy. It has been also recognized that the lack of standards or not using existing relevant standards could be harmful, as has been experienced, for example, in numerous cases of disaster management.

5. While some countries are adopting and implementing international standards, 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. Despite the progress being made, many challenges remain with the adoption and implementation of existing standards, especially in national legal and policy frameworks, chief among them being the lack of understanding at the political/policy level. There is a general recognition from Member States' experts that mechanisms are needed that emphasize and support the adoption and implementation of global geospatial standards, and in particular, reach out to the policy makers.

6. The standards community is interested to learn how Member States have utilized the existing best practice documents, "The Guide to the Role of Standards in Geospatial Information Management" and its companion technical document. A special area of interest is how these documents have been utilized in implementing and adopting the existing standards within national legal and policy frameworks in geospatial information. This feedback is critical to: (1) update and review the documents that will be formulated in the coming year; and (2) to support the Member States better. The standards community also urges Member States to consider translation of the Standards Guide and its Standards Companion as a way to contribute in the capacity building and sharing of best practices, especially for those Member States who could leverage the experiences from other nations.

III. Update on the work of the international geospatial standards organizations

7. Underpinning our capacity for global geospatial information sharing is an ecosystem of standards provided by a variety of Standards Development Organizations (SDOs). Each plays a role in developing standards for a key technology or domain area, but no suite of standards can exist in isolation, and collaboration to ensure interoperability is key.

8. For the geospatial domain, the key SDOs are the OGC, ISO/TC 211 and the IHO. Each SDO convenes technical and/or plenary meetings throughout each year and the following is a brief update of the significant developments for each organization and the key areas of joint and collaborative work being undertaken.

Update from the Open Geospatial Consortium

9. Since August 2016 the OGC membership has convened 4 technical meetings in the USA, Taiwan, Province of China, The Netherlands and Canada. The OGC celebrated its 100th Technical Meeting, since its inception in 1994, in September 2016 in Florida, USA.

10. Future technical meetings of the OGC will take place in the United Kingdom (September 2017), New Zealand (December 2017), France (March 2018), USA (June 2018) and Germany (September 2018). Member States are invited to participate in these meetings.

11. OGC has approved a number of new standards since August 2016 and encourages the Committee of Experts to review and implement these where appropriate. The Discrete Global Grid Systems (DGGS) has been recognized by the Committee as providing connection between statistics and geospatial information. The OGC has now approved the DGGS as an Abstract Specification and encourages Member States to review the specification and implement as appropriate within their national contexts.

12. The DGGS has been developed to enable common global architectures that will assist in:

(a) Organising multiple uniformly spaced measurements over the globe;

(b) Calculating gradients faithfully;

(c) Comparing time-series of globally distributed data;

(d) Making statistically meaningful regional comparisons of global data;

(e) Comparing and combining data from multiple measurements taken at different resolutions;

(f) Improving operation of numerical models; and

(g) Documenting the precision as well as location of spatial data on the globe.

13. Within the OGC, there are a number of working groups that discuss the requirements of specific domains. See http://www.opengeospatial.org/projects/groups/wg. Since August 2016 newly approved domain working groups (DWG) of note are:

(a) Unmanned Systems;

(b) Electromagnetic Spectrum;

(c) Quality of Service and Experience; and

(d) Marine.

14. The Charter for the Land Administration DWG was presented at the side meeting of the Expert Group on Land Administration and Management at the Fourth High Level Forum on UN-GGIM in April 2016 in Ethiopia. Following its approval at the OGC's 99th Technical Meeting in June 2016, the DWG has formed a direct liaison with ISO/TC 211 and the Expert Group to ensure shared goals are developed and the work programs of both groups are synergistic. As a result of this liaison, a joint meeting was held in Delft, The Netherlands in March 2017. The event consisted of a 2-day Expert Group meeting (http://ggim.un.org/Delft_Meeting.html) followed by 2 days of technical focus on the Land Administration Doman Model (LADM) with the following preliminary actions identified:

(a) The International Federation of Surveyors (FIG) to make a new work item proposal (NWIP) to ISO/TC 211 to initiate a review of the LADM;

(b) ISO Stage 0 – project, given potential broad scope;

(c) OGC Innovation Program prototyping capabilities to potentially be utilized;

(d) Global Land Tool Network (GLTN) support for developing countries; and

(e) To be in collaboration with FIG, ISO/TC 211, OGC, World Bank, TUDelft, Kadaster, UN-GGIM, GLTN, Royal Institute of Chartered Surveyors (RICS), and others.

15. A significant joint working group between the World Wide Web Consortium (W3C) and the OGC was initiated in 2015 to develop best practice documentation under the title of Spatial Data on the Web. The scope of this working group includes: geosemantics, linked data, temporal and coverage themes; noting also ISO/TC 211's contribution in the area of terminology. At the time of writing this report, the working group is in the final stages of documentation and expects to formally present the standards work in the coming months. Current documentation can be found at https://www.w3.org/TR/sdw-bp/

16. The OGC would like to inform the Committee members of key international interoperability projects that have been concluded since August 2016 and encourage the members to review the outcomes:

(a) Arctic Spatial Data Pilot – Interoperability Project;

(b) OGC Testbed 12 including Aviation, Compliance, Field Operations, Large-Scale Analytics & Linked Data and Advanced Semantics; and

(c) Future Cities Pilot, Phase 1.

17. The OGC would like to inform the Committee of key international interoperability projects that have been initiated since August 2016 and encourage the members to support and participate in these projects:

(a) OGC Testbed 13 including Aviation, Compliance, Cross-Community Interoperability, Dynamic Source Integration, Earth Observation Clouds, Streaming & 3D Data, Compliance Testing;

(b) ESPRESSO Project (Europe) http://espresso-project.eu/ Funded as part of the European Union's Horizon 2020 program this project seeks to develop a systemic standardized approach to empower smart cities and communities;

a) Underground Infrastructure Concept Development Study based in New York, with participation from Singapore and the Ordnance Survey;

b) API (Application Program Interface) Concept Development Study focused on how APIs can be developed and used in a consistent interoperable manner in the geospatial community;

c) NextGEOSS http://nextgeoss.eu/ in partnership with the Group on Earth Observations seeks to increase the use of GEOSS data in Europe through a next generation data hub and

d) Environmental Linked Features Interoperability Experiment.

18. As part of the ESPRESSO project, OGC will map the ISO 37120 Indicators for City Services and Quality of Life methodology with the GEO SBA and seek alignment with H2020 ESPRESSO to identify cities that use earth observations for their smart cities activities – and promote the use of earth observations (space born and in-situ) with the ESPRESSO SmaCStak (stakeholder network of Smart Cities).

Update from ISO/TC 211

19. Since August 2016 the ISO/TC 211 membership has convened 2 plenary meetings in the United States of America (43rd) and Sweden (44th), with 2 Member States becoming new Participating Members; (Algeria and Slovenia).

20. The Chair and Secretariat transition from Norway to Sweden has been very successful.

21. ISO/TC 211, in collaboration with the OGC and FIG, has initiated the review of ISO 19152 Land Administration Domain Model (LADM). The review will also take into account the requirements from the United Nations Division for the Ocean Affairs and the Law of the Sea (UN-DOALOS) and IHO.

22. ISO/TC 211 continues the on-going development of the multi-part Address Standard, with Part 3 – Address data quality now under development.

23. ISO/TC 211, along with OGC, has been invited to contribute to the United Nations Economic Commission for Europe (UNECE) workshop on integrating Geospatial and Statistical Standards. Key themes for the workshop are; metadata and data exchange, terminology and ontologies, and future support to open and big data.

24. ISO/TC 211 continues to strengthen its relationship with other ISO committees requiring geospatial information; ISO/TC 204 Intelligent Transport Systems (ITS) and the new joint work GIS/Building Information Modelling (BIM) Interoperability with ISO/TC 59/SC13 Organization of Information about Construction Works.

25. The use of Blockchain technology with geospatial information continues to strengthen, therefore ISO/TC 211 has established a liaison with ISO/TC 307 Blockchain and Electronic Distributed Ledger Technologies.

26. The next meeting of the ISO/TC 211 will be in Wellington, New Zealand, 27 November – 1 December 2017.

Update from the International Hydrographic Organization (IHO)

27. The technical programme of the IHO continued to focus on developing the S-100 series of new standards in support of e-navigation and spatial data infrastructures, while keeping the current IHO standards fit for purpose. The programme remained under the principal responsibility of the IHO Hydrographic Services and Standards Committee (HSSC) and continued to draw on the active contributions of representatives from IHO Member States and partner international organizations as well as expert contributors from industry.

28. Edition 3.0.0 of S-100 - *Universal Hydrographic Data Model* was approved by the IHO Member States and published. The major extensions are meant to assist the development of S-100-based product specifications. They include additional encoding formats and portrayal elements and the use of alerts and indications in navigation systems.

29. The S-100 infrastructure is underpinned by the on-line S-100 *Geospatial Information Registry* owned and managed by the IHO. A new version with improved interface and functionalities was introduced to facilitate the use of the Registry submitting organizations involved in developing S-100-based product specifications.

30. Much effort continued to be devoted to the on-going development of S-100 based product specifications, including S-101 - *Electronic Navigational Chart Product Specification* and several product specifications related to nautical information, tides and surface currents, maritime limits and boundaries. The data quality model and the decision tree for designating the quality of bathymetric data in S-101 were developed. The first draft of the S-100 interoperability specification for Electronic Chart Display and Information Systems (ECDIS) is about to be completed.

31. Under the continuous maintenance of S-4 - *Regulations for International (INT) Charts and Chart Specifications of the IHO*, a revised edition 4.7.0 was approved by the Member States and will be published shortly.

32. A new edition 3.0.0 of S-11 - Part A - *Guidance for the Preparation and Maintenance of International Chart and ENC Schemes* was developed to include guidance related to preparing and maintaining regional schemes for Electronic Navigational Charts (ENC).

33. A new edition 2.0.0 of C-17 - *Spatial Data Infrastructures: "The Marine Dimension" - Guidance for Hydrographic Offices* is being prepared to encourage further IHO Member States to implement Marine Spatial Data Infrastructures for applications other than navigation.

34. The IHO continued to foster close liaison with partner international standards organizations, including ISO/TC211 and the OGC. The on-going cooperation with the OGC was formalized through a Memorandum of Understanding which was signed in December 2016. The IHO welcomed in particular the establishment of an OGC Marine Domain Working Group.

35. At the invitation of the Organization for the Economic Co-operation and Development (OECD), the IHO has agreed to participate in the partnership of international organizations led by the OECD on ensuring the quality of international rule-making. The IHO highlighted the standard-related activities of UN-GGIM as an example of best practice.

IV. Sustainable Development Goals and the Joint Study Group

36. Since August 2016 the Joint Study Group of the OGC, ISO/TC 211 and IHO have met several times to discuss the workplan for developing a guidance for use of geospatial standards in supporting the measurement and monitoring of the Sustainable Development Goals (SDGs).

37. In recognition of the adoption of the 17 SDGs, ISO/TC 211, the OGC and the IHO would like to emphasis the important role that geospatial information standards will play in the decision-making processes, measurement and monitoring of the global efforts towards the achievement of the SDGs.

38. The ability to sustainably manage land, environment and sea and water areas across the planet is reliant on high quality geospatial data that can be easily shared, communicated and utilized across multiple purposes. The adoption of common principles and the consistent application of international geospatial standards can enable decision makers to access the location based information they need to enable their nation the best pathway to achieving the 17 SDGs.

39. The SDGs also present the possibility for new or modified standards. ISO/TC 211, the OGC and the IHO encourage Member States to review their standards requirements as they determine how they will pursue achieving the SDGs in their own country, and invite them to participate in the standards development processes of ISO/TC 211, the OGC and the IHO to assist in the development of any new or enhanced standards as may be required.

40. A workshop was held in Sydney in April 2017 as part of the International Society for Digital Earth conference to present and discuss existing geospatial standards that are applicable for use in assisting the measurement and monitoring of the SDGs. Focus was restricted to the indicators for Goals 6, 9, 11 and 15.

41. With the establishment of the Geospatial Information Working Group under the auspices of the Inter-Agency Expert Group on Sustainable Development Goals (IAEG-SDGs) and the global indicator framework being agreed, it offers an opportunity to ensure that existing geospatial standards and interoperability tools are applied in the geospatial inputs and metadata needs for the measuring and monitoring of the SDGs.

42. ISO/TC 211, the OGC and IHO will continue to work with the IAEG-SDGs Working Group on Geospatial Information to ensure a synergistic approach to providing guidance on the use of geospatial standards.

V. Points for discussion

43. The Committee is invited to:

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

(b) Provide feedback to the international standards organizations on the use of the Standards Guide and Companion documents, and their experiences in implementing standards within their national policy and legal frameworks;

(c) Provide guidance as to how the international standards organizations can best contribute towards the provision of geospatial standards in the implementation of the SDGs; and

(d) Take note of the encouragement by the Standards Development Organizations (SDOs) for Member States to participate through membership in the international geospatial standards development processes of ISO/TC 211, the OGC and the IHO to ensure that the geospatial standards required to achieve the SDGs are available.