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Integration of geospatial, statistical and other information

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Note by the Secretariat

Summary

The present paper contains the report of the Expert Group on the Integration of Statistical and Geospatial Information for consideration by the Committee of Experts on Global Geospatial Information Management.

At its fourth session, held in New York from 6 to 8 August 2014, the Committee of Experts adopted decision 4/105, in which it welcomed the report prepared by the Expert Group on the Integration of Statistical and Geospatial Information and commended the leadership taken by the Expert Group in formulating a programme of work that included an international workshop held in Beijing from 9 to 12 June 2014; and a global forum held in New York on 4 and 5 August 2014, on the margins of the fourth session. The two events prompted solid engagement by and synergy between the statistical and geospatial communities. The Committee of Experts endorsed the terms of reference of the Expert Group, including its programme of work and areas of focus, and took note of the suggestions from Member States regarding the need to consider big data, the 2020 round of censuses and other information as means of integration, while avoiding duplication of efforts. The report provides information on the recent activities of the Expert Group, including the major outcomes of the first Global Forum on the Integration of Statistical and Geospatial Information, held in New York in August 2014, and the main findings and recommendations of the second meeting of the Expert Group, held in Lisbon in May 2015. The report also presents information on a consultative meeting of the Expert Group, held in Beijing in October 2014, with regard to the review of its work programme and the formulation of plans for future progress, and describes progress made towards integration of the 2020 round of censuses into a global geospatial-statistical framework.

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[*] E/C.20/2015/1

I.   Introduction

1.   At its forty-fourth session, the United Nations Statistical Commission, in making decision 44/101 (see E/2010/24, chapter I.C), requested the United Nations Statistical Division (UNSD) to establish the Expert Group on the Integration of Statistical and Geospatial Information. This decision was supported by the Committee of Experts at its third session in July 2013 (decision 3/107). Comprising members of both the statistical and geospatial professional communities from Member States, the Expert Group was established and had its first meeting in New York from 30 October to 1 November 2013 to determine its terms of reference and program of work, and reported back to the forty-fifth and forty-sixth sessions of the Statistical Commission (respectively in March 2014 and March 2015), and to the fourth session of the Committee of Experts in August 2014. The Expert Group sought and obtained the endorsement of the Statistical Commission and the Committee of Experts for its terms of reference, inclusive that the Expert Group will report to the Statistical Commission and the Committee of Experts.

2.   The present report provides information on the recent activities of the Expert Group since the fourth session of the Committee of Experts, including the major outcomes of the first Global Forum on the Integration of Statistical and Geospatial Information, held in New York in August 2014, and the main findings of the second meeting of the Expert Group, held in Lisbon in May 2015. The report also presents information on a consultative meeting of the Expert Group, held in Beijing in October 2014, with regard to the review of its work programme and the preparation/formulation of plans for future progress, and describes progress made towards integration of the 2020 round of censuses into a global geospatial-statistical framework. The Committee of Experts is invited to take note of the report and to express its views on the work of the Expert Group and on the way forward for the global geospatial information management community to actively contribute to the integration of geospatial, statistical and other information. Points for discussion and decision are provided in paragraph 36.

II.   Global Forum on the Integration of Statistical and Geospatial Information

3.   In accordance with Statistical Commission decision 44/101 and the Committee of Experts decision 3/107, UNSD, in collaboration with the Expert Group on the Integration of Statistical and Geospatial Information, convened the first Global Forum on the Integration of Statistical and Geospatial Information in New York, 4-5 August 2104, in conjunction with the fourth session of the Committee of Experts. In pursuance of its objectives to reach out and develop best practices and to bring together both the statistical and geospatial professional communities, the Global Forum brought together more than 200 participants from 73 countries to discuss the strategic vision and goals for the integration of statistical and geospatial information. It continued the global consultation and communication on the development of a global statistical-geospatial framework initiated since the inception of the Expert Group in November 2013. A full list of participants is available at http://ggim.un.org/Global%20Forum.html.

4.   The programme of the Forum was strategy-oriented, with an opening session setting the global context for the main theme of the Forum - A strategic vision and goals for the integration of statistical and geospatial information - and four subsequent sessions to discuss what has been achieved so far towards the vision of integrating statistical and geospatial information, and how to get there (see http://ggim.un.org/Global%20Forum.html). Experts from both the statistical and geospatial communities were compelled by emerging trends to look for the common ground, and their contributions were fully supportive of the need to integrate statistical and geospatial information, including the development of a geospatial-statistical framework, the building of capabilities and expertise, the adoption of common terminology, and better coordination and cooperation.

5.   The Global Forum offered a good opportunity to better understand the challenges and actions required to be taken by both the national statistical offices (NSOs) and the national geospatial information authorities (NGIAs) in integrating statistical and geospatial information. It was acknowledged that in order to meet the objective of providing a forum for coordination and communication among representatives of both statistical and geospatial communities, with a view to closely working with the 'Big Data' community, it was important to first define common terminologies and share agreed protocols. It was also noted that data collection, processing, analysis and operations are important, but more so are the access to and sharing of data, and particularly the communication of related information and knowledge sought by end users.

6.   Participants stressed the fact that institutional integration within a country to support statistical and geospatial integration requires a strong political commitment. In this regard, advocacy of the benefits of linking socio-economic data to a location, and the value proposition of integrating statistical and geospatial information, should be conveyed to decision and policy makers, allowing them to understand the need of national institutions for adequate resources to achieve the integration.

7.   One of the recurrent key issues discussed was the variety of geographic classifications, practices and approaches used to determine and represent geographical units for statistical purposes. In this regard, there was agreement on the need for a comprehensive study and methodological guidelines on the advantages, benefits, and appropriate use associated with a grid-based approach, a population/administrative approach, or a mixed approach to the compilation and dissemination of statistical data and information.

8.   Participants stressed the challenges NSOs and NGIAs face in maintaining data confidentiality and privacy with the advancement of technology and the associated demands for greater data accessibility. It was recommended that national statistical and geospatial organizations take extra steps to safeguard confidentiality, not only in the micro-data provisions, but also with regard to small areas with geographic information systems (GIS) presentations and its corresponding spatial analysis capabilities. Noting that confidentiality breaches can potentially happen with outsourcing services, it is now a requirement that safeguards, by way of specific or explicit provisions in contracts with service providers, should be provided and adhered to.

9.   The benefits of developing, adopting and implementing technical standards and common metadata have been recognized by the participants from both statistical and geospatial communities, as they enable interoperability and facilitate the integration and use of diverse sources of statistical and geospatial data and services in all sectors of a global economy. It was noted that the development of common standards and metadata would make statistical and geospatial information more interoperable, and therefore, more useable and relevant to a wider range of stakeholders.

10. Geography is increasingly being recognized as key to virtually all national statistics, providing a structure for collecting, processing, storing, aggregating and disseminating data. It was noted that many national statistics offices are already transforming, or are planning to transform, their statistical infrastructure, offering an opportunity to embed geography into their national systems and processes; such activities can contribute to the modernization of statistics. It was also noted that there is a strong spatial dimension to environmental economic accounting which can benefit from the integration of statistical and geospatial information.

11. Providing a greater geographic context for population census information was also an important driver that was noted by the participants. In this regard, there was agreement that the 2020 Round of Censuses offer an opportunity to enhance the geospatial capabilities of NSOs, including opportunities for efficiencies. The agreement on a course of action for the development of a geospatial-statistical information infrastructure in support of the 2020 Round of Censuses was emphasised.

12. Participants recognized that adding geospatial capability to statistics requires the codification of location attributes linked to socio-economic statistical information, known under the concept of geocoding. Geocoding, including geocoding of addresses, was indeed recognized as a fundamental building block to maximising the spatial potential of statistical information. The Expert Group should agree on a common approach to geocoding address information, such as the addition of a geocoded reference (ideally latitude and longitude) in each data record in the data management system, and the use of a common set of hierarchical geographic boundaries that are based on population numbers, so that each geographic area within each level of the hierarchy contains similar population numbers.

13. It was noted that sharing best practice principles, particularly around innovative dissemination and analytical/modelling techniques, is another mechanism for developing a consistent approach to integrating socio-economic and geospatial information. The global analytics community has similar interests and objectives and could be a powerful ally in meeting the challenge of linking socio-economic information to a location.

14. Participants confirmed the need for an overarching statistical-geospatial framework as part of an overall information architecture at both the national and global levels. They recognized that when both statistical information and geospatial information are integrated within a geospatial-statistical framework, the geo-statistical results can significantly improve the quality of official statistics and Population Censuses, and the measuring and monitoring of the sustainable development goals.

III.   Consultative meeting of the Expert Group

15. UNSD organized a consultative meeting of the Expert Group on the Integration of Statistical and Geospatial Information, on Saturday 25 October 2014, occurring between two United Nations events in Beijing: the Third High Level Forum on UN Global Geospatial Information Management, 22-24 October 2014, and the International Conference on Big Data for Official Statistics, 28-31 October 2014. The consultative meeting was attended by representatives who attended one or both United Nations events, and included participants from Australia, Azerbaijan, Brazil, Mexico, Republic of Korea, United States of America and the Open Geospatial Consortium (OGC).

16. The consultative meeting was convened as an opportunity to review the work programme of the Expert Group and establish plans for further progress, including the identification of candidate Expert Group members to lead the work programme items (existing work programme items leaders were confirmed). In order to improve the communication strategy, it was proposed to ensure that the contact list of the Expert Group was kept up-to-date. The consultative meeting proposed that the next Expert Group meeting be held in 2015 in either New York or Europe, unless an alternate venue was proposed in the interim.

IV. Second meeting of the Expert Group

17. UNSD, as the Secretariat of the Statistical Commission and the Committee of Experts, organized the second meeting of the Expert Group on the Integration of Statistical and Geospatial Information, held on 24 May 2015 in Lisbon, Portugal, one day prior to the INSPIRE/Geospatial World Forum events (25-29 May 2015). The meeting was attended by 25 participants from 12 countries (Australia, Colombia, Egypt, Finland, Mexico, Moldova, Norway, Poland, South Africa, Sweden, UK, USA) and four regional/ international organizations (Eurostat/European Commission, EuroGeographics, OGC and Esri).

18. An introductory overview was provided of what the future might look like within the context of the proposed geospatial-statistical framework. It was stressed that the Expert Group should focus on the integration of statistical and geospatial information and do so with the relevant communities (i.e. statistical and geospatial and others) in line with the terms of reference of the Expert Group. For those additional work items that have not been core work of the Expert Group, it was agreed that these need to be energized, and the progress of relevant groups (for example the working group working on standards - e.g. SDMX) needs to be encouraged. The Expert Group agreed that it should keep aware of and monitor the progress of "Big Data" via the UN Global Working Group on Big Data for Official Statistics, with the view to being evaluated as a future activity, and consider Metadata, Privacy and Confidentiality in the context of integration. Another related area was in context of the Task Team on Satellite Imagery and Geospatial Data, a sub-group of the Global Working Group on Big Data. However, it was noted that this should be undertaken with the aim to be included in the discussion with the leading proponents of these topics, but not be directly involved with the details.

19. The Expert Group discussed how to best influence those making the decisions within the Sustainable Development Goals (SDGs) process and the development of the indicator framework, noting that the requirements for data collection need to be connected to the benefits of society. In this regard, the Expert Group members need to consider the benefits that integrated statistics and geography can bring to the sustainable development agenda.

20. In order to determine 'what a global framework would look like', the Spatial-Statistical Framework (SSF), the Generic Statistical Business Process Model (GSBPM), and the INEGI, Mexico national institution model were introduced and discussed as three levels of possible frameworks. For example, the SSF could be viewed as a principles-based framework, not too detailed and not overly prescriptive, but able to be customized for individual national circumstances. The GSBPM could be viewed as providing a link to the internationally agreed statistical processes, while the Mexico model is a detailed case study of a successful and realized end state, which is useful for the users. The Expert Group agreed that these three models should usefully be harmonized together in some way.

21. Participants discussed whether the Expert Group can prepare a practical geospatial-statistical framework in the coming months, based on the 3 models above, and distribute it for global consultation before submitting to the Committee of Experts and the Statistical Commission. Australia agreed to progress this as an action item (i.e. to flesh out the existing SSF model, incorporate a link to the GSBPM and provide the INEGI model as a best practice example). UNSD will then undertake a global consultation, with the intent of submitting an international geospatial-statistical framework to the Committee of Experts and Statistical Commission in 2016 for adoption.

22. The Expert Group acknowledged that it needs to capture the user needs and requirements as well, with the overarching objective for Member States to collect statistical and geospatial data in an integrated manner during the 2020 Round of Censuses. More specifically, for data collection purposes, Censuses will need to look at the dwelling and unit level and capture information at that level. Furthermore, there is a need to be more innovative with other data collected and integrated, and consider the collection of other locational data: financial, economic, etc. The Expert Group agreed that it should also consider developing the overarching SSF principles framework and how it would apply to the 2020 Round of Censuses.

23. The Expert Group reviewed the progress on its work programme items. In this regard, following a research study, the advantages and disadvantages of Administrative Areas and Grid Areas were presented and discussed. The Expert Group confirmed that, based on the complexities and issues with each approach, one is not preferred over the other. The issue is rather should the two methodologies be combined, and how to coherently transfer between the two approaches. Each approach needs to consider user needs, as well as maintaining statistical and geospatial integrity in the integration, bearing in mind that it is not yet determined how this will be achieved. The Expert Group concluded that the preferred approach was to collect the finest level of geography possible (preferably longitude/latitude), so that any geography can be constructed from the collection unit level.

24. The Expert Group agreed that the presented advantages and disadvantages were a useful aid in deciding between the two approaches for particular applications. The USA agreed to consolidate and complete the list of advantages/disadvantages, and UNSD will then undertake a global consultation, with the intent of submitting the list with the international geospatial-statistical framework to the Committee of Experts and Statistical Commission in 2016 for adoption.

25. With regard to the work programme item on Common Terminology, the European Commission proposed steps for developing a list of definitions and synonyms as a starting point, and forming a small editorial board of experts, from both the statistical and geospatial communities, to review the list of terms/synonyms, proposing additional and redundant terms/synonyms. The editorial board will then consult with and seek agreement by the wider Expert Group before transferring the terminology to a web-repository with ongoing maintenance and review. It was agreed that the European Commission would complete the list of definitions and synonyms, and that the Expert Group would work with UNSD in completing the remaining steps.

26. The Principles and Recommendations adopted by the UN Statistical Commission for the 2020 Round of Censuses were brought to the attention of the Expert Group, and were recognized as an important contribution by the Expert Group. The Group considered that the Committee of Experts should be more involved in the 2020 Round of Censuses and consider funding for capacity development. This topic will be on the agenda of the next Expert Group meeting.

27. The Expert Group inquired whether UNSD has any plans to undertake a programme on strengthening capacities (regional workshops, Guidelines on Geospatial Information Infrastructure, etc.) for the 2020 Round of Censuses, as it did during the 2010 Census Round. The Expert Group specifically recommended the update of the Handbook on Geospatial Infrastructure in Support of Census Activities. In addition, the Expert Group requested UNSD to cooperate with the United Nations Population Fund (UNFPA) in order to promote the Handbook, particularly for the least developed countries and small Pacific islands.

28. For the Metadata and Interoperability work item, a presentation comparing the General Statistical Information Model (GSIM) and General Feature Model (GFM) was made. The Expert Group recognized that joining statistical and geospatial data is not easily transformed and integrated. Often, too much time is spent preparing and managing data, as opposed to analysing and modelling the data. Presently, standards do not support easy transformation, particularly machine to machine. In this regard, it was recommended that UNSD establish a small working group composed of members from the Expert Group and relevant standards organizations with the aim to: (i) standardize the means to join statistical and geospatial data; and (ii) address different data models and ensure that both GSIM and GFM support joining of the two data types.

29. In addition, the DCAT-AP (application profile for statistical and geospatial data portals in Europe) provides a metadata interchange format for data portals operated by EU Member States and will be completed soon. DCAT-AP is considered a bridge between statistics and geography and a proposal was made that ideally the Expert Group issue a recommendation to adopt it.

30. Some common data challenges were noted by the Expert Group, particularly data quality, privacy and security. Standards and associated business processes can assist in easing these data and integration challenges. In this regard, it was recommended that the Expert Group work collaboratively with the Open Geospatial Consortium (OGC) and pilot an interoperable global Statistical Geospatial Information Framework to take it to best practice.

31. The Expert Group recognized the valuable contribution that the European Forum for Geography and Statistics (EFGS) makes in the professional community through its annual technical meetings and forums, and welcomed the collaboration and contribution of the EFGS to the work of the Expert Group. While the EFGS is a forum that primarily networks amongst the professional community, it is also influencing decisions in the broader statistical and geospatial communities. Therefore, in welcoming the collaboration and contribution of the EFGS, the Expert Group concluded that the EFGS should focus on more technical aspects of work, whereas the Expert Group should focus on the strategic and political aspects of statistical-geospatial information integration.

V. Conclusion

32. The participation of more than 200 senior leaders, from both NSOs and NGIAs of 73 countries, in the first Global Forum exemplifies the importance and relevance of the integration of statistical and geospatial information. The Global Forum was particularly successful in bringing national statistical and geospatial leaders together to communicate and understand each other. The Global Forum welcomed future meetings of the Expert Group on the Integration of Statistical and Geospatial Information, and stressed that it was imperative that the professional statistical community, in partnership with relevant national geospatial information authorities, remain fully engaged in the work of this Expert Group.

33. In both events, the Global Forum and the second meeting of the Expert Group, it was specifically noted that statistical and geospatial communities are major contributors of information used for evidence-based decision-making across many sectors, whether public or private, for which institutional coordination and cooperation between the statistical and geospatial agencies within a country are vitally important, and key factors to the success of the integration.

34. It was also stressed that geospatial data can significantly improve the quality (accuracy, relevance, accessibility) of official statistics, and Population and Housing Censuses are key enablers for demonstrating statistical and geospatial integration for all stages of a statistical cycle.

35. Both statistical and geospatial communities should have a common voice in information discussions, such as the Post-2015 development agenda at the strategic level and the 2020 Round of Censuses at the tactical level, and there is an urgent need for a mechanism, such as a global statistical-geospatial framework, to facilitate consistent production and integration approaches for geo-statistical information.

VI.   Points for discussion

36. The Committee is invited to:

(a) Take note of the progress of the work of the Expert Group on the Integration of Statistical and Geospatial Information;

(b) Encourage the involvement of the geospatial community from Member States in the work of the Expert Group and participation in related appropriate events; and

(c) Take note that the development of the Global Geospatial-Statistical Framework by the Expert Group will be submitted to the Statistical Commission and the Committee of Experts in 2016.