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## Committee of Experts on Global Geospatial Information Management

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### Linking of geospatial information to statistics and other data

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### Report of the Secretariat

#### Summary

The present paper contains the report for consideration on linking geospatial information to statistics and other data. At its second session, held in August 2012, the Committee of Experts on Global Geospatial Information Management discussed an inventory of issues (see E/C.20/2012/5) relevant to a number of national geospatial information authorities and noted that the issue of linking geospatial information to statistics needed to be considered in greater detail. The Committee of Experts concluded that the mechanisms to support the integration of geospatial information and statistics and other data, in particular through geocoding, did not exist in the global geospatial community in general. As an initial step towards establishing such mechanisms, it was suggested that the Statistical Commission undertake a programme review to support the development of a statistical geospatial framework in national statistical systems. The report addresses the need to integrate geospatial information with statistics and other data; the programme review on developing a geospatial-statistical framework, conducted by the Australian Bureau of Statistics on behalf of the Statistical Commission; and the decision on the issue adopted by the Statistical Commission at its forty-fourth session, held in February 2013 (E/2013/24, decision 44/101). It summarizes the consultations and deliberations leading to the recommendations and proposes points of discussion for the Committee. The Committee of Experts is invited to take note of the report and to express its views on the way forward for the global geospatial information community, including in considering the recommendations of the Statistical Commission; encouraging Member States to participate in the expert group to be established on the integration of statistical and geospatial information; and organizing an international conference on the topic.

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\* E/C.20/2013/1

## I. Introduction

1. At its second session, held in August 2012, the United Nations Committee of Experts on Global Geospatial Information Management discussed an inventory of issues (E/C.20/2012/5) relevant to a number of national geospatial information authorities, and noted that the issue of linking geospatial information to statistics needed to be considered in greater detail. The Committee of Experts concluded that the mechanisms to support the integration of geospatial information and statistics and other data, in particular through geocoding, did not exist in the global geospatial community in general. The Committee identified the need to determine how Government agencies, such as national geospatial information authorities, and other actors on geospatial information can best work together with national statistical offices in order to best exploit the synergies of both domains.

2. In this regard, the United Nations Statistical Commission agreed that a programme review be conducted to understand: the current geospatial activities of national statistical offices; the demands on national statistical offices for location-based information; what activities might be undertaken both nationally and internationally to enhance the integration of statistical and geospatial information; and the need for developing a statistical geospatial framework in national statistical systems. The Australian Bureau of Statistics was tasked to carry out this programme review in 2012, and to conduct a survey on the status of the integration of statistical and geospatial information within National Statistical Offices (NSO) globally. In total, 52 countries participated in the survey and the responses provided a wealth of information to the programme review which was presented for discussion to the forty-fourth session of the Statistical Commission, held in February 2013 (E/CN.3/2013/2).

3. At its forty-fourth session the Statistical Commission, recognizing the importance of the integration of geospatial information and statistics in supporting social, economic and environmental policy decision-making, adopted decision 44/101 (E/2013/24). This decision: “strongly supported the linking of socio-economic and environmental data to a location in order to enrich and maximize the potential of statistical information”, “welcomed the proposal of an international conference as a way of outreach and best practices, bringing together both statistical and geospatial (professional) communities” as well as “the proposal to develop an international statistical geospatial framework”, and “requested the United Nations Statistics Division to establish an Expert Group composed of representatives of both statistical and geospatial communities to carry the work on developing a statistical spatial framework as a global standard for the integration of statistical and geospatial information” and to address various technical, institutional and information policy issues.

4. The present report outlines the need for linking geospatial information to statistics and other data, and summarizes the consultations and deliberations which occurred after the second session of the Committee. The Committee of Experts is invited to take note of the report and to express its views on the way forward for the global geospatial information community, including in considering the recommendations of the Statistical Commission; encouraging Member States to participate in the expert group to be established on the integration of statistical and geospatial information; and organizing an international conference on the topic. Points for discussion and decision are provided in paragraph 19.

## **II. Need for linking geospatial information to statistics and other data**

5. The geospatial and statistical communities are major contributors of information used as evidence in decision-making processes across many sectors, both public and private. With the increasing complexity of national and global challenges and issues, the need to understand the interrelationships across the economic, social and environmental pillars is becoming critical. In today's global community, there is a clear recognition of the need to link statistical information (which includes much socioeconomic information) and geospatial information (which includes much environmental information) to improve the relevance of the evidence on which decisions will be made. Understanding the impact of the environment on socioeconomic activities, and vice versa, is just one of the key issues currently being addressed locally, nationally and globally within the sustainable development agenda.

6. In its own right, geospatial information has become ubiquitous in almost every aspect of government, the economy and everyday life. Web-based mapping services, location-based technologies and services, including mobile and cloud computing, crowd-sourcing and volunteered geographic information are just some examples that reflect the importance of geo-referenced data and the emergence of geospatial information as an integral driver for economic growth. At the same time, there is an increasing realization from planners, programme managers and policy makers that adding a location to statistical and socioeconomic information brings substantial analytical benefits.

7. The need to link statistics to a location is increasingly acknowledged, but the challenge being faced is how best to achieve this integration in an effective and consistent way. This challenge was recognized by the Secretary-General in his report to the Statistical Commission in 2012 on global geospatial information management, in which he noted that the work on global geospatial information management over the past two to three years had confirmed that one of the key challenges was a better integration of geospatial and statistical information as a basis for sound and evidence-based decision-making (E/CN.3/2012/31, para. 14). The geographic dimension is indeed increasingly considered as key to virtually all national statistics, as it provides the spatial framework and structure for collecting, processing, storing and aggregating the data. Furthermore, it is generally recognized that "adding location information increases the value of statistics" (E/CN.3/2013/2, para. 1).

8. The Statistical Commission, inter alia, has recognized the need to meet the challenges of managing and effectively using geospatial information nationally and globally. Moreover, the development of geospatial information infrastructures, integrated with other information networks such as official statistics, will become as essential for countries and individuals as roads, telecommunications or other basic services.

## **III. Geocoding: the link between statistical data and geography**

9. The benefits of linking geospatial information to statistics are generally acknowledged, and reflected in the growing demand for statistical organizations to provide information for smaller and smaller geographic areas, including down to the unit level or geocode. Linking people, business, the economy, and other statistical data to a particular location can result in a fuller understanding of social, economic and environmental issues than is possible through a statistical information lens on its own. Location also provides a common factor or point of reference supporting the linking of diverse information. The geospatial community is starting to recognize the significance

of social and economic information as an important value-added element to their traditional focus on the natural and built environments, especially in domains like agriculture, land use, utilities, transportation, housing, energy, the environment, as well as geo-marketing and other business sectors.

10. As an example, for a National Statistical Office, mapping is one the most critical activities to conduct a population and housing census. The recent technological developments, especially the use of Global Positioning Systems (GPS) for location of dwellings or other geographic features, and Geographical Information Systems (GIS) for analysis and display of census information, have improved census mapping in fundamental ways. Specifically, the accuracy of the delineation of enumeration areas and the quality of their representation on a map has a crucial impact on the quality of the data collected and aggregated.

11. At the core of census mapping is the georeferencing process. A georeference can be obtained from a number of sources: a geocode obtained from geographic coordinates (often expressed as latitude and longitude); from a map or GPS device; from other geographic data such as street addresses; or via a region code. These georeferences are considered one of the basic common elements in statistics to which characteristics of persons, households and enterprises can be attributed and that can be used in a GIS. Assigning a location, usually in the form of coordinate values, to an address is becoming very popular and almost a basic function of a GIS (address matching). Technically, the geocode is the most precise and flexible link between geographic units and unit record census data. It is the foundation building block for the creation of any geospatial database.

12. In many countries, the National Statistical Offices (NSO) cannot commit resources and efforts to build their own geospatial information capacity. Producing base maps is not a core competency of the NSO, thus, building institutional arrangements to share geospatial data with other national organizations, such as the National Geospatial Information Agency (NGIA), is very beneficial to both the NSO and the NGIA. For example, the construction of a national census geospatial database can be employed in many different national contexts for numerous purposes. These examples show that NGIAs and NSOs have much to gain through actively participating in building a National Geospatial Information Infrastructure.

#### **IV. UN activities in progressing the integration of statistical information and geospatial information**

13. In response to the needs expressed by many countries for the use of geospatial tools and methodologies in their statistical activities, and particularly in support of their census activities, the United Nations Statistics Division (UNSD) has prepared guidelines for managers and census cartographers in the form of a Handbook<sup>1</sup>. UNSD also organized regional workshops on census mapping in all regions of the world, each carried out in the context of the 2010 World Population and Housing Census Programme. An international Seminar on 'Integrating Statistical and Geospatial Information - Issues and Challenges' took place in Seoul on 27 October 2011, as a side event to the First High Level Forum on Global Geospatial Information Management and the inaugural session of the Committee of Experts (24-26 Oct 2011). Co-organized by Statistics Korea, US Census Bureau, Eurostat, and UNSD, the seminar was attended by 62 participants, from 31 countries and 5 organizations (4 UN agencies and 1 private company).

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<sup>1</sup> Handbook on Geospatial Infrastructure in Support of Census Activities, UN publication, 2009, ST/ESA/STAT/SER.F/103:

14. Two side events dedicated to the integration of geospatial and statistical information were convened at the forty-third and forty-fourth sessions of the Statistical Commissions. The events included the use of cloud computing and the development of a geospatial statistical framework within the agenda and were well attended by many countries reflecting a growing and real interest in the topic.

15. At its forty-fourth session, in February 2013, the Statistical Commission adopted decision 44/101 “Programme review: developing a statistical-spatial framework in national statistics”. Specifically, the Statistical Commission:

- (a) Welcomed the programme review on developing a statistical-spatial framework in national statistical systems, expressed its appreciation to the Australian Bureau of Statistics for its excellent work, and noted with appreciation the contribution of the 52 countries that had responded to the review questionnaire;
- (b) Recognized the importance of the integration of geospatial information and statistics in supporting social, economic and environmental policy decision-making, including at the sub-national level;
- (c) Strongly supported the linking of social, economic and environmental data to time and location attributes in order to enrich and maximize the potential of statistical information, while noting the need to provide technical assistance to countries, developing countries in particular, in the early stages of the integration process;
- (d) Welcomed the proposal to organize an international conference as a way of reaching out and developing best practices, bringing together both statistical and geospatial professional communities, while bearing in mind the critical link with the informatics community, especially in the context of the current discussion on big data;
- (e) Also welcomed the proposal to develop an international statistical geospatial framework, taking into account existing national and international efforts;
- (f) Requested the United Nations Statistics Division to establish an expert group composed of representatives of both statistical and geospatial communities to carry out work on developing a statistical-spatial framework as a global standard for the integration of statistical and geospatial information, addressing various technical issues (for example, the choice of basic units), as well as institutional and information policy issues, especially those related to confidentiality, noted the expression of those interested in participating in the expert group, and thanked the Australian Central Bureau for offering to provide continued leadership; and
- (g) Requested the United Nations Statistics Division to report back to the Commission in due course.

## **V. Future directions**

16. As follow-up to the Statistical Commission decision described above, UNSD is working with the Australian Bureau of Statistics (ABS), which offered to provide continued leadership in this area. Draft terms of reference have been prepared and the process of establishing the expert group, to be composed of representatives of both statistical and geospatial communities, has been initiated. The terms of reference define the overall objectives of the expert group, the specific actions to achieve these objectives, membership, reporting arrangements, its organization, mandate, and other modalities. These terms of reference would be discussed and agreed upon at the first meeting of the expert group.

17. UNSD is also considering the organization of an international conference, gathering the geospatial and statistical communities, as a forum for exchange of ideas and good practices related to the integration of geospatial and statistical information. It would offer the opportunity to be organized in conjunction with the inaugural meeting of the expert group and, thus, kick start its establishment.

18. The Committee is invited to consider the Statistical Commission decision and recommendations. If the establishment of an expert group is supported, Committee members may wish to express interest in being involved in the expert group and participating in the international conference. UNSD, in its role as the Secretariat for both professional communities, will take forward the important issue of linking statistical and geospatial information and coordinate the involvement of the geospatial community in this expert group. Further, the Committee might like to invite that progress be reported back to it at a future meeting.

## **V. Points for discussion**

### **19. The Committee may wish to:**

- (a) Take note of the consultations held and the recommendations adopted by the forty-fourth session of the Statistical Commission;**
- (b) Take note of the creation of the expert group on the integration of geospatial information and statistical information and its terms of reference;**
- (c) Approve the involvement of the geospatial community in the expert group and participation in the international conference;**
- (d) Provide guidance on the time frame within which a progress report should be submitted at future meetings.**