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Economic and environmental questions: cartography

Global geospatial information management

Report of the Secretary-General

Summary

The present report is based on a process of extensive consultation with geospatial information experts from Member States of all regions. The importance of geospatial information in addressing humanitarian, peace and security, environmental and development challenges is stressed and the establishment of a global mechanism to discuss critical issues on geospatial information management is suggested. Information is provided on the activities of the United Nations in the field of geospatial information, including their legislative background, as well as on major initiatives at the national, regional and global levels in this field. In addition, the urgent need for better coordination facilitated by the United Nations is addressed and specific recommendations are made on the way forward, including the creation of a committee of experts on global geospatial information management.

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I. Introduction

1. The rapid advances in geospatial information and related technologies and their easy accessibility have made this type of information an invaluable tool in research, policy, and business planning and implementation. Across all sectors of society, it is increasingly recognized that the effective use of geospatial information helps in addressing many of the humanitarian, peace and security, environmental and development challenges facing the world, such as climate change, natural disasters, pandemics, famines, population displacement and food and economic crises, which are of a cross-border nature requiring global, regional and national policy responses.

2. Building infrastructure for the gathering, validation, compilation and dissemination of geospatial information is as important to countries as the building of roads and telecommunications networks and the provision of other basic services. It is a critical aspect of the national, regional and global information infrastructure. It is increasingly recognized, however, that the major barriers and impediments to building geospatial information infrastructure will not be technical in nature, but rather institutional and organizational, including the ability to bring countries together to cooperate with and learn from each other and to promote collaboration on the development of regional and global spatial data infrastructure standards. Hence, promoting international cooperation in capacity development, institutional strengthening and knowledge transfer to countries in need is a central development challenge. Progress in improving the availability and accessibility of global geospatial information will depend on how well countries cooperate with each other.

3. There is no global multilateral or intergovernmental mechanism that can play an important leadership role in setting the agenda for the development of global geospatial information and promote its use to address key global challenges; to liaise and coordinate among Member States and between countries and international organizations active in this field; and to ultimately serve as the leading entity of the global geospatial information community. It is proposed that the United Nations take this important lead.

4. The present report is submitted pursuant to a decision adopted by the Economic and Social Council at its substantive session of 2010, in which the Council requested the Secretary-General to submit to it in 2011 a report on global geographic¹ information management (decision 2010/240). It builds on discussions of the same topic by the United Nations Regional Cartographic Conferences for Asia and the Pacific and of the Americas, the Statistical Commission at its 2010 and 2011 sessions, the United Nations Group of Experts on Geographical Names and three preparatory meetings for the proposed Committee of Experts on Global Geospatial Information Management attended by Member States.²

¹ During the consultation process with Member States, the experts recommended the use of the term “geospatial information” instead of “geographic information” because it is more comprehensive and more commonly used at present.

² A total of 24 countries have participated in at least one of the three meetings: Australia, Brazil, Burkina Faso, Canada, Chile, China, Colombia, Cuba, Egypt, Finland, Germany, Guatemala, India, Japan, Malaysia, Mexico, Norway, Republic of Korea, Singapore, Sweden, Thailand, United Kingdom of Great Britain and Northern Ireland, United Republic of Tanzania and United States of America.

5. The report gives an overview of United Nations activities in the field of geospatial information, including their legislative background, as well as the major initiatives at the national, regional and global levels; addresses the need for a global coordination mechanism and makes recommendations regarding the creation of a committee of experts and its terms of reference.

II. United Nations geospatial information activities

6. Since 1948, the United Nations has been promoting better understanding of cartography, geographical names and geospatial information among the Member States through international cooperation as well as conferences, publications, training courses and technical projects. The Member States have recognized the importance of integrating geospatial information in public policy formulation, in disaster prevention and mitigation and in establishing a sound national information infrastructure.

A. Economic and Social Council resolutions on cartography and geospatial information

7. A summary of the resolutions and decisions adopted by the Economic and Social Council setting out the mandate and activities of the regional cartographic conferences and the United Nations Group of Experts on Geographical Names follows:

(a) In 1948, the Council adopted resolution 131 (VI) on the coordination of cartographic services of specialized agencies and international organizations, in which it recognized the importance of mapping for global activities and the benefits of coordinating cartographic services of the United Nations and its Member States. The Council highlighted the interest of several member Governments in a coordinated programme of international cartography;

(b) The adoption by the Council of resolutions 476 (XV) in 1953, 556 (XVIII) in 1954 and 1839 (LVI) in 1974 led to the establishment of regional cartographic conferences for Asia and the Pacific, the Americas and Africa;

(c) Subsequent resolutions of those conferences reaffirmed the need for regional and global cooperation on geospatial information and led to the establishment of the Permanent Committee on Geographic Information System (GIS) Infrastructure for Asia and the Pacific and the Permanent Committee on Spatial Data Infrastructure for the Americas;

(d) In its decision 2010/240, the Council, recalling resolution 7 of the eighteenth United Nations Regional Cartographic Conference for Asia and the Pacific, in which the Conference requested the Secretary-General to initiate discussions and prepare a report on global coordination of geographic information management, and decision 41/110 of the Statistical Commission, in which the Commission requested the Secretary-General to outline a global vision for geographic information management, requested the Secretary-General to submit to the Council at its 2011 substantive session a report on global geographic information management.

B. Regional cartographic conferences

8. The regional cartographic conferences for Asia and the Pacific (convened every three years; 18 conferences since 1955) and of the Americas (convened every four years; nine conferences since 1976) constitute an important regional mechanism for the exchange of information among national mapping and surveying authorities and the international scientific organizations active in geospatial information. They address common and critical issues affecting the work of national mapping organizations in this area.

9. From 1963 until the 1990s, nine regional cartographic conferences were hosted by the Economic Commission for Africa (ECA) in Addis Ababa. In 1997, the conference was replaced by the ECA Committee on Development Information and its subcommittee on geoinformation, since 2009 known as the Committee on Development Information, Science and Technology (CODIST). The role of CODIST is to review challenges and issues pertaining to information and communications technology, geoinformation and science and technology, formulate policies and strategies to address Africa's development challenges and determine priorities. The subcommittee on geoinformation meets every two years and has recently put much effort into the development of a spatial data infrastructure in Africa through the inventory of existing spatial data infrastructure, the development of a metadata profile for Africa and human capacity-building activities. The geospatial community in Africa has recently adopted a resolution to welcome the global geospatial information management initiative.

C. Geographical names

10. Since its first meeting, in 1960, the United Nations Group of Experts on Geographical Names has worked to promote the standardization of geographical names and the associated economic and social benefits. Geographical and linguistic divisions and working groups have been established as needed to address regional and specific global issues pertaining to the technical and cultural aspects of the standardization of geographical names. United Nations Conferences on the Standardization of Geographical Names are convened every five years (nine to date, with the next Conference to be held in 2012). Among recent projects, the Group of Experts, through its secretariat, has developed a multilingual, multiscriptural database of names of countries, capitals and major cities, available online free of charge.

D. United Nations support to intergovernmental geospatial activities

11. The Department of Economic and Social Affairs, through the Statistics Division, serves as the secretariat for the implementation of United Nations resolutions on geospatial information. It promotes the strategic use of geospatial information in Member States through the organization of regional cartographic conferences in Asia and the Pacific and the Americas, conferences on the standardization of geographical names and meetings of the United Nations Group of Experts on Geographical Names. It has developed methodological guidelines, training courses and technical assistance for the use of geospatial tools in support of census activities in developing countries.

12. The Cartographic Section of the Department of Field Support is responsible for providing cartographic and geospatial information services to the Security Council and the Secretariat, including all United Nations field missions, in support of decision-making and operational needs and for researching and analysing international boundary issues in support of conflict prevention and border demarcation exercises. The Cartographic Section is maintaining a digital base map of primary geospatial data layers with global coverage and at a small scale (1:1 million), which includes international boundaries, subnational administrative boundaries, coastlines, roads, railways, airports, drainage areas, bodies of water, physical places, populated places and urban areas. These are the fundamental data layers for thematic mapping of the globe, regions and countries.

13. Launched in 2001, the Second Administrative Level Boundaries data set project is providing the international community and individual countries with a working platform for the collection, management, visualization and sharing of data and information attached to administrative subdivisions down to the second subnational level of each Member State. The project, developed under the leadership of the World Health Organization, has been handed over to the United Nations Secretariat and is now supported by the Statistics Division and the Cartographic Section.

14. In the context of the 2010 World Population and Housing Census Programme, the Statistics Division has organized a series of expert group meetings and regional and subregional workshops on census mapping using GIS and other geospatial technologies and the processing, analysis and dissemination of census data. The Statistics Division, in partnership with the United Nations Children's Fund and the United Nations Population Fund, has developed a free software package with mapping functionalities, CensusInfo, to help countries disseminate their census data on CD-ROM and on the Internet.

E. Specialized agencies

15. The agencies, funds and programmes of the United Nations have focused on geospatial information activities related to the use of satellite imagery, the location of physical infrastructure and projects, thematic mapping and other spatial distribution analysis in support of their mandates in the areas of emergency and humanitarian assistance, safety and security, poverty mapping, pandemics and public health, food security and agriculture, oceans, the environment, natural resources and so on. Most of the entities are members of the United Nations Geographic Information Working Group, established in March 2000 to coordinate activities and recommend guidelines and policies concerning geospatial information within the United Nations system.

III. Developments in national, regional and global geospatial information

A. National initiatives

16. Several resolutions of the regional cartographic conferences have stressed that developing a functioning national spatial data infrastructure will better facilitate the

availability of and access to spatial data for governmental organizations, the private sector, universities and the general public. The national spatial data infrastructure provides a structure of practices among data producers and users that facilitates data-sharing and use and avoids costly duplication of data sets. It also provides a common geospatial reference base within the country on which thematic geospatial information is built.

17. A growing number of Member States (including Australia, Brazil, Canada, Chile and the United States of America) are building their national spatial data infrastructures and enhancing the management of their geospatial information. There are considerable benefits to be derived from effective knowledge management at the intergovernmental level. Furthermore, many national mapping and geospatial agencies are increasingly willing to work at the international level and have carried out exchange activities and bilateral cooperation work. It is increasingly clear that there is a need for Member States to share their experiences and to engage in discussion on both policy and technical issues in the area of geospatial information.

B. Regional initiatives

18. At the regional level, cooperation on geospatial information projects is emerging, as in the case of a unique geocentric reference system for the American continent. The Asia and Pacific region has been carrying out the similar geodetic reference work and developing the Asia and Pacific Spatial Data Infrastructure clearinghouse portal. The African Geodetic Reference Frame project has been set up to create a basis for national and regional three-dimensional reference networks consistent with the International Terrestrial Reference Frame. In Europe, EUREF, a subcommission of the International Association of Geodesy, is responsible for the maintenance of the European Geodetic Reference Frame (ETRS89).

19. The European Parliament in 2007 established the Infrastructure for Spatial Information in Europe (INSPIRE) to ensure that the spatial data infrastructures of member countries are compatible and to make geospatial information more readily available for policymaking in the European Union. INSPIRE, based on the spatial information infrastructures established by the members of the European Union, addresses 34 spatial data themes needed for environmental applications, with key components specified through technical implementing rules. This makes INSPIRE a unique example of a legislated regional approach, which is promoted by the European Commission and other regional bodies, such as the European Umbrella Organization for Geographic Information.

20. The Permanent Committee on GIS Infrastructure for Asia and the Pacific, the Permanent Committee for Geospatial Data Infrastructure of the Americas, CODIST, in Africa, and EuroGeographics, an organization of European national mapping, land registry and cadastral agencies, are intergovernmental bodies established to coordinate geospatial information activities in the countries of their respective regions.

C. Global initiatives

21. The use of geospatial information is becoming a major thrust of initiatives within the global community. There are already several programmes under way for

implementing transnational geospatial data infrastructures by Governments or driven by military or commercial interests, which aim to improve the quality of observations and interpretation, manage large quantities of global data and communicate the results of global change research to the international community. Examples of some major initiatives are provided below.

Global spatial data infrastructure

22. The Global Spatial Data Infrastructure Association is a non-profit organization comprising agencies, firms and individuals from around the world. The purpose of the organization is to promote international cooperation and collaboration in support of local, national and international spatial data infrastructure developments that will allow nations to better address social, economic and environmental issues of pressing importance.

Global Earth Observation System of Systems

23. The Group on Earth Observations, with 86 member countries, is coordinating international efforts to build a Global Earth Observation System of Systems. This emerging public infrastructure is interconnecting a diverse and growing array of instruments and systems for monitoring and forecasting changes in the global environment. It supports policymakers, resource managers, science researchers and many other experts and decision makers.

Global map

24. The global mapping project is an international cooperation initiative launched in 1996 through the voluntary participation of national mapping organizations, led by the International Steering Committee for Global Mapping and its secretariat, the Geospatial Information Authority of Japan. The project is aimed at the development of digital geoinformation framework data sets ensuring spatial resolution at 1 km (scale of 1:1 million), with standardized specifications, available to all at marginal cost. Global map data sets consist of eight basic layers (boundaries, drainage, transportation, population centres, elevation, land cover, land use and vegetation). Currently, 181 countries and regions, including Antarctica, are participating in the project. Data sets for 71 countries and 4 regions have been released covering 60 per cent of the land area, and those for another 64 countries are being validated for future release.

Multinational Geospatial Coproduction Programme

25. Since its inception in November 2003, the Multinational Geospatial Coproduction Programme (MGCP) has been working towards the development of international cooperative production and the coordination of digital vector data (scale of 1:50,000) based on high-resolution satellite imagery in high-interest regions where there are inadequate data. At present, 28 nations are participating in the project.³ All MGCP data producers are populating the data set at the International Geospatial Warehouse, which is established and maintained by the

³ Australia, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Netherlands, New Zealand, Norway, Poland, Portugal, Republic of Moldova, Romania, Slovakia, Spain, Sweden, Turkey, United Kingdom and United States.

United States National Geospatial-Intelligence Agency, for the storage, exchange and use of geospatial information. The project is scheduled to run to 31 December 2011.

Other professional initiatives

26. The Cambridge Conference, organized by the Ordnance Survey of the United Kingdom of Great Britain and Northern Ireland, is held every four years, with the Exchange Conference, held in the interim. It brings together the chief executives of national mapping agencies from across the world to discuss ideas and share experiences.

27. The Joint Board of Geospatial Information Societies⁴ is a coalition of leading international geospatial societies set up to speak on behalf of the geospatial profession at the international level, especially to the United Nations and other global stakeholders.

28. International standards for exchanging geospatial and temporal data have been in development since the early 1990s, mainly through the work of the International Organization for Standardization (ISO) Technical Committee 211 on geographic information and geomatics, the Open Geospatial Consortium (OGC) and the Unicode Consortium. While ISO Technical Committee 211 produces international standards for geographic information and geomatics through a country-driven balloting process, OGC is an international industry consortium of more than 423 companies, Government agencies and universities developing and establishing common interfaces that “geo-enable” the Internet and mainstream information technology. Its work can be seen as complementary in the sense that the ISO standards form the foundation and OGC specifications implement the standards.

IV. Global mechanism on Global Geospatial Information Management

A. Need for a global consultation mechanism

29. At present, a number of gaps in the management of geospatial information globally have been identified.

30. First, there is a lack of United Nations intergovernmental processes in the area of global geospatial information to work with Member States to set global norms on geospatial information, develop common tools and bring geospatial information to bear on global policy issues. In the expert community of Member States, there is a general recognition of the need for a global mechanism, namely, a multilateral consultative process, to effectively coordinate ongoing work in the wide field of geospatial information. Without such a global coordinating mechanism, the risk of further fragmentation is very high, which would greatly hamper the development of

⁴ Current members: Global Spatial Data Infrastructure Association, IEEE Geoscience and Remote Sensing Society, International Association of Geodesy, International Cartographic Association, International Federation of Surveyors, International Geographic Union, International Hydrographic Organization, International Map Trade Association, International Society of Photogrammetry and Remote Sensing and International Steering Committee for Global Mapping.

national spatial data infrastructure and the coordinated use of global geospatial information.

31. Second, United Nations activities have supported Member States in the areas of cartography, the standardization of geographical names and the deployment of GIS technology. These are important work programmes and they are very well supported by Member States. There are many more components of a geospatial information infrastructure that the United Nations could facilitate, however, such as demographic, health, environmental, topographic, cadastral and economic information. This was recognized as early as 1948, when the Economic and Social Council, in its resolution 131 (VI), called for a coordinated programme of international cartography and recognized the importance of maps to global activities.

32. Third, various national, regional and global initiatives show that expanding the traditional role of cartography and aligning it with the management of geospatial information and spatial data infrastructure is greatly needed to cater to an extended base of information-users, who require not only maps, but also location-based applications and services. Global issues such as climate change, natural disasters, food and epidemic crises, disruptions to peace and security and the need for humanitarian assistance all require strong support for geospatial information on a global scale.

33. The establishment of a formal framework would enable Member States to develop effective strategies for building and strengthening their capacity for the management of geospatial information, especially developing countries, and help to address the global challenges that are facing the world, which are interconnected, interdependent and quintessentially geospatial, with cross-border and global impacts. A successful response to such global challenges as natural disasters and pandemics in the years to come will depend largely on the quality and timeliness of the geospatial information available to users and the ways in which the essential data are managed and shared.

34. Such a global mechanism, under the auspices of the United Nations, could furthermore raise the awareness of politicians and decision makers of the scope and significance of geospatial or location-based information, its powerful analytical potential when effectively integrated with statistical and other information systems and ultimately the critical importance of location-based information for sustainable socio-economic development.

B. Committee of experts on global geospatial information management

35. On the basis of the views expressed during extensive consultations among Member States at various informal expert meetings, it is proposed that a committee of experts be established similar to the United Nations Group of Experts on Geographical Names. The committee would meet annually and be charged with the identification and coordination of specific areas of work and the preparation of policy papers for consultation among Member States. The Statistics Division, in collaboration with the Cartographic Section, has organized three preparatory meetings of the proposed committee of experts on global geospatial information management to consult with Member States on its mandate and terms of reference.

36. The committee of experts would perform the following functions:

(a) Provide an intergovernmental platform for discussion on global geospatial information management issues, wider than that currently offered by the regional cartographic conferences held in Asia and the Pacific, Africa and the Americas;

(b) Bring the regional perspectives together and help evolve a global community of practice;

(c) Help to enhance the institutional integration of geospatial information with other types of information, such as statistical or humanitarian assistance information;

(d) Through dialogue with the Statistical Commission, the Commission on Population and Development and other specialized intergovernmental bodies, help to create a common information base.

37. The proposed terms of reference of the proposed committee are provided in the annex.

38. In conjunction with the work of the committee of experts, it is proposed that additional multi-stakeholder high-level gatherings on global geospatial information management be organized from time to time to provide an opportunity for in-depth discussion and consultation with Governments, non-governmental organizations and the private sector. Such global forums could bring all Member States and stakeholders together to address current critical issues and exchange information, in particular for sharing best practices regarding legal and policy instruments, institutional management models, technical solutions and standards the interoperability of systems and data and the sharing of mechanisms that guarantee that geospatial information and services are accessible easily and in a timely manner. Some Member States have expressed their interest and willingness to host such a global forum.⁵

V. Conclusions and recommendations

39. Many Member States are using geospatial information as an important element in the formulation of national policy, but despite the progress made by most developed countries in this area, many developing countries are still experiencing a serious lack of institutional capacity to harness the enormous potential of geospatial information technologies and to build a sustainable national infrastructure. This is combined with a lack of effective cooperation among countries.

40. Regional efforts, like those of the European Union to create the INSPIRE directive, and those of the Permanent Committee for Geospatial Data Infrastructure of the Americas and the Permanent Committee on GIS Infrastructure for Asia and the Pacific to create regional spatial data infrastructures are an indication of the value of such cooperation. Increased international cooperation in this field could help to develop the full potential of geospatial information and the underlying

⁵ The Republic of Korea has expressed its commitment to host a high-level forum on global geospatial information management in Seoul from 24 to 26 October 2011.

technologies and make them more useful and accessible to a wide range of users and policymakers.

41. In response to the rapid rise in the availability of and access to geospatial information and the need for such information in humanitarian responses and disaster relief operations, Member States have come to the realization that a global consultation mechanism is required to address critical management issues concerning geospatial information in a comprehensive manner. Such a global intergovernmental mechanism would serve as the foremost entity of the global geospatial information community to provide global coordination and support.

42. Member States and international professional bodies have widely supported the idea of establishing a committee of experts on global geospatial information management.⁶ The regional cartographic conference for Asia and the Pacific explicitly noted the absence of a United Nations consultation process led by Member States to deal with global geospatial information management and the desire of Member States for such a global mechanism to develop common frameworks and tools and a process of standardization, for which the United Nations has a key mandate.

43. To address the gaps in global cooperation on geospatial information management and sharing, the Council may wish to take the following actions:

(a) Take note of the present report and of the urgent need to take concrete action to foster and strengthen global cooperation in the area of geospatial information management, particularly through the United Nations;

(b) Encourage stronger engagement by Member States, at both the technical and policy levels, through the establishment of a global mechanism to address issues related to the management and sharing of global geospatial information;

(c) Decide to establish the Committee of Experts on Global Geospatial Information Management to perform the functions set out in the proposed terms of reference (see annex);

(d) Recognize the need to hold high-level discussions through global forums from time to time;

(e) Encourage stronger efforts to be made at the national, regional and global levels by Member States and international organizations for facilitating the transfer of knowledge and expertise to develop the capacity of developing countries in this field.

⁶ The meetings of the committee would be organized within existing resources and following standard United Nations practice, which means that the expenses of the participating experts would be borne by their own offices and the meetings would be conducted with limited conference-servicing support. Meanwhile, the Statistics Division will undertake efforts to create a trust fund to support the work of the committee and facilitate the participation of experts from developing countries.

Annex

Proposed terms of reference of the Committee of Experts on Global Geospatial Information Management

1. The proposed terms of reference of the Committee of Experts on Global Geospatial Information Management include the basic aims of the Committee, its membership and composition, the term of office of members, reporting procedures, the frequency of meetings, secretariat arrangements and documentation and resource requirements.

2. The basic aims of the Committee of Experts are:

(a) To play a leadership role in setting the agenda for the management of global geospatial information and promote its development so as to address key global challenges (poverty reduction, sustainable development, climate change, early warning, disaster management, peace and security, environmental quality, energy and infrastructure, economic crises, etc.);

(b) To provide a vehicle for liaison and coordination among Member States and between Member States and international organizations, including the regional cartographic conferences and the related permanent committees, on work associated with the management of global geospatial information and to demonstrate the benefits to be derived from such coordination;

(c) To propose workplans to define actions to guide the development of principles, policies, methods and mechanisms for the standardization, interoperability and sharing of geospatial data and services, to help countries to develop the full potential of geospatial information and the underlying technology and to make it accessible to and able to be used effectively by a broad range of users;

(d) To compile and disseminate the best practices of national, regional and international bodies dealing with legal instruments, management models and technical standards for the building of spatial data infrastructures as one of the vital elements of information management and to facilitate the dissemination of those practices and experiences to States Members of the United Nations;

(e) To provide a platform for the development of effective strategies on how to build and strengthen capacity for the management of geospatial information, especially in developing countries;

(f) To support the organization of high-level forums on global geospatial information management by developing their agendas and facilitating their arrangements and consider proposals emanating from discussions at the high-level forums.

Membership, composition and term of office

3. The Committee of Experts would comprise experts from all Member States, with experts from international organizations participating as observers. The membership would be drawn from the interrelated fields of surveying, geography, cartography and mapping, remote sensing, land/sea and geographic information systems and environmental protection so as to avoid the need to engage consultants

and to ensure geographical and gender balance. During each session the Committee would elect two co-chairs from among its membership. The Committee could also establish, as and when needed, informal working groups or subcommittees to deal with specific issues related to its work programme.

Reporting procedure

4. The Committee of Experts would report to the Economic and Social Council.

Frequency of meetings

5. The Committee of Experts would meet annually.

Secretariat

6. The Committee of Experts would be supported by the Statistics Division of the Department of Economic and Social Affairs and the Cartographic Section of the Department of Field Support.

Documentation

7. The documentation required for the meetings would include the agenda, any previous report of the Committee of Experts, thematic notes prepared by working groups or subcommittees, notes by the secretariat and other relevant documentation of external experts or expert groups.

Resource requirements

8. The activities of the Group of Experts would be carried out within existing resources, with no budgetary implications.
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