ADVANCE UNEDITED VERSION

UNITED NATIONS **E/C.20/2018/16/Add.1**

Economic and Social Council

24 July 2018

Committee of Experts on Global Geospatial Information Management
Eighth session
New York, 1-3 August 2018
Item 15 of the provisional agenda*
National geospatial data and information systems

National geospatial data and information systems

Note by the Secretariat

Summary

The present paper contains the report of the Secretariat, prepared with the assistance of the World Bank Group, on new developments with regard to national geospatial data and information systems for consideration by the Committee of Experts on Global Geospatial Information Management.

At its seventh session, held in New York from 2 to 4 August 2017, the Committee of Experts adopted decision 7/112, in which it expressed support for the collaborative agreement between the Statistics Division and the World Bank, which formulated a joint vision to promote growth and prosperity, to assist countries to take practical actions to achieve a digital transformation, and to bridge the geospatial digital divide in the implementation of the 2030 Agenda for Sustainable Development. Also in decision 7/112, the Committee of Experts acknowledged the need for collaboration to develop an overarching geospatial framework that countries could reference when implementing integrated evidence-based decision-making solutions that maximized and leveraged national systems tailored to their own situations. In this report, information is provided on the joint efforts made by the Statistics Division and the World Bank to develop an integrated geospatial information framework as an overarching strategic policy guide and reference for countries that are developing, strengthening and modernizing their national geospatial information management, systems and infrastructure, capacities and capabilities in order to achieve national strategic priorities and the Sustainable Development Goals.

* E/C.20/2018/1

I. Introduction

1. In adopting resolution 2016/27 entitled 'Strengthening institutional arrangements on geospatial information management'[1] in July 2016, the United Nations Economic and Social Council (ECOSOC) acknowledged the considerable achievements of the Committee of Experts and its role in the implementation of the 2030 Agenda for Sustainable Development, and stressed the continued need to strengthen the coordination and coherence of global geospatial information management in capacity-building, norm-setting, data collection, data dissemination and data sharing, among others, through appropriate coordination mechanisms.

2. Over the 2016-2017 period, the UN-GGIM Expanded Bureau, Secretariat and the World Bank discussed and explored possible mechanisms and modalities for creating an enabling environment for geospatial data, infrastructure and related policies and processes to be embedded more holistically within concessional financing, technical assistance and knowledge-sharing services, and their subsequent implementation in developing countries. This complemented the World Bank's goal to ensure that, in each country in which the World Bank operates, geospatial information is able to underpin future development decision-making in a transparent way, and assists in many aspects of the country's work, including their measuring and monitoring processes.

3. These discussions were realized in August 2017 when, at the seventh session of the Committee of Experts, the United Nations Statistics Division (UNSD) and the World Bank's Global Practice on Social, Urban and Rural Development and Resilience (GSURR) signed a Collaborative Agreement to 'Assist Countries to Bridge the Geospatial Digital Divide'. The Agreement formulated a joint vision to promote growth and prosperity through creating and strengthening capacity development, to assist countries to move towards e-economies, improve services to citizens, build capacity for using geospatial technology, enhance informed government decision making processes, to take practical actions to achieve a digital transformation, and to bridge the geospatial digital divide in the implementation of national strategic priorities and the 2030 Agenda for Sustainable Development.

4. At its seventh session in August 2017, the Committee of Experts adopted decision 7/112, in which it noted the report of the Secretariat, prepared with the assistance of the World Bank, on new developments with regard to geospatial data and information systems and the progress made by the Bureau; welcomed and expressed support for the Collaborative Agreement between UNSD and the World Bank; applauded the timeliness of the initiative as an urgent mechanism to assist countries in further developing their national geospatial information systems; and acknowledged the need for collaboration to develop an overarching geospatial framework that countries could reference when implementing integrated evidence-based decision-making solutions that maximized and leveraged national systems tailored to their own situations.

5. In this present report, information is provided on the joint efforts made by UNSD and the World Bank to develop an Integrated Geospatial Information Framework as an overarching strategic policy guide and reference for countries that are developing, strengthening and modernizing their national geospatial information management systems, infrastructure, capacities and capabilities in

[1] Strengthening institutional arrangements on geospatial information management, E/RES/2016/27. https://undocs.org/E/RES/2016/27

order to achieve national strategic priorities and the Sustainable Development Goals (SDGs). The Committee of Experts is invited to take note of the report and to express its views on the way forward on new developments with regard to national geospatial data and information systems, and to assist countries to bridge the geospatial digital divide. Points for discussion and decision are provided in paragraph 33.

II. Evolving an overarching geospatial information framework to develop national systems

6. A key deliverable of the UNSD and World Bank collaboration is to develop an overarching geospatial information framework for countries to reference when developing and strengthening their national and sub-national spatial data infrastructures. The aim being to develop and implement mechanisms to establish the framework holistically in such a way that transformational change is enabled, visible and sustainable. Direct benefits will include encapsulating new and innovative approaches to national geospatial information management, implementing integrated evidence-based decision-making solutions, and maximizing and leveraging national information systems tailored to individual country's own situations.

7. Another very important focus of the collaboration includes assisting countries to prepare and implement country-level Action Plans and road maps to operationalize the geospatial framework, taking into consideration national circumstances and priorities. The country-level Action Plans will include elements such as the economic impact and value of geospatial information systems, identification of investment needs, priorities, analysis of socio-economic benefits and potential funding sources.

8. With the ambition of providing the Committee of Experts with an appropriate geospatial framework for adoption at this eighth session, UNSD and the World Bank embarked on an aggressive programme of work towards achieving such an outcome. In September 2017, UNSD and the World Bank commissioned a body of work to outline and document aspects and requirements, including context and understanding, to develop the overarching geospatial framework. This included considering new methods, approaches and tools to strengthen national geospatial data and information systems. This guidance sought to identify any gaps that will require further input, and the development and preparation of mechanisms to establish geospatial information management systems in developing countries.

9. This initial work was guided by the UN-GGIM Expanded Bureau, the World Bank, the UN-GGIM Expert and Working Groups, and by the Secretariat. A first draft of the main elements of an 'Integrated Geospatial Framework' was presented to and discussed at length by the Expanded Bureau at its its fourth annual meeting immediately following the Fifth High Level Forum on Global Geospatial Information Management in Mexico City, Mexico on 1 December 2017. At that time, three important features were noted: i) the Framework is to be fully endorsed and owned by the Committee of Experts; ii) consultations on the Framework are to be conducted globally; and iii) the Framework is to be tested by Member States. It was then decided that the Framework would continue to evolve and be discussed at a specific expert consultation workshop on the margins of the World Bank's Land and Poverty Conference in Washington, D.C. in March 2018.

10. As the draft of the Framework evolved in the first months of 2018, opportunities were taken to socialize the Framework at opportune times with Member States and

other key stakeholders. Prior to the March consultation at the World Bank, a roundtable was organized by UNSD together with the World Bank on the margins of the First Arab Land Conference on 28 February 2018 in Dubai, United Arab Emirates. The objective of the roundtable was to inform and seek feedback on the rationale and ongoing development of the Framework. The roundtable was well attended by stakeholders who applauded the initiative, urged the development to address technical, economic and capacity issues, and to be ambitious, comprehensive, and serve all countries.

11. A draft 'Towards an Integrated Geospatial Framework (version 2.0)' was the subject of a consultation organized by the World Bank on 19 March 2018 on the margins of the Land and Poverty Conference at the World Bank in Washington D.C. The objectives of this consultative workshop were to discuss and test the main elements of the draft (version 2.0) with the group of invited experts. The consultation was well-attended, provided more clarity, constructively highlighted additional elements needed to be included in the overall Framework development process, and provided additional guidance for the next iteration of the draft.

12. Recognizing that the Framework is aimed at strengthening geospatial capability and capacity in developing countries, a further consultative workshop was convened by the Secretariat in Addis Ababa, Ethiopia on 27 April 2018, on the margins of the International Workshop on Global Fundamental Geospatial Data Themes for Africa. This proved a very fruitful exercise, as the African countries were able to voice their concerns towards ensuring that the Framework is organized in such a way that it could be readily used as a guidance to establish a geospatial information management system in their countries.

13. A further consultation on the Framework was convened by the World Bank during the EuroGeographics Extraordinary General Assembly in Leuven, Belgium, on 15-16 May 2018. With participants primarily representing developed countries, it was observed that the document was not yet a high-level, overarching framework which will persuade politicians and finance ministers that it is necessary to invest in geospatial information, and to then help develop country specific action plans to do so. It was also noted that it was 'developed country' centric, and assuming many of the links and infrastructure are already in place for countries.

14. An expert group write-shop was then convened in New York at the United Nations Headquarters from 21-25 May 2018, to review, revise and finalise the draft Framework in preparation for global consultation prior to its provision to the Committee of Experts at this eighth session for adoption. After considering the feedback received through the various informal rounds of consultations over the previous months, the comments revealed that the draft Framework was well written and provided a very solid foundation for why countries require an Integrated Geospatial Framework. However, the feedback also suggested that the Framework did not quite meet a number of expectations and aspirations of the overarching Framework, and how it is envisaged to be used. Therefore, the expert group, taking into account the valuable comments and information provided, restructured the draft Framework in such a way that it would meet the required expectations of the geospatial community, and of the Committee of Experts when making decision 7/112; to develop an overarching geospatial framework that countries could reference when implementing integrated evidence-based decision-making solutions that maximized and leveraged national systems tailored to their own situations. The outcome of the week long write-shop was the formulation of a draft 'Integrated Geospatial Information Framework' for global consultation with Member States.

III. Integrated Geospatial Information Framework

Overview

15. The Integrated Geospatial Information Framework has been developed with the knowledge that it will be a living document, and will be further refined as technologies, processes and knowledge evolves. It is intended to provide a basis and guide for countries when developing and strengthening their national and subnational arrangements in geospatial information management and related infrastructures, and comprises three (3) parts as separate, but connected, documents:

(a) **Part 1: Overarching Strategic Framework** presents a forward-looking Framework built on national needs and circumstances, and provides the overarching strategic messages and more expansive and integrated national framework, particularly focusing on policy, perspectives and elements of geospatial information. It sets the context of 'why' geospatial information management is a critical element of national social, economic and environmental development via seven (7) underpinning principles, eight (8) goals and nine (9) strategic pathways that lead to a national approach that takes account of national circumstances, priorities and perspectives. The Overarching Strategic Framework is intended for a wide range of stakeholders – these primarily being high-level policy and decision makers, institutions and organizations within and across government.

(b) **Part 2: Implementation Guide** is the detail document that provides the 'what', the specific guidance and actions to be taken in implementing the Framework. Expanding on each of the nine strategic pathways, the Guide comprises reference guides, good practices and specific principles for each of the strategic pathways, including those generated through each of the Subcommittee, Expert and Working Groups of the Committee of Experts. The aim is to provide guidance for governments to establish 'nationally' integrated geospatial information frameworks in such a way that transformational, albeit staged, change is enabled, visible and sustainable.

(c) **Part 3: Country-level Action Plans** will provide templates and guides to operationalize the Framework in a national and sub-national context. Providing the 'how, when and who' approach, this document will assist countries to prepare and implement their own country-level Action Plans taking into consideration national circumstances and priorities. The country-level Action Plans will include elements such as the economic impact and value of geospatial information systems, identification of investment needs, priorities, sequenced implementation through identification of short, medium and long-term activities, and potential funding sources.

16. Although the Integrated Geospatial Information Framework comprises three separate but connected documents, it is only the Overarching Strategic Framework that has been fully reviewed by Member States through the global consultation, and is now complete. The outline, structure and first components of the Implementation Guide have been developed, and noted in the global consultation, so that the connections between the two (Part 1 and Part 2) documents can be understood. Importantly, Part 1 and Part 2 are anchored and connected by each of the nine strategic pathways.

17. Part 1: Overarching Strategic Framework is provided as Annex II to this present report, and is presented for adoption by the Committee of Experts. Part 2:

Implementation Guide has been reviewed by Member States for structure and components, and is still to be completed. The outline and structure of the Implementation Guide is provided as a background document to this present report, and is presented for in-principle agreement by the Committee of Experts. It is anticipated that the Implementation Guide will be brought to the attention of the Committee for adoption at its ninth session in August 2019. Part 3: Country-level Action Plans is still to be developed, and will also be brought to the attention of the Committee of Experts at its ninth session in August 2019. It should be noted that dedicated resources and expertise will be required to achieve these outcomes within the August 2019 time frames.

Global Consultation

18. The Secretariat provided drafts of Part 1 and Part 2 of the Integrated Geospatial Information Framework to Member States for global consultation on 14 June 2018. The consultation requested that Part 1 be subjected to detailed review and comment, with the objective of adoption by the Committee of Experts at this eighth session. The consultation also requested that Part 2, although still under development, be reviewed for in-principle agreement of its structure by the Committee at this eighth session. The consultation sought inputs regarding the overall substance of the Framework, if the approaches and levels of detail were suitable, and if the structure of three separate but connected documents was a reasonable approach to deliver the Integrated Geospatial Information Framework to our global community. The consultation process was open for one month, although responses were accepted through to 20 July 2018.

19. The global consultation realized valuable and constructive responses from 36 Member States: The World Bank; the Economic Commission for Africa (ECA); the Economic Commission for Latin America and the Caribbean (ECLAC); and the Economic and Social Commission for Western Asia (ESCWA). Of the 36 Member State responses, approximately half were from developing countries. The full list of respondents is provided as Annex I to this present report. The following paragraphs provide a general summary and overview of the responses.

20. Without exception, the critical importance of the Integrated Geospatial Information Framework for geospatial information management was recognized. All respondents welcomed and supported the Framework as being a vital policy tool and of benefit for the implementation of national development strategies, and the implementation of the SDGs, especially in developing countries. There was full agreement to develop the Framework in three parts as separate, but connected, documents as suggested. It was recognized that the Framework forms an important set of documents that provides good advice, and a balanced and prioritized set of objectives and actions to be undertaken to develop national geospatial strategies.

21. Respondents agreed with the Overarching Strategic Framework as a means to provide the high level strategic overview and fully supported and endorsed the Framework and proposed methods. Respondents also agreed that the Implementation Guide is on the right track with its structure and outline, although concerns were expressed it may end up being a very long document. Respondents noted that the Country-level Action Plans should be based on examples and case studies from pilot countries. It was also suggested that piloting the Implementation Guide in at least one developing country in Africa would help to produce a Guide that can be used in the practical implementation of the Framework based on the realities of developing countries.

Overarching Strategic Framework

22. Respondents observed that the Overarching Strategic Framework contained the right issues and matters necessary for such a document. It was noted that the language is at the right level, understandable and not too technical. The approach and level of detail is logical and reflects new concepts and items not previously considered. The Framework is seen as being comprehensive and provides a clear vision and mission on how to develop and facilitate the utilization of geospatial information at the national level. For developing countries, it is a valuable tool to be utilized to bridge the geospatial digital divide. Despite its comprehensiveness, the Framework is still clear enough to be used at the highest level. It was considered valuable to identify the seven underpinning principles, eight goals and nine strategic pathways; several countries even expressed interest to expand these further. Several countries already plan to use the Framework as a manual for further national geospatial development.

23. Developing countries reiterated the importance of international cooperation in the Framework, as it is a major goal to have well established international cooperation and partnerships that support national development and capacity-building interests in situations where countries are just beginning to spread the importance of geospatial information across national aspects. International cooperation donors require a strong business case and confidence in governance before releasing funds to countries. Given the breadth of potential audience, it was suggested that there should be more emphasis on making the case to decision makers and finance institutions on direct and indirect benefits, and benefits realization, of geospatial information. This includes appreciation of the widespread benefits accruing a long time after the initial investment has been made, treating it like an infrastructure. This would ensure that decision-makers then have a fuller understanding of not only what investment is required, but what the long-term benefits may be. The strategic pathways within the Framework provide a checklist of components that help deliver more sustainable programs and projects for donors, and provides a mechanism for better coordination between donors in considering 'which donor does which element'.

24. It was observed by a small number of developed countries that the Framework may be too long and repetitive in substance and structure, particularly in the early sections of the document. It was suggested that the vision and mission be reduced and that the principles, goals and strategic pathways may be overloading the core messages to policy makers with too many details, and that the document should be significantly reduced and the language more direct. Conversely, the developing countries overwhelmingly welcomed the present structure of the Framework, as there is a complete absence of understanding of key messages and elements that communicate the message and need to policy makers in developing countries. These countries are seeking more detail so that the key areas of international cooperation and capacity development could be better understood and recognized. This has been addressed by reviewing the Framework and consolidating aspects of the text that have appeared duplicative and non-critical. A further option, as was also suggested, is to produce a separate 4-6 page glossy and illustrative executive summary aimed directly at communicating key messages to policy makers.

25. Comparisons of the Framework were also made with more developed guidelines in related sectors, which were more concrete and mature, and that provided well-articulated courses of action. However, it must be acknowledged that these comparable guides were developed over several years and with significant investment and resources provided. That said, as the Framework is a living

document and will evolve, it is readily able to be strengthened and calibrated with more direct advice on what counties should aim for in terms of geospatial infrastructure and services, and how to make such a Framework sustainable in the long-term. The dilemma, to some degree, is to not compare the Framework directly with a national spatial data infrastructure (NSDI), which it is not; it is intended to be placed above the NSDI.

26. Due to the time of year for some European Member States, it was observed that there was not enough time available to carefully evaluate and assess the Overarching Strategic Framework, and that the consultation period for the Implementation Guide and Country-level Action Plans should be more extensive, and allowing for more time to consider the technical detail. In addition, several Member States also offered to contribute to drafting and developing the detail and descriptions of the Implementation Guide and Country-level Action Plans. Both suggestions are acknowledged and welcomed by the Secretariat.

27. A few respondents observed that the Overarching Strategic Framework did not directly reference the many current activities, guides and frameworks of the Committee of Experts. By way of examples, the Global Statistical Geospatial Framework, the Standards Guides, the Compendium on Licensing of Geospatial Information, the National Institutional Arrangements Framework, Fundamental Geospatial Data Themes, and the Shared Guiding Principles for Geospatial Information Management. This lack of specific referencing is intentional. It is intended that the Implementation Guide will build upon each of these activities and relationships in considerable detail through each of the nine strategic pathways – which capture the activities and themes of the work of the Committee of Experts. The Overarching Strategic Framework is an 'overarching' document that stands above all the activities of the Committee of Experts.

28. Included in the responses were offers from Member States to reference and leverage existing regional and national frameworks within the Integrated Geospatial Information Framework. Australia offered the ANZLIC Foundation Spatial Data Framework (FSDF) to be identified as an example of an existing national framework implementation to be referenced in the Implementation Guide. New Zealand suggested the Pacific Geospatial and Surveying Council Strategy 2017-2027. UN-GGIM: Africa referenced the Geospatial Information for Sustainable Development in Africa: African Action Plan on Global Geospatial Information Management. Mexico suggested the National System of Statistical and Geographic Information (SNIEG). Each of these initiatives, along with INSPIRE, were referenced as resource documents during the expert group write-shop in May 2018.

IV. Summary and next steps

29. The Integrated Geospatial Information Framework provides strategic guidance for Member States to develop and strengthen their national and subnational arrangements in geospatial information management and related infrastructures, and comprises three parts as separate, but connected, documents. It is both an ambitious and critical piece of work for the global geospatial community. Developed as a collaboration between UNSD and the World Bank, its original intent was to provide a basis and guide for lower to middle income countries. However, as the Framework has evolved, and will continue to evolve as a living document in the years ahead, it has become apparent that many high income and developed countries will also significantly benefit from the integrative and inclusive strategic nature of the Framework. The Framework and its guidance build upon the existing body of work of the Committee of Experts and the World Bank, and aims to identify

gaps that will require further input, especially related to the establishment of geospatial information management practices in developing countries.

30. Since the seventh session of the Committee of Experts, the Overarching Strategic Framework has been developed, reviewed by multiple stakeholders, subjected to a global consultation by all Member States, refined and completed; such is the sense of urgency of this work. The Overarching Strategic Framework is provided as Annex II to this present report, and is presented for adoption by the Committee of Experts. This Overarching Strategic Framework anchors and frames the two remaining documents – the Implementation Guide and the Country-level Action Plans.

31. While many of the elements are in place in draft form, including the structure and connectivity to the Overarching Strategic Framework, the Implementation Guide will need to be completed with the same sense of urgency in the coming months. Given the overwhelmingly positive response thus far, the Committee of Experts may wish to consider the most effective means, including resourcing requirements, to complete the Implementation Guide – possibly with support from interested Member States and experts through a dedicated and resourced working group.

32. Over the upcoming years the World Bank will provide support to assist low and middle income countries, with the focus on Africa, to develop national and sub-national Action Plans. By way of example, the World Bank has recently piloted the development of two Action Plans: the State of Palestine at the country level; and Tirana, Albania at the sub-national level. This important pilot work demonstrates how the Framework is viewed through the lens of national and sub-national implementations, and how such implementations are then guided by the Framework, thus taking the strategic document to implementation. Furthermore, it is expected that multi-lateral and bilateral development institutions will join this effort in assisting countries to develop Action Plans based on this Framework. Financing the implementation of the Action Plans will be facilitated through government and donors funding, including World Bank financing.

V. Points for discussion

33. The Committee of Experts is invited to:

(a) Take note of the present report on the progress made by the Bureau, the Secretariat and the World Bank in formulating the Integrated Geospatial Information Framework comprising three separate, but connected, documents;

(b) Express its views on Part 1: Overarching Strategic Framework, provided as Annex II to this present report, with a view towards its adoption;

(c) Express its views and provide guidance on Part 2: Implementation Guide, provided as a background document to this present report, with a view to: in-principle agreement on its structure and main elements; consideration of the most effective means and resources to complete the Guide; and for the completed document to be provided to the Committee for adoption at its ninth session in August 2019;

(d) Express its views and provide guidance on the way forward for Part 3: Country-level Action Plans, with expert support from the World Bank and a number of pilot countries; and

(e) Provide any further guidance on the way forward on new developments with regard to national geospatial data and information systems, and to assist countries to bridge the geospatial digital divide.

ANNEX I

Integrated Geospatial Information Framework
Respondents to the Global Consultation

1. Argentina
2. Australia
3. Burkina Faso
4. Cameroon
5. Canada
6. Chile
7. China
8. Colombia
9. Cyprus
10. Denmark
11. Dominican Republic (the)
12. Ethiopia
13. Finland
14. France
15. Germany
16. Ireland
17. Japan
18. Mexico
19. Morocco
20. Myanmar
21. Nepal
22. Netherlands (the)
23. New Zealand
24. Norway
25. Peru
26. Romania
27. Samoa
28. Serbia
29. South Africa
30. South Sudan
31. Sweden
32. Switzerland
33. United Kingdom of Great Britain and Northern Ireland (the)
34. Ukraine
35. Uruguay
36. United States of America

37. ECA
38. ECLAC
39. ESCWA
40. World Bank

ANNEX II

Integrated Geospatial Information Framework

INTEGRATED GEOSPATIAL INFORMATION FRAMEWORK

A STRATEGIC GUIDE TO DEVELOP AND STRENGTHEN NATIONAL GEOSPATIAL INFORMATION MANAGEMENT

PART 1: OVERARCHING STRATEGIC FRAMEWORK

EXECUTIVE SUMMARY

Geospatial information provides the integrative platform for all digital data that has a location dimension to it. All countries and all sectors need geospatial information for national development and decision-making. This document provides an Integrated Geospatial Information Framework to guide countries in the development and management of their geospatial information resources.

The Integrated Geospatial Information Framework is a United Nations endorsed Framework that was developed in collaboration between the United Nations and the World Bank, originally to provide a basis and guide for lower to middle income countries to reference when developing and strengthening their national and sub-national arrangements in geospatial information management and related infrastructures. However, as the Framework has evolved, and will continue to evolve as a living document in the years ahead, it has become apparent that many high income and developed countries will also significantly benefit from the integrative and inclusive strategic nature of the Framework.

The Framework provides the strategic guidance that enables country-specific action plans to be prepared and implemented. Direct benefits will include encapsulating new and innovative approaches to national geospatial information management, implementing integrated evidence-based decision-making solutions, and maximizing and leveraging national information systems that are tailored to individual country's situations and circumstances.

The Framework aims to assist countries to move towards e-economies, e-service and e-commerce to improve services to citizens, build capacity for using geospatial technology, enhance informed government decision-making processes, facilitate private sector development, take practical actions to achieve a digital transformation, and to bridge the geospatial digital divide in the implementation of national strategic priorities and the 2030 Agenda for Sustainable Development.

The Framework and its guidance build upon the existing body of work of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) and the World Bank, and aims to identify gaps that will require further input, especially related to the establishment of geospatial information management practices in developing countries.

The Integrated Geospatial Information Framework provides a basis and guide for developing, integrating and strengthening geospatial information management.

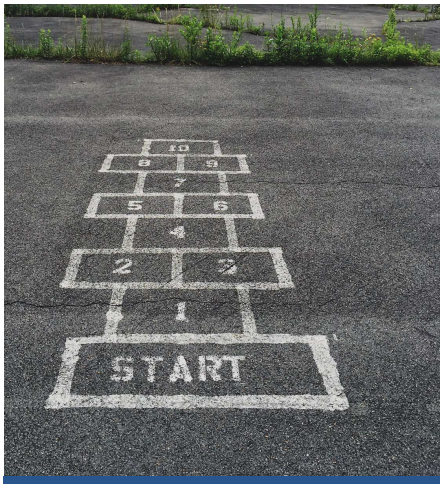
It is important to recognize that, due to the global and intergovernmental nature of UN-GGIM, work by the Committee of Experts has focused on concepts, methods, standards and guides to address global goals as well as the needs of Nations. The Framework aims to translate all these concepts to more practical implementation guidance for use by Member States, the World Bank, international organizations, supporting NGOs, academia, the private sector and others. It does this by leveraging seven (7) underpinning principles, providing eight (8) goals and nine (9) strategic pathways as a means for governments to establish more effective geospatial information management practices and policies.

There is a specific focus in the Framework on issues related to the enduring sustainability of geospatial information management in a nation. This means that particular attention is given to longer-term financial sustainability, multi-stakeholder approaches, capacity and capability development, and innovation and communication; while also addressing more technical aspects such as data maintenance and standards.

While the emphasis in this Framework is on the nation and national government needs, the approach is applicable and scalable to other functional levels of government, including at regional and local levels. The intent is to provide an inclusive and engaging mechanism to bring collaboration, coordination and cohesion across a country, including government institutions and the private sector, for the purposes of developing, strengthening and integrating arrangements in national geospatial information management.

The Framework is also a mechanism for articulating and demonstrating national leadership, cultivating champions and developing the capacity of leaders to take positive steps to achieve the vision for the effective use of geospatial information to measure, monitor and achieve sustainable social, economic and environmental development - leaving no one behind.

Finally, the Integrated Geospatial Information Framework considers both the provider and user communities. Both must work together on this journey if tangible benefits are to be achieved for countries.



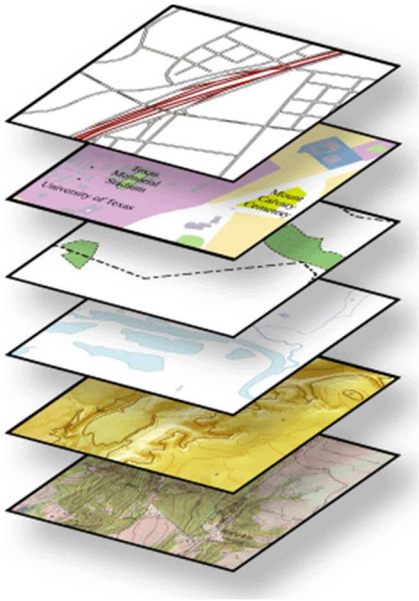
The Framework is a mechanism for articulating and demonstrating national leadership, cultivating champions, and developing the capacity to take positive steps.

CONTENTS

INTRODUCTION

Everything happens somewhere – a well coined phrase. For centuries maps have been used for defence, trade, navigation, land and resource management, infrastructure planning, and for administration. Decisions are made based on knowledge of the environment provided by maps; the better the maps the better the decisions.

Today, digital geospatial information provides far more value than just a simple map. It is an essential national information resource with proven societal, economic and environmental value that enables government systems and services, and national development initiatives, to be integrated using 'location' as a common and underpinning reference frame. With the development of hand-held devices and telecommunications technologies, we are already witnessing its use in important emerging services – Uber, Airbnb, Amazon, etc. – to name a few.



Geospatial information is a critical component of the national infrastructure and knowledge economy; a blueprint of what happens where, and the means to integrate a wide variety of government services.

Geospatial Information reflects the physical world in which all human, economic and environmental activity takes place, and provides the digital version of our world - without which a digital economy is not possible. Geospatial information describes the physical location of geographic features and their relationship to other features and associated statistical information. Geospatial information is presented in many forms and mediums including maps, satellite imagery and aerial photography.

Citizens, communities, business sectors, governments, and many other stakeholders benefit, on a daily basis and often unknowingly, from the use of geospatial information and related location-based services. This is because geospatial information provides the digital connection between a place, its people and their activities, and is used to illustrate what is happening – where, how and why. It is also used to model and portray the impact of the past, the present and likely future scenarios.

Geospatial information is a nation's 'digital currency' for evidence-based decision-making. It is a critical component of a national infrastructure and knowledge economy that provides a nation's blueprint of what happens where, and the means to integrate a wide variety of government services that contribute to economic growth, national security, sustainable social development, environmental sustainability and national prosperity.

All governments, both at the national and local levels, hold considerable quantities of geospatial information and location data, for example databases of schools and school performance, flood risk data and mobile phone ownership data. However, this information is often not current, shared or of sufficient quality for effective decision-making.

In contrast, a geospatially-enabled nation is one that shares, integrates and uses a wide range of data to achieve social, economic and environmental benefits. This use and associated benefits extend across governments, businesses and citizens, and from national to city and small community levels.

Governments by their nature understand applications that are more traditionally geospatially-enabled; many of which are expressed in the Sustainable Development Goals, such as:

- Land administration and management
- Environmental protection
- Planning and land use
- Agriculture
- Water management
- Defence and national security
- Forest management
- Disaster management
- Infrastructure development
- Statistics and demographics
- Marine information
- Address management
- Telecommunications
- Urban planning

The strength of the Integrated Geospatial Information Framework is that it supports a wide range of societal applications and needs.

The strength of the Integrated Geospatial Information Framework approach presented in this document, is that it also supports a far wider range of application areas and societal challenges, for example:

- Tourism
- Health and Education
- Economic development
- Industrial development
- Energy transition
- Social inclusion
- Water, energy and food nexus
- Smart cities
- Smart transportation
- Citizen engagement
- Risk management
- Crime investigation

Geospatial information is the underpinning infrastructure for all these applications. This document, the Integrated Geospatial Information Framework, now provides the mechanism for countries to take action. It is designed to leave no one behind.

CASE FOR CHANGE

Geospatial information has emerged as a major contributor to economic transformation in many countries, including e-government, e-service and e-commerce. Yet there is still a considerable lack of awareness and understanding of the vital and integrative role of geospatial information and related enabling architectures, such as National Spatial Data Infrastructures (NSDIs), in contributing to national development.

This lack of awareness is particularly common at the policy and decision-making levels in developing countries. National policies, and technical capacities and capabilities, need to be better aligned and considerably strengthened so that all countries have the opportunity to develop and contribute to a vibrant national geospatial information ecosystem.

At the national government level, it is recognized that there needs to be more institutional collaboration, interoperability and integration across the various national data information systems and platforms that exist; particularly those related to people and place - statistics, administrative, environment, Earth observations, etc.

Essential data management policies, practices, integration and analytical capacities are currently limited in many countries, and are a significant challenge in developing countries. Geospatial information has been typically collected in organisational silos; resulting in data duplication, and the use of different standards, formats and classifications. This has made data harmonisation, maintenance and integration problematic.

The 2030 Agenda for Sustainable Development, the Sendai Framework for Disaster Risk Reduction 2015–2030 and the Small Island Developing States Accelerated Modalities of Action (SAMOA) Pathway unequivocally call for globally coordinated actions in new data acquisition and integration approaches. There is also a need for employing geospatial information for sustainable development and for disaster risk reduction, and to strengthen the availability and accessibility of geospatial data platforms.

There needs to be more institutional collaboration, coordination, interoperability and integration across the various national data information systems and platforms.

To meet this 'call to action', Member States need to develop, strengthen and modernize their approaches to geospatial information management, including aspects relating to geospatial information - policies and legal documents, governance, data integration and infrastructure, education, innovation, use and collaboration. This applies across institutions and infrastructures, capacities and capabilities, and citizen-centric and user-friendly delivery systems, to ensure investment leads to desired outcomes and benefits at all levels. In most low and middle income countries there is no internationally accepted framework for governments to determine how this can be implemented and how geospatial information can be integrated into national development strategies and agendas.

The United Nations Economic and Social Council (ECOSOC) established the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) in 2011 to take concrete action to strengthen international cooperation in global geospatial information management. UN-GGIM makes joint decisions and sets directions on the production, application and use of geospatial information within national, regional and global policy frameworks, and provides a forum for Member States to develop and strengthen their national geospatial information management and systems capabilities and capacities.

In 2017 the United Nations and the World Bank agreed to collaborate on a joint vision to promote growth and prosperity through creating and strengthening geospatial information capacity and development. The objective being to develop an Integrated Geospatial Information Framework that countries can use to develop and enhance their own geospatial information management.

This Framework, implemented at the national level, will assist countries to move towards e-economies, improve services to citizens, build capacity for using geospatial technology, enhance informed government decision-making processes, take practical actions to achieve a digital transformation, and be able to bridge the geospatial digital divide in the implementation of national strategic priorities and the 2030 Agenda for Sustainable Development.

To meet the 'Call to Action', UN-GGIM and the World Bank have collaborated on a joint vision to promote growth and prosperity through strengthening geospatial information management.

DOCUMENT STRUCTURE

As shown in Figure 1, the Integrated Geospatial Information Framework comprises three parts as separate, but connected, documents.

Part 1: Overarching Strategic Framework presents a forward-looking Framework built on national needs and circumstances, and provides the overarching strategic messages and more expansive and integrated national framework, particularly focusing on policy, perspectives and elements of geospatial information. It sets the context of 'why' geospatial information management is a critical element of national social and economic development via seven (7) underpinning principles, eight (8) goals and nine (9) strategic pathways that lead to a national approach that takes account of national circumstances, priorities and perspectives. The Overarching Strategic Framework is intended for a wide range of stakeholders – these primarily being high-level policy and decision makers, institutions and organizations within and across government.

Part 2: Implementation Guide is the detail document that provides the 'what', the specific guidance and actions to be taken in implementing the Framework. Expanding on each of the nine strategic pathways, the Guide comprises reference guides, good practices and specific principles for each of the strategic pathways, including those generated through each of the Subcommittee, Expert and Working Groups of UN-GGIM. The aim is to provide guidance for governments to establish 'nationally' integrated geospatial information frameworks in countries in such a way that transformational change is enabled, visible and sustainable.

Part 3: Country-level Action Plans will provide templates and guides to operationalize the Framework in a national and sub-national context. Providing the 'how, when and who' approach, this document will assist countries to prepare and implement their own country-level Action Plans taking into consideration national circumstances and priorities. The country-level Action Plans will include elements such as the economic impact and value of geospatial information systems, identification of investment needs and priorities, sequenced implementation through the identification of short, medium and long-term activities, and potential funding sources.

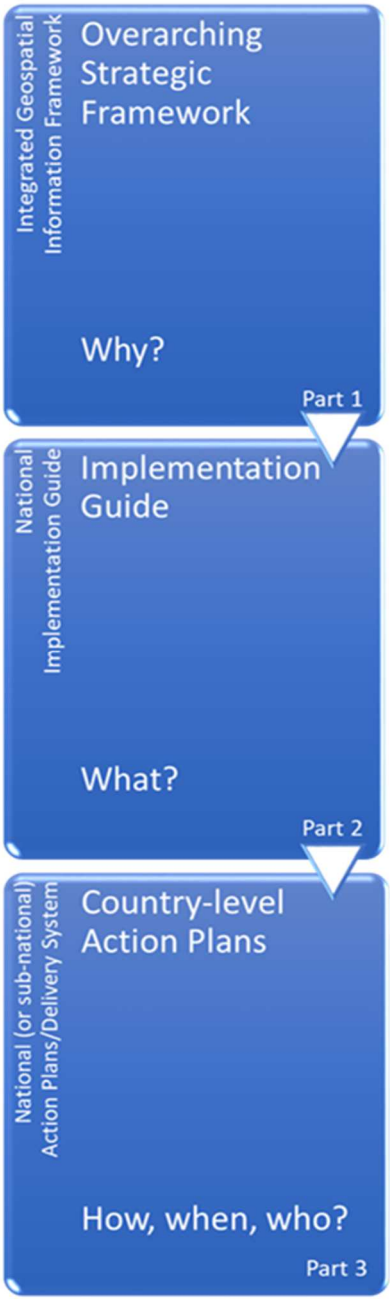


Figure 1: *The 3 component documents of the Integrated Geospatial Information Framework.*

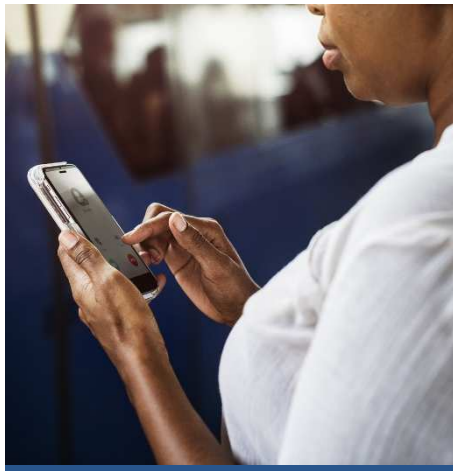
Integrated Geospatial Information Framework

The Integrated Geospatial Information Framework can be used to inform and contribute to national development plans (Figure 2). The Framework highlights how relevant geospatial information can be utilized while exploiting accessible and available technologies to support developing countries and regions to establish and enhance geospatial capabilities through the use of appropriate frameworks, methods, guidelines and standards which can be piloted, replicated and delivered within and across countries and regions.

The Framework presents a forward-looking approach that creates an enabling environment where national governments can coordinate, develop, strengthen and promote efficient and effective use and sharing of geospatial information for policy formulation, decision-making and innovation. It establishes a common vision for all government agencies, expresses the goals that will realize the vision, the actions that need to be implemented to achieve the goals, and the outcomes and benefits necessary to support national development.

The Framework also provides a mechanism by which citizens and the community can discover, view and obtain meaningful and accurate information about their country and community from different organizations; while reducing the burden on the user to locate, access, and use traditionally disintegrated data themes.

Community participation is an integral part of the Framework. Local knowledge, in conjunction with scientific methods and government data resources, enhances our understanding of our natural and built environments.



The Framework is an enabler for coordinating, developing, strengthening and promoting the effective sharing of geospatial information for policy formulation, decision-making and innovation.

VISION

The efficient use of geospatial information by all countries to effectively measure, monitor and achieve sustainable social, economic and environmental development – leaving no one behind

MISSION

To promote and support innovation and provide the leadership, coordination and standards necessary to deliver integrated geospatial information that can be leveraged to find sustainable solutions for social, economic and environmental development.

STRATEGIC DRIVERS

National Development Agenda ● National Strategic Priorities ● National Transformation Programme ● Community Expectations ● Multilateral trade agreements ● Transforming our World: 2030 Agenda for Sustainable Development ● New Urban Agenda ● Sendai Framework for Disaster Risk Reduction 2015–2030 ● Addis Ababa Action Agenda ● Small Island Developing States Accelerated Modalities of Action (SAMOA Pathway) ● United Nations Framework Convention on Climate Change (Paris Agreement) ● United Nations Ocean Conference: Call for Action

UNDERPINNING PRINCIPLES

Strategic Enablement	Transparent and Accountable	Reliable, Accessible and Easily Used	Collaboration and Cooperation	Integrative Solution	Sustainable and Valued	Leadership and Commitment

GOALS

Effective Geospatial Information Management	Increased Capacity, Capability and Knowledge Transfer	Integrated Geospatial Information Systems and Services	Economic Return on Investment
Sustainable Education and Training Programs	International Cooperation and Partnerships Leveraged	Enhanced National Engagement and Communication	Enriched Societal Value and Benefits

STRATEGIC PATHWAYS

Governance and Institutions	Legal and Policy	Financial	Data	Innovation	Standards	Partnerships	Capacity and Education	Communication and Engagement
Governance model	Legislation	Business model	Fundamental data themes	Technological advances	Legal interoperability	Cross-sector and interdisciplinary cooperation	Awareness raising	Stakeholder identification
Institutional structures	Implementation and accountability	Investment	Data supply chain interlinkages	Promoting innovation and creativity	Semantic interoperability	Community participation	Entrepreneurship	Planning and execution
Leadership	Norms, policies and guides	Partnerships and opportunities	Custodianship, acquisition and management	Process improvement	Data interoperability	Industry partnerships and joint ventures	Formal education	Integrated engagement strategies
Value proposition	Data protection and licensing	Benefits realization	Data curation and delivery	Bridging the digital divide	Technical interoperability	International collaboration	Professional workplace training	Monitoring and evaluation

Knowledge | Decisions | Development |Society | Economy | Environment | Users | Citizens | Access | Technology | Applications | Value

Figure 2: *Integrated Geospatial Information Framework.*

VISION AND MISSION

The Vision and Mission statements communicate the overarching aim of the Integrated Geospatial Information Framework to stakeholders. The vision statement describes a future state where integrated geospatial information is used to achieve sustainable social, economic and environmental development; and the mission statement is a call to action that will enable governments to achieve the vision.

Vision

The vision is that governments are able to achieve sustainable social, economic and environmental development through the effective use of national and local geospatial information, systems and capabilities for evidence-based policy and decision-making. The vision statement is a future orientated and aspirational declaration of purpose and being.

The vision recognises the responsibility for countries to plan for and provide better outcomes for future generations, and our collective aspiration to leave no one behind.

Additionally, it recognizes that any national SDG implementations will be optimized using strategies and frameworks that integrate geospatial information into overall national social, economic and environmental development plans.

Mission

The mission is for countries to promote and support the required innovation, leadership, coordination and standards in order to develop, strengthen, integrate and deliver national geospatial information policy, data, systems, tools, services and capabilities into their national government development policies, strategies and arrangements.

The mission is designed to stimulate action towards bridging the geospatial digital divide; to find sustainable solutions for social, economic and environmental development; and to influence inclusive and transformative societal change for all citizens according to national priorities and circumstances.

Vision

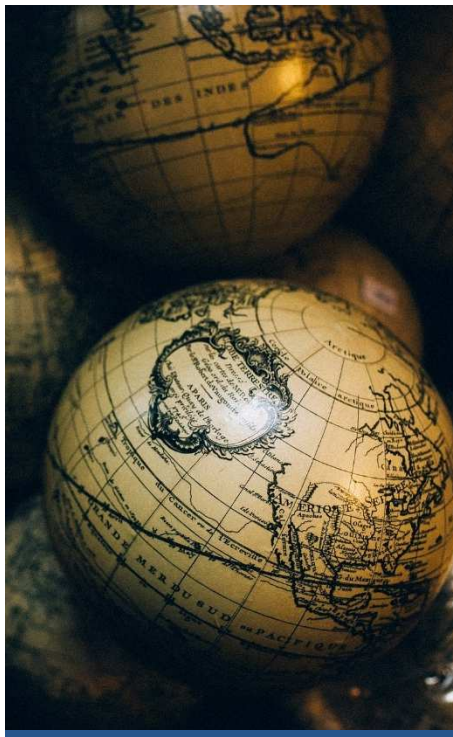
The efficient use of geospatial information by all countries to effectively measure, monitor and achieve sustainable social, economic and environmental development - leaving no one behind.

Mission

To promote and support innovation and provide the leadership, coordination and standards necessary to deliver integrated geospatial information that can be leveraged to find sustainable solutions for social economic and environmental development.

GOALS

To achieve the overarching vision, the Integrated Geospatial Information Framework identifies eight (8) goals. The progressive achievement of these goals will move countries towards a future state where they have the capacity and skills to organize, manage, curate and leverage geospatial information to advance government policy and decision-making capabilities; bridge the geospatial digital divide; influence inclusive and transformative societal change; achieve economic prosperity and social development; and ensure effective environmental management. The eight goals are:



The eight goals reflect a future state where countries have the capacity and skills to organize, manage, curate and leverage geospatial information to advance government policy and decision-making capabilities.

GOAL 1: Effective Geospatial Information Management

Enabling geospatial information governance, policy and institutional arrangements that ensure effective geospatial information management, accommodate individual organizational requirements and arrangements, and that are aligned to national and global policy frameworks.

GOAL 2: Increased Capacity, Capability and Knowledge Transfer

Mechanisms are established to raise awareness of the value and use of geospatial information, promote capacity and capability, and build an inventive and resourceful mindset across government, industry, academia, private and community sectors.

GOAL 3: Integrated Geospatial Information Systems and Services

Geospatial information, including community information is integrated across the government sector and maximized for evidence-based policy and decision-making.

GOAL 4: Economic Return on Investment

An economic return on investment is realized through best practice management, and the exploitation and innovative use of integrated geospatial information.

GOAL 5: Sustainable Education and Training Programs

Education and training programs are established to grow the number of professionals in the fields of geography, data science and geospatial

information technology, and to develop specialist skills related to geospatial financial systems, policy and law, and project management.

GOAL 6: International Cooperation and Partnerships Leveraged

International cooperation and partnerships are leveraged in a way that fosters the management and exchange of geospatial information in support of national development interests.

GOAL 7: Enhanced National Engagement and Communication

All stakeholder groups, and specifically high-level decision makers and champions, are fully engaged in the value of integrated geospatial information for decision-making and socio-economic development.

GOAL 8: Enriched Societal Value and Benefits

Social and economic development, and environmental sustainability is enriched through increased levels of use of integrated geospatial information products and services.

A major goal is to have well established international cooperation and partnerships that support national development and capacity building interests.

SIGNIFICANCE

There is a growing and recognized consensus that interoperable, high quality and timely geospatial information and analysis are a prerequisite for good policymaking. Increases in the amount and variability of data, combined with recent advances in digital and communications technologies, have seen the emergence of geospatial information as a major contributor to better policy formulation and responses to many of the current social, economic and environmental challenges facing citizens, communities and countries. This is particularly apparent given its ability to integrate both quantitative and qualitative information across multiple platforms and industry sectors, and present this information to decision makers in innovative and informative formats.

Conversely, the absence of sufficient reliable, high quality and timely geospatial information leads to delayed and/or poor decisions; and at times no decision. It inhibits effective and efficient distribution of goods and services, restricts economic growth, limits opportunities for progress,

and diminishes living conditions and livelihoods, especially where adequate planning is deficient.

Geospatial information has immense societal and economic value. Citizens, communities, academia, business sectors, governments, and many other stakeholders benefit, on a daily basis and often unknowingly, from the use of geospatial information and related location-based services. The most prevalent aspects of daily life employing geospatial information include simply seeing and knowing where we are on mobile devices, and navigating from one location to another. Knowing where a road is, the name of the road and the level of use of the road, helps in diverse applications such as navigation, road maintenance, accident reporting, and potential economic development. The road feature becomes a strategic integrator when showing the relationship to postal addresses for delivering mail to a household or business, serving as a boundary of an administrative unit that links to statistical data used by a community to plan health facilities and the necessary health resources, school attendance, school district delineation, or school bus routing.

These same aspects extend to emergency services when responding to an incident or disaster in a timely way - saving lives and property. This is because geospatial information shows characteristics of the population such as different age groups, and the number of senior citizens or those who are disabled, and links this information to current weather conditions and forecasts. Forecasting supports predictive modelling of the likely impacts of flooding to small neighbourhoods and large communities, and whom may be at risk – including the disabled and senior citizens.

The electric grid is a critical component of the infrastructure of a country. Geospatial information is critical in showing the location of the grid, the need to expand and extend the grid and managing service to electricity customers, including identifying the location of outages. Geospatial information can also be vital to show the extent of coverage of broadband internet service and other forms of communication, and to plan for improvements to offering these services. These are just a few examples of how geospatial information underpins other forms of critical infrastructure for a country, region or sub-national government. Further, the spread of information and communications technology and global interconnectedness has great potential to accelerate human progress, to bridge the digital divide, to develop knowledge societies, and leverage scientific and technological innovation.

Geospatial information has immense social and economic value. Citizens, communities, business sectors, governments, and many other stakeholders benefit every day.

BENEFITS

Societal Benefits

Most improvements in government activity have a direct impact on improving lives for citizens. For example, providing health facilities and access to education, clean water and sanitation improves the social well-being of citizens. Good geospatial information integrated with planning, census and health data enables efficient allocation of resources. The same approach allows integrated urban planning incorporating education, employment, health and resilience. The same applies to gender equality, derived from a range of measures, such as improved health and education, security of land tenure and access to transport and employment, all of which are better enabled by geospatial information. Citizen connectivity is increasing, with geospatial information playing a greater part in smartphone applications. This leads to greater demand by industry for quality geospatial information, and equally leads to greater citizen expectations for digital government services.

It is estimated that the global economic value of geospatial services is in the order of 0.2% of global GDP[1].

Economic Benefits

Economies depend on successful businesses, whether large or small. Geospatial information is used across sectors, from marketing through logistics to insurance, utilities to telecoms. Banks use it for fraud detection and governments to improve taxation. It is estimated that the global economic value of geospatial services is in the order of 0.2% of global gross domestic product.[1] However, these studies cannot be easily extrapolated nation to nation. Sectorial emphasis and business needs differ – benefits could be greater or lesser.

Environmental Benefits

Sustainable management of the environment, particularly water sources and lakes, forestry, coastal zones, national parks and crop yield prediction, relies upon geospatial information. Management of climate change impact, and of scarce resources, is a driver for geospatial information, often bringing satellite remote sensing to the fore. Geospatial information brings better measurement of the current situation, monitoring change, planning mitigation, evidence-based decision-making, and then delivering mitigation projects. This is particularly important to small island developing States and other countries highly susceptible to climate change and natural disasters.

[1] *Oxera (2013) What is the Economic Impact of Geo Services, [Online] Available at https://www.oxera.com/wp-content/uploads/2018/03/What-is-the-economic-impact-of-Geo-services_1-1.pdf, accessed July 2018.*

DRIVERS FOR CHANGE

Benefits are a Key Driver for Change

Many socio-economic and environmental benefits can be measured and, through demonstrating a positive return on investment, help to make a compelling business case for action. But there are other drivers that governments will need to consider. These are discussed below.

Strategic Alignment to Global Agendas

Contributing to, and aligning with, global development agendas is frequently a driver for maintaining quality geospatial information to better inform government policy and demonstrate national progress globally. At present the 2030 Agenda for Sustainable Development, Sendai Framework for Disaster Risk Reduction, Paris Agreement, New Urban Agenda, and others are global drivers, with geospatial information helping assess and measure and monitor progress, as well as supporting target delivery. Agenda 2063, the future we want for Africa, is a regional driver, and equally INSPIRE, backed by legislation, is a driver for European countries. These frameworks respond to both the global and regional agendas.

Community Expectations

Community expectations evolve with advancements in technology and the increase in computer literacy. Governments are recognizing the need to maintain relevance with prevailing societal needs. This generates a need to deliver up-to-date geospatial information in a way that can be visualized and integrated anywhere, anytime and on any electronic device. Staying abreast of community expectations and having a sense of where the best public value lies is a key responsibility of government. This Framework responds to these community aspirations.

Transforming Government

Geospatial information management is a core element to governments following transformation agendas. It enables integration of shared data, improving transparency and evidence-based decision-making. In so doing, it is also reducing costs to government. In many governments geospatial information is a key component of government open data agendas, stimulating opportunities, including effective and efficient citizen-centric government delivery systems.

Global development agendas are a major driver for maintaining quality geospatial data to better inform policy and demonstrate national progress globally.

Bridging the Digital Divide

Geospatial information management technologies and processes, from satellite sensors through geospatial cloud services to smartphone applications, can give governments, businesses and communities an opportunity to improve efficiency and encourage innovation. There are two types of outcomes going forward: (a) national institutions can be 'left behind', and governments become reactive to the drivers of non-government organizations; or (b) countries can 'leapfrog' other contemporary institutions using the most advanced and cost-effective methods to bridge the digital divide without delay, and deliver benefits early.

Recognising the importance of geospatial information is the first step towards overcoming barriers to implementation and bridging the digital divide.

BARRIERS TO SUCCESS

Barriers do exist in making the case for acknowledging the need for, and benefits of geospatial information, particularly as the benefits often accrue long after the initial investment. It is then often intangible, or at least difficult, to ascertain the role and value of geospatial information in the outcome. Reluctance to invest in geospatial information, prioritising resources, resistance to change, and the absence of a geospatial information use and policy culture, are examples of the major barriers that impede progress and success. Explaining what geospatial information is, why it is important, and how it contributes to the mandate, vision, goals, and objectives of a government or organization is a first step in offering a path forward.

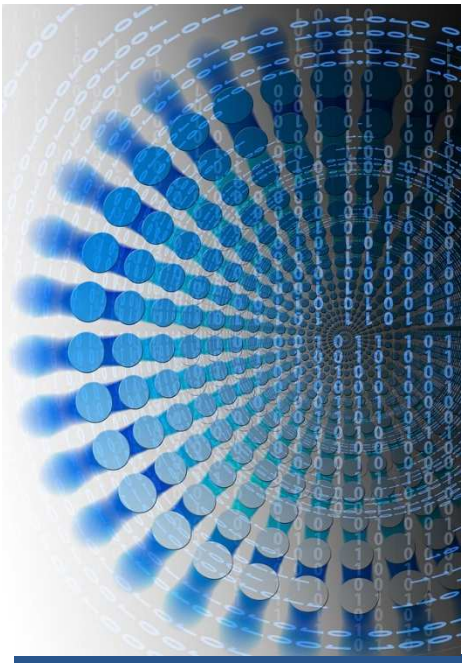
Recognition of the importance of geospatial information is followed by the need to invest. There are costs and resource commitments required to plan and implement a successful, functional geospatial capability. Having access to funding, either through a government-provided investment or other source, such as a donor, is needed. How much investment is required is then determined by the scope and approach.

Starting small by addressing one national priority is one approach; planning for a full implementation is another. In either case, the level of funding required is estimated based on the proposed approach and the anticipated outcomes. It is important to consider where functional and technical capabilities are developing so that plans are not hampered by a

dated or defunct approach. For example, not long ago the only option for processing voluminous amounts of geospatial data was to procure, install, and maintain large servers, which translated into costs for hardware, technical expertise, and space. With the introduction of the Cloud, new capabilities are possible that shift internal responsibilities to external services. Rather than scaling and paying for the maximum storage and processing throughput, customers only pay for what they use. This also relieves an organization from some of the IT burdens associated with managing comparable services in-house.

Human resources are another potential barrier to effective planning, implementation and maintenance of geospatial information and services. Knowledge of geography, geospatial information technology, and data management are key skills that are preferable for success. In situations where these skills are not yet developed or available, other options include hiring the necessary expertise, training staff in core capabilities, or acquiring external help by donors or consultants. Maintaining qualified staff is another challenge where techniques to minimize staff turnover contribute to stability of the program. Retention techniques include offers of training, pay and benefits incentives, increased program responsibility, position promotion, and travel opportunities supporting the program. Outsourcing certain functions, especially those that involve the need for high level skills, is another option.

Data sharing is a barrier that reflects the culture and/or policy of a government or an organization. There is value to each instance of geospatial information and there's greater value when that data is joined, shared, compared, or integrated. Either with other geospatial data, or other data types such as geospatially referenced statistical data. For example, an administrative area, such as a city boundary, can be linked using geocodes to the poverty level of its inhabitants (statistical data); the resulting integrated information is visually informative on its own on a map, but can also be compared with other cities throughout the region or nation. The result is a knowledge indicator for planning, decision-making and monitoring. When the practice of an organization either does not allow for the geospatial data use, not only is the data underutilized, but it precludes innovative uses of various data types for different purposes. Making data available, and collaboration across organizations that encourage data sharing and data use, are examples of mitigations to the barrier.



Barriers to storing vast amounts of data can now be overcome with the introduction of the Cloud. New capabilities make it possible to shift internal responsibilities to external services.

UNDERPINNING PRINCIPLES

The Integrated Geospatial Information Framework identifies seven (7) underpinning principles. These principles represent the key characteristics and values that are to be used as a guide when implementing the Framework. How these principles are applied will depend on the implementation approach adopted by each country. The principles are the compass for implementation, but allow for methods to be tailored to individual country needs and circumstances. Adherence to these principles will deliver consistent geospatial information management, resulting in more open, accountable, responsive, and efficient government. The seven principles (and values) that underpin the Framework are:

The principles are the key characteristics and values that provide the compass for implementing the Framework, and allow for methods to be tailored to individual country needs and circumstances.

PRINCIPLE 1: Strategic Enablement

The implementation of the Framework requires political and financial support, and should therefore align with and support government's strategic direction on issues such as economic growth, social well-being, job creation, natural resource monitoring, and environmental management and preservation.

PRINCIPLE 2: Transparent and Accountable

Government geospatial information is developed and shared according to key accountability and transparency guidelines so that all citizens, government agencies, academia and the private sector have access to this valuable and underpinning national resource.

PRINCIPLE 3: Reliable, Accessible and Easily Used

Geospatial information is reliable, and made accessible and usable so that it can be leveraged for research and development, used to stimulate innovation, and support the creation of sustainable services and products to advance social, economic and environmental development.

PRINCIPLE 4: Collaboration and Cooperation

Collaboration and cooperation (between government, business, academia, civil society and donors) are factored into the implementation of the Framework to strengthen information sharing between providers and users, reduce duplication of effort across the government sector, make for a robust system, as well as providing clarity on roles and responsibilities.

PRINCIPLE 5: Integrative Solution

The implementation of the Framework is to be integrative in nature – and consider how people, organisations, systems, and legal and policy structures work together to form an effective system for managing geospatial information and its use.

PRINCIPLE 6: Sustainable and Valued

The implementation of the Framework will be conducted in such a way that it enhances national efficiency and productivity; is sustainable in the long term; and is deployed in a way that provides improved government services to citizens.

PRINCIPLE 7: Leadership and Commitment

Importantly, the implementation of the Framework will require strong leadership and commitment, often at the highest level, to enhance the long-term value of investments in geospatial information. This will be achieved through careful analysis, prioritization and sequencing to develop an action plan that carefully applies interventions in the short, medium and long term, and that can receive high level endorsement and support by government.

A key principle is that collaboration and cooperation are factored into the implementation of the Framework to strengthen information sharing.

STRATEGIC PATHWAYS

The Framework is anchored by nine (9) strategic pathways in three (3) main areas of influence: governance; technology; and people.

The objective of these strategic pathways is to guide governments towards implementing integrated geospatial information systems in a way that will deliver a vision for sustainable social, economic and environmental development.

Each strategic pathway is augmented by specific objectives to assist countries in achieving the required results. The strategic pathways are presented as separate pieces of a jigsaw puzzle in recognition that there are many aspects and dimensions to each individual pathway, and that when joined together, the Framework is connected, integrated and implemented. Figure 3 illustrates the nine strategic pathways surrounded by the benefits that are able to be realised when implemented together. Each of the nine strategic pathways are summarized below and are explained in more detail, along with specific actions, in Part 2: Implementation Guide.

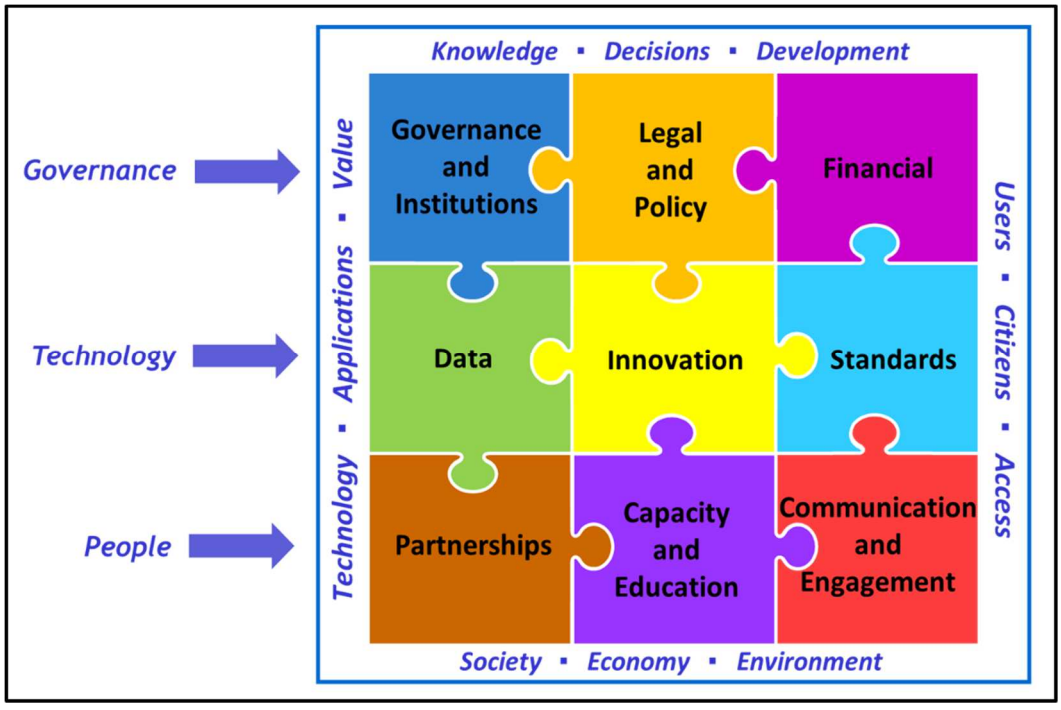
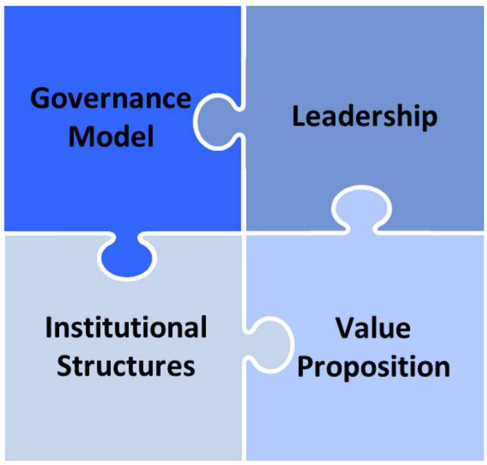


Figure 3: *The Framework is anchored by nine strategic pathways and three main areas of influence. Once implemented, the strategic pathways realize many benefits.*

STRATEGIC PATHWAY 1

Governance and Institutions



This strategic pathway establishes the leadership, governance model, institutional arrangements and a clear value proposition as a means to strengthen multi-disciplinary and multi-sectoral participation and a commitment to achieving an Integrated Geospatial Information Framework.

The objective is to attain political endorsement, strengthen institutional mandates and build a cooperative data sharing environment through a shared understanding of the value of an Integrated Geospatial Information Framework, and the roles and responsibilities to achieve the vision.

STRATEGIC PATHWAY 2

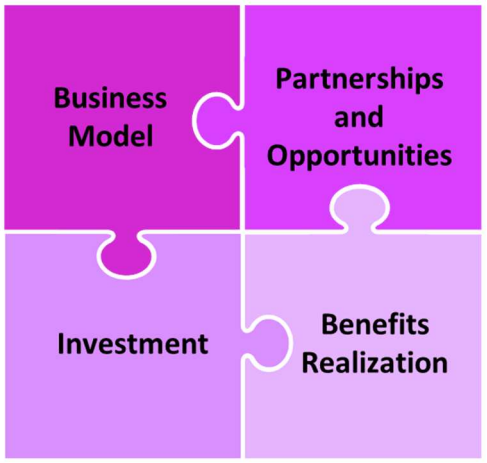
Legal and Policy

This strategic pathway establishes a robust legal and policy framework that is essential to institute appropriate national geospatial information legislation and policy that enables the availability, accessibility, exchange, application and management of geospatial information.

The objective is to address current legal and policy issues by improving the laws and policies associated with, and having an impact on, geospatial information management; and by proactively monitoring the legal and policy environment, particularly with regard to designating the official responsibility for the production of data, and with respect to the issues raised by emerging technologies and the evolving innovative and creative use of geospatial information.

STRATEGIC PATHWAY 3

Financial



This strategic pathway establishes the business model, develops financial partnerships, and identifies the investment needs and funding sources for delivering integrated geospatial information management, as well as recognizing the benefits realization milestones that will achieve and maintain momentum.

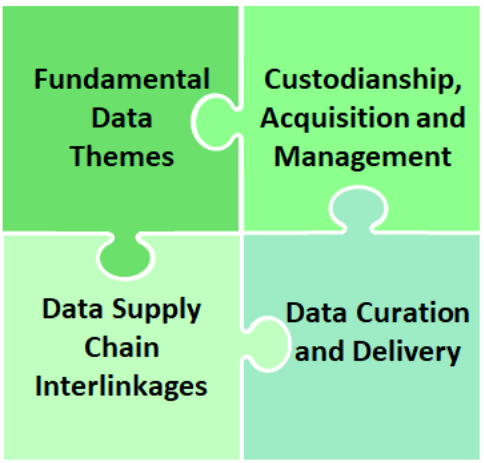
The objective is to achieve an understanding of the implementation costs and ongoing financial commitment necessary to deliver integrated geospatial information management that can be sustained and maintained in the longer term.

STRATEGIC PATHWAY 4

Data

This strategic pathway establishes a geospatial data framework and custodianship guidelines for best practice collection and management of integrated geospatial information that is appropriate to cross sector and multidisciplinary collaboration.

The objective is to enable data custodians to meet their data management, sharing and reuse obligations to government and the user community through the execution of well-defined data supply chains for organizing, planning, acquiring, integrating, managing, maintaining, curating, publishing and archiving geospatial information.

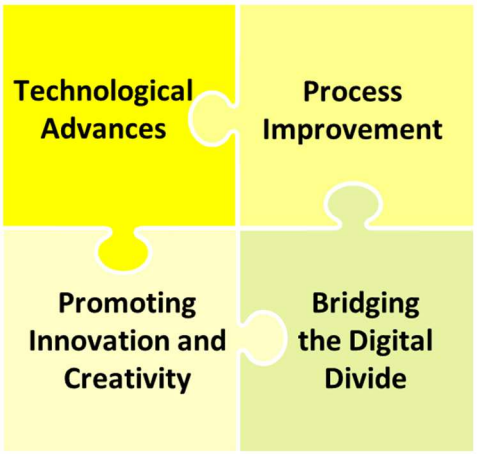


STRATEGIC PATHWAY 5

Innovation

This strategic pathway recognizes that technology and processes are continuously evolving; creating enhanced opportunities for innovation and creativity that enable governments to quickly bridge the digital divide.

The objective is to stimulate the use of the latest cost-effective technologies, process improvements and innovations so that governments, no matter what their current situation is, may leapfrog to state-of-the-art geospatial information management systems and practices.

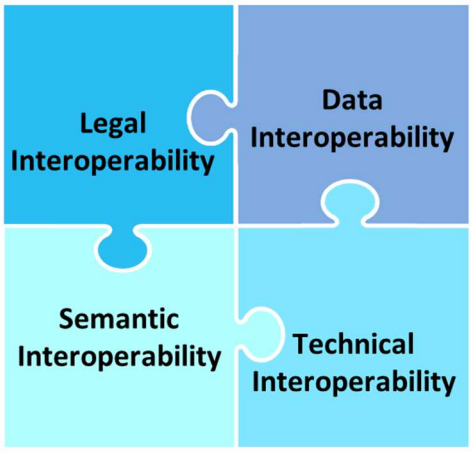


STRATEGIC PATHWAY 6

Standards

This strategic pathway establishes, and ensures the adoption of, best practice standards and compliance mechanisms that enable legal, data, semantic and technical interoperability, which are fundamental to delivering integrated geospatial information and knowledge creation.

The objective is to enable different information systems to communicate and exchange data, enable knowledge discovery and inferencing between systems using unambiguous meaning, and provide users with lawful access to and reuse of geospatial information.



STRATEGIC PATHWAY 7

Partnerships

This strategic pathway establishes effective cross-sector and interdisciplinary cooperation, industry and private sector partnerships, and international cooperation as an important premise to developing a sustainable Integrated Geospatial Information Framework.

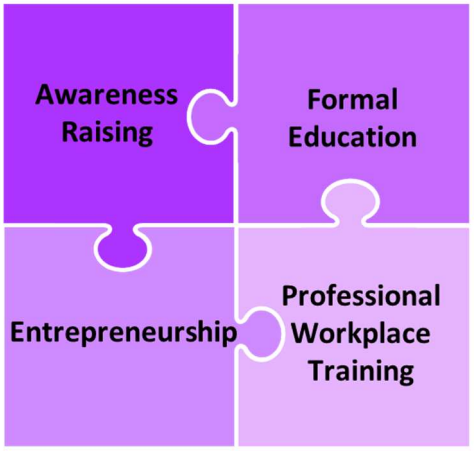
The objective is to create and sustain the value of geospatial information through a culture based on trusted partnerships and strategic alliances that recognize common needs and aspirations, and national priorities.

STRATEGIC PATHWAY 8

Capacity and Education

This strategic pathway establishes enduring capacity building programs and education systems so that geospatial information management and entrepreneurship can be sustained in the longer term.

The objective is to increase the awareness and level of understanding of geospatial information science. This includes developing and strengthening the skills, instincts, abilities, processes and resources that organizations and communities require to utilize geospatial information for decision-making.



STRATEGIC PATHWAY 9

Communication and Engagement

This strategic pathway recognizes that stakeholders (including the general community) are integral to the implementation of integrated geospatial information management systems and that their buy-in and commitment is critical to success.

The objective is to deliver effective and efficient communication and engagement processes to encourage greater input from stakeholders to achieve transparent decision-making processes when implementing the Integrated Geospatial Information Framework.

CONCLUSION

The Integrated Geospatial Information Framework has been developed as a reference guide for developing and strengthening arrangements in national geospatial information management. It has been designed specifically for low to middle income countries and small island developing States.

Part 1: The Overarching Strategic Framework sets out the nine strategic pathways to assist governments starting the journey of implementing integrated geospatial information management practices and its inclusion in their national plans and strategies. It is to be used as an engagement tool to bring about coordination, collaboration and coherence across government when working towards strengthening national geospatial information management.

Part 1 is also a mechanism for leaders to articulate the significance and benefits of integrated geospatial information and to build leadership and capacity, as they embark on programmes and activities to achieve the vision for effective use of geospatial information to measure, monitor and achieve sustainable social, economic and environmental development - leaving no one behind.

Part 2: The Implementation Guide is to be used to provide the guidance and oversight to develop and follow up on the country-level Action Plans (Part 3) through indicators that include geospatial information at a national level, as well as at a sub-national level. The Guide includes detailed actions, examples and links to reference material to support the implementation of consistent nationwide geospatial information management.

Strengthening geospatial information management will assist countries in bridging the geospatial digital divide, secure socio-economic prosperity, and leave no one behind.