UNITED NATIONS **E/C.20/2022/6/Add.1**

Economic and Social Council

22 July 2022

Committee of Experts on Global Geospatial Information Management
Twelfth session
New York, 3–5 August 2022
Item 4 of the provisional agenda*
Determining the future geospatial information ecosystem

Determining the future geospatial information ecosystem

Note by the Secretariat

Summary

The present paper contains the report of the Secretariat on determining the future geospatial information ecosystem for consideration by the Committee of Experts on Global Geospatial Information Management.

At its eleventh session, held virtually on 23, 24 and 27 August 2021, the Committee of Experts adopted decision 11/103, in which it emphasized that the Integrated Geospatial Information Framework now provided an overarching paradigm to further strengthen nationally integrated geospatial information management, not only for Member States that were in the early stages of adopting national spatial data infrastructures but also for those that had already successfully implemented spatial data infrastructure capabilities. However, continuous collaboration would be necessary with other emerging and complementary initiatives, such as the Geospatial Knowledge Infrastructure, the European Union Location Framework Blueprint and a geospatial ecosystem beyond spatial data infrastructures, which provided direct interlinkages with the Framework, and which would ultimately extend the Framework's relevance in the future geospatial information ecosystem.

The complexity of the future geospatial ecosystem, and thus the need to give consideration thereto, was reiterated in a background paper entitled "Towards a sustainable geospatial ecosystem beyond spatial data infrastructures", which was submitted to the eleventh session of the Committee of Experts. In this regard, the need to consider ways towards an even stronger global geospatial ecosystem, including a comprehensive programme to encourage the modernizing of national geospatial information agencies and to address the growing geospatial needs of developing countries, was also noted by the Committee.

As the Framework has developed and its implementation has become more widespread, it is clear that the geospatial ecosystem continues to grow and evolve and that it is now more expansive than ever owing to rapid technological developments, thus leading to increased use and adoption of geospatial information across diverse government, industry and user sectors, as well as the generation of large amounts of public-good geospatial data and applications. However, obtaining a clear understanding of what the future geospatial information ecosystem beyond the Framework might

* E/C.20/2022/1

look like, one in which almost all data will relate to a location in some way, may be difficult for some of the sectors involved, especially in developing countries.

In this present report, the Secretariat provides information on efforts aimed at continuing to take steps with regard to exploring the geospatial landscape and determining the future geospatial information ecosystem with a view to assisting Member States and national geospatial information agencies in their thinking on future geospatial environments in which technological developments will play a crucial role. In the light of the many global geospatial leaders and senior executives in attendance at the 2022 edition of the Geospatial World Forum, held in Amsterdam from 10 to 12 May 2022, the Secretariat took the opportunity to convene a two-hour open discussion session to explore the many dimensions and perspectives of a future geospatial information ecosystem, including how it might coexist within a larger digital ecosystem. In the report, the discussion session is further elaborated on and some suggested next steps are provided. The Committee of Experts is expected to provide further inputs and guidance and to discuss elements of the future geospatial information ecosystem.

I. Introduction

1. Today, technology is transforming almost every aspect of our lives, and all sectors of industry and the economy, at an unprecedented pace and scale. It is similarly having a major impact on the geospatial industry, creating innovative technological enablers and applications, and generating previously unimaginable amounts of location-referenced information. These technologies and processes are not only disruptive, but they are continually evolving and providing new opportunities for innovation, enabling business, industry, and governments to be more agile, to adapt and transform their own internal processes, and to scale-up capability more quickly than in the past. The pace and reach of technological developments will increase, transforming human experiences and capabilities, while transforming our future aspirations to explore, unlock and understand problems in the real world.

2. At the same time, there is an increasing consensus among countries and stakeholders to develop a national geospatial information ecosystem which is not derived explicitly as a 'cause and effect' of innovations and advancements in technology but is based on and for addressing the challenges the world faces today. With the world grappling with significant socio-economic and environmental challenges inclusive of resilience, sustainability, climate and environment, and energy, it is imperative that national geospatial information agencies can transform themselves to be agile and develop their operational needs and infrastructure to address the challenges the world is facing.

3. A key role for the Committee of Experts is to keep abreast of future trends and opportunities in the application and use of geospatial technologies, and to develop the necessary global policy to facilitate change where it will be of most benefit. Through this endeavor, the Committee of Experts has recognized the need to remain both agile and relevant as countries move beyond current geospatial management activities, to take advantage of rapid technological developments and innovations, and to exploit the vast amounts of data that are being amassed, as they consider the future geospatial information ecosystem.

4. At its eleventh session, held virtually on 23, 24 and 27 August 2021, the Committee of Experts considered a number of interlinkages with the Integrated Geospatial Information Framework (IGIF) as contained in E/C.20/2021/6/Add.1. Aided by the IGIF as the Framework of choice for countries to build and strengthen their national geospatial information management arrangements, combined with rapid technology development and digital transformation, geospatial user expectations and needs are undergoing incremental change. A draft position paper entitled Towards a Sustainable Geospatial Ecosystem Beyond SDIs was provided as a background document to the Committee, its purpose being to initiate a re-thinking and re-imagining of the way in which geospatial information is shared, analyzed, and used in the rapidly changing environment of today and into the future. The paper provided thoughts and ideas to enable the global geospatial community to be more adequately prepared and to drive and facilitate the transition to a geospatial ecosystem beyond spatial data infrastructures (SDIs) and proposed some initial first steps towards a 'future vision', a sustainable geospatial ecosystem beyond SDIs.

5. In transitioning towards a sustainable geospatial ecosystem, the draft position paper recognizes the global importance and role of the Committee of Experts and the IGIF, noting "the global geospatial landscape, including greater understanding and awareness, has grown significantly because of UN-GGIM, especially when considering the location-based policy and development demands that are increasing exponentially, and how SDIs evolve to support globally adopted frameworks such as the Integrated Geospatial Information Framework (IGIF). It is therefore appropriate that the re-thinking and re-alignment of geospatial information management and governance is considered and debated through UN-GGIM with its global

reach and impact. In this regard, critical initiatives such as UN-GGIM and others deserve to be wholeheartedly supported".

6. At its eleventh session, the Committee of Experts, in adopting decision 11/103, emphasized that the IGIF now provided an overarching paradigm to further strengthen nationally integrated geospatial information management, not only for Member States that were in the early stages of adopting national spatial data infrastructures but also for those that had already successfully implemented spatial data infrastructure capabilities. However, continuous collaboration would be necessary with other emerging and complementary initiatives, such as contained within the Geospatial Knowledge Infrastructure (GKI) White Paper, the European Union Location Framework (EULF) Blueprint and the position paper Towards a Sustainable Geospatial Ecosystem Beyond SDIs, which provided direct interlinkages with the IGIF, and which would ultimately extend the IGIF's relevance in the future geospatial information ecosystem.

7. In adopting decision 11/103, the Committee of Experts also emphasized the importance of maintaining the impact and continuity of the IGIF at the national level, and noted the variability in the levels of national circumstances and conditions (governance, technology, partnerships, capacities, etc.) between developed and developing countries when establishing a Country-level Action Plan, and that a set of performance indicators or diagnostic measures might assist countries as they determine which priority goals, activities and actions to apply in their respective integrated geospatial information management Country-level Action Plans with a view to having a significant impact for geospatially enabled e-services, embarking on a path towards digital transformation and to bridge the geospatial digital divide.

8. Conversations on the future geospatial information ecosystem are well underway, and there is now a growing body of work envisioning a global interconnected geospatial information ecosystem in which everyone can interact to gain knowledge. The Committee of Experts, as the peak body for making joint decisions and setting direction on the production and use of geospatial information within national, regional and global policy frameworks, has an important role in providing forward-looking and strategic guidance for Member States and the global geospatial community as they evolve and transition towards a future geospatial information ecosystem.

9. While it may seem difficult to determine and define the future geospatial information ecosystem, what has become clear from discussions, is that the geospatial landscape needs to move beyond 'data' as a focal point of activity, to processing and synthesizing data into contextualized information, so that it can be readily used to gain new knowledge and insights. The Committee's experience and expertise gained from the development, and now implementation, of the IGIF provides a valuable and geographically balanced context. This is important given that rapid technology innovations are influencing the definition of the 'geospatial ecosystem'.

10. Industry and the technology sectors have already advanced from the traditional definition of geospatial information to a much more dynamic definition of geospatial applications inclusive of digital cities, digital twins, and even the metaverse. However, these rapidly evolving technology advancements bring with them an alternative scenario – an increasing 'digital' and 'geospatial' divide between developed and developing nations, a widening technology understanding gap among users, lack of skilled personnel to exploit new opportunities, and the need to protect privacy, address ethical use of data, bias and cybersecurity issues – which necessitates governments and industry worldwide exploring a modern, knowledge-driven and sustainable geospatial information ecosystem.

11. In this present report, the Secretariat provides information on efforts aimed at continuing to take steps with regard to exploring the geospatial landscape and determining the future geospatial information ecosystem with a view to assisting Member States and national geospatial information agencies in their thinking on future geospatial environments in which technological developments will play a crucial role. These efforts, as captured in this present report, comprise three elements: an informal discussion and dialogue with geospatial leaders during Geospatial World Forum in Amsterdam in May 2022; development of contextual understanding for a national geospatial information ecosystem, provided as a background document to this present report; and the development of contextual guidance for a future geospatial information ecosystem that transitions from SDI, to a system-of-systems (SoS), and on to the Geoverse, and making the step change using the IGIF, also provided as a background document to this present report. The Committee of Experts is invited to take note of the report and the two background documents, and to express its views on determining the future geospatial information ecosystem. Points for discussion and decision are provided in paragraph 33.

II. Informal discussion and dialogue with geospatial leaders

12. Taking the opportunity of many global geospatial leaders and senior executives attending Geospatial World Forum in Amsterdam, the Netherlands, from 10-12 May 2022, the Secretariat convened an informal two-hour discussion and dialogue for participants to share their thoughts and views as to what the future geospatial information ecosystem may look like. With more than fifty participants attending, the underlying aim was to seek thoughts and ideas which can enable the global geospatial community to be more adequately prepared for the rapidly emerging geospatial ecosystem and environment of the future. If we start thinking ahead, like industry, we will be on the front foot and not the back foot.

13. While there was a considerable focus on the ‘technology’ aspects of geospatial information, the discussion was wide-ranging and touched on a number of other key areas for future consideration. Additionally, it was recognized at the outset that ‘when we speak about the geospatial ecosystem, we are the geospatial experts talking to ourselves’. Connecting and communicating to those not traditionally from the geospatial community, but are necessary for the success of the geospatial ecosystem, will be important. The discussion is summarized in the following paragraphs.

14. What do we mean by an ‘ecosystem’? Informed by natural ecosystems, these are complex interconnected systems. An ecosystem seeks to balance many dynamic factors, being self-organized and with active interventions to keep balance and equilibrium. As an analogy, geospatial information is like the soil in a natural ecosystem, one does not always see the importance of the soil, it is invisible – yet it is fundamental for the ecosystem to function. Further, soil is different all over the world, and therefore ecosystems operate differently. Sometimes soil is not as good as in other areas. The same applies for national geospatial information agencies around the world, they need to be nurtured differently. Who is part of the ecosystem, who is not, and how do we include them? An ecosystem is about looking at the whole – about coexistence and collaboration. For example, ‘infrastructure’ implies direction – supply and demand – which traditionally has no feedback loops. An ecosystem emerges – takes direction out of the equation – it is not one direction. Data is not the most important element, it is the knowledge that is derived, but one enables the other.

15. What is our (geospatial information and mapping agency) role in the future geospatial ecosystem, how will we fill it, what is the strategic approach to take? Our capabilities are typically based on legacy systems and work streams. What does the future look like in comparison (horizon scanning) with many more actors coming into the industry? What do we

need to do to support a wider market and diverse industry base? We are the creators and curators of data, delivery and intelligence. Yet, we need to continue to evolve from data, to information, to knowledge, and do so in a way that is inclusive of broader user groups. This builds on the three UN-GGIM Future Trends reports, which recognize broader stakeholder groups that now go well beyond our traditional sectors.

16. Technologies are moving and innovating quickly, data are pouring in, they need to be analysed faster (near real time) retaining trust and quality. But it's not just about technology. There are also challenges in determining an environment for taking things forward with the frameworks and policies we currently have. Systems are becoming less traditional e.g. AI and ML, and these need new skills and talents including a variety of expertise to deliver future innovations. While there are mechanisms for interoperability, frameworks and policies to steer the future direction of the geospatial ecosystem, we also need to take into consideration the future and direction of society and the world as a whole. This means, looking at global challenges and trying to solve them in innovative ways. This requires less silos, more integration and collaboration. Addressing future challenges and then the technology to solve them will be crucial; but we must also realize that we cannot control the ecosystem itself. It is not just about data and technology; evolution will be driven by the problems that need to be solved.

17. So, what do we do? Moving beyond SDI's requires us to examine the existing SDI construct to see what is missing. The IGIF has done that. We have the frameworks, resources, tools, and know the participating sectors. We know the roles that we need to apply to get there. For example, a system-of-systems is a starting point to the internet of things – providing direction towards where we need to head. In moving from SDIs to system-of-systems, to the future geospatial ecosystem. We need to build collaborative, sharing environments to enable people and organizations to work together – a collaborative twin. We need to zero in on technology, improvements, as well as overcome policy challenges, so that things can move forward. Data needs to be knowledge ready – able to be consumed by machines, and with geospatial embedded in all sectors and across all societies. Challenges remain – understanding the role of space, and weaknesses around legality, ethics and the dark web.

III. Development of contextual understanding for a national geospatial information ecosystem

18. The background document 'Development of Contextual Understanding, Information and Analytics Towards Determining the National Geospatial Information Ecosystem' has been provided as a background discussion paper for the Committee of Experts. The paper is based on the premise that technology is widely accepted to be a key driver of economic development – for countries, regions, cities, and communities. Therefore, it considers the emerging technologies, trends and innovations in geospatial information, and their impact on the geospatial ecosystem. The paper recognizes the rapid digital and technology advancements that have occurred in recent years, enabled by fourth industrial revolution (4IR) technologies (inclusive of big data, the cloud, artificial intelligence (AI), machine learning (ML), and the Internet of Things) to accelerate automation and knowledge-on-demand. In the technology realm, what was once considered science fiction is a reality today, and what is seemingly science fiction today will soon be a reality tomorrow. Therefore, a futuristic national geospatial information ecosystem will need to include a much broader range of stakeholders, far and beyond the geospatial community, than it does today.

19. Building on the Geospatial Knowledge Infrastructure (GKI) White Paper and draft position paper Towards a Sustainable Geospatial Ecosystem Beyond SDIs, and their relationship with the IGIF, a large part of the report aims to highlight the current discussions

and deliberations, and political, economic, social, and technological (PEST) trends driving the geospatial community, and the potential impact they may have on the current definition of the national geospatial information ecosystem. The PEST provides the framework for adoption of the IGIF – that the national geospatial ecosystem, or the adoption and adaptation of the IGIF framework, depends significantly on the political, economic, social, and technological environment in a country. A series of maturity assessment questionnaires are provided in the PEST analysis as a tool for the development of a national geospatial information ecosystem.

20. The discussion paper concludes that the identification of emerging trends is critical, if a country is to adequately transform itself from the use of traditional SDI's and national spatial data infrastructures (NSDIs) methods and approaches, and to shift from a 'data to knowledge' paradigm – while adopting the IGIF as a framework or a tool to achieve the vision of a future geospatial ecosystem. Digital technology advancements, reinventing the business model wheel, evolution of federal geospatial data providers, changing user expectations and requirements, standards, and interoperability frameworks, etc., represent some of the emerging trends which will pave the way toward the next generation of geospatial information ecosystem. These trends have the ability to assist developing countries who are still at the nascent stage of SDI and NSDI development to leapfrog, bridge the digital and geospatial divide and build a geospatial infrastructure which is dynamic, and futuristic.

21. However, this cannot be achieved without a thorough assessment of a country's political, economic, social, and technological (PEST) environment. An environmental scanning exercise, as defined in the IGIF Implementation Guide, is necessary for countries to first identify the existing capabilities and variables driving geospatial information and technology implementation. A PEST analysis (based on the questionnaires in the report) is aimed at providing countries with a framework to self-evaluate their environment with respect to each strategic pathway and make informed decisions on what actions to take to strengthen their geospatial information management capabilities towards participation in the future geospatial information ecosystem.

IV. Future Geospatial Information Ecosystem: From SDI to SoS and on to the Geoverse

22. The background document 'Future Geospatial Information Ecosystem: From SDI to SoS and on to the Geoverse – Making the Step Change Using the Integrated Geospatial Information Framework' has also been provided as a background discussion and consultation paper for the Committee of Experts. The paper aims to provide further contextual guidance towards an understanding of the future geospatial information ecosystem, which goes beyond the traditional SDI processes, models, and architectures. The IGIF is used as a practical starting point to examine the SDI construct and provide contextual guidance in the form of the step change required to achieve a paradigm shift. This step change captures existing systems-of-systems (SoS) concepts and then introduces the Geoverse. Importantly, the paper considers the needs of countries that are in the early stages of developing their IGIF Country-level Action Plans, as well as those that have already successfully strengthened their SDI capabilities and have started to adopt 4IR technologies. Framing the future geospatial information ecosystem with the IGIF means that countries can readily maintain the impact and continuity of change through their Country-level Action Plans. The paper is structured as in the following paragraphs and is intended to promote thinking and discussion for the Committee of Experts.

23. **Why do we need to move beyond SDIs?** It is well acknowledged that SDIs are known to be delivering valuable access to data for decision-making. So why is there a need to change, or perhaps, evolve? While we have seen many developments in SDIs, they are currently unable to leverage all that advanced 4IR technologies have to offer, particularly the Internet of Things

(IoT), which is providing new ways to collect and process data and create and transmit new knowledge and insights. SDIs are designed as 'human accessible' libraries that are not machine friendly. Search engines find it difficult to locate data within these catalogues, and as a consequence, Artificial Intelligence (AI), Big Data geoanalytics, knowledge inferencing and IoT communication interfaces are not being used to their full potential. In this new future, access to geospatial data will be essential, but not enough. Our data of the future also needs to be understandable, integratable and actionable by machines using networks, powerful tools, automated geoanalytics and multimodal digital network communications. The traditional SDI bi-directional data supply network is not able to deliver the level of sophistication necessary to deliver knowledge on-demand.

24. **The future geospatial information ecosystem:** Before describing the future geospatial information ecosystem, it is important to clarify and reiterate that SDIs are an important first step in the evolutionary process. For those countries working towards establishing their SDI, this work continues to be valuable and crucial to strengthening geospatial information management and enabling progress towards the future ecosystem. In essence, the SDI comes first. This is because, in addition to delivering access to data, SDIs also establish data governance frameworks, enact geospatial policy and laws, and implement technology and standards, all of which are the foundation for the step change required to move to an ecosystem centered on delivering geospatially enabled knowledge. Importantly, the evolution of our geospatial information ecosystem is occurring in parallel with advancements to the Internet and its transitionary phase from interactive bi-directional data transactions (circa Web 2.0) to a decentralized multimodal digital environment (Circa Web 3.0 and beyond) that is able to process and curate information in real time.

25. From a technology perspective, the future geospatial information ecosystem will consist of three concepts: the traditional SDI; a network of systems referred to as a 'system-of-systems'; and a third element, a concept which has until now not been described or named, and which is referred to here and going forward as the 'Geoverse'. All three concepts co-exist in the future geospatial information ecosystem – potentially manifesting into the Geoverse in the longer term. For clarification, these concepts are explained below and illustrated in Figure 1:

(a) **Traditional SDI:** Recognizing that SDIs comprise various implementations and levels of maturity, this discussion paper describes the SDI as a server-based geoportal for organizing, visualizing and making geospatial data and services available and consumable. SDI geospatial data is accessible via the web, typically using one-to-one communications, similarly to other information, applications, and services.

(b) **System-of-systems (SoS):** This is a collection of systems that consume geospatial information from SDI data catalogues or from other sources available on the web. Each system is capable of independent operation, but also interoperates with other systems to achieve additional capabilities. Concepts such as smart cities, intelligent transport systems, driverless systems and dashboards that consume data from several databases or registries, are examples of the SoS approach. These systems are constructed and operated by people, but also include connections to machine generated data, such as IoT sensors and other data processed on the edge in real time. SoS participate in a Web 2.0 environment, as well as applying more advanced Web 3.0 technologies.

(c) **Geoverse:** This refers to an aspirational globally interconnected geospatial information ecosystem – one that permits intelligent interactions between SDI web portals, systems, sensors, applications, devices, and other things; using a broad range of communication interfaces and machine facilitated technologies such as AI, Machine Learning (ML), Natural Language Processing (NLP), data mining, virtual

assistants, digital identities, blockchain etc. The Geoverse is envisaged as a super-set of the Metaverse (Figure 1) that extends the notion of a 3D virtual society to include 4D visualizations, predictive analytics, and real time knowledge in all its forms, as well as a wide range of integrated and interoperable data from across various sectors and disciplines. Like the web, the Geoverse belongs to everyone; it is non-proprietary and not controlled by a single organization. The name 'Geoverse' is used to convey the use of geospatial technologies in combination with the web as a medium for positive change. The notion being "to better integrate and understand the complex relationships between people, place and planet", leading to sustainable development from a position of knowledge, wisdom, and insight.

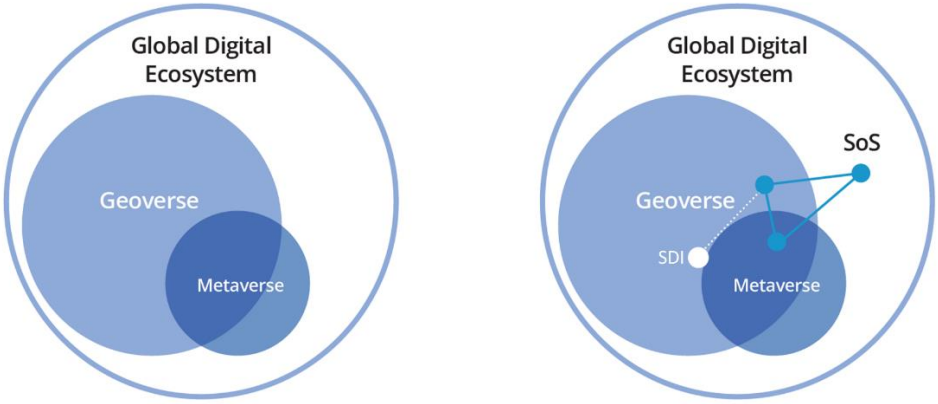

Figure 1: *(a) The Geoverse is a subset of the global digital ecosystem and participates in the Metaverse; (b) The SDI is a source of data for the Geoverse, system-of-systems (SoS), and Metaverse. SoS participate in the global digital ecosystem, Geoverse and the Metaverse.*

26. **What do we mean by knowledge?** The rationale for the paradigm shift from 'data to knowledge' is at the core of the transition to the future geospatial information ecosystem. Knowledge has different connotations, depending on the discipline and philosophy of thought. It refers to our ability to gain an accurate or deep intuitive understanding of something that leads to insight and wisdom. Our deep understanding of a subject emerges by passing through four qualitative steps: Data - Facts and figures without context for a specific question; Information - Data that is filtered and analyzed so that it is applicable to a specific question; Knowledge – Information put into context to answer a specific question; and Wisdom – the ability and confidence to act on knowledge.

27. With geospatial processes, knowledge is embedded into rules and procedures, machines can process and filter data to create synthesized information, which in turn results in the creation of new knowledge, and the cycle repeats. Traditionally, computer algorithms based on pre-determined inputs, rules (algorithms) and outputs, have undertaken this task. However, they are not suited to knowledge on-demand 'question and answer' type scenarios. The system/algorithm knows no more than the coder. Consequently, random, unpredictable and context dependent queries, and those requiring individualized filters, are difficult to code.

28. This is where AI has made a huge leap forward and opens significant opportunities for the geospatial sector to move beyond the SDI paradigm. AI has made automating knowledge creation a reality. While it still requires an element of explicit knowledge e.g., rules and training data; deep learning models (a branch of AI) are now able to learn on their own, and we are seeing sophisticated results in image interpretation. In addition, knowledge graphs are being used to infer relationships and meaning between separate pieces of data, and machine learning is used to improve natural language processors used in virtual assistant technology. These

knowledge graphs continually extract meaning from a growing web of 'searched words' and their associations.

29. Our ability to directly obtain new insights from vast amounts of data will become a reality when the future geospatial information ecosystem is able to provide real time access to knowledge that has been processed and contextualized for the individual and denoted as trustworthy; be it insights into the relationship between complex phenomena, the likelihood of an event, or simply navigating to a location. This is a paradigm shift from single direction, supplier driven SDI data networks and traditional data analytics and services created for a general market. In contrast, the knowledge on-demand paradigm focuses on specific knowledge, created by machine-actionable data and automated analytics driven by, and in response to, the questions of individuals. Importantly, the accuracy of answers, and therefore the trustworthiness of knowledge services, will have an interdependency with the accuracy and timeliness of the source data.

30. **What are the drivers for change?** There are multiple reasons why countries need to enhance the way geospatial information is managed and used. Much of the recent discussion focuses on delivering knowledge value with technology serving as an enabler for change; creating opportunities to make a difference that will ultimately bring lasting progress and sweeping transformation to address the many challenges faced. Understanding our challenges provides us with context to know what needs to change. From a national and global perspective, the drivers for change are recognized under three main themes: deliver unified solutions to global challenges; meet society's growing demand for equitable and affordable access to knowledge on-demand; and bridge the ever-widening geospatial digital divide between developed and developing countries. As we move beyond SDIs, it will be important to ensure the future geospatial information ecosystem is able to evolve with a priority on 'putting' developing countries at the center of everything we do. This means exploiting new technologies and incentivizing partnerships in a way that fosters the sharing of new capabilities and increasing digital literacy and innovation, so that everyone benefits.

31. **Making the step change:** As we transition towards a future geospatial information ecosystem, we will need a plan to guide the step change needed – so all countries can participate equally in the transition. The IGIF can be used to develop this evolutionary plan, and the advancements needed, in all of its nine strategic pathways. The IGIF was designed with constancy and flexibility in mind. In terms of constancy, the IGIF provides a consistent basis for strategizing, analyzing, and creating Country-level Action Plans for strengthening geospatial information management. In terms of flexibility, the IGIF recognizes that countries have unique starting points, and as such, their Action Plans can be designed for different priorities and circumstances.

32. Within the discussion paper, each of the nine strategic pathways of the IGIF is discussed in terms of their four key elements, the three 'drivers for change' and the 'step change' needed to transform geospatial information management arrangements to realize an ecosystem that meets future needs. Planning for change is a significant milestone in the evolving use of the IGIF. While it is impossible to know how the future will unfold, we can begin to map out the future geospatial information ecosystem as it appears at the present and adjust using the IGIF strategic pathways as new possibilities and technologies arise.

VI. Points for discussion

33. The Committee of Experts is invited to:

(a) Take note of the present report and to express its views on determining the future geospatial information ecosystem;

(b) Provide guidance and feedback on the two background documents provided, with a view to elaborating and defining the concept of the 'Geoverse' as the future geospatial information ecosystem for the global geospatial community;

(c) Encourage Member States and relevant interested experts to contribute to the further development of the future geospatial information ecosystem under this present agenda item;

(d) Provide further inputs and guidance towards next steps and elements of the future geospatial information ecosystem.