

**FORUM:** Economic and Social Council (ECOSOC)

**QUESTION OF:** Enhancing global geospatial information management arrangements

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**POSITION:** Deputy President

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## INTRODUCTION

Geospatial information and technologies have been used since 2300 BCE<sup>1</sup> to aid people in understanding the world around them. First, in the form of hand-drawn maps<sup>2</sup>, geospatial technologies have reached an extremely developed state in the modern day, with tools such as satellites and advanced computer software.

Geospatial information has many uses in the 21st century, such as urban planning, population mapping, emergency planning, agriculture, and military uses, among many others. Every Member State has some form of collecting and using geospatial information because of its extensive relevance.

Because each Member State manages its geospatial information, some have more developed management systems than others. However, even though it is the responsibility of each nation to manage its geospatial information, that information can have international importance. Thus, it is in the interest of all to create effective geospatial management arrangements so that international collaboration can occur smoothly and efficiently when needed, and to ensure the best internal operations.

Through the creation and implementation of international standards for national geospatial information management frameworks, the highest quality management arrangements can be achieved in all nations, extending the possible uses of geospatial information. In relation to the theme of the 19th CGSMUN, "Ethos vs Progress: Reassessing our Values in a Fragile World," as geospatial information technologies continue to develop, it is important for Member States to consider the values and motivations behind the development and use of this technology. It is imperative that Member States additionally, consider how to actively develop and manage this information for good while upholding its ethics and respecting the privacy of all whose information is used to develop these technologies.

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<sup>1</sup> Løwe, Vegard J. "History of Cartography." *Atlas.co*, <https://atlas.co/blog/history-of-cartography/>.

<sup>2</sup> "History of GIS | Timeline of the Development of GIS." Esri, <https://www.esri.com/en-us/what-is-gis/history-of-gis>.

## DEFINITION OF KEY TERMS

### Geodesy

Geodesy refers to “the science of accurately measuring and understanding the Earth's geometric shape, orientation in space, and gravity field.”<sup>3</sup>

### Geographical

Geographical refers to “relating to the features of the earth’s surface, or those of a particular area or place”<sup>4</sup>

### Geographical/Geospatial Information System (GIS)

GIS refers to “a system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data”<sup>5</sup>, its components include its database, software, hardware, network, management and procedures, and people<sup>6</sup>

### Geospatial

Geospatial refers to things “consisting of, derived from, or relating to data that is directly linked to specific geographical locations”<sup>7</sup>

### Geospatial Information Management (GIM)

GIM refers to what “encompasses the management, leadership, structures and practices required for the successful operation of GIS within an entity, nationally, regionally or globally”<sup>8</sup>

### Global Positioning System (GPS)

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<sup>3</sup> “What is geodesy?” NOAA's National Ocean Service, <https://oceanservice.noaa.gov/facts/geodesy.html>.

<sup>4</sup> “GEOGRAPHICAL | English meaning - Cambridge Dictionary.” Cambridge Dictionary, Cambridge University Press & Assessment, <https://dictionary.cambridge.org/dictionary/english/geographical>.

<sup>5</sup> “Geospatial Information for Sustainable Development.” Sustainable Development Knowledge Platform, United Nations, <https://sustainabledevelopment.un.org/topics/informationforintegrateddecision-making/geospatialinformation>.

<sup>6</sup> Planetizen Courses. “What is GIS? An introduction to Geographical Information Systems.” YouTube, 27 October 2015, <https://www.youtube.com/watch?v=AGWbKVpOrWc>.

<sup>7</sup> “Geospatial Definition & Meaning.” Merriam-Webster, Merriam-Webster, <https://www.merriam-webster.com/dictionary/geospatial>.

<sup>8</sup> “Frequently Asked Questions.” UN-GGIM, United Nations, <https://ggim.un.org/faq/>.

GPS refers to “a space-based navigation system that provides location and time information in all weather conditions, anywhere on or near the earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver.”<sup>9</sup>

### **National Spatial Data Infrastructure (NSDI)**

NSDI refers to “gives the basis for discovery, viewing and use of spatial data within government bodies, in the economic, non-commercial and public sectors, the academic community and citizens in general.”<sup>10</sup>

### **Spatial Analysis**

Spatial Analysis refers to “any of the formal techniques which study entities using their topological, geometric, or geographic properties. Spatial analysis includes a variety of techniques, many still in their early development, using different analytic approaches and applied in fields as diverse as astronomy, with its studies of the placement of galaxies in the cosmos, to chip fabrication engineering, with its use of “place and route” algorithms to build complex wiring structures. In a more restricted sense, spatial analysis is the technique applied to structures at the human scale, most notably in the analysis of geographic data.”<sup>11</sup>

## **BACKGROUND INFORMATION**

### **Development of Geospatial Information Technologies and Management Arrangements**

Geospatial information originated with the first maps hundreds of years ago and has continued to evolve since. In the 1960s, geographic computer systems began to emerge, followed by the first Geographical/Geospatial Information System (GIS) being created in Canada in 1963. Later, the United States launched the first Landsat satellite for global imaging in 1972, followed by the first GPS satellite in 1978.<sup>12</sup> These technologies are all essential to geospatial information systems and management as we know them today. We continue to use these technologies today, though in a more modernized form. For example,

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<sup>9</sup> “Geospatial Information for Sustainable Development.” *Sustainable Development Knowledge Platform*, United Nations, <https://sustainabledevelopment.un.org/topics/informationforintegrateddecision-making/geospatialinformation>.

<sup>10</sup> “What is NSDI?” *NIPP*, <https://www.nipp.hr/default.aspx?id=42>.

<sup>11</sup> “Geospatial Information for Sustainable Development.” *Sustainable Development Knowledge Platform*, United Nations, <https://sustainabledevelopment.un.org/topics/informationforintegrateddecision-making/geospatialinformation>.

<sup>12</sup> “History of GIS | Timeline of the Development of GIS.” Esri, <https://www.esri.com/en-us/what-is-gis/history-of-gis>.

the original geographic computer systems are now GIS software, satellite images are used to create maps, and GPS is used in navigational apps. Founded in 1969 as the Environmental Systems Research Institute, what is known today as Esri became one of the first companies in GIS management software. With the emergence of Artificial Intelligence (AI), companies such as Esri have embraced AI and utilized it to implement in their GIS software, using it for analysis of geospatial information. For example, Geospatial AI can be used to sort through geospatial data and identify patterns, as well as make future predictions based on current data<sup>13</sup>. Drones and Virtual Reality (VR) are also contributing to the development of geospatial information management systems in the digital age.<sup>14</sup> Drones can collect geospatial information through cameras, sensors, and various tools more easily than traditional human-operated planes<sup>15</sup>. This data can later be uploaded to GIS software. VR allows the user to view geospatial information in 3D, truly visualize the location, and have a deeper understanding of the geospatial information they are viewing<sup>16</sup>.

Additionally, the creation of Google Maps in 2005 is a landmark event<sup>17</sup> in the history of geospatial information management, as it represents the introduction of modern geospatial information being provided free and accessible to the public. In fact, the easy access and sharing of geospatial information, especially between Member States can be said to be a major goal of developing NSDIs today.

### **Geospatial Information Management Arrangements and Geospatial Information Management Software Companies**

The most useful and efficient management arrangements for geospatial information nowadays are digital. There are many GIS software companies, and U.S.-based Esri and its ArcGIS server are the most prominent. Others include Google Earth Pro, Trimble, Hexagon, Mapbox, Autodesk, and Axim Geospatial. Many businesses use the GIS software these companies produce. They are used by both local and national governments, to manage and analyze geospatial information.

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<sup>13</sup> "GeoAI." *Esri*, <https://www.esri.com/en-us/capabilities/geoai/overview>.

<sup>14</sup> Lagana, Celeste. "Examples and uses of GIS." *IBM*, 18 December 2023, <https://www.ibm.com/blog/geographic-information-system-use-cases/>.

<sup>15</sup> "Drones and GIS Mapping | Top 5 Drone Mapping Softwares." *Ellipsis Drive*, <https://ellipsis-drive.com/blog/drones-and-their-impact-on-gis-mapping/>.

<sup>16</sup> "Virtual Reality GIS." *Atlas*, <https://atlas.co/glossary/virtual-reality-gis/>.

<sup>17</sup> "History of GIS | Timeline of the Development of GIS." *Esri*, <https://www.esri.com/en-us/what-is-gis/history-of-gis>.

GIS software is important for compiling and storing all the geospatial data a company or government has. GIS software presents the data in a format that is easy to understand and makes analysis convenient through specialized tools and artificial intelligence. GIS software allows the user to look at different sets of data in relation to location, such as the population of cities on a map, in order to better understand the data in context and to make informed decisions based on the data.

### **Uses of Geospatial Information Management Arrangements**

There are many uses for geospatial information, especially combined with the analytical power of GIS software. Geospatial information extends beyond simply maps and geographical information but also into population and demographic data. Using this software makes it easy to combine different layers of geospatial information for deeper analysis. These uses extend to the commercial, government, and private sectors. Some of these uses include infrastructure industries, facilities management, utilities, energy management, agriculture, and natural disaster management.<sup>18</sup> Some of the uses of GIS for government include code enforcement, economic development, and planning and zoning.<sup>19</sup>

There are many various uses of GIS, and the only real way of misusing GIS is by violating ethical principles. Thus, it is of the utmost importance for those who collect and process, and use geospatial data to consider the ethics of how they collect and use data and for what purposes, and they should ensure the protection of individual privacy, and the security of the data they use.<sup>20</sup> Finally, when new information is found from geospatial information analysis, they should approach it with consideration and uphold ethical standards, especially when it regards personal matters.<sup>21</sup>

### **Legal Framework & Policies**

#### **National Legal Frameworks and National Spatial Data Infrastructure**

As each nation began to collect and use its own geospatial information, they also developed their own geospatial information management systems, National Spatial Data

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<sup>18</sup> "Using Geospatial Information to Manage Your Assets." Comparesoft, March 2023, <https://comparesoft.com/asset-management-software/using-geospatial-information/>.

<sup>19</sup> "GIS for Government: 193 Use Cases." OpenGov, <https://opengov.com/gis-government/#general>.

<sup>20</sup> Altaweel, Mark. "Ethics in GIS." *Geography Realm*, 25 May 2021, <https://www.geographyrealm.com/ethics-in-gis/>.

<sup>21</sup> "A GIS Code of Ethics." *GIS Certification Institute*, <https://www.gisci.org/Ethics/Code-of-Ethics>.

Infrastructures (NSDIs), and legal frameworks. These legal frameworks include standards for geospatial information management. Some legal bodies involved with these standards in any given nation may be geospatial organizations, data, technology, and digitalization departments, and any bodies related to these issues.<sup>22</sup> An effective NSDI and strong geospatial information management standards are essential to a nation making the most of its geospatial information and being able to collaborate and share information with other nations.

The state of development of NSDI is unique for each nation, especially as for a while there were no international standards for geospatial information management. In general, Less Economically Developed Countries (LEDCs) do not have as developed NSDIs as More Economically Developed Countries (MEDCs). However, the creation of the Integrated Geospatial Information Framework (IGIF)<sup>23</sup> in 2018 signifies a landmark for a new era in the development of geospatial information management systems globally.

### **The Integrated Geospatial Information Framework**

Created by the UN in conjunction with the World Bank<sup>24</sup>, the Integrated Geospatial Information Framework (IGIF) was created to guide LEDCs in improving their geospatial information management systems but is suitable to be adopted by nations of all states of economic development.<sup>25</sup> It provides geospatial information management frameworks that are highly useful in improving NSDIs. The IGIF is a basis for improving national geospatial information management but is not a one-size-fits-all legal framework that will look the same in every nation.

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<sup>22</sup> "A Guide to the Role of Standards in Geospatial Information Management." UNGGIM Standards Guide, [https://standards.unggim.org/unggim\\_guide.pdf](https://standards.unggim.org/unggim_guide.pdf).

<sup>23</sup> "United Nations Integrated Geospatial Information Framework (UN-IGIF)." UN-GGIM, <https://ggim.un.org/UN-IGIF/>.

<sup>24</sup> "Strengthening Geospatial Information Management: Using the Integrated Geospatial Information Framework (Self-Paced)." *World Bank*, <https://www.worldbank.org/en/olc/course/51929>.

<sup>25</sup> "INTEGRATED GEOSPATIAL INFORMATION FRAMEWORK." UN-GGIM, 24 July 2018, <https://ggim.un.org/meetings/GGIM-committee/8th-Session/documents/Part%201-IGIF-Overarching-Strategic-Framework-24July2018.pdf>.

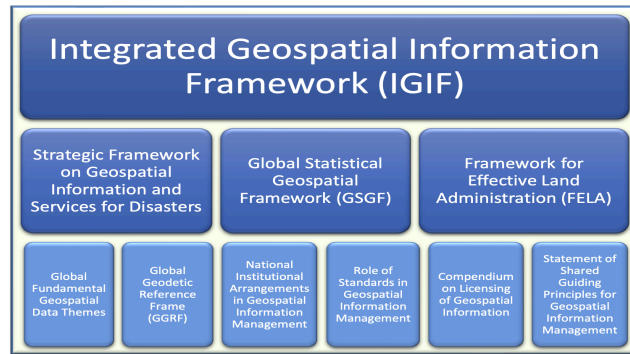


Figure 1: A quick overview of the components of the IGIF<sup>26</sup>

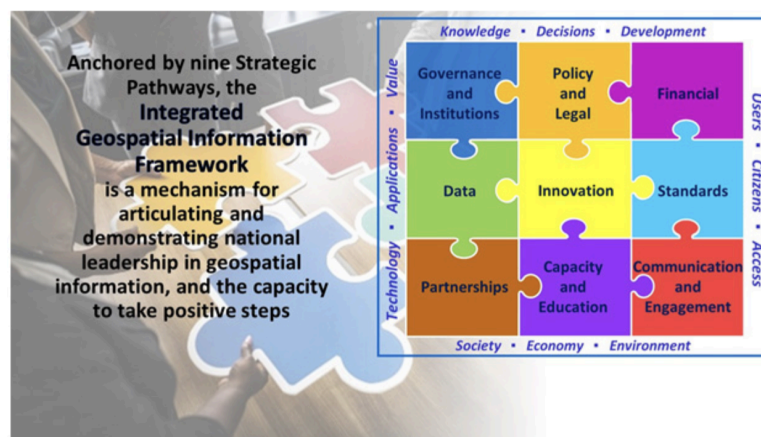


Figure 2: The nine strategic pathways of the IGIF for improving geospatial information management<sup>27</sup>

## Case Studies

### Sweden’s National Spatial Data Infrastructure and implementation of INSPIRE

Sweden is focusing on improving its National Spatial Data Infrastructure <sup>28</sup> and setting attainable goals for itself. These goals are concerned with improving the functionality, quality, and sharing and collaboration of Sweden’s geodata. For example, in line with these goals, Sweden wants to unify the different geodata standards in all its municipalities. Sweden

<sup>26</sup> “UNGGIM EUROPE EIGHTS PLENARY MEETING OCTOBER 13, 2021.” UN-GGIM Europe, [https://un-ggim-europe.org/wp-content/uploads/2021/10/7\\_20211013-EighthPlenaryUNGGIME-HLG-IGIF-Implementing-the-IGIF-.pdf](https://un-ggim-europe.org/wp-content/uploads/2021/10/7_20211013-EighthPlenaryUNGGIME-HLG-IGIF-Implementing-the-IGIF-.pdf).

<sup>27</sup> “United Nations Integrated Geospatial Information Framework (UN-IGIF).” UN-GGIM, <https://ggim.un.org/UN-IGIF/>.

<sup>28</sup> Kjellson, Bengt, et al. “Country Report of Sweden Swedish Spatial Data Infrastructure and the National Geodata Strategy.” *UN-GGIM*, August 2017, <https://ggim.un.org/country-reports/documents/Sweden-2017-country-report.pdf>.

implemented the EU INSPIRE<sup>29</sup> legal framework in 2011, which requires EU Member States to share geospatial information in an accessible manner<sup>30</sup>. Sweden has created a web portal that is open to the general public to upload geospatial data. The Member State also prioritizes following and collaborating with UN-GGIM and developed a national data portal to host its geospatial information. Sweden is doing well in terms of setting clear and strong goals for itself, with the only downside being that its systems are not ideal until they reach those goals. Some challenges faced are the speed of their development in the geospatial sector, the amount of Swedish government materials available to the public digitally and the lack of digitalization of Sweden’s urban planning data. Additionally, there is a shortage of usable bathymetric data to combat climate change and a need for uniformity and consistency in geospatial information for military uses.

### **Africa Regional Data Cube**

Launched in May of 2018, the Africa Regional Data Cube (ARDC), composed of Kenya, Senegal, Sierra Leone, Ghana, and Tanzania had a limited mission of using satellite technology to address issues such as “agriculture, food security, deforestation, urbanization, [and] water access”.<sup>31</sup> In 2020, ARDC began transitioning to Digital Earth Africa to widen the mission of the service to the entire continent of Africa and incorporate more uses into the service<sup>32</sup>. Although ARDC was short-lived and limited in its uses, it laid the foundation for a more extensive international geospatial information management framework to be established in Africa.

## **MAJOR COUNTRIES AND ORGANIZATIONS INVOLVED**

### **United States of America (U.S.A)**

In addition to developing many of the technologies used for geospatial information, such as GPS and satellite imagery, the United States is a leading Member State for GIS. One of the most important global geospatial management systems, Esri, is U.S.-based. Moreover, the Member State has a wealth of geospatial information.

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<sup>29</sup> “Overview.” *INSPIRE Knowledge base - European Commission*, [https://knowledge-base.inspire.ec.europa.eu/overview\\_en](https://knowledge-base.inspire.ec.europa.eu/overview_en).

<sup>30</sup> “Learn about INSPIRE.” *wetransform*, <https://wetransform.to/learn-about-inspire/>.

<sup>31</sup> “Africa Regional Data Cube.” *Global Partnership for Sustainable Development Data*, <https://www.data4sdgs.org/initiatives/africa-regional-data-cube>.

<sup>32</sup> “Africa Regional Data Cube To Transition To Digital Earth Africa.” *Space in Africa*, 3 February 2020, <https://spaceinafrica.com/2020/02/03/africa-regional-data-cube-to-transition-to-digital-earth-africa/>.



The U.S. NSDI framework includes sharing data between organizations in the nation so resources do not go towards duplicating geospatial research and providing basic geospatial information to all who need it.<sup>33</sup> Section 755 of the U.S. Geospatial Data Act of 2018 states that the U.S. NSDI will use geospatial information from numerous sources, and aims to make geospatial information free and accessible to the public, protect individual privacy, and support the development of a Global Spatial Data Infrastructure<sup>34</sup>.

## China

Along with its large presence in the global economy, China has a large role in international GIS. Due to the increasing need of the population for geospatial information, China has taken the development of its own NSDI seriously and has devoted many resources to developing it through expanding and updating national and regional geospatial databases, improving its geospatial technology, and advancing its NSDI frameworks<sup>35</sup>. China's main geospatial body is the National Administration of Surveying, Mapping and Geoinformation. Another part of China's NSDI is the National Fundamental Geographic Information System, which contains basic national geospatial information. The Member State has also worked to create digital city infrastructure that can be used in fields such as urban management.

Additionally, the Member State's national geoportal links geospatial information across the country, with Map World providing publicly accessible free geospatial information. China also has a National Geographic Information Coordinating Council responsible for improving its NSDI.<sup>36</sup>

## United Kingdom (U.K)

Although the U.K. has a major role to play in international GIS, it only recently developed its own NSDI. The U.K. Location Strategy was created in 2006. Meant to increase the value of geospatial information to the U.K., it provides "a consistent framework to assist national, regional and local initiatives and service delivery"<sup>37</sup>. The U.K. also adopted the

<sup>33</sup> "FRAMEWORK OVERVIEW." FGDC, <https://www.fgdc.gov/initiatives/framework/frameworkoverview>.

<sup>34</sup> "Geospatial Data Act Online Version." Federal Geographic Data Committee, [https://www.fgdc.gov/gda/online#\\_TOC\\_250007](https://www.fgdc.gov/gda/online#_TOC_250007).

<sup>35</sup> Chen, Jun, and Xinhua Chen. "Development of National Spatial Data Infrastructure (NSDI) in China: Progress and Applications." *The Hong Kong Polytechnic University*, [http://www.lsgi.polyu.edu.hk/staff/ZL.Li/Vol\\_5\\_2/01-chengjun-2.pdf](http://www.lsgi.polyu.edu.hk/staff/ZL.Li/Vol_5_2/01-chengjun-2.pdf).

<sup>36</sup> "The Status of Geospatial Information Management in China." UN-GGIM, <https://ggim.un.org/country-reports/documents/China-2012-country-report.pdf>.

<sup>37</sup> "Place matters: the Location Strategy for the United Kingdom." UN-GGIM, November 2008, <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://ggim.un.org/knowledgebase/>

INSPIRE<sup>38</sup> legal regulations, which came out in 2007 when it was an EU Member State, and has continued to recognize its benefits after Brexit, where the U.K. officially left the EU in 2020. In 2018, the U.K. established its national Geospatial Commission, which conducts research, establishes policies and standards relating to geospatial issues, invests in the geospatial sector, and aims to produce economic, social, and environmental benefits through geospatial information development<sup>39</sup>.

### **United Nations Committee of Experts on Global Geospatial Information Management**

Established by ECOSOC resolution 2011/24<sup>40</sup>, the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) is one of the most important organizations in global geospatial information management. The UN-GGIM “aims to address global challenges regarding the use of geospatial information, including in the development agendas, and to serve as a body for global policymaking in the field of geospatial information management”.<sup>41</sup> It meets yearly and hosts a platform for Member States to discuss and collaborate on issues of geospatial information. The UN-GGIM has created the Integrated Geospatial Information Framework (IGIF) in conjunction with the World Bank, which is a leading example framework for Member States.

### **World Bank**

Founded in July 1944 in the U.S.A., the World Bank<sup>42</sup> is one of the most influential financial organizations in the world. As the World Bank states: “In the digital era, geospatial technologies are revolutionizing the economy,”<sup>43</sup> and as such, improving geospatial information management systems is connected to developing a country’s economy and is a concern of the World Bank. The World Bank co-developed the Integrated Geospatial

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tion,local%2520initiatives%2520and%2520service%2520delivery.&v.

<sup>38</sup> “EU INSPIRE Directive.” *British Geological Survey*, <https://www.bgs.ac.uk/technologies/collaborations/inspire/>.

<sup>39</sup> “UK Geospatial Strategy 2030.” GOV.UK, 3 August 2023, <https://www.gov.uk/government/publications/uk-geospatial-strategy-2030/uk-geospatial-strategy-2030>.

<sup>40</sup> “Resolution 2011/24 Committee of Experts on Global Geospatial Information Management.” *the United Nations*, 27 July 2011, <https://www.un.org/en/ecosoc/docs/2011/res%202011.24.pdf>.

<sup>41</sup> “Mandates.” UN-GGIM, <https://ggim.un.org/Mandates/>.

<sup>42</sup> “Explore History.” World Bank, <https://www.worldbank.org/en/archive/history>.

<sup>43</sup> “Geospatial Technology and Information for Development.” World Bank, 2 October 2019, <https://www.worldbank.org/en/topic/land/brief/geospatial-technology-and-information-for-development>.

Information Framework with the UN,<sup>44</sup> and is a key organization for funding and supporting geospatial information systems in LEDCs.

### International Association of Geodesy

The International Association of Geodesy<sup>45</sup> (IAG)'s mission is the furthering of the science of geodesy, a science concerned with the shape, gravity, and rotation of the Earth in relation to time and which depends on geodetic reference frames<sup>46</sup>, which it aims to achieve through scientific development, the development of reference systems, and promoting international collaboration.<sup>47</sup> The IAG is an associate member of the UN-GGIM subcommittee on geodesy,<sup>48</sup> making it a relevant organization to the issue at hand.

### Open Geospatial Consortium

The Open Geospatial Consortium (OGC) is “a consortium of experts committed to improving access to geospatial, or location information”<sup>49</sup>. The OGC often collaborates with the UN-GGIM, including to create a guide on the role of standards in geospatial information management<sup>50</sup>. In fact, one of the most important roles of the OGC is in establishing and furthering standards<sup>51</sup> for geospatial information management systems.

## TIMELINE OF EVENTS

1963	Geographer Roger Tomlinson creates the first GIS for the Canadian government <sup>52</sup>
1969	Today’s major GIS software company Esri is founded as the Environmental Systems Research Institute <sup>53</sup>

<sup>44</sup> “Strengthening Geospatial Information Management: Using the Integrated Geospatial Information Framework (Self-Paced).” *World Bank*, <https://www.worldbank.org/en/olc/course/51929>.

<sup>45</sup> <https://iugg.org/associations-commissions/associations/iag/>

<sup>46</sup> “What is Geodesy?” *Global Geodetic Observing System*, <https://ggos.org/about/what-is-geodesy/>.

<sup>47</sup> “International Association of Geodesy (IAG).” IUGG, 3 July 2024, <https://iugg.org/associations-commissions/associations/iag/>.

<sup>48</sup> “UN Subcommittee on Geodesy established.” IAG, <https://www.iag-aig.org/topic/47>.

<sup>49</sup> Open Geospatial Consortium: Home, <https://www.ogc.org>.

<sup>50</sup> “UNGGIM Standards Guide.” OGC, <https://standards.unggim.ogc.org/index.php>.

<sup>51</sup> Schrack, Amanda. “The Importance of the OGC & Open Standards - FME by Safe Software.” *FME*, 17 March 2021, <https://fme.safe.com/blog/2021/03/importance-ogc-open-standards/>. Accessed 8 August 2024.

<sup>52</sup> “History of GIS | Timeline of the Development of GIS.” Esri, <https://www.esri.com/en-us/what-is-gis/history-of-gis>.

<sup>53</sup> “History of GIS | Timeline of the Development of GIS.” Esri, <https://www.esri.com/en-us/what-is-gis/history-of-gis>.

23 July 1972	NASA launches the first Landsat satellite to observe the Earth <sup>54 55</sup>
14 February 1989	The U.S. Air Force launches the world’s first GPS satellite <sup>56 57</sup>
8 February 2005	Google Maps created <sup>58 59</sup>
2006	The U.K. Location Strategy is created <sup>60</sup>
15 May 2007	The EU Inspire Directive begins <sup>61</sup>
27 July 2011	United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) established with ECOSOC resolution 2011/24 <sup>62</sup>
26 February 2015	Resolution 69/266 <sup>63</sup> passed by the General Assembly, which encourages the establishment of a global geodetic reference frame
25 September 2015	2030 Agenda for Sustainable Development adopted by the General Assembly with resolution 70/1 <sup>64</sup>
27 July 2016	Mandate of the Committee of Experts expanded with ECOSOC resolution 2016/27 <sup>65</sup>
2018	the U.K. established its national Geospatial Commission <sup>66</sup>

<sup>54</sup> “History of GIS | Timeline of the Development of GIS.” Esri, <https://www.esri.com/en-us/what-is-gis/history-of-gis>.

<sup>55</sup> “Landsat 1.” USGS, <https://www.usgs.gov/landsat-missions/landsat-1>.

<sup>56</sup> “History of GIS | Timeline of the Development of GIS.” Esri, <https://www.esri.com/en-us/what-is-gis/history-of-gis>.

<sup>57</sup> “Aerospace 60th Anniversary Timeline.” The Aerospace Corporation, <https://aerospace.org/timeline#event-gps-block-ii-and-delta-ii>.

<sup>58</sup> “History of GIS | Timeline of the Development of GIS.” Esri, <https://www.esri.com/en-us/what-is-gis/history-of-gis>.

<sup>59</sup> Reid, Elizabeth. “Google Maps’ biggest moments over the past 15 years.” The Keyword, 6 February 2020, <https://blog.google/products/maps/look-back-15-years-mapping-world/>.

<sup>60</sup> “Place matters: the Location Strategy for the United Kingdom.” *UN-GGIM*, November 2008, <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://ggim.un.org/knowledgebase/Attachment2210.aspx%3FAttachmentType%3D1%23~:text%3DThe%2520objective%2520of%2520the%2520Location,local%2520initiatives%2520and%2520service%2520delivery.&v>.

<sup>61</sup> “INSPIRE Directive.” *Irish Government*, 9 April 2024, <https://www.gov.ie/en/publication/1def1-inspire-directive/>.

<sup>62</sup> “Resolution 2011/24 Committee of Experts on Global Geospatial Information Management.” *the United Nations*, 27 July 2011, <https://www.un.org/en/ecosoc/docs/2011/res%202011.24.pdf>.

<sup>63</sup> “69/266. A global geodetic reference frame for sustainable development.” UN-GGIM, 11 March 2015, [https://ggim.un.org/documents/a\\_res\\_69\\_266\\_e.pdf](https://ggim.un.org/documents/a_res_69_266_e.pdf).

<sup>64</sup> “70/1. Transforming our world: the 2030 Agenda for Sustainable Development.” *United Nations Official Document System*, 21 October 2015, <https://documents.un.org/doc/undoc/gen/n15/291/89/pdf/n1529189.pdf?token=o6sQCT6EckDJNSjGp4&fe=true>.

<sup>65</sup> “2016/27. Strengthening institutional arrangements on geospatial information management.” *UN-GGIM*, 15 August 2016, [https://ggim.un.org/documents/E\\_Res\\_2016-27\\_en.pdf](https://ggim.un.org/documents/E_Res_2016-27_en.pdf).

<sup>66</sup> “UK Geospatial Strategy 2030.” GOV.UK, 3 August 2023, <https://www.gov.uk/government/publications/uk-geospatial-strategy-2030/uk-geospatial-strategy-2030>.

May 2018	Africa Regional Data Cube launched <sup>67</sup>
August 2018	IGIF Overarching Strategic Framework adopted by the UN <sup>68</sup>
2020	Africa Regional Data Cube transitions to Digital Earth Africa with Digital Earth Africa’s release <sup>69</sup>
22 July 2022	The terms of reference for the UN-GGIM are updated by Resolution 2022/24 <sup>70</sup> adopted by ECOSOC

## UN INVOLVEMENT: RELEVANT RESOLUTIONS, TREATIES AND EVENTS

### Committee of Experts on Global Geospatial Information Management 2011/24

Resolution 2011/24 “Committee of Experts on Global Geospatial Information Management”<sup>71</sup> was adopted by ECOSOC on July 27, 2011. The resolution established the Committee of Experts on Global Geospatial Information Management (UN-GGIM)<sup>72</sup>, now one of the major organizations involved with the issue. Additionally, it reinforces the UN’s goal of international collaboration for GIM and encourages Member States to promote knowledge sharing on the subject. The UN-GGIM’s objectives include creating a space for Member States to collaborate on GIS/GIM and bettering those systems globally.

### A Global Geodetic Reference Frame for Sustainable Development 69/266

Resolution 69/266 “A Global Geodetic Reference Frame for Sustainable Development”<sup>73</sup> was adopted by the General Assembly on February 26, 2015. The main focus of this resolution was on the creation of a global geodetic reference frame<sup>74</sup>. It stresses the importance of international collaboration on geodesy, especially to promote its development

<sup>67</sup> “Home - African Regional Data Cube.” *Digital Earth Africa*, <https://www.digitalearthafrika.org/african-regional-data-cube>.

<sup>68</sup> “OPERATIONALIZING THE INTEGRATED GEOSPATIAL INFORMATION FRAMEWORK INFORMATION SESSION AND REGIONAL CONSULTATION ON THE IMPLME.” UN-GGIM Europe, 5 June 2019, <https://un-ggim-europe.org/wp-content/uploads/2019/06/WS-IGIF-UNGGIM-Europe-5Jun2019-Final.pdf>.

<sup>69</sup> “Africa Regional Data Cube To Transition To Digital Earth Africa.” *Space in Africa*, 3 February 2020, <https://spaceinafrica.com/2020/02/03/africa-regional-data-cube-to-transition-to-digital-earth-africa/>.

<sup>70</sup> “2022/24. Enhancing global geospatial information management arrangements.” *UN-GGIM*, 1 August 2022, [https://ggim.un.org/documents/E\\_RES\\_2022\\_24\\_e.pdf](https://ggim.un.org/documents/E_RES_2022_24_e.pdf).

<sup>71</sup> “Resolution 2011/24 Committee of Experts on Global Geospatial Information Management.” *the United Nations*, 27 July 2011, <https://www.un.org/en/ecosoc/docs/2011/res%202011.24.pdf>.

<sup>72</sup> “About.” *UN-GGIM*, <https://ggim.un.org/about/>

<sup>73</sup> “69/266. A global geodetic reference frame for sustainable development.” UN-GGIM, 11 March 2015, [https://ggim.un.org/documents/a\\_res\\_69\\_266\\_e.pdf](https://ggim.un.org/documents/a_res_69_266_e.pdf).

<sup>74</sup> “Description of the Global Geodetic Reference Frame.” *International Association of Geodesy*, <https://www.iag-aig.org/topic/3>.

in LEDCs, including through providing information to the global geodetic reference frame and collaboration with the International Association of Geodesy. Finally, the resolution encourages all nations to improve their NSDIs.

### **Transforming our world: the 2030 Agenda for Sustainable Development 70/1**

Resolution 70/1 “Transforming our world: the 2030 Agenda for Sustainable Development”<sup>75</sup> was adopted by the General Assembly on September 25, 2015. Since then, the 2030 Agenda for Sustainable Development has had an impact of a large scope. Although the improvement of geospatial information management systems can be linked to many of the Sustainable Development Goals, it is explicitly mentioned in paragraph 76, where the General Assembly commits to support nations in improving their national data systems, including for geospatial information, especially in African countries and LEDCs. The main challenge this resolution faces is that it is unlikely all the sustainable development goals will be reached by 2030.

### **Strengthening Institutional Arrangements on Geospatial Information Management 2016/27**

Resolution 2016/27 “Strengthening Institutional Arrangements on Geospatial Information Management”<sup>76</sup> was adopted by ECOSOC on July 27, 2016, and expresses ECOSOC’s continuing support of the UN-GGIM. It emphasizes the need to improve the “coordination and coherence”<sup>77</sup> of global geospatial information management systems, and the need to strengthen the capacity for these systems in LEDCs especially. Perhaps most importantly, the resolution expands the mandate of UN-GGIM and expounds on the various changes and support needed with this expansion.

### **United Nations Integrated Geospatial Information Framework**

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<sup>75</sup> “70/1. Transforming our world: the 2030 Agenda for Sustainable Development.” United Nations Official Document System, 21 October 2015, <https://documents.un.org/doc/undoc/gen/n15/291/89/pdf/n1529189.pdf?token=o6sQCT6EckDJNSjGp4&fe=true>.

<sup>76</sup> “2016/27. Strengthening institutional arrangements on geospatial information management.” UN-GGIM, 15 August 2016, [https://ggim.un.org/documents/E\\_Res\\_2016-27\\_en.pdf](https://ggim.un.org/documents/E_Res_2016-27_en.pdf).

<sup>77</sup> “2016/27. Strengthening institutional arrangements on geospatial information management.” UN-GGIM, 15 August 2016, [https://ggim.un.org/documents/E\\_Res\\_2016-27\\_en.pdf](https://ggim.un.org/documents/E_Res_2016-27_en.pdf).

The United Nations Integrated Geospatial Information Framework (UN-IGIF)<sup>78</sup> was adopted in August of 2018. The UN-IGIF “provides a basis and guide for developing, integrating, strengthening, and maximizing geospatial information management and related resources in all countries”<sup>79</sup>. While the UN-IGIF provides a strong framework for countries to improve their NSDIs, as of today it does not host a platform for the integration of NSDIs and thus sharing of geospatial information.

### **Enhancing Global Geospatial Information Management Arrangements 2022/24**

Resolution 2022/24 “Enhancing Global Geospatial Information Management Arrangements”<sup>80</sup> was adopted by ECOSOC on July 22, 2022. The resolution emphasizes improving geospatial information management in LEDCs, the UN-GGIM’s need for funding and support from the UN and Member States, as well as updating the terms of reference of the UN-GGIM, placing the Committee in command of all issues of geospatial information, and including the Committee’s annual meetings in the UN calendar. The Annex of the Resolution with the updated Terms of Reference of the UN-GGIM is especially valuable, as it includes many important details on how the UN-GGIM will conduct its work and help enhance geospatial information management arrangements globally. A main challenge identified by this resolution is the difficulty of the UN-GGIM’s functioning if not provided with proper funding.

## **PREVIOUS ATTEMPTS TO SOLVE THE ISSUE**

### **Geographical Information System of the [European] Commission**

The Geographical Information System of the [European] Commission is a service of the European Commission (Eurostat), which provides geographic information and assists in integrating statistical and geospatial information for Europe.<sup>81</sup> The Commission operates and maintains geospatial databases for the European Commission. It is a good example of a

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<sup>78</sup> “United Nations Integrated Geospatial Information Framework (UN-IGIF).” UN-GGIM, <https://ggim.un.org/UN-IGIF/>.

<sup>79</sup> “United Nations Integrated Geospatial Information Framework (UN-IGIF).” UN-GGIM, <https://ggim.un.org/UN-IGIF/>.

<sup>80</sup> “2022/24. Enhancing global geospatial information management arrangements.” *UN-GGIM*, 1 August 2022, [https://ggim.un.org/documents/E\\_RES\\_2022\\_24\\_e.pdf](https://ggim.un.org/documents/E_RES_2022_24_e.pdf).

<sup>81</sup> “Eurostat: Update on latest activities.” UN-GGIM Europe, [https://un-ggim-europe.org/wp-content/uploads/2024/01/3\\_20231003\\_JointMeeting\\_Eurostat\\_final.pdf](https://un-ggim-europe.org/wp-content/uploads/2024/01/3_20231003_JointMeeting_Eurostat_final.pdf).

geospatial information management system that integrates information while still giving Member States the sovereignty to have their NSDIs.

### **INSPIRE Initiative**

Started in 2007, the Infrastructure for Spatial Information in Europe is “a legal requirement within the European Union to publish spatial data in a way that makes it accessible, interoperable, and above all useful”.<sup>82</sup> INSPIRE acts as a legal framework for all EU Member States for the best sharing of geospatial information gathered by various organizations. The initiative is not a replacement for NSDI in Member States, but rather a framework of the minimum rules Member States’ data must follow. In addition, some countries that are not EU Member States also choose to use INSPIRE.

### **ARABREF Infrastructure**

The ARABREF infrastructure is meant to be a “unified geodetic reference frame for the Arab States to support the Global Geodetic Reference Frame”.<sup>83</sup> Although it is a good idea that promote collaboration between Arab nations, it has not yet become a full reality as of today, and thus it is difficult to make a deep assessment of its successes and failures.

### **Digital Earth Africa**

Released in 2020<sup>84</sup>, Digital Earth Africa (DE Africa) is a continent-wide platform that equips African professionals with tools to monitor and analyze Africa’s landscape<sup>85</sup>. DE Africa has a lot of easily accessible geospatial information and GIS software that African countries can use. The platform is a continent-wide data cube, somewhat an expanded version of ARDC. Although it is a useful tool to view and analyze geospatial data, it does not provide legal frameworks for African countries’ geospatial information management arrangements.

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<sup>82</sup> “Learn about INSPIRE.” wetransform, <https://wetransform.to/learn-about-inspire/>.

<sup>83</sup> “UN-GGIM: Arab States.” UN-GGIM-AP, [https://un-ggim-ap.org/sites/default/files/media/meetings/Plenary08/WG1\\_S2B\\_1%20Othman%20Al-Kherayef\\_UN-GGIM%20Arab%20States%20WG%20on%20Geodetic%20Reference%20Frame.pdf](https://un-ggim-ap.org/sites/default/files/media/meetings/Plenary08/WG1_S2B_1%20Othman%20Al-Kherayef_UN-GGIM%20Arab%20States%20WG%20on%20Geodetic%20Reference%20Frame.pdf).

<sup>84</sup> “Africa Regional Data Cube To Transition To Digital Earth Africa.” *Space in Africa*, 3 February 2020, <https://spaceinafrica.com/2020/02/03/africa-regional-data-cube-to-transition-to-digital-earth-africa/>.

<sup>85</sup> “About Us.” Digital Earth Africa, <https://www.digitalearthafrika.org/about-us>.



## POSSIBLE SOLUTIONS

### Use of the Integrated Geospatial Information Framework

Every Member State has room for improvement in its National Spatial Data Infrastructure (NSDI) framework. By following the Integrated Geospatial Information Framework (IGIF), all Member States will be operating under similar and high quality frameworks, making internal use as well as international collaboration on geospatial information easier and more effective. Additionally, the IGIF makes the jobs of governing bodies involved with NSDI less strenuous, as they can follow already set goals and frameworks as a basis instead of needing to devise entire frameworks from scratch, while still having the sovereignty over their NSDIs. Although implementation<sup>86 87</sup> of the IGIF would be beneficial for all Member States, it does not contain a platform for geospatial information sharing, so it is not a replacement for regional/continental data-sharing platforms.



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Figure 3: A strategic plan for countries wanting to implement IGIF

<sup>86</sup> “United Nations Integrated Geospatial Information Framework (UN-IGIF) Part 2.” *UN-GGIM*, <https://ggim.un.org/UN-IGIF/part2.cshtml>.

<sup>87</sup> “United Nations implementation guide for integrated geospatial information framework.” *EuroGeographics*, 15 September 2020, <https://eurogeographics.org/news/united-nations-implementation-guide-for-and-integrated-geospatial-information-framework/>.

<sup>88</sup> “UNGGIM EUROPE EIGHTS PLENARY MEETING OCTOBER 13, 2021.” *UN-GGIM Europe*, [https://un-ggim-europe.org/wp-content/uploads/2021/10/7\\_20211013-EighthPlenaryUNGGIME-HLG-IGIF-Implementing-the-IGIF-.pdf](https://un-ggim-europe.org/wp-content/uploads/2021/10/7_20211013-EighthPlenaryUNGGIME-HLG-IGIF-Implementing-the-IGIF-.pdf).

## Creation of Regional Geospatial Information Systems and Frameworks

Regional systems for the sharing of geospatial data and geospatial information management frameworks can be quite successful, as shown by initiatives such as INSPIRE. If the already existing regional/continental systems such as INSPIRE, ARABREF, and DE Africa are improved and expanded, they will continue to make international geospatial data sharing easy and effective, as well as provide high-quality geospatial management frameworks. INSPIRE could be improved through the incorporation of more modern geospatial data sources<sup>89</sup>, ARABREF could be improved firstly through its actualization, and Digital Earth Africa could be improved through the addition of model legal frameworks. These regional systems could also be extended to international collaboration for economic development in the geospatial information sector. While a worldwide system for the sharing of geospatial data and geospatial information management frameworks is unrealistic as of today, regional systems can be effective and attainable. However, it is still the responsibility of Member States to contribute to and maintain these systems, and all member nations of the regional systems would need to actively participate for the systems' success.

## Providing Less Economically Developed Countries with Geospatial Software

Many companies and governments in less economically developed countries (LEDCs) may not have the resources to obtain high-quality geospatial information software (GIS software) such as Esri. As comprehensive GIS software is invaluable in properly storing, managing, and fully utilizing geospatial data collected, as well as in learning how to improve geospatial information collection and processing, providing LEDCs with GIS software can be essential in further enhancing geospatial information management arrangements in LEDCs. Providing LEDCs with GIS software could also help grow their geospatial industry economies, as there would be more ways to use and share geospatial information.

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<sup>89</sup> "The future of INSPIRE (revisited): EU common data spaces, high-value data sets, evidence-based policy development." *European Union*, 14 June 2021, [https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://wikis.ec.europa.eu/download/attachments/33527464/%255BDOC5%255D\\_MIG13\\_WS\\_FutureOfINSPIRE.pdf%3Fversion%3D1%26modificationDate%3D1623674120352%26api%3Dv2&ved=2ahUKewi0-uG-rqmlAxUL2AIH](https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://wikis.ec.europa.eu/download/attachments/33527464/%255BDOC5%255D_MIG13_WS_FutureOfINSPIRE.pdf%3Fversion%3D1%26modificationDate%3D1623674120352%26api%3Dv2&ved=2ahUKewi0-uG-rqmlAxUL2AIH)

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