UN-GGIM Future Trends

**Potential Themes and sub-themes – Long list**



# **Instructions**

Please refer to this document when completing the response form for the revision of the report ‘Future trends in geospatial information management: the five to ten-year vision’.

The sub-themes are split into two priority areas which were identified during the first phase of the review. We ask that you provide your perspectives and expert opinions on the first priority area. We also welcome contributions for the second priority area.

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|  | Priority area 1 |
|  | Priority area 2 |

# **Themes and Sub-themes**

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| **1. Global trends** |
| 1. Climate change and the environment |
| 1. Sensors, information and connectivity |
| 1. Automation and changing nature of work |
| 1. Gender and diversity |
| 1. Population growth, age, and gender imbalance and the rise of the millennials |
| 1. Urbanisation |
| 1. Health and education |
| 1. Demand for resources |
| 1. Economic turbulence |
| 1. Transport, automation and unmanned systems |
| 1. Corruption |
| 1. The function and resources of the state |
| 1. National security including cyber considerations |
| 1. The digital divide |
| 1. Politics and society (i.e. polarisation and individualisation) |

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| **2. Disruptive technologies** |
| 1. Artificial intelligence and Machine Learning |
| 1. New platforms for data collection – alignment with sensor technology – Earth Observations, Cube Satellites, HAPS, LiDAR SLAM, SAR, Imagery7, Quantum sensing |
| 1. Domains of 'data transformation'/big data analytics/data science and the predominant emergence of data ecosystems |
| 1. Cloud-, Edge-, Quantum-, and Fog- Computing |
| 1. Sensor networks – self-locating, utilising existing infrastructure, repurposing of data |
| 1. Blockchain and Distributed Ledger Technology |
| 1. Immersive experiences: Augmented Reality, Virtual Reality, Mixed Reality |
| 1. Re-purposing of data i.e. satellite derived bathymetry |
| 1. Ontologies |
| 1. autonomous systems on and under the water, i.e. AUV (Autonomous Underwater Vehicles) and ASV (Autonomous Surface Vehicles) |
| 1. Internet of Things |
| 1. Connectivity and 5G |
| 1. Smart Infrastructure through sensor deployment |
| 1. Robotics and automation, including vehicles |
| 1. Next generation social media |
| 1. Increasing use of ‘airspace’ including drones and UAVs |
| 1. indoor positioning, modelling and navigation |

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| **3. Data capture, creation, maintenance, and management** |
| 1. New data sources and collection technology: satellite imagery, Smallsats, laser scanning, sensor networks, IoT, UAVs and drones, point cloud, EO and high performance spaceborne sensors |
| 1. open source, social media and sensors are creating increasing amounts of spatially located information – big data analytics |
| 1. Data harmonisation, maintenance and integration |
| 1. Linked data – rich semantics and new ontological models to help align more data and derive new meaning |
| 1. Global Geodetic Reference Frame (GGRF) |
| 1. Spatial Data Infrastructure |
| 1. Automatic change detection and feature extraction, and machine-to-machine learning |
| 1. ‘Mission’ Ready Data – cloud, APIs and web map services |
| 1. Data quality indicators |
| 1. Human sensors and citizen science |
| 1. API and machine processing |
| 1. 2D, 3D, 4D data, standards and trends in model creation and archiving |
| 1. Data requirements: more, faster, better…. |
| 1. High accuracy GNSS positioning |
| 1. Street-level data capture requirements and technologies for Connected Autonomous Vehicles (CAVs), etc. |
| 1. Emergence of new datasets – e.g. point clouds |
| 1. Natural language querying of geographic information |
| 1. Mapping and mapping platforms-as-a-Service - the opportunity of cloud. |
| 1. Trends in cognition and cartography |
| 1. Distributed data networks |

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| **4. Changing Relevance** |
| 1. Real-time information demand |
| 1. Ubiquitous use of position in technology and business |
| 1. Platform business model are becoming dominant, next developments in the areas of frictionless brokerage |
| 1. Modelling, simulation, and prediction |
| 1. The partial recognition of the impact that geospatial information can have to Societal, Economic, and Environmental issues |
| 1. The quest for information advantage |
| 1. Digitisation of services |
| 1. Managed services are on the rise |
| 1. New commercial sectors (PlanTech, FinTech), peer-to-peer services with new business models emerging |
| 1. Asset management at both macro and micro level |
| 1. Building Information Modelling (BIM) and Asset Management at the micro-scale |
| 1. Global scale and pre-eminence of global businesses |
| 1. Commodification of data |

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| **5. Integrating data.** |
| 1. Integration of different data sources |
| 1. Sustainable Development Goals |
| 1. Integrating statistical and geospatial information |
| 1. Open standards |
| 1. Legal, data, semantic, and technical interoperability |
| 1. Integration between outdoor, above ground, underground, indoor, and offshore fundamental data |
| 1. Digital Twin |
| 1. Indicators associated with wellbeing frameworks that access social, economic, and environmental factors |
| 1. Verification of data authenticity, quality, and origin |
| 1. Changing approach to Censuses |
| 1. Is this more – integrating authoritative government data? |
| 1. Fostering greater innovation with data |

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| **6. Legal and Policy Developments** |
| 1. Legal and policy frameworks that enable geospatial benefit |
| 1. Digital Ethics and Privacy |
| 1. Authoritative and trusted data, assurance, and liability |
| 1. Open Data |
| 1. Licensing, Pricing, and data ownership |
| 1. Assessing the true value of GI. |
| 1. Use of national and local geospatial information, systems and capabilities for evidence-based policy, and decision-making |
| 1. Cybersecurity |
| 1. Transparency and evidence-based decision making |
| 1. Funding models (and commercial models) |
| 1. Digital Law (administrative law, GDPR, information security law) |
| 1. eGovernment |
| 1. Liability with regard to automized process, decision making, and AI |
| 1. Emergence of national data strategies emerging at the national level that will influence or embrace geospatial. |
| 1. Global agendas impacting national policies |
| 1. Regulatory bodies – stipulating data demands on functional services |
| 1. Predicting and managing adaptation to shocks and technology changes (e.g. CAV impact on urban environments/transport patterns) |

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| **7. Skills and Training** |
| 1. Data science – increasing level of understanding at all levels needed |
| 1. Improving data skills and GI awareness in our societies |
| 1. The need to develop professionals in the fields of geography, data science, geospatial information technology; and, specialist skills related to geospatial financial systems, policy and law, and, project management |
| 1. Creating a true national Geospatial Information community |
| 1. Research and Development |
| 1. Training in new core capabilities such as 4D visualisation, analytics, etc. |
| 1. Career development community |
| 1. Innovation |
| 1. Use of AI to manage, replace, keep, and reorganise skills and competences |
| 1. Access and computer literacy/digital exclusion (elderly, disabled, remote geographies etc) |

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| **8. The role of private and non-governmental sectors** |
| 1. Crowdsourcing |
| 1. Private sector as data/service provider |
| 1. Public sector a challenge to private sector? |
| 1. Open software – hacking community |
| 1. Volunteered geographic information (VGI) |
| 1. Private sector setting the challenge to Governments |
| 1. Delivering new location-based applications and services |
| 1. Community based standards |
| 1. Activism - the use of data as a weapon? |
| 1. Trust |
| 1. Distributed value networks |

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| **9. The future role of government in geospatial data provision and management** |
| 1. Interoperability and integration of information |
| 1. Commitment to invest in accessible data including maintaining accurate, detailed, trusted fundamental geospatial information |
| 1. National data infrastructure |
| 1. Standards and freedoms |
| 1. Managing challenges:    * Fast moving and demanding customers;    * Demand for increasing accuracy, currency, and detail;    * increasing volume of data; and,    * increasing competition from the private sector. |
| 1. Data brokerage |
| 1. Ocean mapping to support the Seabed 2030 project run by IOC/IHO GEBCO (to be completed by 2030) – less than 20% of the ocean has been mapped |
| 1. Innovation and developing new business opportunities |

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| **10. Cross sectoral Partnerships** |
| 1. Inter- and intra-regional, and international cross-sectoral and inter-disciplinary collaboration, cooperation and partnership |
| 1. Industry and private-sector partnerships |
| 1. Disaster risk reduction and humanitarian response |
| 1. Funding partnerships such as between the United Nations and the World Bank |
| 1. Influencing the international policy agenda: Sustainable Development Goals, Sendai Framework for Disaster reduction 2015-2030, Small Island Developing States Accelerates Modalities of Action (SAMOA) |
| 1. Distributed value chains without explicit partnerships |

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