Earth Observations and Geospatial Information for Monitoring the SDGs

The Global Framework: A Geospatial Vision for the 2030 Agenda

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A bit of history...and a lot of vision...

"Personal uses of computing will include the ability to generate computer maps using a new technology known as 'Mapavision'. Mundane applications will include preparation of route maps at home or enroute for the journey to work, shopping, picking up the kids, etc., taking into account weather, road conditions, existing traffic conditions and a minimum travel path.

Cross country travelers will have the novel opportunity of not being able to get lost due to the constant availability of a map on their TV screen which pinpoints their current location.

Of greatest importance will be everyone's ability and right as a free citizen to display information related to recent and forthcoming public policy issues on the national, regional, and local level...."

"The medium of computer graphics may prove to be the messenger (if not the message) by which all people will most effectively benefit from the emergence of computer technology."

Allan Schmidt, 1979: Future directions of computer mapping

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A bit of history...and a lot of vision...

"I believe we need a 'Digital Earth' – a multi-resolution three-dimensional representation of the planet, into which we can embed vast quantities of geo-referenced data.

Imagine a young child going to a Digital Earth exhibit at a local museum. After donning a head-mounted display, she sees Earth as it appears from space. Using a data glove, she zooms in, using higher and higher levels of resolution, to see continents, then regions, countries, cities, and finally individual houses, trees, and other natural and man-made objects.

We have an unparalleled opportunity to turn a flood of raw data into understandable information about our society and our planet. This data will include not only high-resolution satellite imagery of the planet, digital maps, and economic, social, and demographic information. If we are successful, it will have broad societal and commercial benefits in areas such as education, decision-making for a sustainable future, land-use planning, agricultural, and crisis management; and to collaborate on the long-term environmental challenges we face."

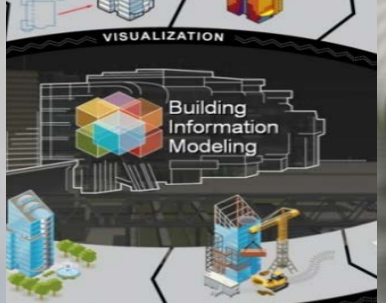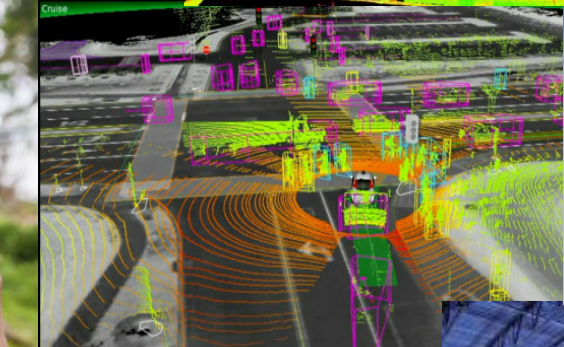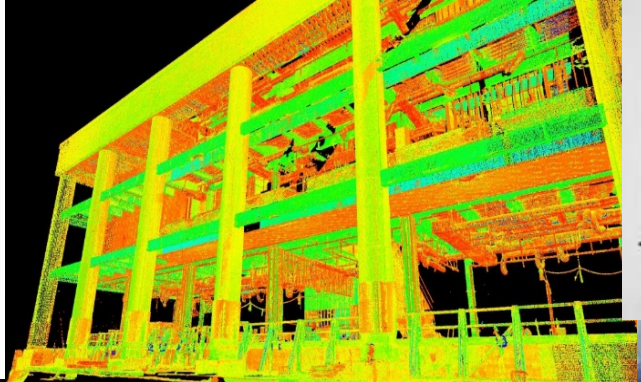*Al Gore, 1998: The Digital Earth: Understanding our planet in the 21st Century*
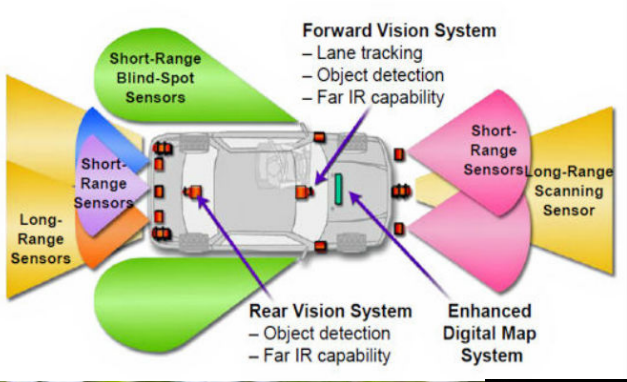
Disruption Fatigue

Wearable Technologies
Social
Internet of Things
Software-Defined
Blockchain
Mobile Applications
User Experience Design
Serverless Computing
Cloud Computing
Bio Sensors
Augmented Reality
Microservices
Gamification
Artificial Intelligence
Extreme Collaboration
Atomic Computing
Big Data
3D Printing
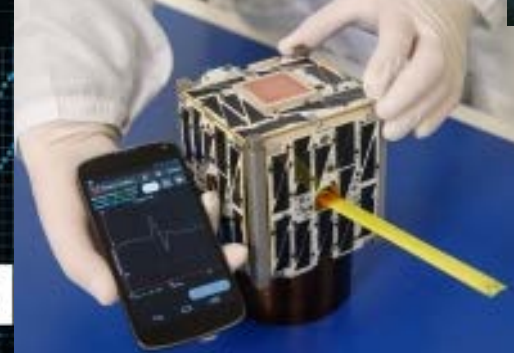
The disruptive nature of digital transformation, technology, innovation, and their exponential impacts, means that society's expectations on how, and at what level of detail, we record what is happening where and when are changing at a rapid pace.

Positioning geospatial information to address global challenges

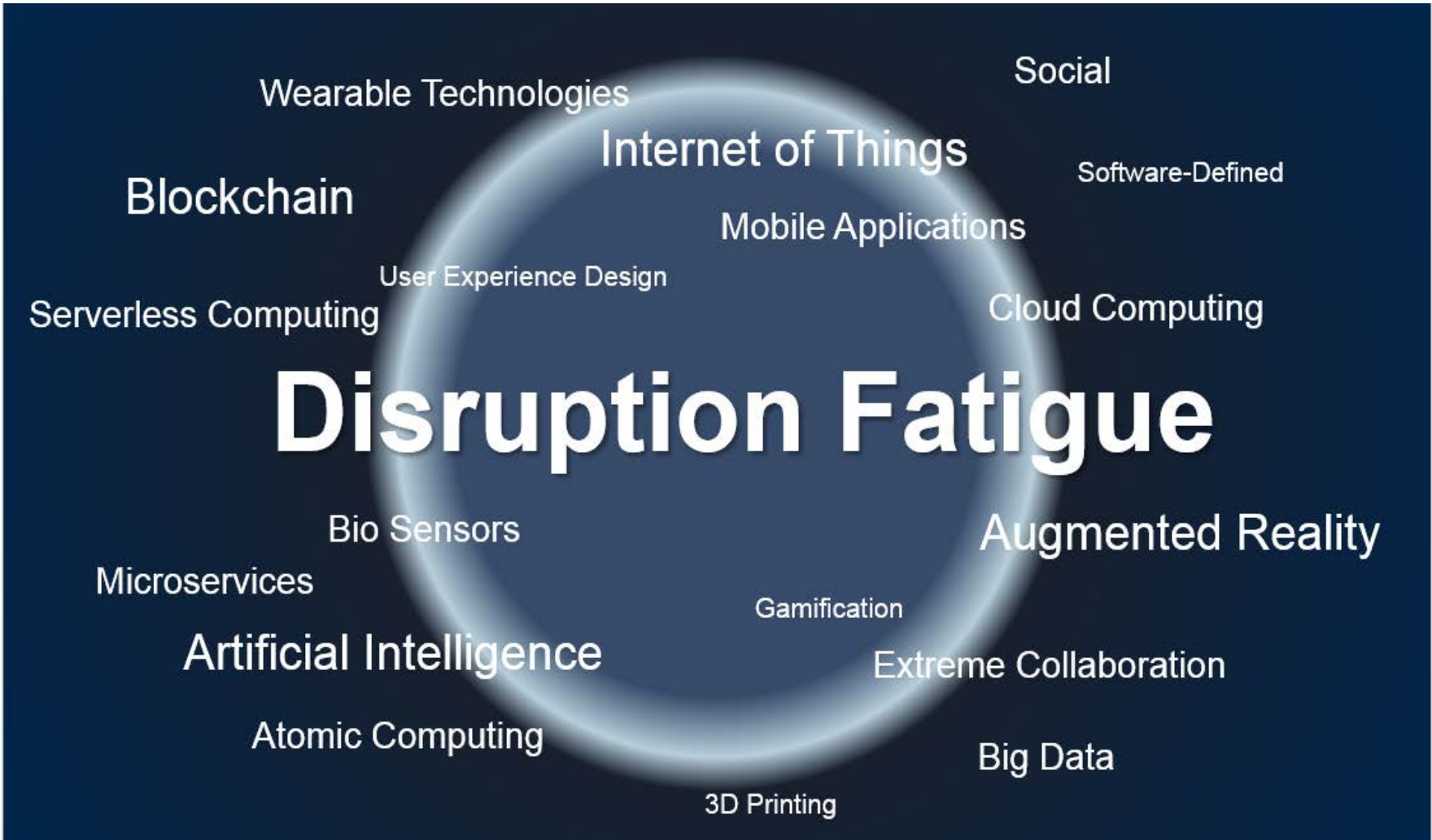UN-GGIM | United Nations Secretariat
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Mission of geospatial information authorities

What does the future look like? What is our mission? How do we keep pace with change, while still shaping our future? How are we going to be anchored in the chaos of the information environment?

- We function in times of disruption: rapidly increasing amounts of data, enabling technologies and associated analytics. New roles are emerging.
- Opportunity to apply these to the benefit of national priorities and economic development more holistically.
- This means moving up the value chain. No longer data collectors, but data connectors and integrators. The information is the currency for policy.
- Data realignment: Outcomes that are more definitive, diversified, integrated, accessible and dynamic.
- Data aggregation and disaggregation: National – local – national.
- Communicate: Link up with other government agencies. They need you!!
- Proposition: Modern, agile, policy-oriented, collaborative, integrated national information systems.

While 'data' is still the primary information currency, the many disruptive technology enablers and applications are challenging the norm for the mission of national geospatial information authorities.
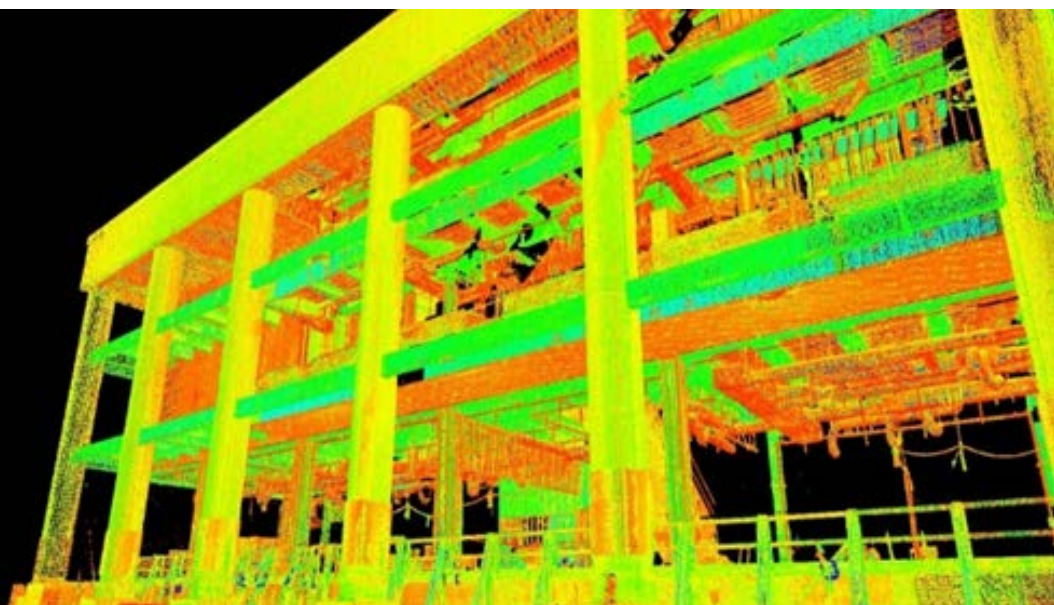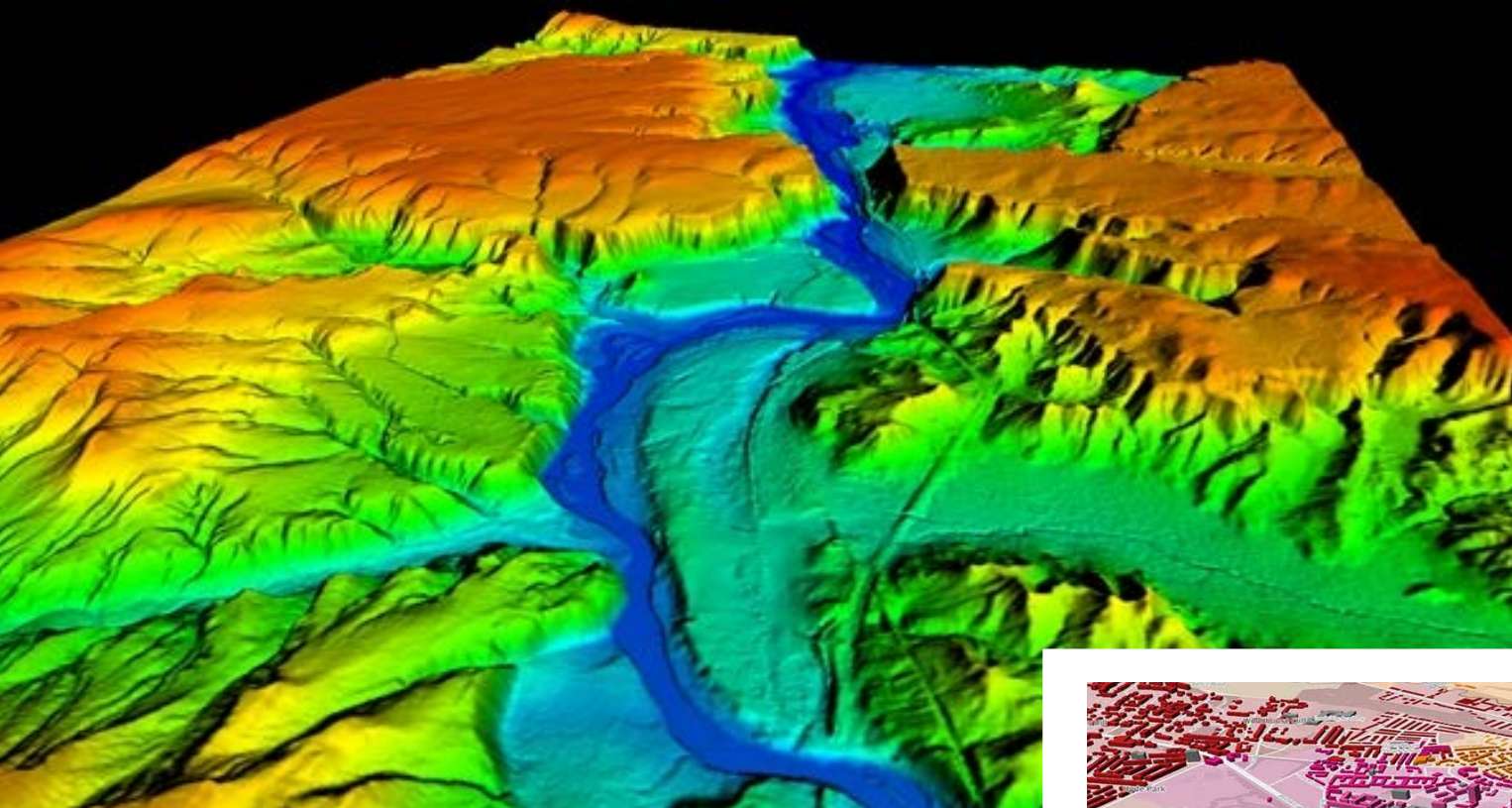
Global Development Policies
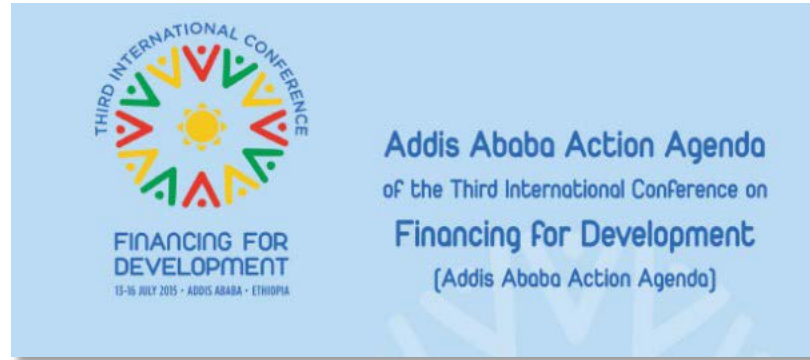
2030 Agenda: Integrated Plan of Action
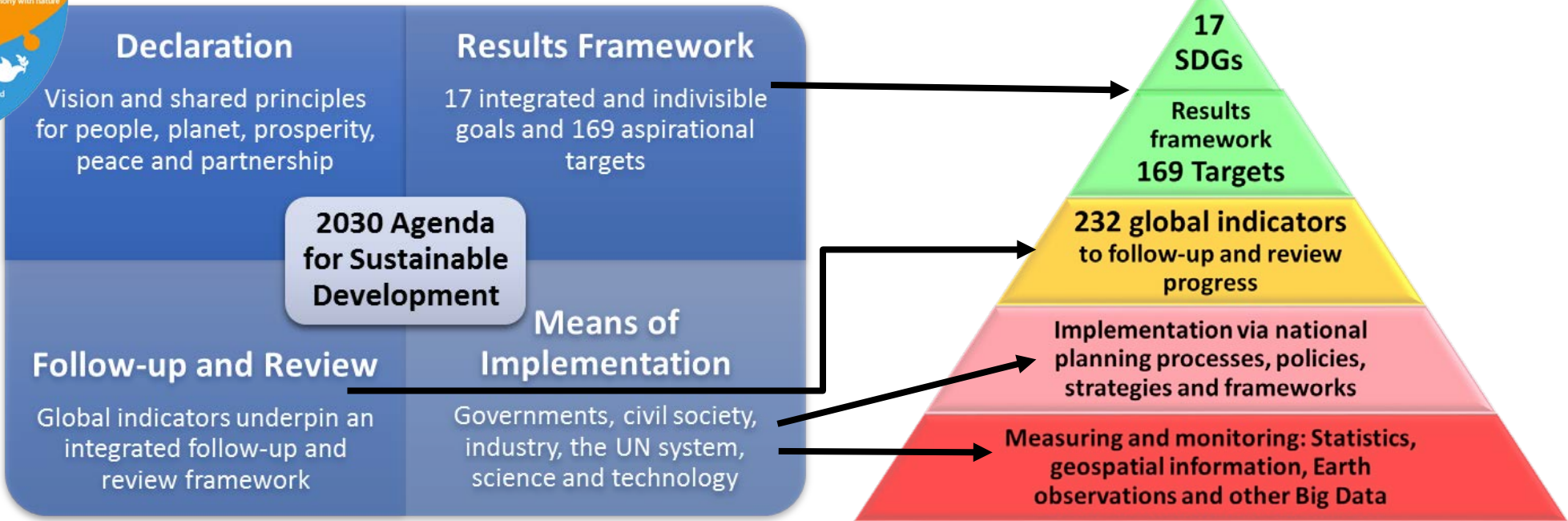
The 2030 Agenda is an integrated plan of action structured in four main parts: (i) a vision and principles for transforming our world as set out in the Declaration; (ii) a results framework of 17 SDGs and 169 targets; (iii) a means of implementation through governments, society and global partnership; and (iv) a follow-up and review framework of global indicators. **Any national SDG implementations will be sub-optimal without strategies and frameworks to integrate geospatial information into the measuring, monitoring and reporting processes.**

2030 Agenda: Goals, Targets, Indicators

17 SDGs

169 Targets

232 global indicators to follow-up and review progress

Implementation via national planning processes, policies, strategies and frameworks

Measuring and monitoring: Statistics, geospatial information, Earth observations and other Big Data

Do we have the data for development??
Can we make it 'production ready' information for all?

A geospatially enabled nation is one that shares, uses and integrates a wide range of such data for sustainable development and economic prosperity. This use will extend across governments, businesses and citizens, and from national through city to small community levels.

Global Geodetic Reference Frame

Geographical Names

Addresses

Functional Areas

Buildings and Settlements

Land Parcels

Transport Networks

Elevation and Depth

Population Distribution

Land Cover and Land Use

Geology and Soils

Physical Infrastructure

Water

Orthoimagery

The Sustainable Development Goals Report 2017

"Implementation has begun, but the clock is ticking. This report shows that the rate of progress in many areas is far slower than needed to meet the targets by 2030"

"This report provides a snapshot of our efforts to date. It stresses that high-level political leadership and new partnerships will be essential for sustaining momentum. It also underscores the need for reliable, timely, accessible and disaggregated data to measure progress, inform decision-making and ensure that everyone is counted"

António Guterres
Secretary-General, United Nations

The Sustainable Development Goals Report 2017

United Nations

Harnessing the power of data for sustainable development

The Sustainable Development Goals Report 2017

To fully implement and monitor progress on the SDGs, decision makers need data and statistics that are accurate, timely, sufficiently disaggregated, relevant, accessible and easy to use. Data availability and quality have steadily improved over the years. However, statistical capacity still needs strengthening and data literacy must be enhanced at all levels of decision-making. This will require coordinated efforts on the part of data producers and users from multiple data systems. It will also demand innovative ways to produce and apply data and statistics in addressing the multifaceted challenges of sustainable development.

Leave no one behind

National averages, even city averages, often mask wide disparities among population groups. The identification of people suffering from deprivation therefore requires sufficiently detailed data across multiple dimensions, including age, sex, geography and disability status, among others. Any global or national statistical system must ensure that the coverage and level of data disaggregation for the follow-up and review of the 2030 Agenda leaves no one behind.

Towards this end, national statistical systems need to invest in the technology and skills necessary to collect and integrate data from multiple sources, including integration of geospatial information with statistics and other data. This means making better use of traditional statistical surveys, censuses and administrative records. It also means harnessing the power of technology to leverage new sources of data, such as from cell phone records, Earth observations, other sensors and social media. More citizen-generated data are also being used to monitor the needs and progress of vulnerable groups. However, new methodologies need to be developed to ensure the quality and reliability of such data.

Using geospatial data can ensure that no one is left behind

Among the different categories of disaggregation called for in the 2030 Agenda, "place", or geographic location, is critical for ensuring that no one is left behind. Geographic location is needed to know where a situation is present or where an event has occurred, and to allow decision makers to respond. Since 2011, the United Nations has made great strides in strengthening the global data ecosystem by establishing the United Nations Committee of Experts on Global Geospatial Information Management. The geospatial community, working closely with the statistical community, has investigated how geospatial information can be used for improving the production of many SDG indicators.

The integration of geospatial information with data and statistics for SDGs is also instrumental in enabling data inter-operability across data ecosystems and linking data sets within and across countries. National statistical offices and national geospatial agencies are now collaborating to establish a Federated Information System for the SDGs. This hub will be a repository for national SDG information and will also transmit this information to a global data hub.

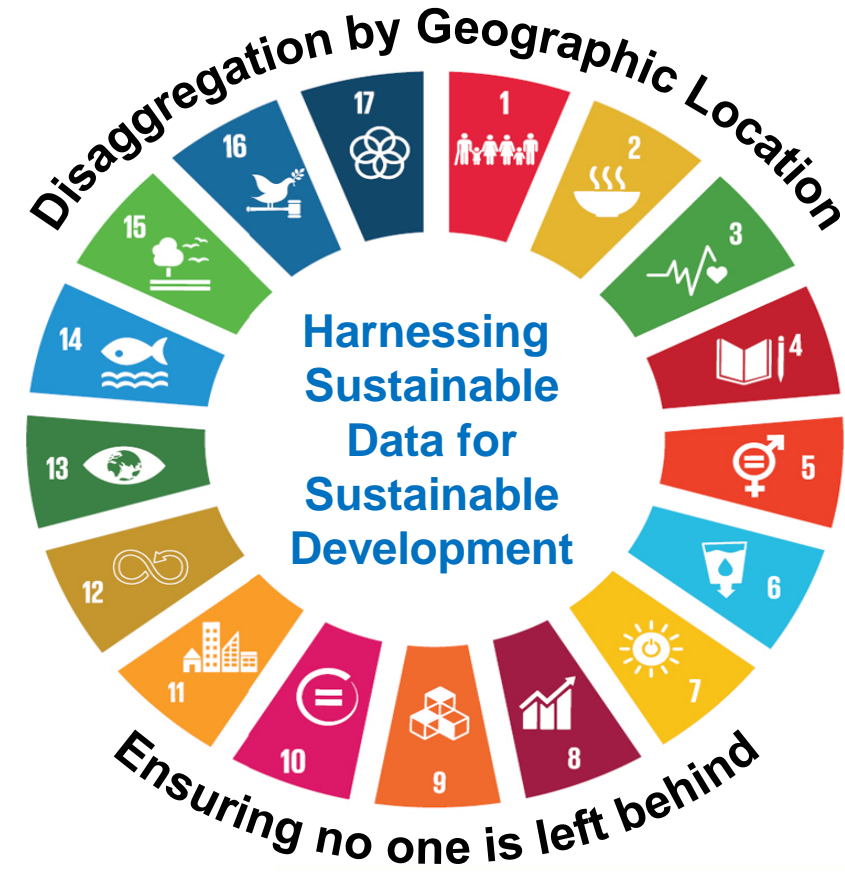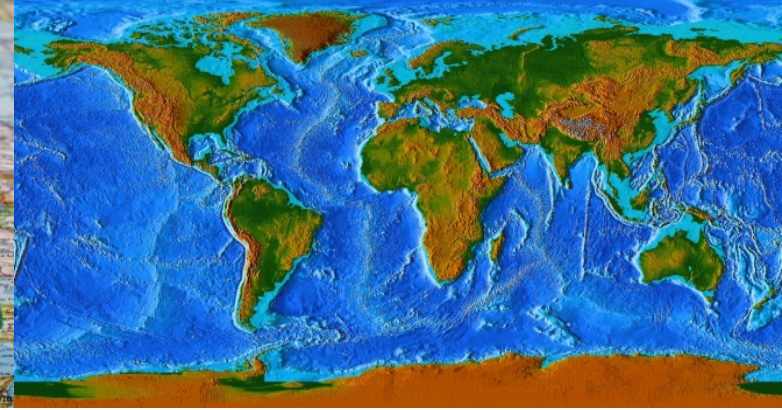United Nations

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Disaggregation by geographic location?
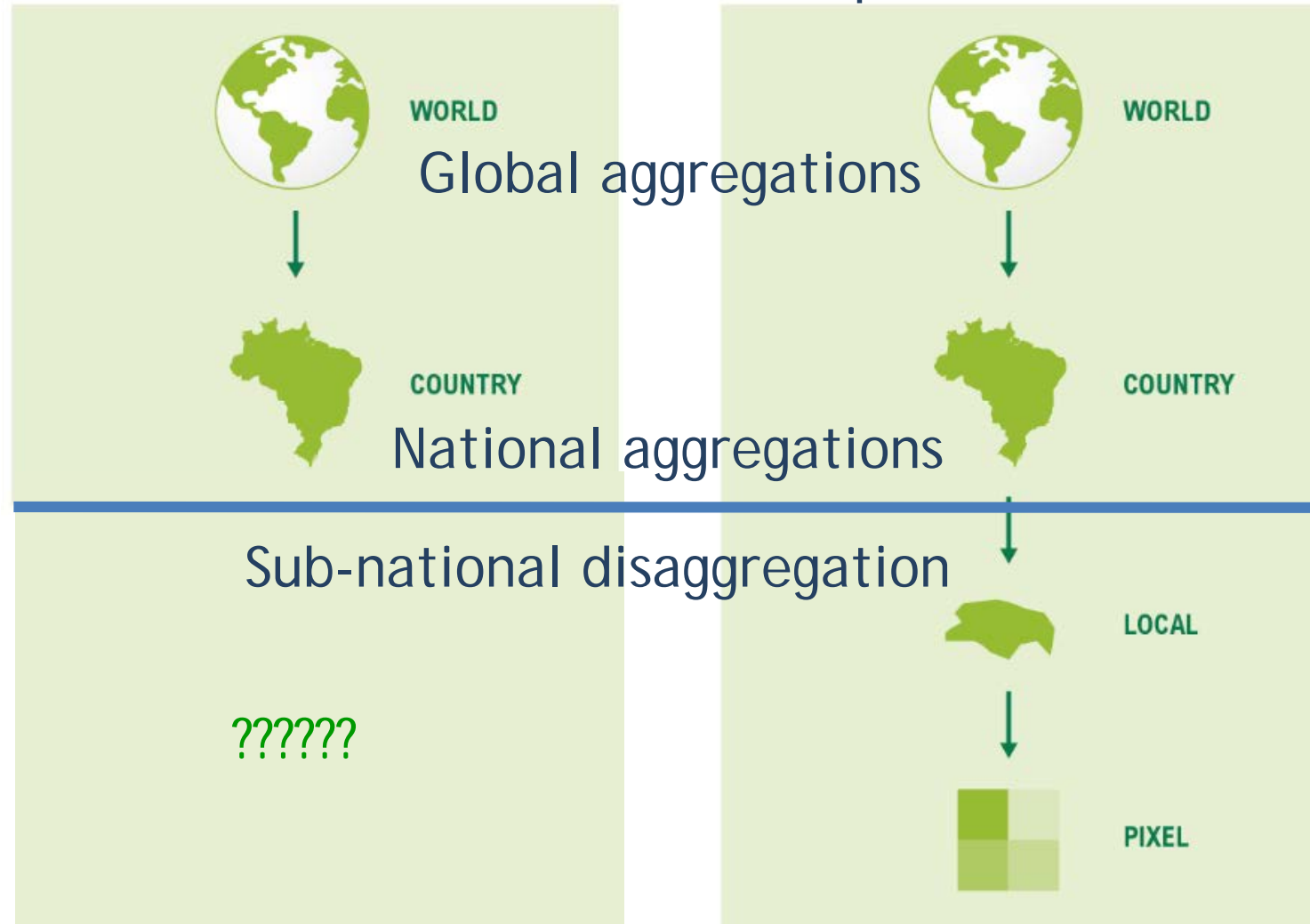
Integration of Statistical and Geospatial Data

Geospatial Framework (GSGF)

Pyramid (bottom to top):
- Fundamental Geospatial Infrastructure
- Geocoded Units
- Common Geographies
- Interoperable
- Usable

Statistical Process Model (GSBPM)

Planning/ Pre Enumeration	Enumeration	Post Enumeration/ Dissemination
Specify Needs	Collect	Disseminate
Design	Process	Evaluate
Build	Analyze	

Quality / Metadata Management

Map View: The maps below display a range of geographic scales at which indicator data can be collected, from the lowest level of geographic detail on the left (administrative unit 1) to the highest level of geographic detail on the right (exact location using latitude/longitude coordinates).
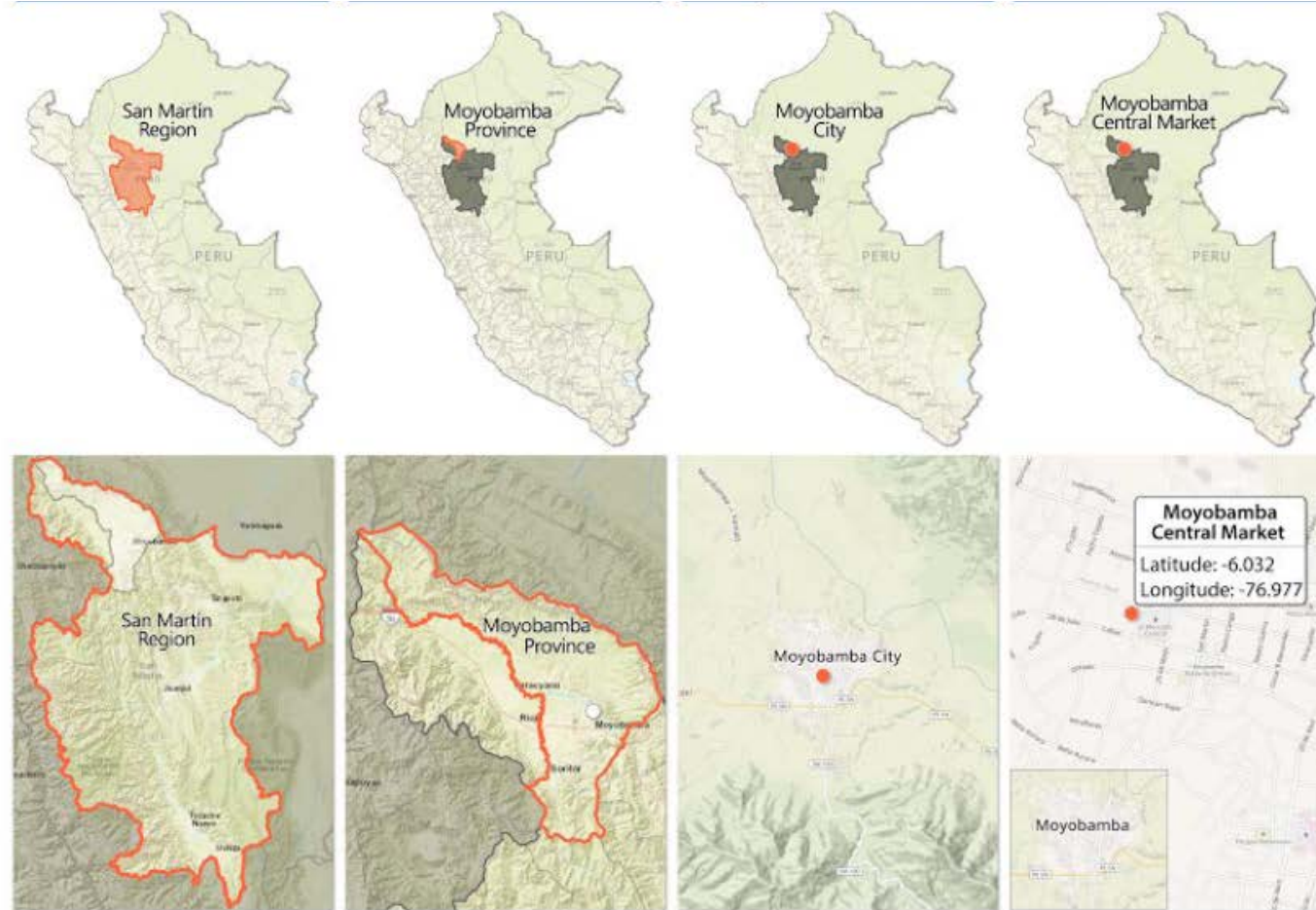
Source: USAID

Example: Peru – Comparing Performance and Context Indicators

With geographically disaggregated indicators, one can explore questions, such as: "Does the nutrition activity appear to perform better (performance indicator) in areas where female education rates (context indicator) are higher? Why might this be?" This type of analysis can support learning and adaptation of programs.
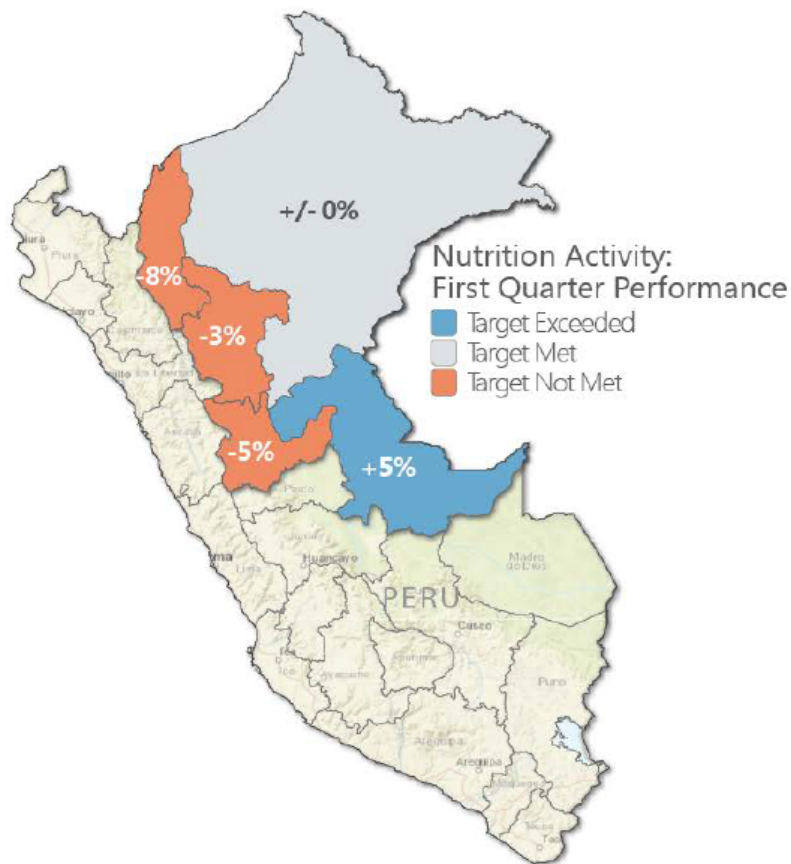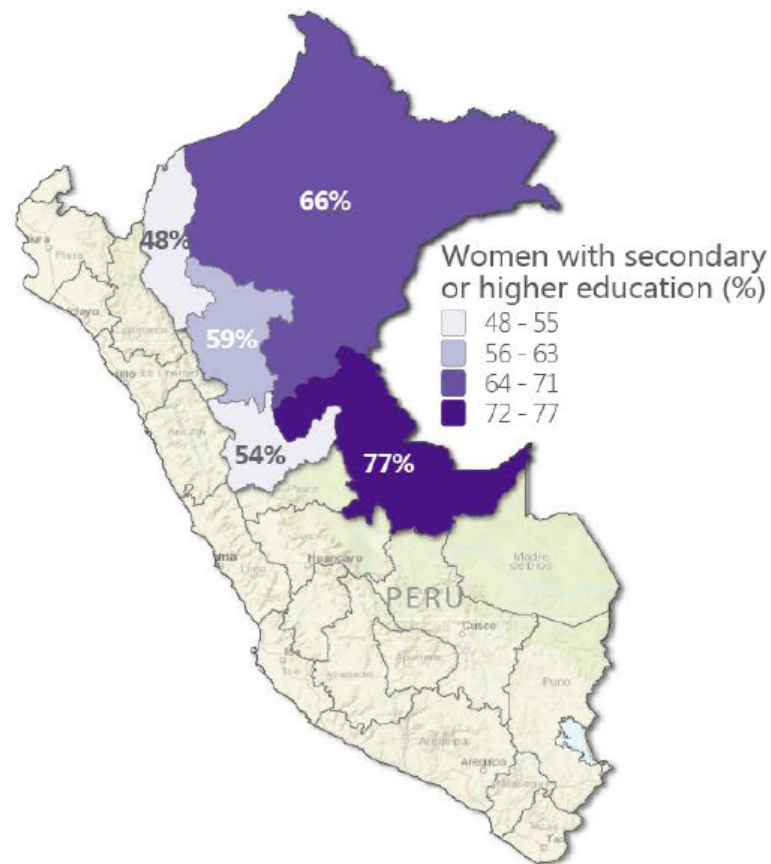
The nutrition activity is underperforming in areas where women are less educated

Source: USAID

Output Indicator

Number of children under five reached
by USG-supported nutrition programs

- 100 – 500
- 501 – 1,000
- 1,001 – 1,500
- 1,501 – 2,000

PERU

Outcome Indicator

Prevalence of stunted
children under five

- 10% – 15%
- 16% – 20%
- 21% – 25%
- Over 30%

PERU
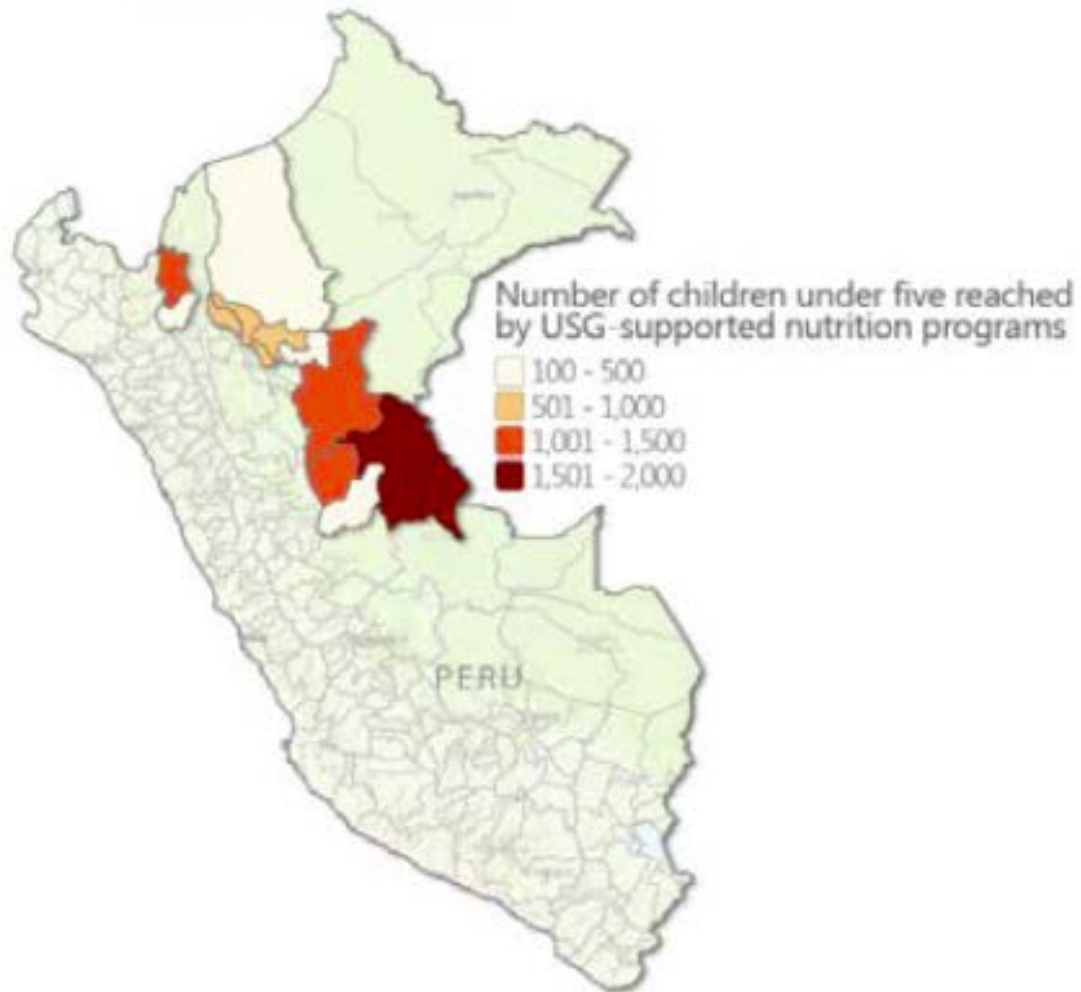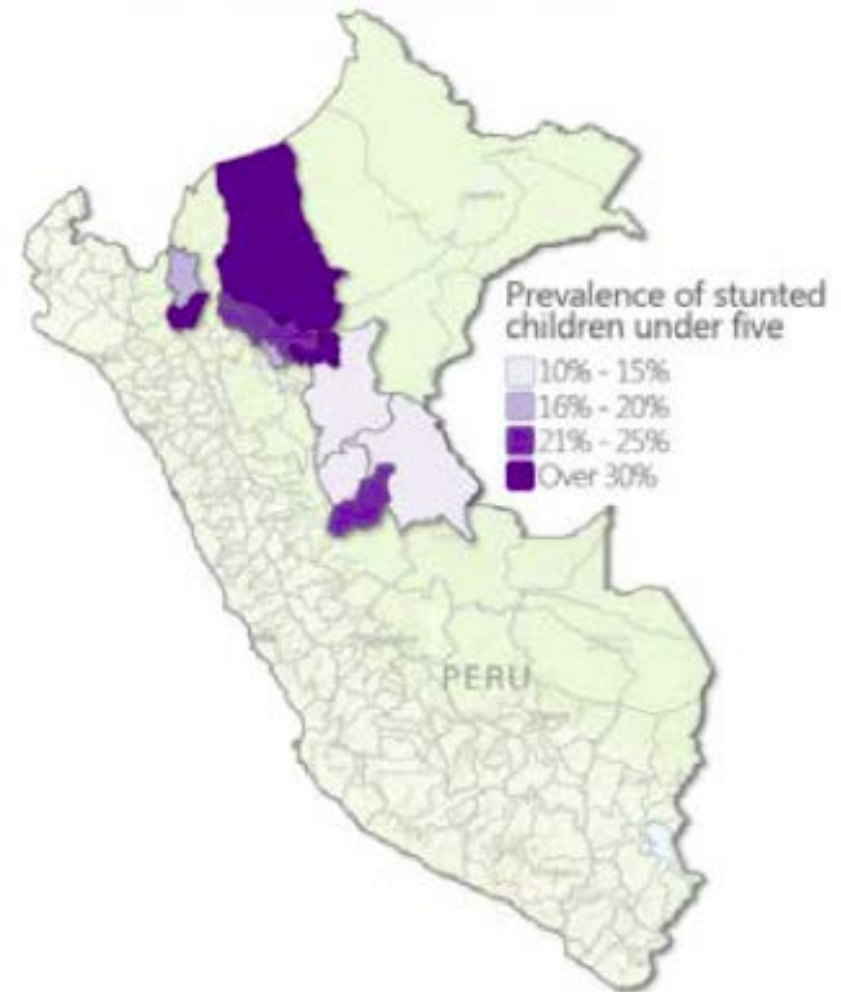
Source: USAID

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Addressing the data needs for the 2030 Agenda

Need to include all parts of the statistical system and new data sources

Need for quality, accessible, timely and reliable disaggregated data

Data on a wide range of topics; unprecedented amount of data

Interoperability and integration of systems is crucial to harnessing the potential of all types of data
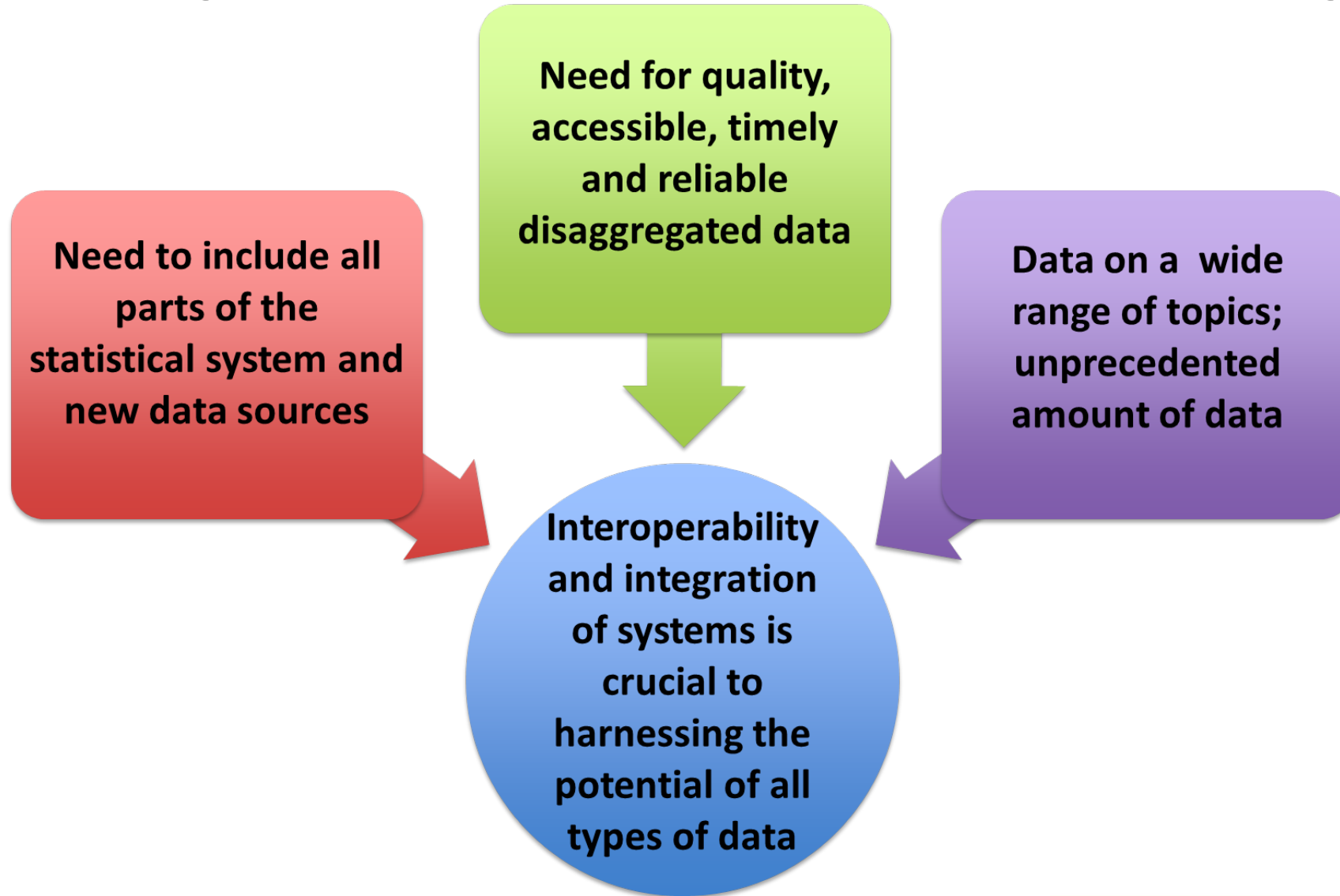
Integrated Geospatial Information Framework

A STRATEGIC GUIDE TO DEVELOP AND STRENGTHEN NATIONAL GEOSPATIAL INFORMATION MANAGEMENT

Background

- In August 2017, UN-GGIM welcomed a new Collaborative Agreement between UNSD and the World Bank.

- The basis of the collaboration was a recognition of the growing need to explore and develop mechanisms for **geospatial data, infrastructure and policies** to be embedded more holistically within concessional financing, technical assistance and knowledge sharing services; and implementation in developing countries.

- A key deliverable of the collaboration is an overarching **geospatial information management framework** that Member States can reference when implementing integrated evidence-based decision-making solutions, and that maximizes and leverages national systems tailored to their own situations.

- The result is an **Integrated Geospatial Information Framework**. Part 1: **Overarching Strategic Framework**, is to be adopted by UN-GGIM at this session.
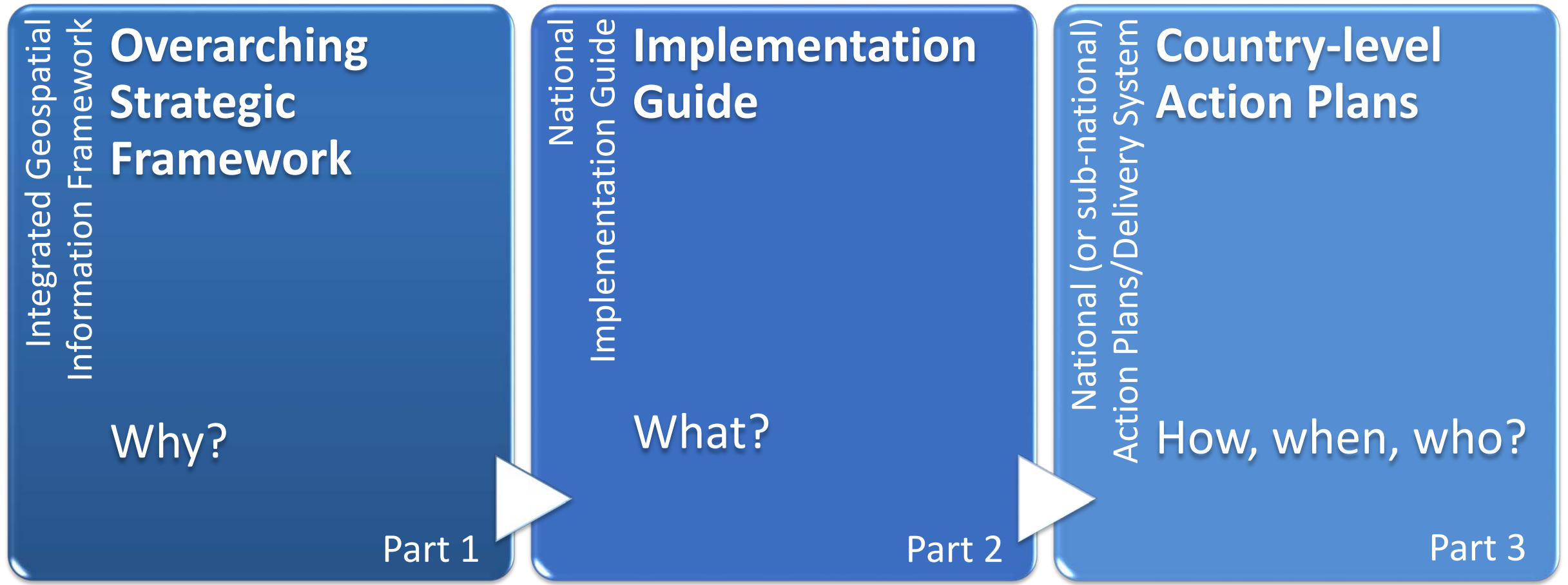
The **Integrated Geospatial Information Framework** comprises a 3-part document set as separate, but connected, documents. The **Overarching Strategic Framework** is fully developed following a global consultation. The structure and main elements of the **Implementation Guide** are developed for in-principle approval. The **Country-level Action Plans** are work in progress.

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Overarching Strategic Framework

- A forward-looking Framework built on national needs and circumstances.

- Provides the overarching strategic messages and more expansive and integrated national framework, particularly focusing on policy perspectives and elements of geospatial information.

- Sets the context of 'why' geospatial information management is a critical element of national social and economic development.

- **Vision** and **Mission** statements communicate the overarching aim of the Integrated Geospatial Information Framework.

- It does this via **7 Underpinning Principles**, **8 Goals and 9 Strategic Pathways** that lead to a national approach that takes account of national circumstances, priorities and perspectives.

- The Overarching Strategic Framework is intended for a wide range of stakeholders – these primarily being high-level policy and decision makers, institutions and organizations within and across government.

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

Overarching Strategic Framework: Vision and Mission

The **Vision** recognizes the responsibility for countries to plan for and provide better outcomes for future generations, and our collective aspiration to leave no one behind

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

Vision

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

Mission

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

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Overarching Strategic Framework: Principles

Underpinning Principles:

PRINCIPLE 1: Strategic Enablement

PRINCIPLE 2: Transparent and Accountable

PRINCIPLE 3: Reliable, Accessible and Easily Used

PRINCIPLE 4: Collaboration and Cooperation

PRINCIPLE 5: Integrative Solution

PRINCIPLE 6: Sustainable and Valued

PRINCIPLE 7: Leadership and Commitment

The 7 Principles are the key characteristics and values that provide the compass for implementing the Framework, and allow for methods to be tailored to individual country needs and circumstances.

Overarching Strategic Framework: Goals

GOAL 1: Effective Geospatial Information Management

GOAL 2: Increased Capacity, Capability, and Knowledge Transfer

GOAL 3: Integrated Geospatial Information Systems and Services

GOAL 4: Economic Return on Investment

GOAL 5: Sustainable Education and Training Programs

GOAL 6: International Cooperation and Partnerships Leveraged

GOAL 7: Enhanced National Engagement and Communication

GOAL 8: Enriched Societal Value and Benefits

The 8 Goals reflect a future state where countries have the capacity and skills to organize, manage, curate and leverage geospatial information to advance government policy and decision-making capabilities.
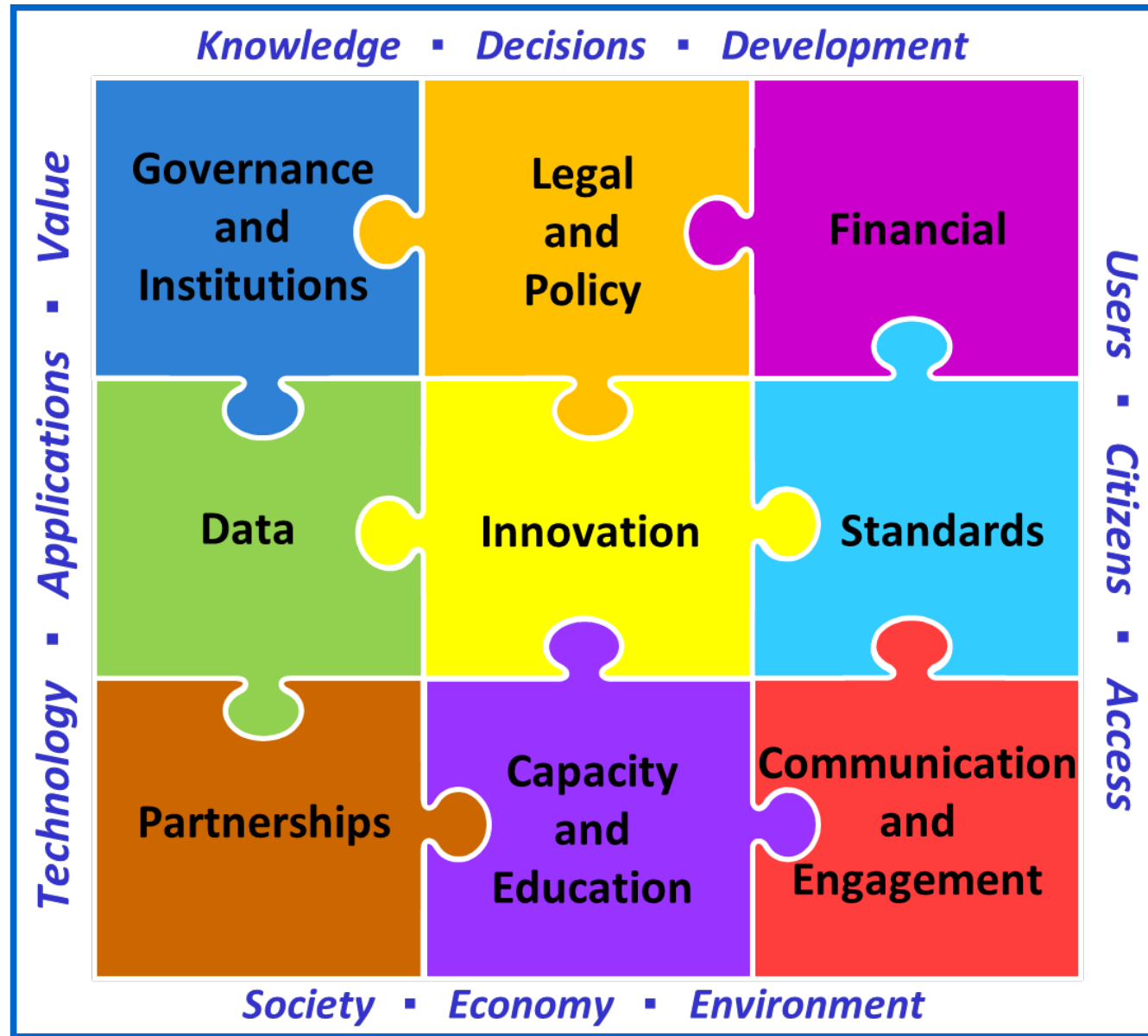
9 Strategic Pathways

Governance →

Technology →

People →

Knowledge ▪ Decisions ▪ Development

Value ▪ Applications ▪ Technology

Users ▪ Citizens ▪ Access

Governance and Institutions

Legal and Policy

Financial

Data

Innovation

Standards

Partnerships

Capacity and Education

Communication and Engagement

Society ▪ Economy ▪ Environment

Anchored by 9 Strategic Pathways, the Framework is a mechanism for articulating and demonstrating national leadership in geospatial information, and the capacity to take positive steps.

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"Everything happens somewhere…"

Nancy Tosta, June 2001

Everything that happens…happens somewhere.

We can locate, view, relate, record, collect, measure, analyze, model and monitor what happens where, when, why, and how.

We can do this more today than ever before….which is far less than what we will do tomorrow.

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