# What's Next for – Cartography and Cartographers: To make our world a better place

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**President, International Cartographic Association**

**AutoCarto 2020 Virtual Conference**

# Greetings

ICA Executive Committee

# ICA Vision

The aim of the ICA is to ensure that cartography and GIScience are employed to maximum effect and full potential for the benefit of society and science **through promotion and representation of the disciplines and professions of cartography and GIScience internationally**.

# We are facing unprecedented challenges locally and globally

# Maps show the plight of people and can contribute to a way out of our current troubles

# So, What's Next?

# Agenda

- ICA – UN collaborations
  - Three UN initiatives
- Examples of challenges and topics to consider
- A few trends to probe
- The role of the ICA in responding to What's Next?

# Building on Current Efforts

This presentation highlights a few ideas to consider based on two recently published works for exploration, further research, and implementation.

- A CAGIS article prepared for the 2019 International Cartographic Conference in Tokyo[1]
- Future Trends document from UN-GGIM10, August 2020[2]

[1] Keith C. Clarke, J. Michael Johnson & Tim Trainor (2019) Contemporary American cartographic research: a review and prospective, Cartography and Geographic Information Science, 46:3, 196-209, DOI: 10.1080/15230406.2019.1571441

[2] Future trends in geospatial information management: the five to ten year vision THIRD EDITION (http://ggim.un.org/meetings/GGIM-committee/10th-Session/documents/Future_Trends_Report_THIRD_EDITION_digital_accessible.pdf)

# The ICA and the UN

# The ICA collaboration with the UN Committee of Experts on Global Geospatial Information Management (UN-GGIM)

## Made possible through the Geospatial Societies Thematic Group (http://ggim.un.org/UN-GGIM-Thematic-Groups/)

# Three UN Initiatives

- Sustainable Development Goals (SDGs) ✔
- Integrated Geospatial Information Framework (IGIF)
- Global Statistical Geospatial Framework (GSGF)

# Seventeen goals to transform our world for the better .. … ….

# Where are we?

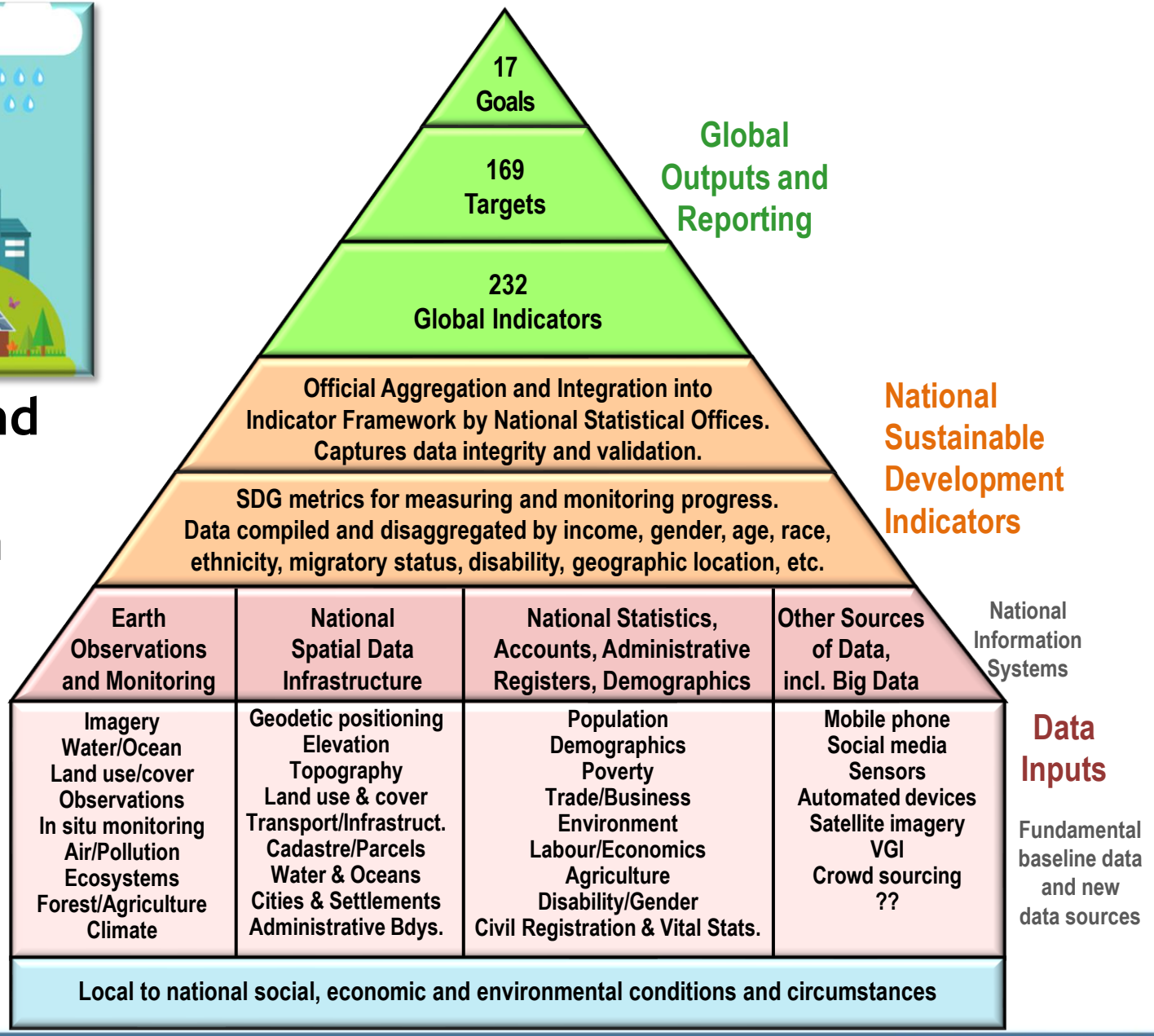
- Countries have been collecting data for each of the 17 goals where possible
- The data are based on very specific indicators
  - Some indicators are very challenging
  - Some indicators show data gaps
  - Experiences are varied
- Results show “current” conditions
  - Dependent on the coverage, resolution, and temporal value of the data

# What's Next for the SDGs? - - Start Here…

- *"by 2020, enhance capacity building support to developing countries, including for Least Developed Countries (LDCs) and Small Island Developing States (SIDS), to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts."*

# Goals, targets, indicators, measuring…fundamental data

# An integrative and interconnected data ecosystem



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

# According to the UN Future Trends Document[2]...

- Three key factors now challenge the limitations of a traditional SDI.
  - First is the recent and growing availability of more diverse data and data types and needs that are now more relevant and dependent on geospatial data than were originally considered.
  - Second limitation is the growing demand for data integration, fusion and analysis.
  - Third is that the main focus of SDIs has just been geospatial data.
- "What's Next" involves how we work toward solving these limitations using cartography as an enabler for success

# Three UN Initiatives

- Sustainable Development Goals (SDGs)
- Integrated Geospatial Information Framework (IGIF) ✔
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# 9 Strategic Pathways

*Governance*

*Technology*

*People*

*Knowledge ▪ Decisions ▪ Development*

*Value ▪ Applications ▪ Technology*

*Users ▪ Citizens ▪ Access*

*Society ▪ Economy ▪ Environment*

| | | |
|---|---|---|
| Governance and Institutions | Policy and Legal | Financial |
| Data | Innovation | Standards |
| Partnerships | Capacity and Education | Communication and Engagement |

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.

# IGIF: Implementation Guide - Foundations

- The Implementation Guide expands on each of the 9 strategic pathways of the IGIF and provides the 'what' – the specific guidance and options to be taken by countries in implementing the IGIF. It captures strategic to operational needs with guiding principles, actions, deliverables, outcomes and resources.
- The aim is to provide guidance for governments to establish 'nationally' integrated geospatial information frameworks in countries in such a way that transformational change is enabled, visible and sustainable.
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http://ggim.un.org/IGIF/part2.cshtml

**The first 3 pages of the Chapter define the high-level 'Summary', and can be used as a stand-alone flyer if required.**

Strategic Pathway 1

# Governance and Institutions

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

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

## *Summary*


Geospatial information is increasingly being harnessed to interconnect and integrate government functions and commercial services - making cities more livable, citizens more engaged and informed, and agricultural areas more productive. Traffic congestion, weather reports, air pollution, bus locations, pest monitoring, flood sensors, and electricity outage applications are all underpinned by geospatial information that can be synthesized into a seamless knowledge environment so that information can be accessed quickly by users to make informed decisions. For government this means streamlining operations, reducing costs and improving overall economic and social sustainability.

This level of geospatial capability can only be achieved through cooperative governance frameworks and with strong leadership that penetrates across sectors and through all levels of government. Institutions need to work together to share information and work towards common strategic priorities and goals.

By interconnecting government functions through well-functioning governance frameworks, it is possible to bring together geospatial information from multiple sources so that it can be used seamlessly on any digital device.

Good governance and cooperative institutional arrangements are the first priority in the geospatial information reform agenda. They enable geospatial information challenges to be met head on, provide flexibility to accommodate the rapidly changing environment, and the ability to embrace community and business participation within a culture of digital reform and transformation.

Common to all governance and institutional arrangements are four key elements that are required to build a cooperative data sharing environment and an appreciation of the value of geospatial information for decision-making.

The four elements are:

- **Governance Model** - based on a geospatial strategy for the nation and facilitated by governing bodies responsible for aligning and supporting policies and laws affecting the acquisition, creation, management, use, and dissemination of geospatial information.
- **Leadership** - to formulate and sustain a national geospatial information management strategy, develop a Country-level Action Plan for implementing the Integrated Geospatial Information Framework (IGIF), and create a governance process for assuring effective management responsibilities for the enterprise.
- **Value Proposition** - that measures, monitors, and communicates the economic benefit of integrated geospatial information to national priorities including citizen and societal benefits.
- **Institutional Arrangements** - that define roles and responsibilities across government for tasks associated with all aspects of geospatial information management, including appropriate coordination, management and oversight for meeting national priorities.

These elements are underpinned by principles that promote successful governance and institutional arrangements that can be adopted by each country. The principles are put into practice through several strategic actions that deliver and strengthen participation and commitment to achieving the IGIF. Tools, such as matrices, examples and checklists, are provided in the appendices to assist countries to work through concepts and processes to successfully complete each action. The overall structure for governance and institutional arrangements is illustrated in and anchored by Figure 1.1.

When implemented the actions (and their interrelated actions[1]) will enable the achievement of the four elements, which in turn will deliver significant and sustainable national outcomes and benefits for a country. These outcomes include attaining:

- Efficient planning and coordination of the government's geospatial information resources;
- Strengthened leadership, institutional mandates and political buy-in;
- A cooperative data sharing environment; and
- A shared understanding of the value of integrated geospatial information management.

[1] The interrelated actions across all Strategic Pathways are described in detail in the introductory Chapter; Solving the Puzzle: Understanding the Implementation Guide.



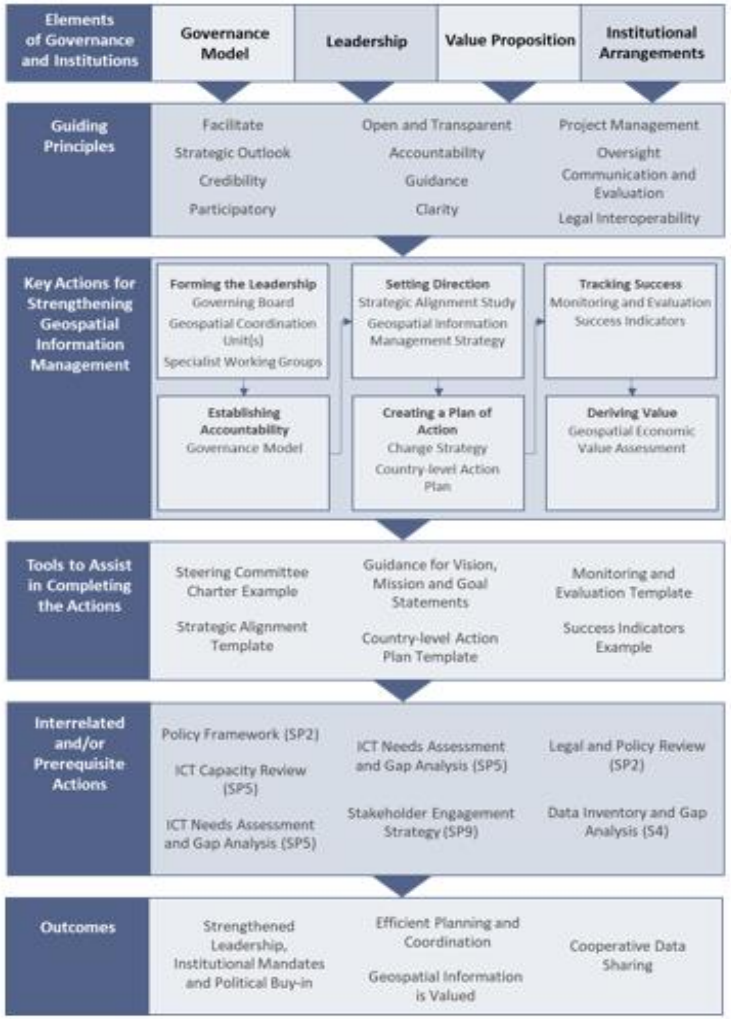



***Figure 1.1:** Overall structure for the Governance and Institutions Strategic Pathway - showing the four key elements, guiding principles, actions and interrelated actions, and the tools provided in the Appendices to support and achieve the outcomes.*

# Three UN Initiatives

- Sustainable Development Goals (SDGs)
- Integrated Geospatial Information Framework (IGIF)
- Global Statistical Geospatial Framework (GSGF) ✔

# Bridging between two communities

## Statistical Community

### Socio-Economic Datasets

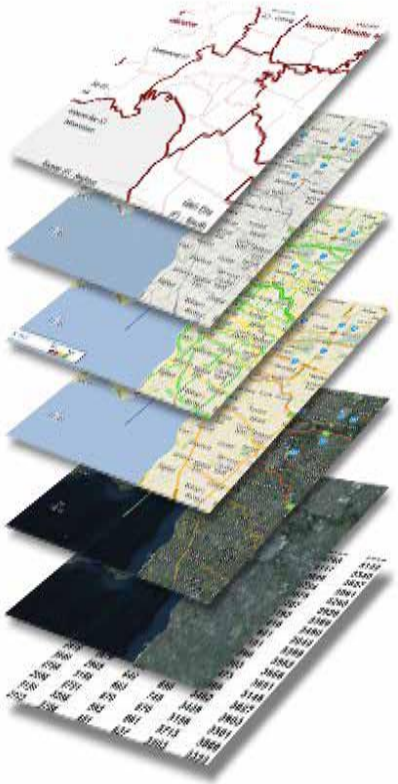
- **Core Statistical** — Census, Demographics, Agriculture, Building, Labour Force, etc.
- **Tax** — Income and Business Tax
- **Immigration**
- **Health** — Medicare, Pharmaceuticals, Workforce
- **Land** — Valuation and Use
- **Social Welfare** — Unemployment, Disability, Family Support
- **Others …**

GSGF bridge

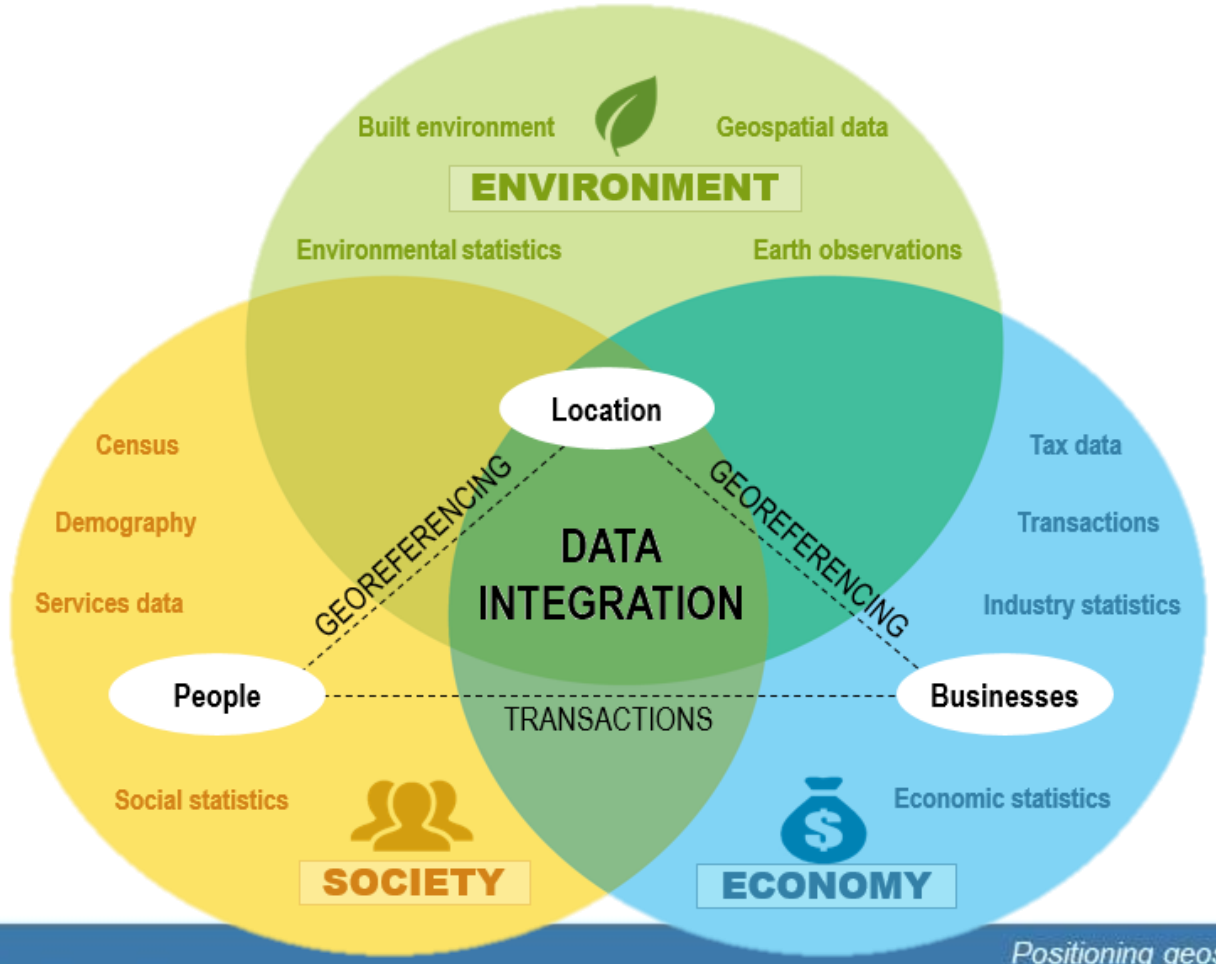
## Spatial Community

### Fundamental Geospatial Datasets

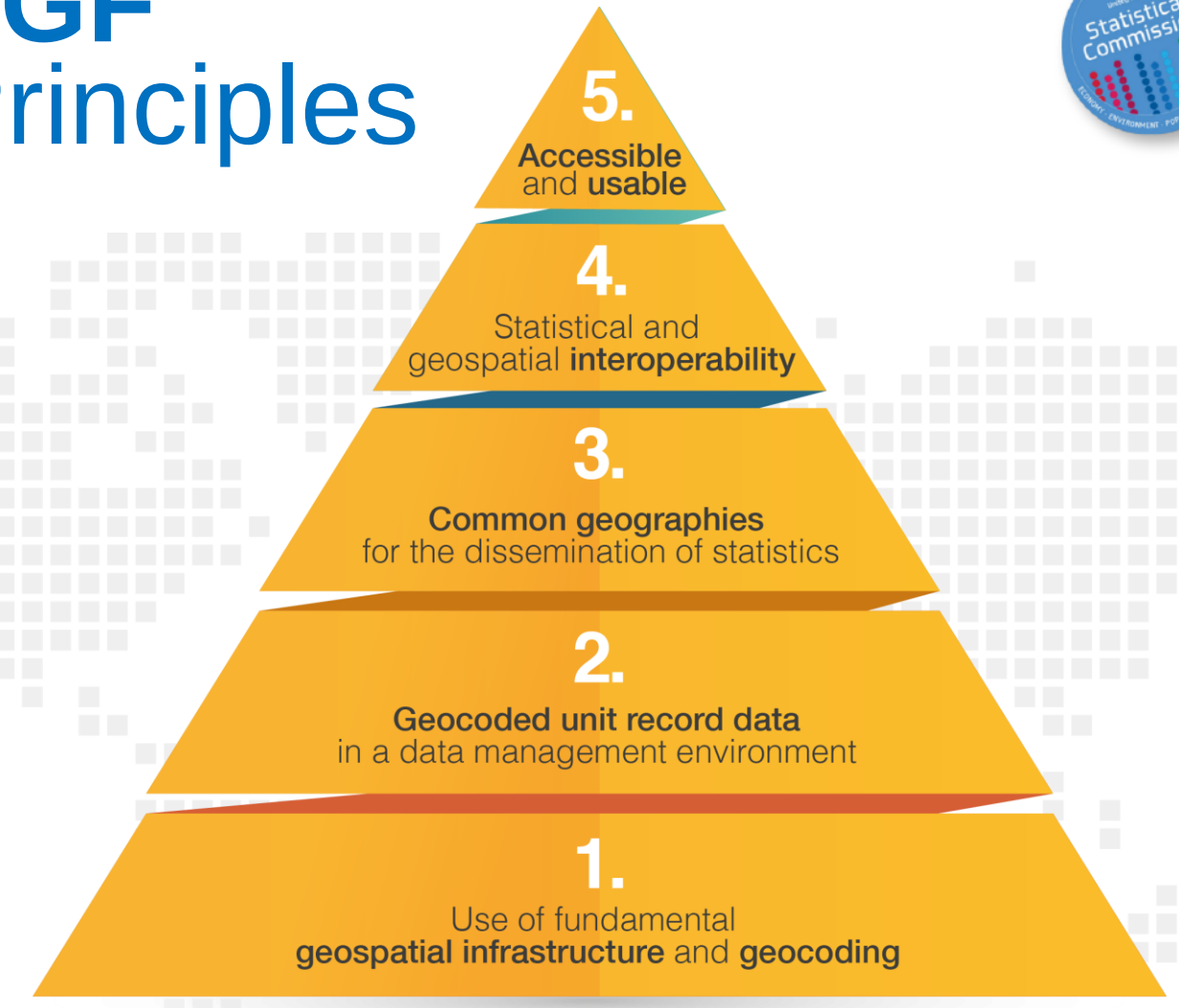
- Admin. & statistical boundaries
- Addressing, Place Names
- Transport, Water
- Land and Property
- Elevation and Depth
- Imagery
- Positioning



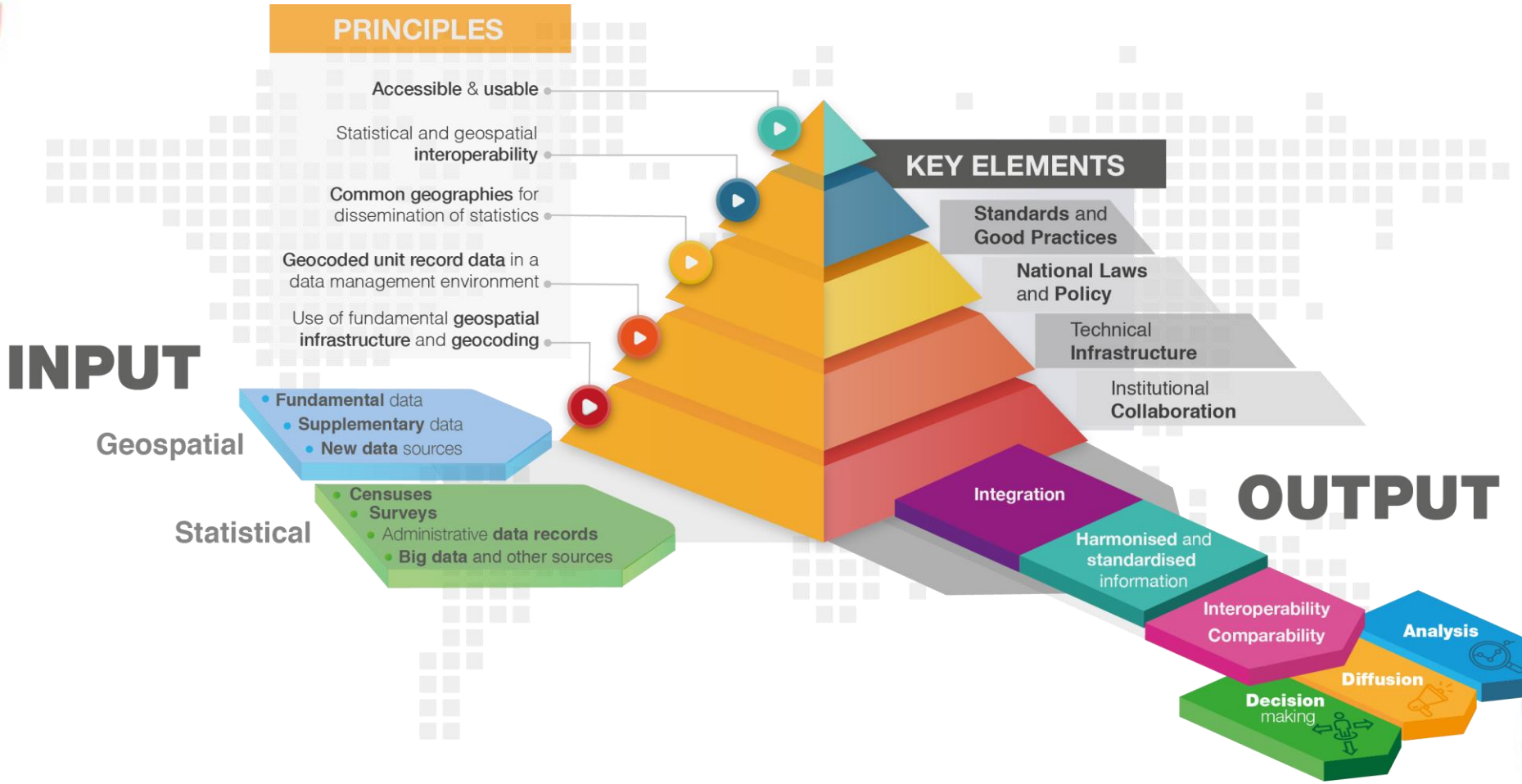
# GSGF
# Integrating data



# GSGF
# 5 Principles



# GSGF
# Full framework



# What's Next for Cartography and GIScience?

- Where gaps and impediments prevent progress, determine what steps are needed.
- Review past research that can contribute solutions
- Identify new areas of research and development that are needed in response to recent and expected advancements and conditions
- Focus on user needs, interests, and requirements to expand the relevance of cartography and GIScience

# A few ideas and opportunities to consider… Excerpts from the article: "Contemporary American cartographic research: a review and prospective[1]"

- Earth observation data are growing in interest and popularity, but challenges remain regarding its use and application potential (Nativi et al., 2015). Cartographic research is needed to better understand the characteristics of earth observation data and the potential it offers for mapping.

# Excerpts continued…

- In dealing with climate change, what specialties from cartography are needed to better understand the pressures of climate change?
- Does current cartographic research sufficiently address the challenges of climate change that humanity now faces?
- …the arrival of social media such as Flickr, Twitter, Weibo, and Facebook coupled with accurate geolocated information from cell tracking of mobile phones and embedded global navigation satellite system receivers (GNSS) have brought big social data to cartography (Crampton et al., 2013)…how are these new data and capabilities included?

# Excerpts continued…

- User contributed data, such as OpenStreetmap.org, have added substantially to the background map data (Haklay, 2010). The result has been a flourishing of information visualization in cartography (Sui, 2004).
- Social media data, and some sensor data such as LiDAR point clouds, are notoriously messy, incomplete and require extensive preprocessing (Batrinca & Treleaven, 2015; Vierling, 2008).
- Much more research on cartographic data needs to focus on data quality.
- Feature-level (at the feature instance) data quality statements are needed to correctly represent accurate characteristics of data elements. Data quality assurance and the representation of uncertainty on maps remain at the forefront of cartographic research, even after 30 years of effort.

# Excerpts continued…

- With new directives to create a Chief Data Scientist position in every US Federal and many academic organizations, cartographic research needs to identify the cartographic tools and methods that are needed to equip this emerging discipline to be more effective. Two areas that need more attention from the US government at many levels are cybersecurity and geospatial privacy (Andrienko & Andrienko, 2012; Iasiello, 2013).

- While visual and mapping tools have emerged…many are based on simple graphical and cartographic methods…it is more likely that future methods will automatically process data flows, and alert analysts only when new or unusual patterns emerge.

# Excerpts continued…

Policy and law have largely been ignored in cartographic research in the past, but are now coming to the surface. The way in which data are designed, displayed, and interpreted could impact cartographers in the future. How can cartographic data meet the demands of data protection and privacy law? What new cartographic methods will be necessary to achieve both transparency and the protection of personal and sensitive information?

# The ICA Offers a Platform for Engagement…

- For collective minds to solve real-world problems
- To advance areas of research that address age-old challenges yet to be solved

# The Strength of the ICA

- **People**
  - 28 Commissions focused on specific cartographic and geospatial topics
  - 5 Working Groups created to address specific topics for the current term
- **Conferences**
  - International Cartographic Conferences (ICCs)
    - 2019 Tokyo, Japan
    - 2021 Florence, Italy
    - 2023 Cape Town, South Africa
- **Publications**
  - International Journal of Cartography (peer reviewed)
  - ICA News
  - eCARTO News
  - ICA website – www.icaci.org
  - ICC Proceedings

ICA
ACI
International Cartographic Association
Association Cartographique Internationale
GHENT - BELGIUM, November 22-24, 2019

# ICA Commissions and Working Groups

- Workshops
- Research
- Publications
- Websites
- International collaboration
- Great people

# ICA Commission Alignment to Current Needs: The Integrated Geospatial Information Framework IGIF

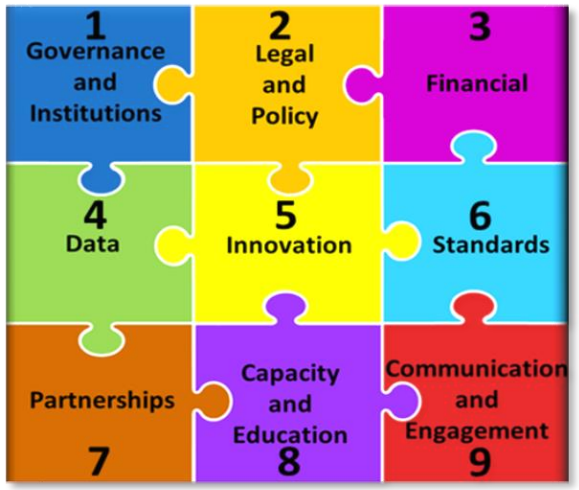
**1.** Cartography in Early Warning And Crisis Management

**4.** Topographic Mapping

Atlases

Map Production and Geoinformation Management

Marine Cartography




**5.** Geospatial Analysis and Modeling

Location Based Services

Open Source Geospatial Technologies

Sensor Driven Mapping

Ubiquitous Mapping

**6.** SDI and Standards

**8.** Education and Training

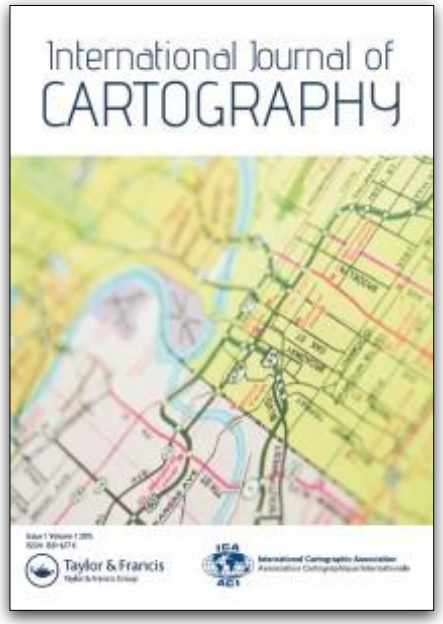
Cartography and Children

# ICA Publications

ICA website

ICA news

IJC




ICA conferences

# Excerpts continued…

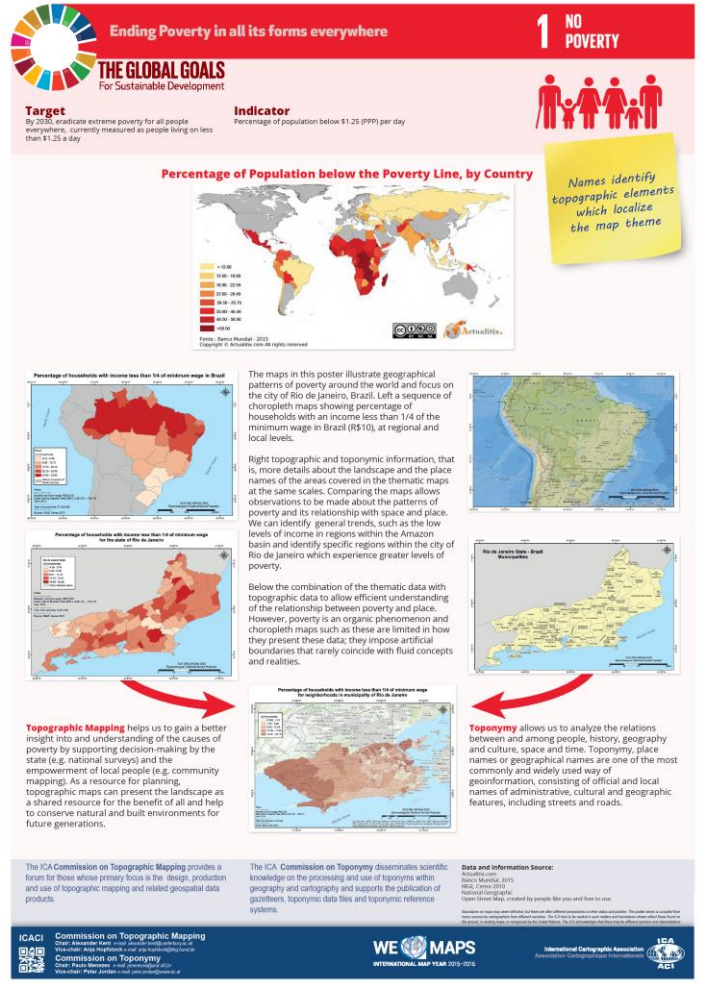
"…cartography has an opportunity to assist with the great challenges facing the world today: climate change, inequality, scarcity, and the negative environmental impacts of human settlements and industries."

# The ICA's Beginning Contributions…

- Focusing on SDG topics and challenges related to efforts by ICA Commissions
- Collaborating with the UN on a book that shows how cartography contributes to leaving no one behind
- Activated new working groups to address needs supporting What's Next
  - WG on cartography and sustainable development
  - WG on a new research agenda in cartography
  - WG on cartographic body of knowledge
  - WG on the transformation of national mapping and geospatial organizations

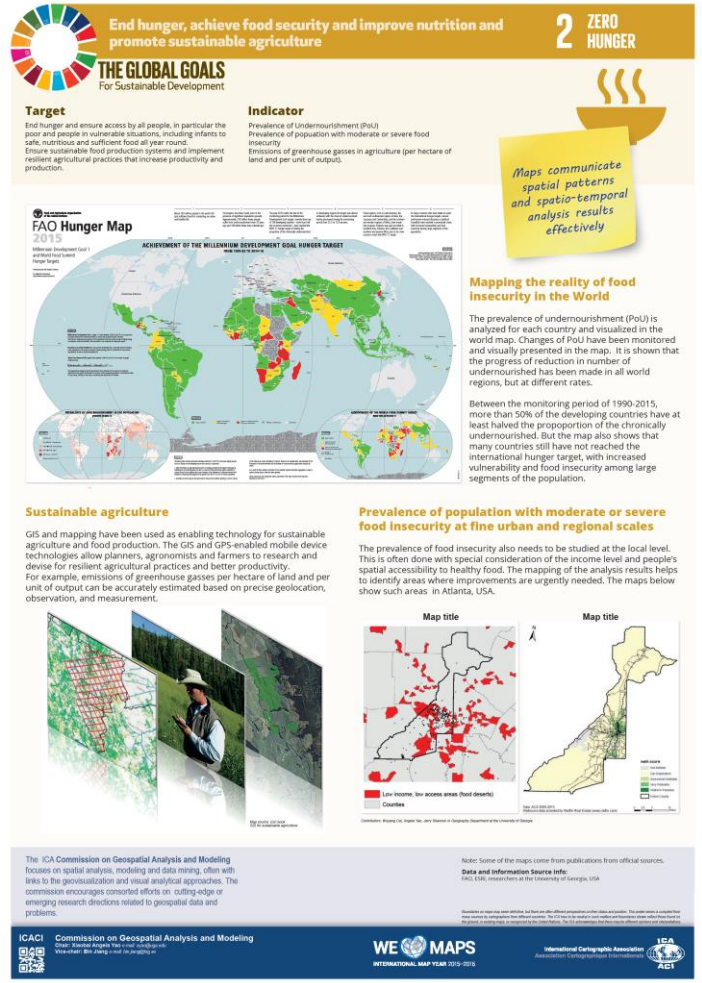
# ICA and SDG Goal 1

## No poverty



# ICA and SDG Goal 2

## End hunger

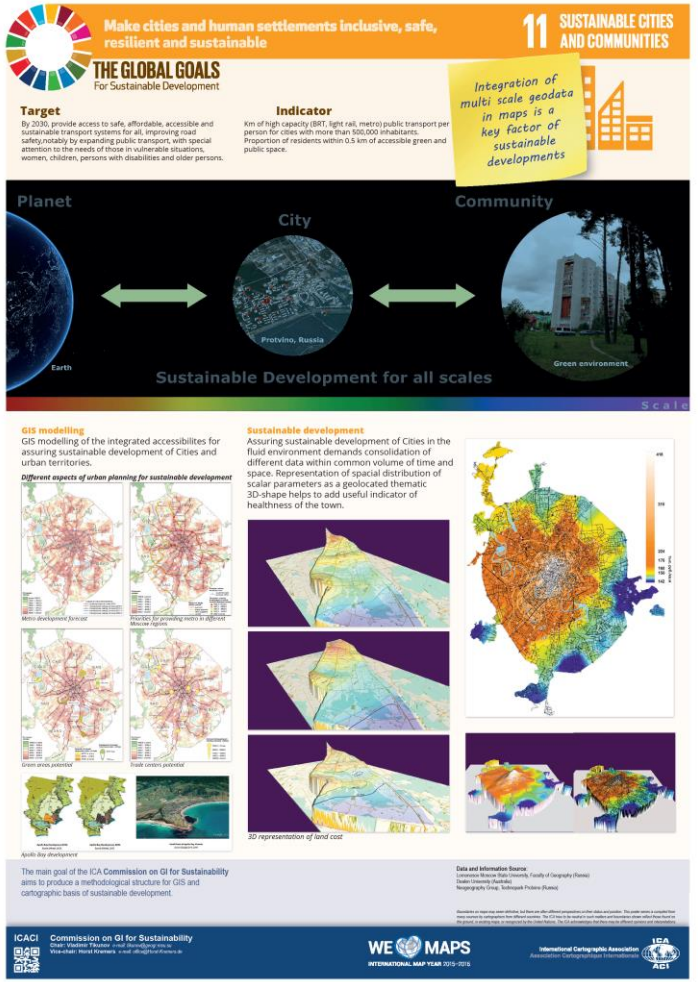


# ICA and SDG Goal 9

## Industry, Innovation, and Infrastructure

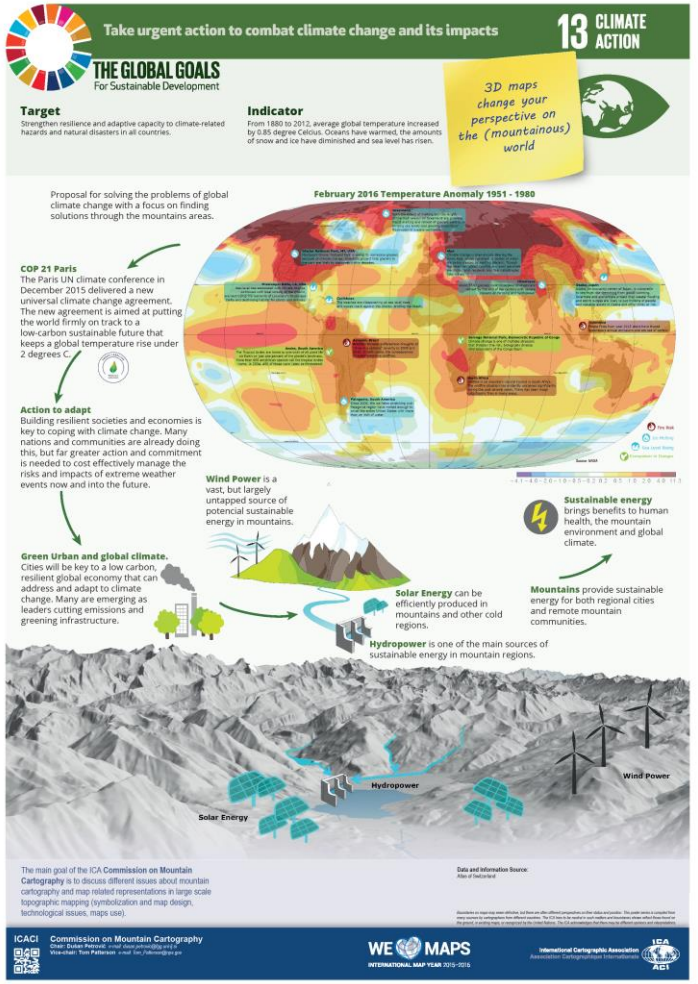
# ICA and SDG Goal 11

## Sustainable Cities and Communities

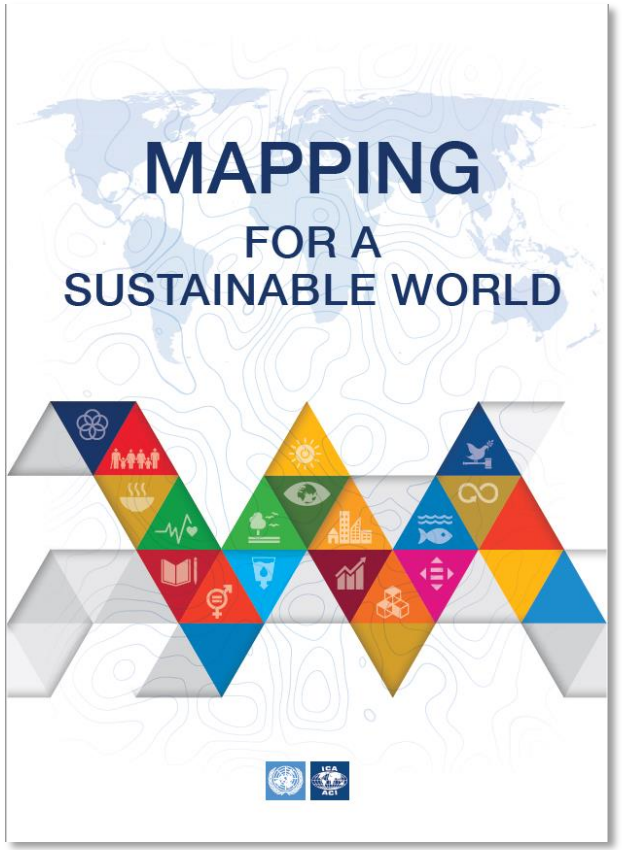


# ICA and SDG Goal 13

## Climate Change



# Forthcoming ICA Publication with the UN



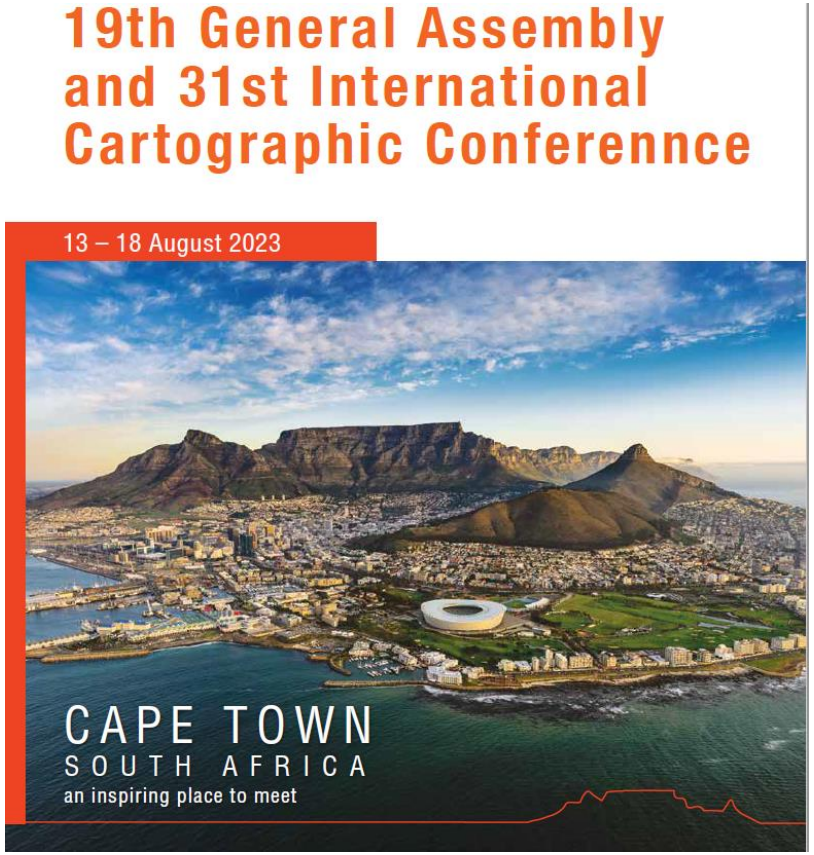
# Future International Cartographic Conferences

2021
Sponsored by the
Cartographic Association of Italy

Rescheduled to
December 13-17, 2021

# Future International Cartographic Conferences

2023
South Africa National Committee for the ICA



# How do you get involved? What to do next?

- Check if there are ICA Commissions in your field of interest
- Participate in the work of the ICA Commissions to learn and influence new developments in cartography and geospatial science
- Come and present your work at our various conferences
- Display your accomplished works at the International Map Exhibition
- Help/sponsor young professionals to participate in ICA Commissions and International/Regional Cartographic Conferences

# Excerpts continued…

"…the future belongs to those who can coordinate and collaborate across the many disciplines involved, and be able to integrate the result to create aesthetic and effective maps"

# We cartographers have much to contribute.

# We need to show how we can make a difference for our communities and our world

# Thank you very much!

Let's make the world a better place with maps