

Actionable **Cartography**

Deqing 2025, Georg Gartner

The main message

Maps Matter!

Trust in the era of AI

Education is key.

Geodata and Geoinformation for Society : Data



Archival
and
Digitized
Content



Positioning
Data



Varieties
of
Raster
Data



Varieties
of
Vector
Data



Distribution of geospatial knowledge : Foundational Spatial Data Themes

UN-GGIM definition of
fundamental spatial data themes



International Cartographic Association
Association Cartographique Internationale



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

Distribution of geospatial knowledge: **Future Trends**

UN-GGIM Future Trends, 5-10 year vision (<https://ggim.un.org/future-trends/>)

Future direction of data creation, maintenance and management: real-time, new methods (UAV), social media, **artificial Intelligence**

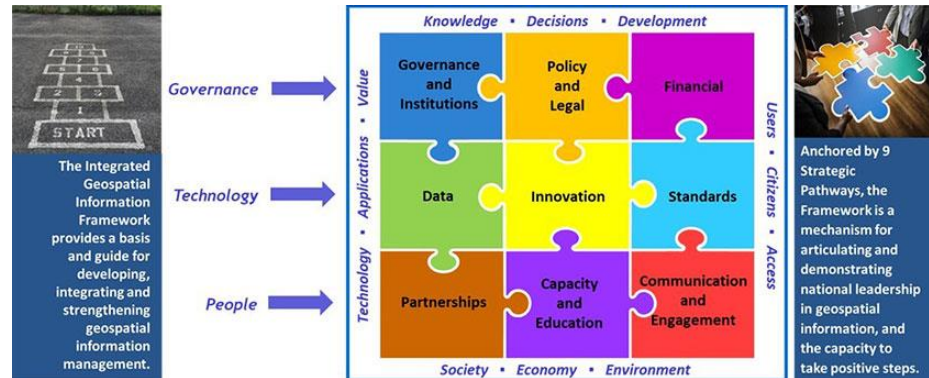
Uses of geospatial data: ubiquitous use might lead to better decision-making, require appropriate **ethical standards**

Trends in technology: location devices will be pervasive data, increasingly interconnected, emerging provision of 3D and 4D, fully automated and **user-centric** processing

Legal and Policy Development: issues of increasing demand for free and **open access privacy** challenges legal status of national spatial data infrastructures

Skills requirements and training mechanisms; shift from a niche to **wider populace**

Distribution of geospatial knowledge: The IGIF



Action Items for future Geospatial Ecosystems

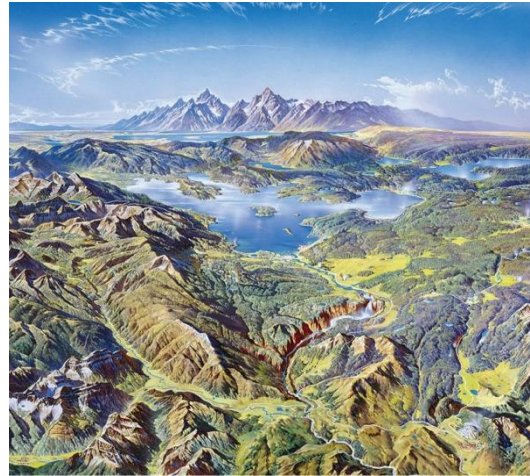
- user – centric
- trustworthy
- educated



User-centred

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22495	22495	34301	46549	58537	34301	46549	58537	34301	46549	58537

User-centred



Cartography.

More than Visualisation.
It's about **Maps**.

Maps.

Empowering Humans.

Cartography as discipline is fundamental for human mankind.

The power of abstraction



Cartography as discipline is fundamental for human mankind.

Tools for **thinking**

Maps help us to categorize, conceptualize, and express (spatial) information.

They help us make sense of the world.

Cartography as discipline is fundamental for human mankind.

Tools for **acting**

Maps help us to plan, to give instructions, to make decisions, influence others and work together.

Maps are practical guides for real-world action,

Cartography as discipline is fundamental for human mankind.

Systems for **communication**

Maps help us to share information, knowledge, even emotions, narratives and stories.

Maps are systems for transmitting information
across
individuals, communities, cultures and generations.

Cartography as discipline is fundamental for human mankind.

Models of the world

Maps are not the truth. They simplify, focus, select.

Maps are representational systems that model the world symbolically.

Cartography as discipline is fundamental for human mankind.

Carriers of **Power**

Maps shape how we think about the world. They define borders, make political claims, reflecting biases.

Maps are not neutral. They can be used to support power or question it.

Cartography as discipline is fundamental for human mankind.

Cultural Meaning

The language of cartography carry cultural meaning, they reflect what a society deems important.

Maps preserve and communicate cultural identity.

Cartography as discipline is fundamental for human mankind.

Flexible and Evolving

Maps grow and evolve with us. New cartographic means come into fashion, old ones fall out of use.

Maps evolve with technology changes and societies.

Cartography as discipline is fundamental for human mankind.

Tools for **Creativity**

Maps are not only for facts. They can be poetic, they can be artistic.

Maps are a medium for creativity and expressions beyond pure function.

Cartography as discipline is fundamental for human mankind.

Critical Perspective

Maps are not only helpful tools.

They are shaping how we see the world, this means they can limit our view, they can hide, distort or even control our view of the world.

Maps can be misused.

Cartography as discipline is fundamental for human mankind.

The impact of **AI**

AI can write test, answer questions, draw maps.

They are using tools made by humans, for humans.

Maps are meant for humans.

Paradigms of scientific cartography

Communication

Visualization

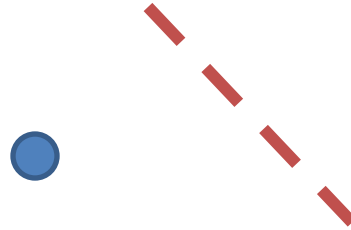
Analytical Cartography

Critical Cartography

Champions of scientific cartography

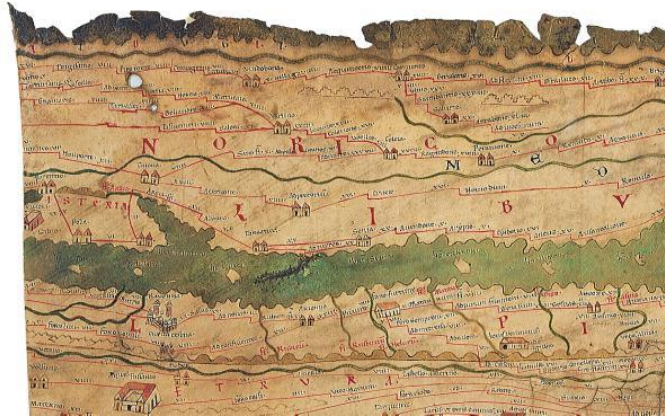
how to say what to whom and is it effective

the **pure nature** of maps



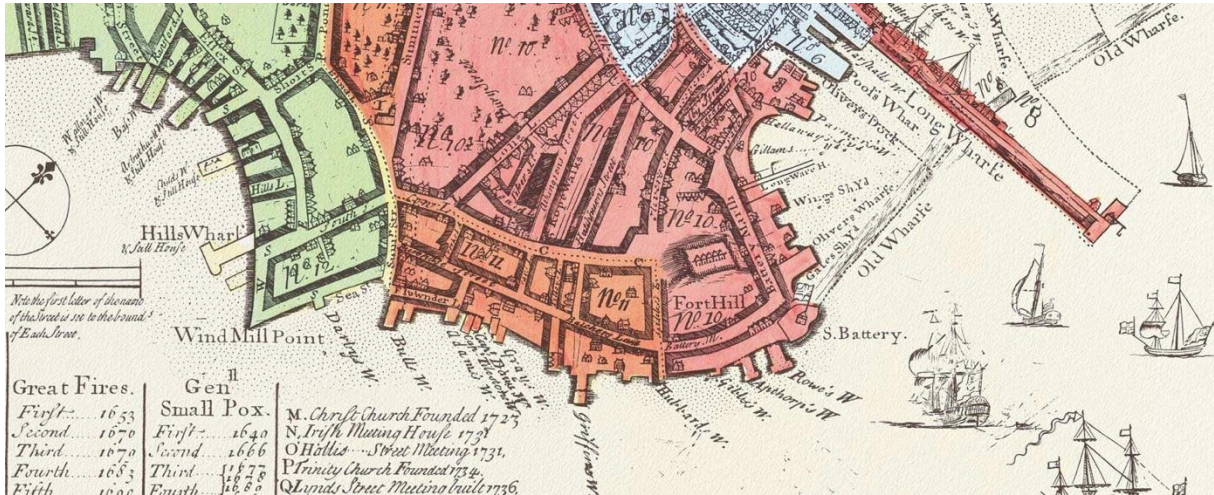
Spatial Understanding: Maps provide a visual representation of entities and spatial relations. By this they help us to perceive and understand the relationships between different locations, landmarks, and geographical features. This spatial understanding is crucial for planning, decision-making, awareness.

the pure nature of maps



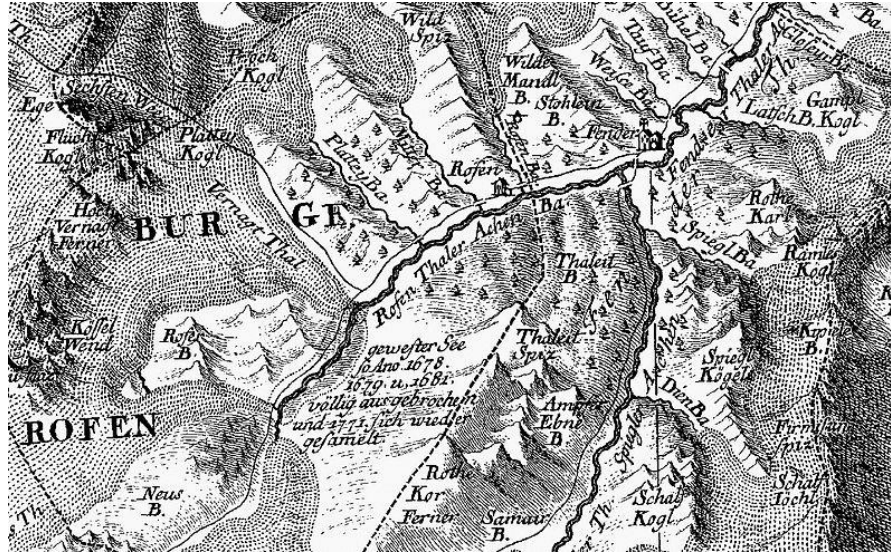
Navigation: Maps are essential for navigation and travel since ancient times. They help people find their way, plan routes, and explore unfamiliar areas.

the pure nature of maps



Planning: Maps are used to locate, manage and plan in space. They aid in making informed decisions about resources, allocation, development.

the pure nature of maps



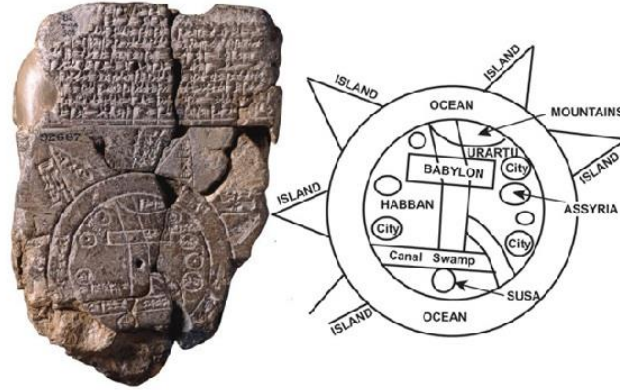
Awareness: Maps are used to understand the environment, eventual changes and impacts and contexts.

the **pure nature** of maps



Analysis: Maps are crucial for identification, planning and coordination.

the pure nature of maps



Context: Maps make statements. They are not neutral. They reflect a context.

the pure nature of maps



Record: maps provide insights into how societies perceived the world at different points in time.

.

the **pure nature** of maps



Spatial Learning: Maps determine how we learn spatial concepts.

Carte Figurative des peuples successifs en hommes de l'Armée Française dans la campagne de Russie 1812-1813.

Dressée par M. MINARD, Inspecteur Général des Ponts et Chaussées en retraite. Paris, le 20 Novembre 1869.

Les nombres d'hommes peignent ainsi, représentés par les largesurs des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en travers des zones. Le rouge désigne les hommes qui ont été en Russie; le noir ceux qui en sont sortis. — Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de M. M. Thiers, de Ségur, de Fozensac, de Chambray et le journal inédit de Jacoby, pharmacien de l'Armée depuis le 28 Octobre.

Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que le corps du Prince Jérôme et du Maréchal Davoust qui avaient été attachés sur le Niémen à Mielow et au-delà, se tenaient vers Orsha et Wilkox, au lieu d'en marcher avec l'armée.

TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.

Les Champs passent au galop le Niémen gelé.

Paris le 20 Novembre 1869.

Storytelling: Maps simplify complex information by presenting it in a visual and understandable format. They convey information effectively.

the pure nature of maps



Potential to please: Maps can be aesthetically pleasing, triggering an emotional responses.

the evolving discipline

Era of Artefacts needs Engineers and Artists

Era of Services needs Data and Computer Scientist

Era of Knowledge Interfaces needs Cognitive Scientist

The evolving discipline needs **Collaboration**

The era of services

Maps are produced

automatically
formally described
in real-time
with ubiquitous means

The era of services

underpinned by

big data

spatial data infrastructure

standards and geo data policies

semantic web and linked data

web services

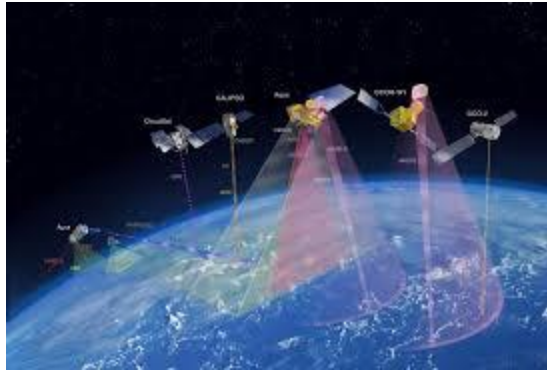
innovative hci and media

The era of services

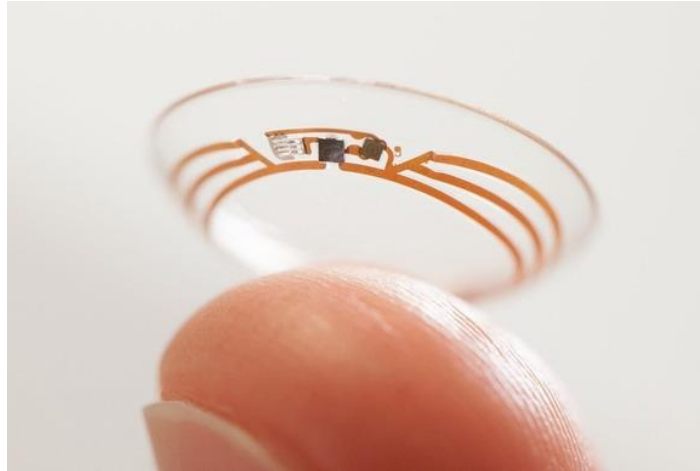


Augmented Reality Geo-LBService

The era of services..



The era of services..



embedded interfaces

Where we head to..



The Era of Maps as Knowledge Interface

Where we head to..



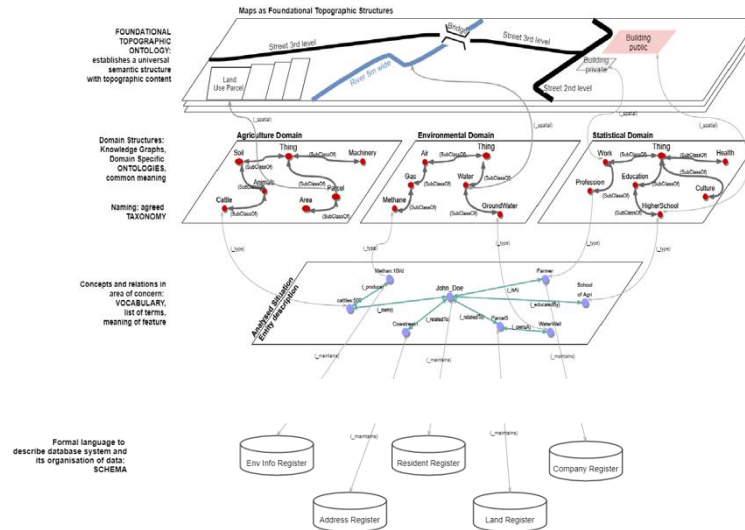
Anticipating, responsive maps

Where we head to..

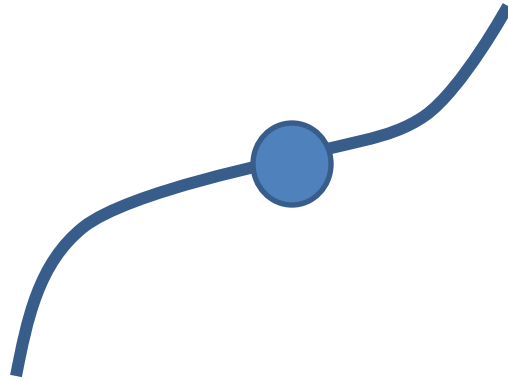


maps for machines

the technology drive knowledge infrastructures



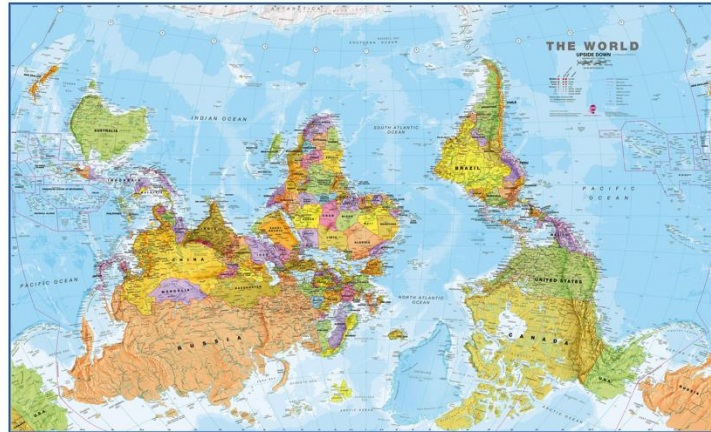
the challenge of trust



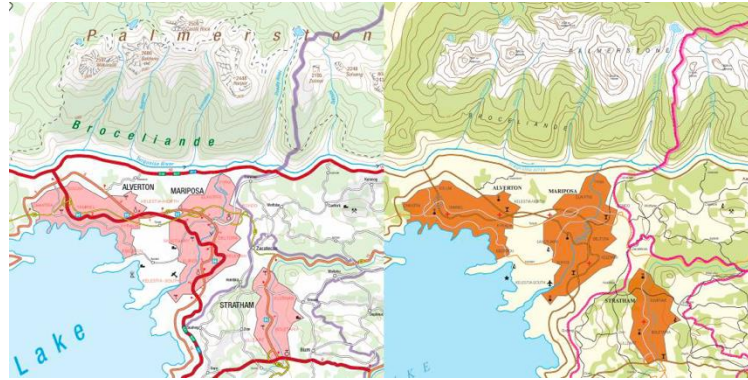
the challenge of trust



the challenge of trust



the challenge of trust



the technology drive
trustworthiness



going deep
going wide

let's act

research, research, research..

ICA is about **Conferences**

International Cartographic Conferences (ICCs)

- 2021 Florence, Italy (Europe)
- 2023 Cape Town, South Africa (Africa)
- 2025 Vancouver, Canada (Americas)
- 2027 Warszawa, Poland (Europe)

Regional Cartographic Conferences (RCCs)

- 2022 AutoCarto, Redlands
- 2024 CAGIS, Columbus
- 2024 EuroCarto, Vienna
- 2024 AsiaCarto, HongKong
- **2026 EuroCarto, Brno**

let's act

education, education, education..

→ **International** MSc, PhD programs needed

Main elements of innovation

- Activation



Main elements of innovation

- Activation



Main elements of innovation

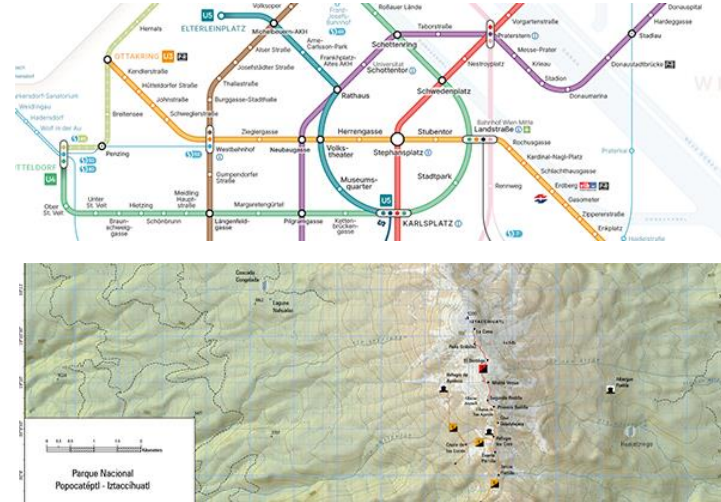
- Activation



Main elements of innovation



- Project based vs. Problem based Learning



Main elements of innovation

- Problem based Learning



let's act

→ Collaboration

International Cartographic Association



Aims and Scope

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.**

International..

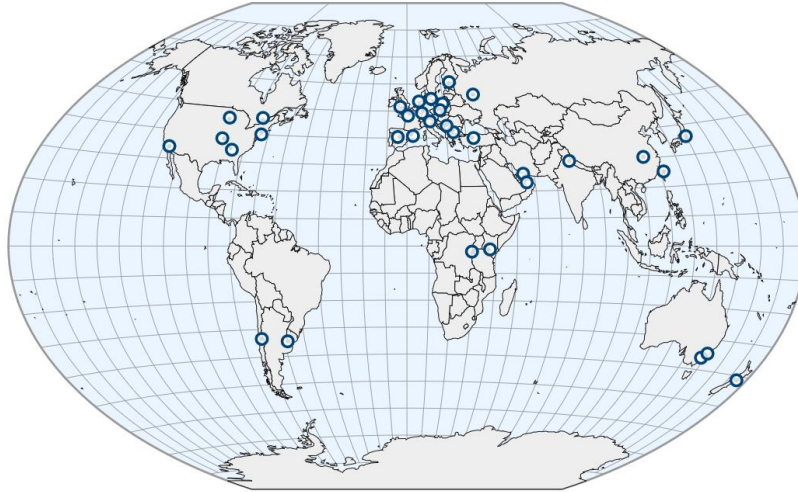
- national and affiliate members from all over the world
- activities globally
- official global voice at UN, ISC

..Association



National Members of the ICA

..Association



Affiliate Members of the ICA

ICA is about **Commissions**

- Art and Cartography
- Atlases
- Cartographic Heritage into the Digital
- Cartography and Children
- Cartography and Sustainable Development * *new*
- Cartography in Early Warning and Crisis Management
- Cognitive Issues in Geographic Information Visualization
- Digital Transformation of NMAs* *new*
- Education and Training

ICA is about **Commissions**

- Ethics in Cartography
- GeoAI * new
- Geospatial Analysis and Modeling
- Geospatial Data Analytics * new
- Geospatial Semantics and Ontology
- Geovisualization
- High-Definition Maps
- Integrated Geospatial Information for Cartography * new
- Location Based Services
- Map Design

ICA is about **Commissions**

- Map Projections
- Maps and the Internet
- Marine Cartography
- Mountain Cartography
- Multi-Scale Cartography
- Topographic Mapping
- Toponymy
- Ubiquitous Mapping
- User Experience