

Bandwidth – šířka pásma, širokopásmový

Agile - agilní

Enhanced reliability – zvýšená spolehlivost

Latency – latentnost, „dlouhodobost“



KONVERZE:

Zdarma zdroje dat GIS ve vaší zemi

Kde?

Jaký druh?

Zdarma nebo ne?

Kdo je uživatel?

Formáty?

Integrace dat?

Co si myslíte o Big Data?

Jak a kdy **5G** ovlivní globální ekonomiku?

5G je hnací silou globálního růstu.

- 13,2 bilionů dolarů světové ekonomické produkce
- 22,3 milionů vytvořených nových pracovních míst
- 2,1 bilionů dolarů růstu HDP

Pozitiva a negativa?

Charakteristiky 5G

5G je pátou generací nejnovější mobilní technologie, která byla vyvinuta za účelem zvýšení rychlosti bezdrátových sítí.

Jednou z důležitých funkcí technologie 5G je, že dokáže zpracovávat tisíce přenosů více, než dnešní sítě; je 10krát rychlejší než 4G.

Představte si, že můžete stahovat videa, mediální soubory během několika sekund. 5G je mezitím základem virtuální reality a internetu věcí.

Každý pokrok v technologickém světě přinesl významný vývoj v oblasti mobilní komunikace s novými generacemi sítí, z nichž každá nová byla lepší než předchozí.

Začalo to mobilní sítí první generace **(1G)**, která uživatelům umožňovala pouze telefonovat.

Tato technologie pokračovala, dokud ji v roce 1991 nenahradila mobilní síť druhé generace **(2G)**.

Podobně **3G** sítě, **4G** sítě a nyní **5G** přišly spolu s technologií internetu a způsobily revoluci ve schopnostech mobilních telefonů.



1G

1ST GENERATION *wireless network*

- Basic voice service
- Analog-based protocols



2G

2ND GENERATION *wireless network*

- Designed for voice
- Improved coverage and capacity
- First digital standards (GSM, CDMA)



3G

3RD GENERATION *wireless network*

- Designed for voice with some data consideration (multimedia, text, internet)
- First mobile broadband



4G

4TH GENERATION *wireless network*

- Designed primarily for data
- IP-based protocols (LTE)
- True mobile broadband



THE NEED FOR SPEED *in kilobits per second*

2.4 *kbps*

64 *kbps*

2,000 *kbps*

100,000 *kbps*

Pokud vidíme, že osoba běží ve 4G připojení, osoba v 5G připojení jako by letěla raketou.

The Landscape of 5G

5G will differentiate itself by delivering various improvements:



Decrease in latency:
Delivering latency as low as 1 ms.



Connection density:
Enabling more efficient signaling
for IoT connectivity.



Experienced throughput:
Bringing more uniform, multi-Gbps
peak rates.



Spectrum efficiency:
Achieving even more bits per Hz with
advanced antenna techniques.



Traffic capacity:
Driving network hyper-densification
with more small cells everywhere.



Network efficiency:
Optimizing network energy consumption
with more efficient processing.

PROS & CONS OF 5G TECHNOLOGY

PROS	CONS
1. Greater Transmission Speed.	1. Cost of Establishment.
2. Lower Latency.	2. Lack of Information.
3. Increased Connectivity.	3. Limited Coverage.
4. Energy Efficiency Plans.	4. Overcrowded Radio Frequency.
5. Efficient Business Processes.	5. Security and Privacy Issue.

Výhoda 1. Vyšší přenosová rychlost

Očekává se, že tato síť využívající vysoké spektrum spárovaná s pokročilou rádiovou technologií bude stokrát rychlejší než sítě čtvrté generace (4G) s přenosovou rychlostí až 10 Gb / s.

To nevyhnutelně vede k rychlejšímu přenosu obrázků a videí.

Výhoda 2. Nižší latence

Latence označuje časový interval mezi přijetím pokynu a provedenou danou instrukcí.

V technologii 5G je doba zpoždění přibližně 4 až 5 milisekund (ms) a lze ji snížit na 1 ms, tj. 10krát méně než latence technologie 4G. To nám umožňuje bez přerušení sledovat vysokorychlostní videa z virtuální reality.

Výhoda 3. Zvýšená konektivita

Vzhledem k tomu, že síť 5G využívá širší spektrum, umožňuje přesnější připojení s větším počtem zařízení, stokrát vyšší dopravní kapacitu. To umožňuje více lidem a více zařízením komunikovat současně.

To zvyšuje šance na založení inteligentních měst, která se regulují pomocí různých připojení senzorů.

Výhoda 4. Plány energetické účinnosti

Šířily se obávy, že výrazné zvýšení rychlosti dat a konektivity přinese stejně velkou spotřebu energie. Cílem sítě 5G je však snížit spotřebu energie o 10 procent ve srovnání se současnými běžnými sítěmi 4G.

Výhoda 5. Efektivní obchodní procesy

Jeho vyšší přenosová rychlost, nižší latence a široká konektivita mají ve světě obchodních podniků co nabídnout.

Díky schopnosti podporovat až jeden milion zařízení na kilometr čtvereční umožňuje technologie 5G podnikům koordinovat všechna zařízení pod jejich kontrolou s nekonečnou účinností.

Za druhé, vyšší rychlost dat poskytovaná sítěmi 5G může být revoluční, což umožňuje rychlejší dosažení všech vzdálených prací, které vyžadují datové připojení.

Nevýhoda 1. Náklady na založení

Zavedení 5G technologie ve světě vyžaduje nahrazení stávajících mobilních infrastruktur, které nejsou kompatibilní s 5G technologií.

To nevyhnutelně vede ke zvýšené spotřebě času a peněz.

Vzhledem ke své složité povaze vyžaduje velké množství kvalifikovaných pracovníků k udržení správného spojení, což zvyšuje nákladový faktor.

Nevýhoda 2. Nedostatek informací

Technologie 5G je stále ve fázi vývoje a zbývá ještě mnoho objevit.

Stejně jako vyřezávání mramoru do podoby detailních soch, vyžaduje i technologie 5G ještě odborníky, aby na jejích vlastnostech pracovali, než bude vytvořen naleštěný a „vymakaný“ plán.

Nevýhoda 3. Omezené pokrytí

V důsledku zvýšení šířky pásma v sítích 5G se celkové pokrytí poskytované každou buňkou snížilo. Proto buněčné systémy využívané technologií 5G cestují na kratší vzdálenost než technologie využívané technologií 4G, což nakonec zmenšuje plochu pokrytou jednotlivým vysílačem buněk 5G.

Rovněž milimetrové vlny mají obecně velmi nízkou penetrační sílu a nemohou procházet budovami, stromy, zdmi nebo jinými překážkami bez narušení signálu.

Vzhledem k tomu, že sítě 5G používají milimetrové vlny spolu s dalšími rozsahy, je vysoce pravděpodobné, že tato vlastnost milimetrových vln naruší 5G připojení.

Nevýhoda 4. Přeplněná rádiová frekvence

Rádiové spektrum již přeplněné v důsledku přítomnosti buněk 3G a 4G se přidáním buněk 5G ještě více zahltí.

Rozšířený rozsah frekvence sítě 5G je také 6 GHz, což je již plné jiných signálů. To naznačuje problém, který může nastat v důsledku přetížené rádiové frekvence.

Nevýhoda 5. Problém se zabezpečením a ochranou soukromí

Výzkumný tým z University of Lorraine a University of Dundee provedl studii o ověřování 5G a dospěl k závěru, že zvyšuje bezpečnostní hrozby. Je to hlavně díky jeho vlastnosti umožňující přenos vysoce kvalitních dat a přítomnosti více vstupních bodů pro útočníky.

Ve světě, který se stává mobilním, se ohrožení integrity sítě nakonec stane otázkou národního zájmu.

RADIATION ZONE



Závěr

Vezmeme-li v úvahu všechny výše uvedené body, je zcela jasné, že technologie 5G se stále rozvíjí, překonává překážky, zdokonaluje se a vylepšuje se tak, aby vyhovovala lidským požadavkům, a formuluje lepší plány pro její zavedení a využití.

Ačkoli má v současné době má podíl na výhodách a nevýhodách, očekává se, že výhody v nadcházející budoucnosti převáží nad nevýhodami.

<https://honestproscons.com/pros-and-cons-of-5g-technology/>

References:

<https://arxiv.org/abs/1806.10360>

<https://www.ericsson.com/en/blog/2020/2/mobile-devices-and-energy-efficiency>

(Last Updated On: September 18, 2020)



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to a Better Future



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CREATING RELATIONSHIPS

UNDERSTANDING

INSPIRING

SHARING

CONNECTING

PURPOSE



CULTURES

DISCIPLINES

BACKGROUNDS

ORGANIZATIONS

YOU

A GLOBAL COMMUNITY

INTERESTS



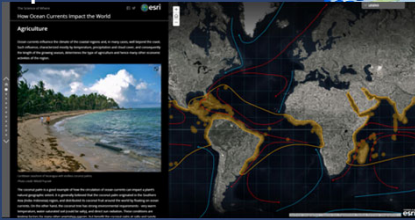
Business
Energy
Climate Change
Water Resources
Environment
Social Conflicts
Transparent Government
National Security
Agriculture
Science & Technology
Natural Disasters
Urbanization & Development
Nature Conservation
Economic Development
Pollution
Natural Resources
Infrastructure

YOUR WORK

Is Already Addressing ...
... Our **World's Challenges**

Environmental Modeling and Assessment

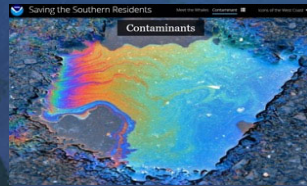
Impacts of Ocean Currents



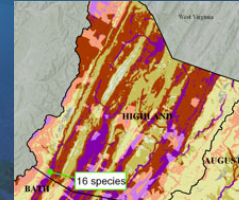
Nearshore Ecological Marine Units



Pollution Impacts to Whales



Threatened Species Protection



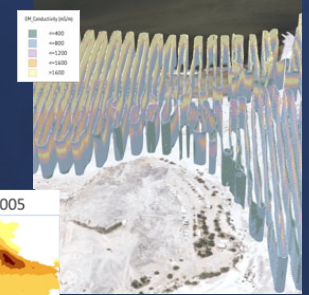
Virginia DCR Natural Heritage Program

Glacier Change



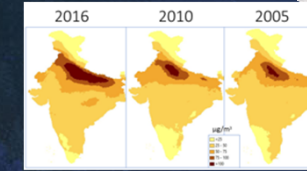
Wyoming USDA Forest Service

Air Quality Modeling



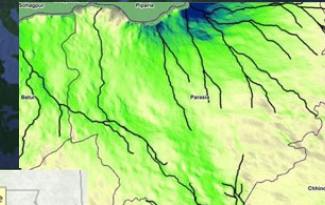
Salton Sea VESTRA Resources

Air Pollution Monitoring



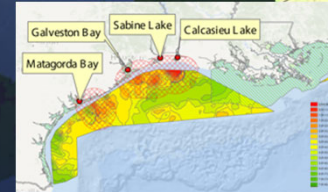
India ML Infomap

Habitat Corridor Analysis



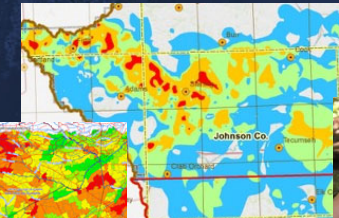
India

Red Drum Hypoxia Risk Analysis



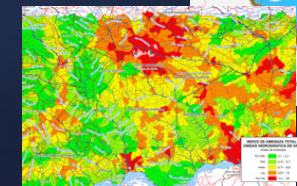
Gulf of Mexico Carlos De Castro

Ground Water Modeling



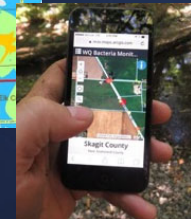
Nebraska WSP

Watershed Vulnerability



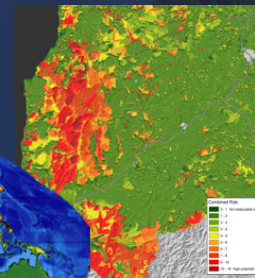
Venezuela Universidad Simón Bolívar

Water Quality Risk



Washington WSDA

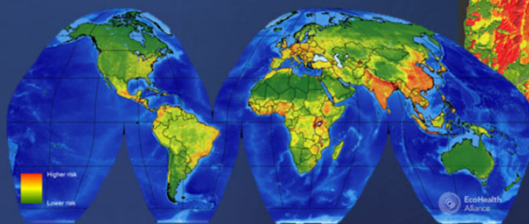
Invasive Pest Risk



Nicaragua

New Zealand Waikato Regional Council

New Disease Risk

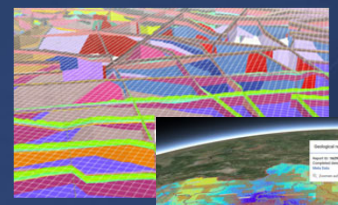


Global EcoHealth Alliance

Natural Resource Management

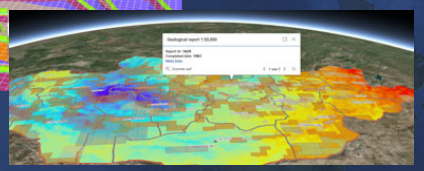
Mining

Geologic Fences



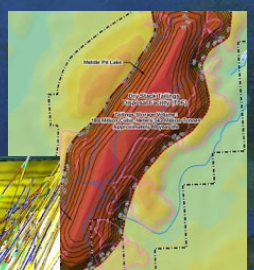
England

Geoscience Resources



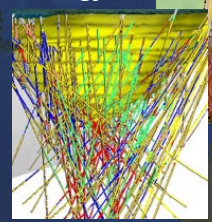
Mongolia
Mineral Resources and Petroleum Authority

Mine Tailings Modeling



Michigan
Foth

Borehole Geology



Michigan
Foth

Forestry

Timber Harvesting

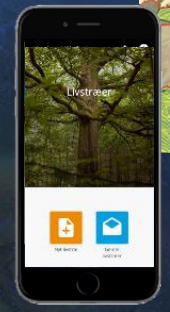


Timber Management Sensitivity



Wisconsin

Tree Inventory

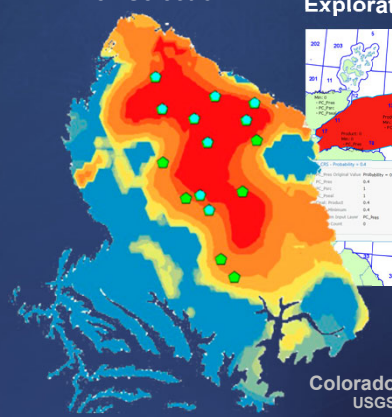


Denmark
Danish Nature Agency

Canada
Geomatics

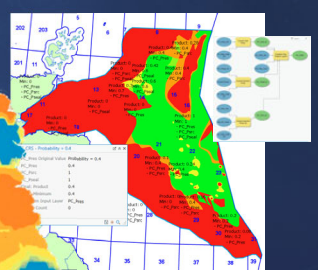
Petroleum

Optimum Well Selection



Colorado
USGS

Exploration



North Sea
Exprodat

Agriculture

Corn Suitability



Mexico
CIMMYT

Vineyard Management



Northern California
Jackson Family Wines

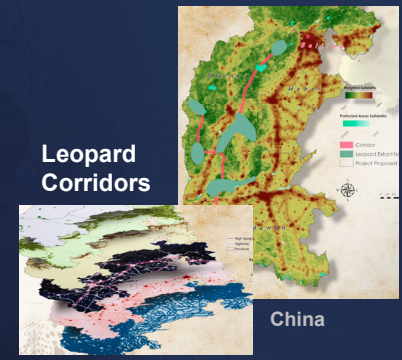
Precision Agriculture



New Zealand
HawkEye

Conservation

Leopard Corridors



China

Managing and Analyzing Land Information

Parcel

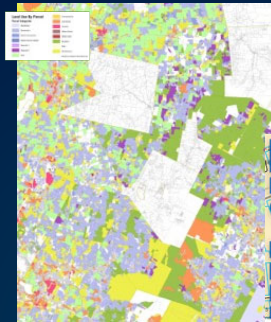


Kansas
Wyandotte County

Tax Productivity



Parcel Land Use



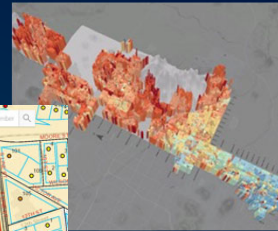
Vermont
Agency of Transportation

Property Explorer



South Carolina
City of Greer

Year of Construction



Arizona
City of Scottsdale

3D Appraisals



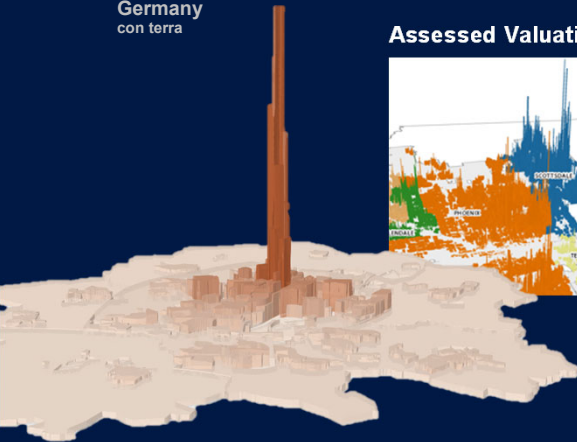
Indonesia

CAMA Data Collection

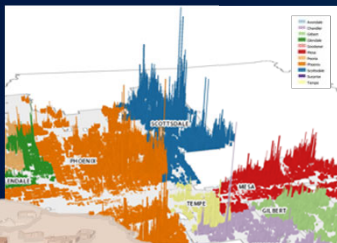


Oregon
Multnomah County

Property Prices
Germany
con terra



Assessed Valuation



Arizona
City of Scottsdale

Property Characterization



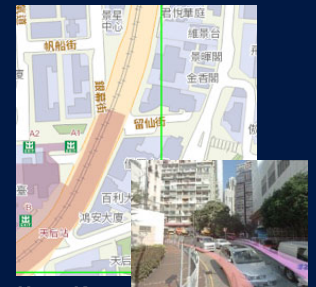
Jamaica
GEO Jobe

Parcel Registration



India
NJS Engineers

Street View



Hong Kong
HKSAR Government

Smart City Development

New Town Master Plan



Abu Dhabi

3D Growth Capacity



Washington

3D City Model



Oklahoma City
Smith Roberts Baldischwiler

Urban Planning



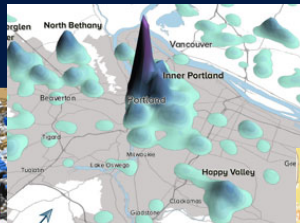
United Kingdom
Garsdale Design

Geodesign



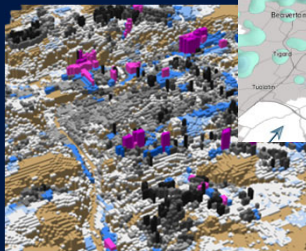
Wisconsin
Houseal Lavigne Associates

Housing Permits



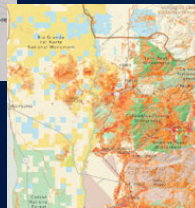
Oregon

Proposed Building Height Limits



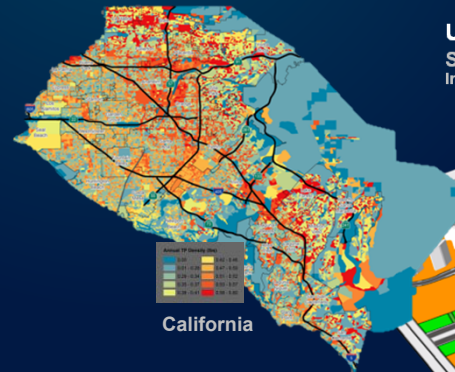
Prague
Metropolitní Plán, IPR Praha

Conservation Planning



New Mexico

Land Use Planning



California

Urban Redevelopment

South Korea
Incheon Metropolitan City



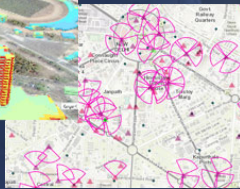
Smart Utilities and Telecommunications

Cellular Network Analysis



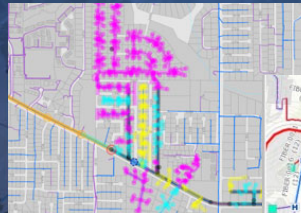
Africa
Cellular Expert

4G Site Selection



India

Electrical Network Tracing



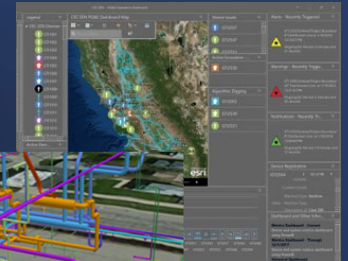
Florida
Schneider Electric

Fiber Management



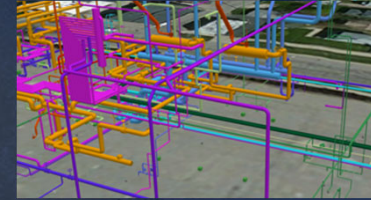
Tennessee
3-GIS

Real-Time Equipment Tracking



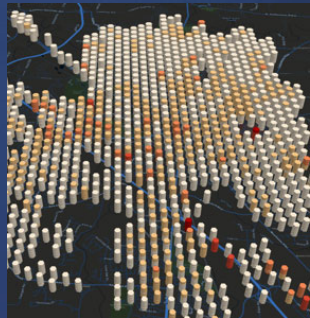
California
GTI

Inside Plant Visualization



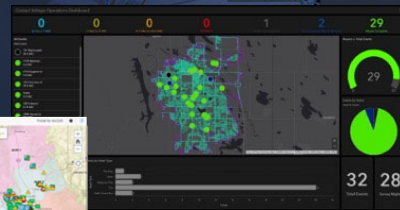
US
POWER Engineers

Power Consumption



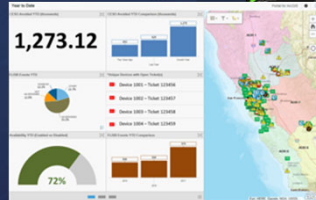
Tennessee
True North Geographic Technologies

Voltage Dashboard



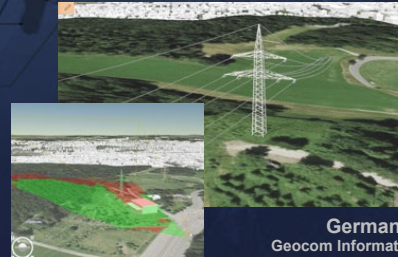
Colorado
City of Fort Collins Light and Power

Outage Dashboard



California
Bridge Energy Group

Tower Modeling Transmission



Germany
Geocom Informatik

Augmented Reality



Italy
OverIT

3D Modeling & Visualization

Noise Modeling



Germany
PSU

Digital City Model

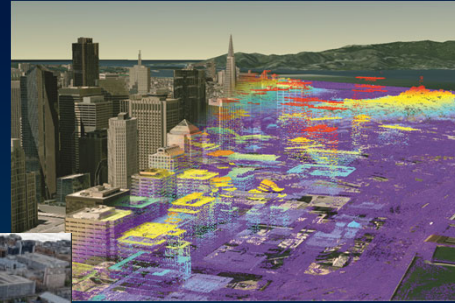


Switzerland
City of Kloten

3 D Systems of Record



Tennessee
GEO Jobe



Procedural Buildings



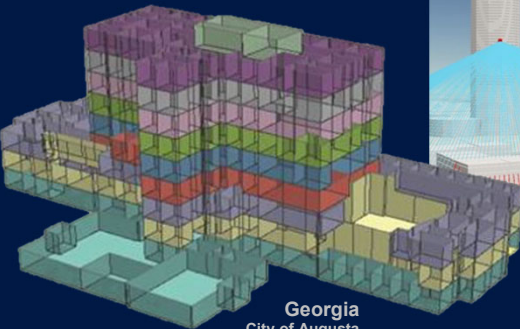
Garsdale Design

Solar Potential



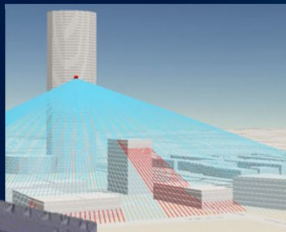
Spain
CIEMAT

Vertical Asset Model



Georgia
City of Augusta

Viewshed



Saudi Arabia
Umar Makdoom

Solar Performance



Boston
CyberCity 3D

Indoor Dashboard



Alabama
GISinc

Indoor Routing

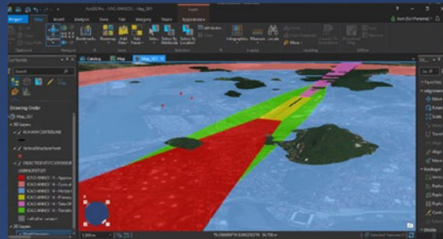


North Carolina
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Transportation Planning and Management

Airports

Approach Charting



Panama
Autoridad Aeronáutica Civil

Ramp Management



Las Vegas
McCarran International Airport

Roads

Roadway Status



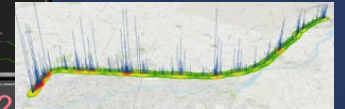
Mongolia
Monmap

Road Safety



Serbia
GDI Solutions

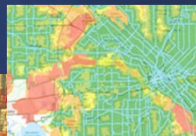
Accident Analysis



Wisconsin
ECWRPC

Transit

Walk Times To Bus Stops



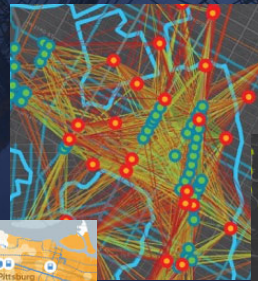
Texas
DART

Bus Route Planning



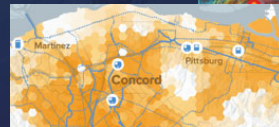
Abu Dhabi

Bicycle Sharing Suitability



New York

Low-Stress Bike Networks



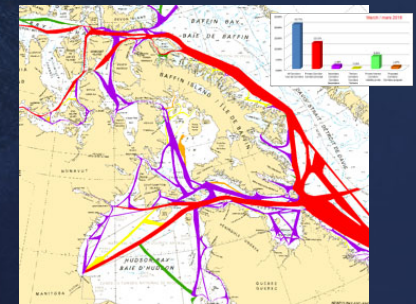
California
CCTA

Regional Transit Modeling



Spain
CRTM

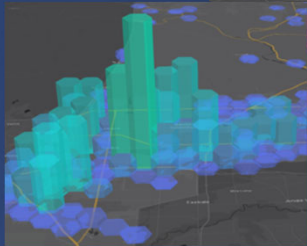
Maritime Shipping Corridors



Canada
CHS

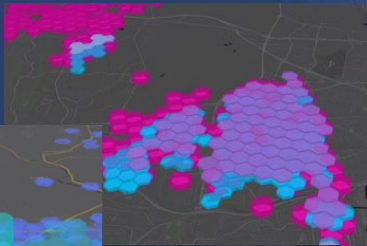
Economic Development and Location Intelligence

Manufacturing Density



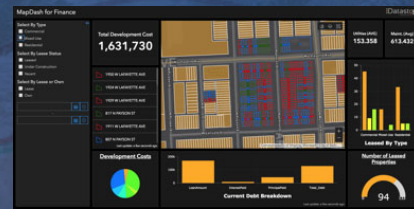
California

Smart Device Distribution



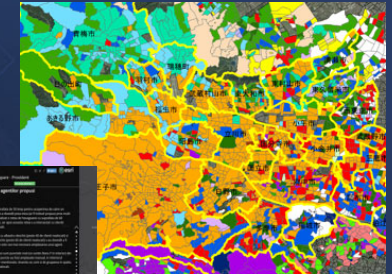
California
ShareTracker

Redevelopment and Investment



Maryland
Datastory

Bank Market Share



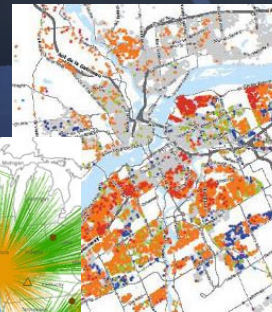
Japan

Insurance Agent Allocation



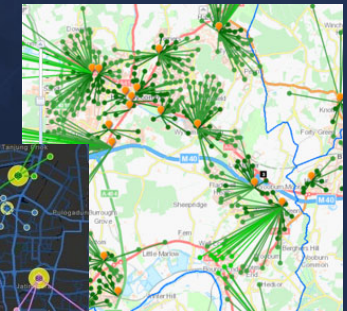
Romania

Target Marketing



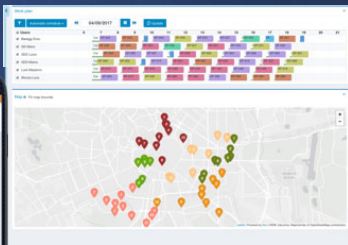
Canada
EnviroNics Analytics

Customer Analysis



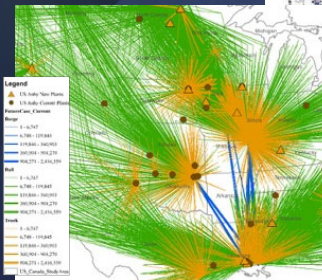
England

Logistics Planning



Italy
MobyPlanner

Supply Chain Modeling



US
California State University Monterey Bay

Truck Routing



Germany
BASF SE

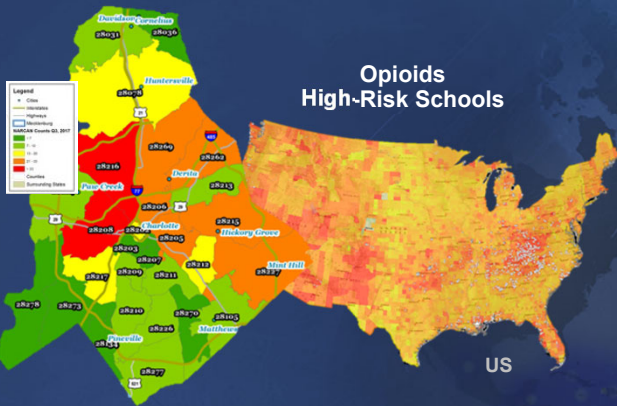
Dealership Competition



Indonesia

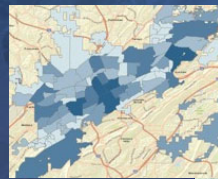
Demographics and Public Health

Narcans Counts



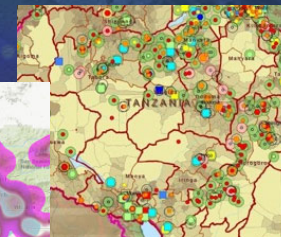
Opioids High-Risk Schools

Cardiac Incidents



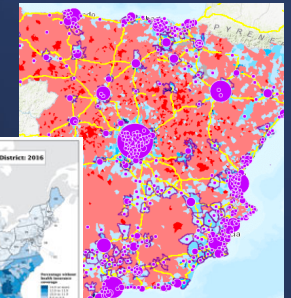
Alabama Birmingham Fire and Rescue

Health Facilities



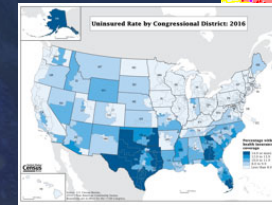
Tanzania USAID / Amoenitas

Population Growth



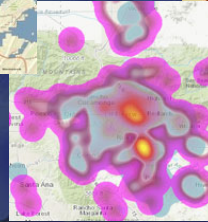
Spain National Institute of Statistics of Spain

Uninsured



US

Flu Epidemic



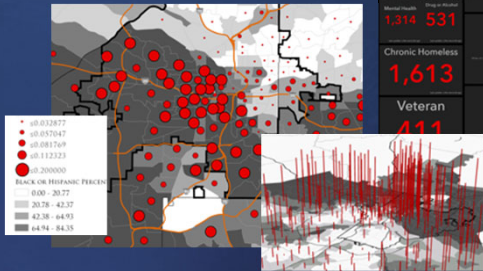
Southern California Loma Linda University Health

Homelessness Dashboard



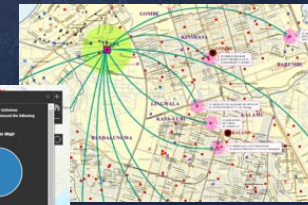
California San Bernardino County

Foreclosure Impacts

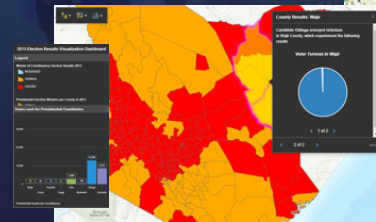


Georgia

Election Operations

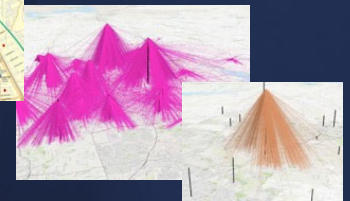


Kenya Presidential Elections



Kenya

Voter Turnout Mountains of Democracy



Texas Collin County

Kinshasa Democratic Republic of Congo

Public Safety and Security

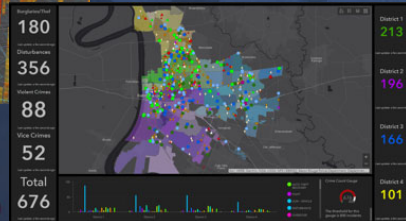
Spatio-Temporal Crime Analysis

Crime Density



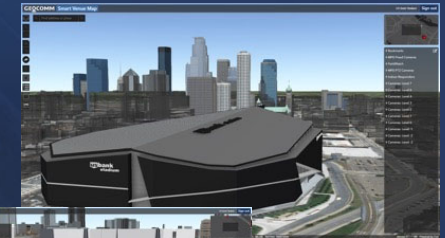
Argentina
Aeroterra

Crime Monitoring



Louisiana

Super Bowl Situational Awareness



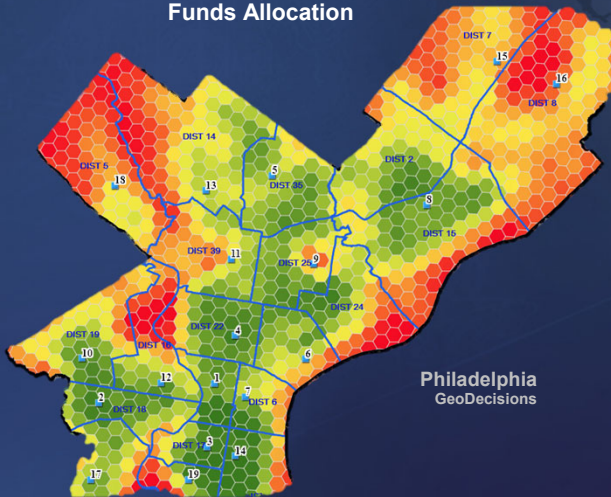
Minnesota
GeoComm

Pre-Incident Planning



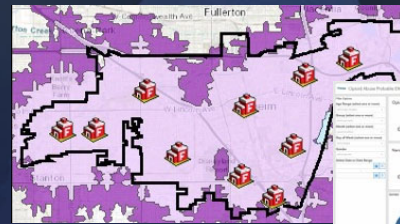
Arizona
NWFDGIS

Modeling Public Safety Funds Allocation



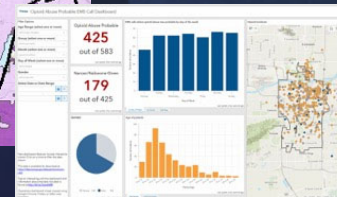
Philadelphia
GeoDecisions

Fire Station Response Times



City of Anaheim

EMS Response



Arizona
City of Tempe

Fire Hydrant Coverage

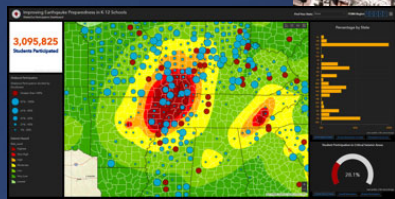


Spain
Servei de Prevenció

Preparing for and Responding to Disasters

Earthquakes

Preparedness



Damage Assessment



Italy
Italian Civil
Protection Department

US
CUSEC

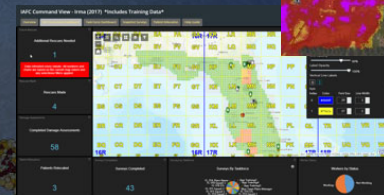
Avalanche Forecasting



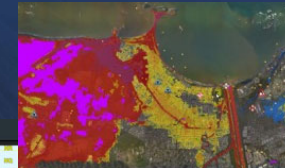
Jackson Hole
Earth Analytic

Hurricanes

Search and Rescue Dashboard



Damage Modeling



Puerto Rico
IAFC

Evacuation Zones



South Carolina

Florida
IAFC / NAPSG

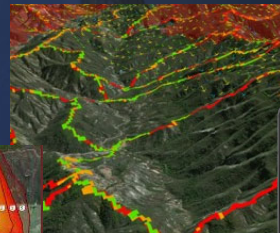
Humanitarian Response



Pakistan
United Nations
World Food Programme

Fires

Tracking Wildfires



Fire Modeling



California
FlameMapper

Fire Management



USFS

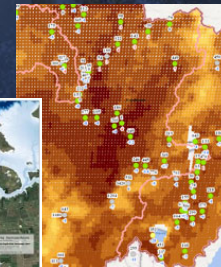
Floods

River Modeling



Texas
FEMA

Flood Forecasting



Russia
Hydrometcentre

Sea Level Rise



Massachusetts
Stantec

Open Data, Portals, and Citizen Engagement

Open Data

UNSD SDG Hub



Philippines



Philippine Statistics Authority



Federal Competitiveness & Statistics Authority



INEGI



Central Statistics Office & Ordnance Survey Ireland



Palestine Central Bureau of Statistics

Citizen Engagement

One Stop Citizen Hub



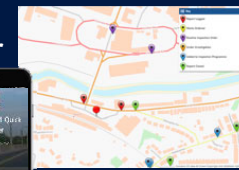
Abu Dhabi

Wildlife Trafficking



Africa USAID

Citizen Problem Reporting



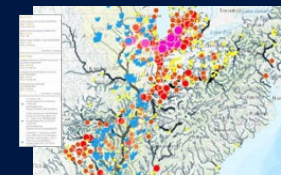
United Kingdom Symology

311 Reporter



Pennsylvania

Flood Reporting with Social Media (Tweets)



USACE

Smart Device Integration



Georgia City of Johns Creek

Adopt-A-Storm Drain



California

Zoning Comment



Texas

Mapping

Storms of a Century



Cartographic Map



Nautical Charting



Narwhal Distribution



DNA Mapping



Global Foundation Geospatial Management (FGM)



Peace Agreement

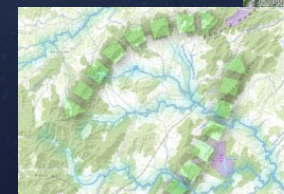


Inland Waterways

UN SDG Report



Green Infrastructure



Land Cover



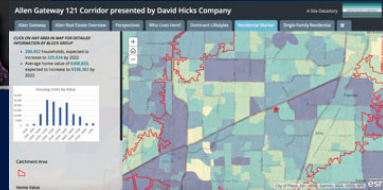
Story Maps | Telling Stories About Everything

Workforce



Washington
Datastory

Investors and Potential Tenants



Texas
Datastory

Tree Mortality



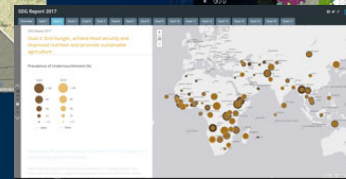
California
CAL FIRE

Peace Agreement



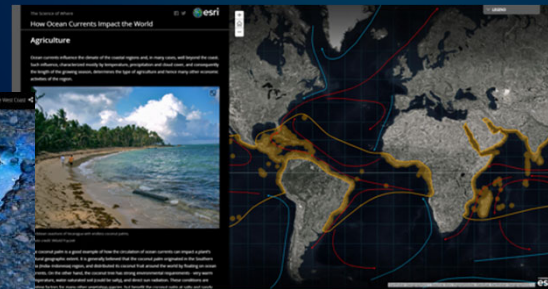
Colombia
UDCA

UN SDG Report



Global

Impacts of Ocean Currents



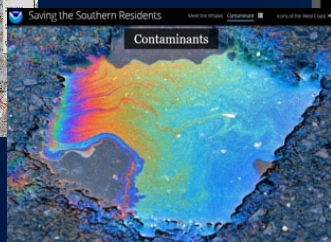
Nicaragua

Glacier Change



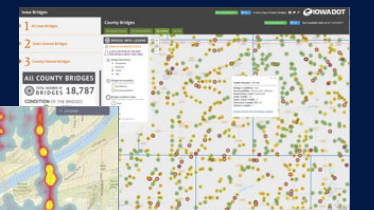
Wyoming
USDA Forest Service

Impacts to Killer Whales



NOAA

Iowa Bridge Conditions



Iowa
DOT

Traffic Safety



Kansas City
Burns & McDonnell Engineering

VISION



VISION

INSPIRING
WHAT'S
NEXT

A Geospatial Way to a Better Future

A futuristic globe with a network overlay and a starry background. The globe is the central focus, showing a grid of lines and glowing points. The background is a dark, starry space with a nebula-like glow. The text is positioned in the upper left and lower right areas.

WE LIVE

In a Complex . . .

. . . and Interconnected World

Geography

Human

Resources
Energy Networks
Buildings
Transportation
Communications
Technology
Cities
Population
Agriculture
Land Uses

Nature

Oceans
Climate
Plants
Animals
Ecosystems
Water
Atmosphere

Constantly Changing . . .



The Pace of Change Is Accelerating

Creating Many Challenges

Threatening Our Natural World
and Our Future as Humans

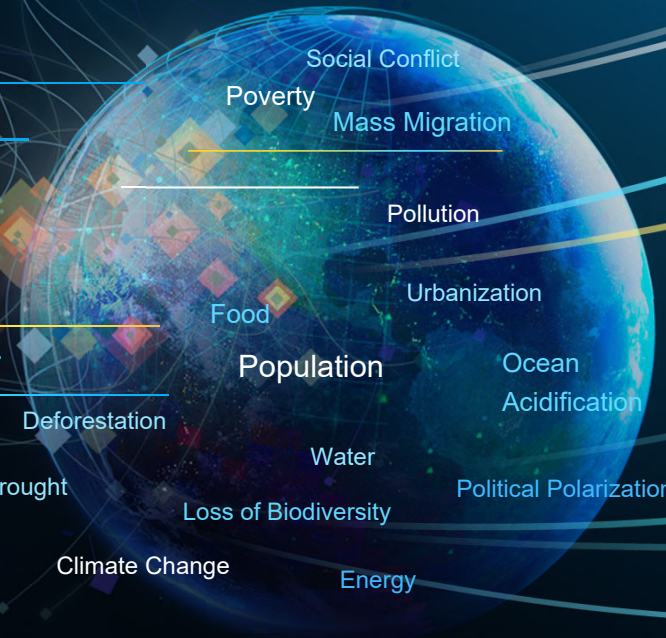
We Are Now at a Place
Where No Humans Have Been . . .

We Need More Understanding

. . . Collaboration and

. . . Action

Evidence



What Should We Do Next?

Apply the Power of Geography and Statistics

Protect
Biodiversity

Envision
What's Possible

Engage
Citizens

Integrate
Environmental
Thinking

Create Sustainable
Development

Improve
Productivity
and Efficiency

Make Cities
Smarter

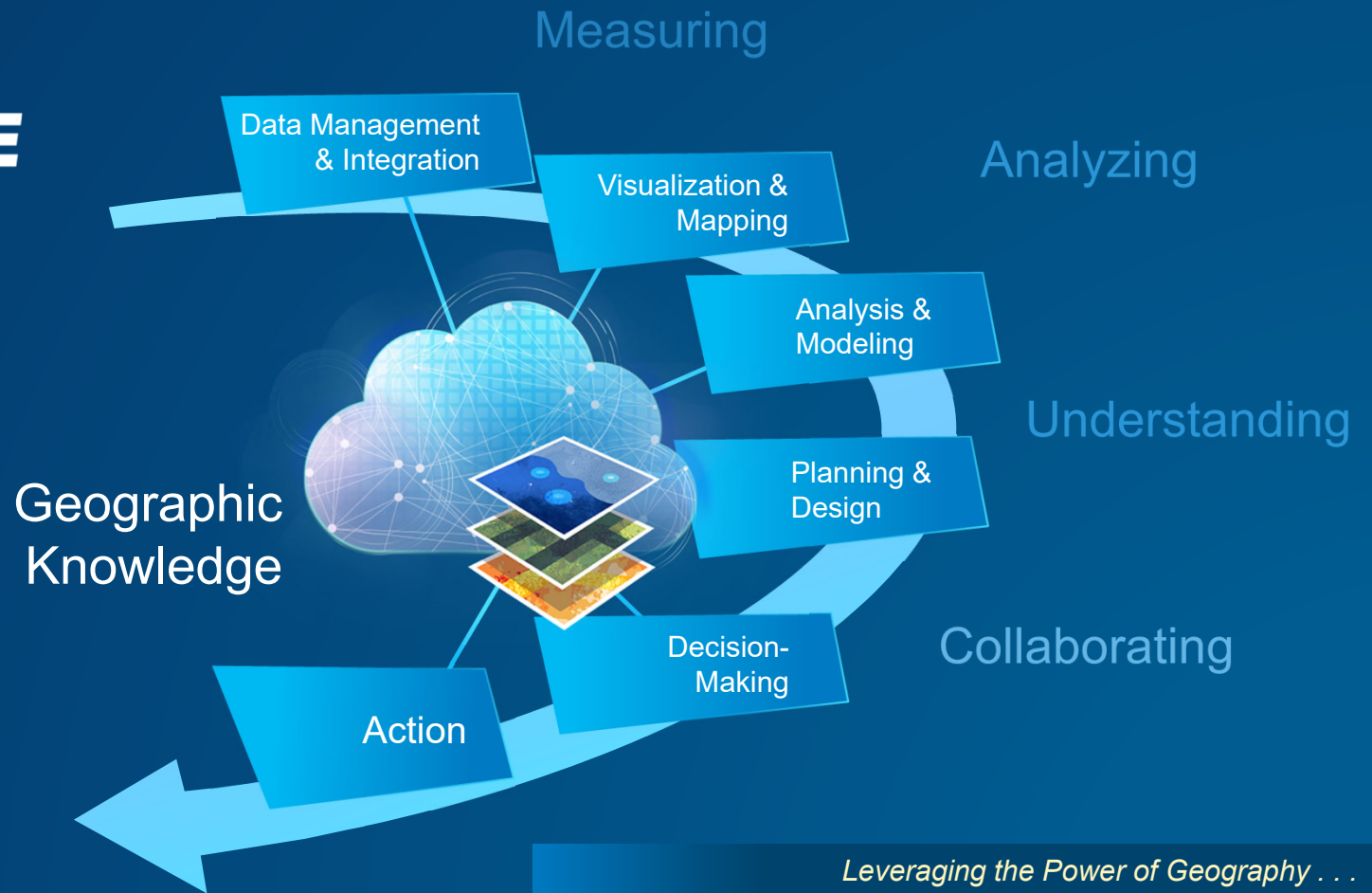
Design with
Nature

Keep Moving, Learning, and Understanding . . .

*Leverage Our Best Technology,
Geographic Science, and Holistic Design Thinking*

THE SCIENCE OF WHERE

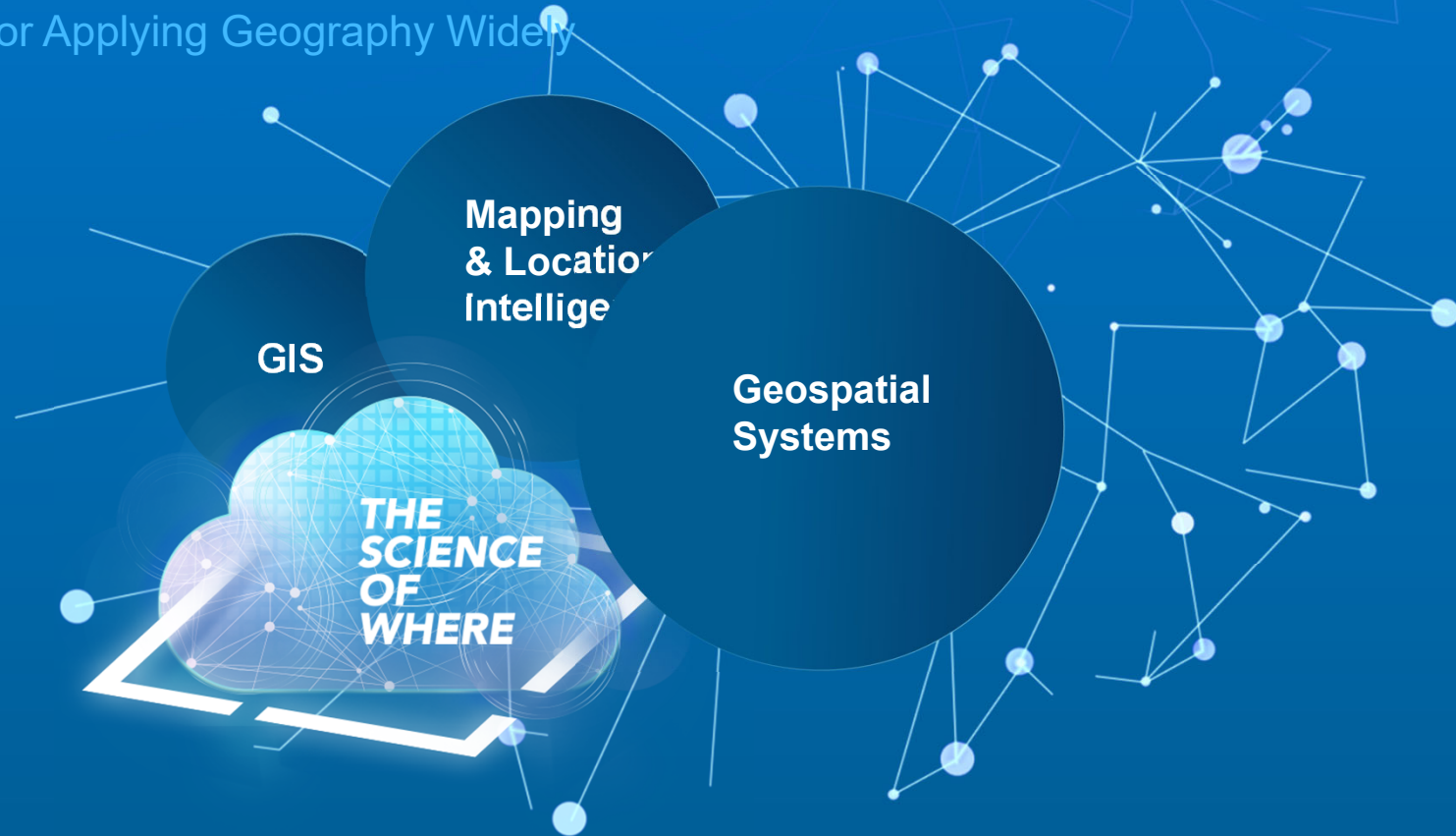
A Framework and Process



*Leveraging the Power of Geography . . .
to Make Better Decisions*

The Science of Where Is the Foundation

For Applying Geography Widely



GIS Is Advancing Rapidly

Integrating and Leveraging Many Innovations

Data

Computing

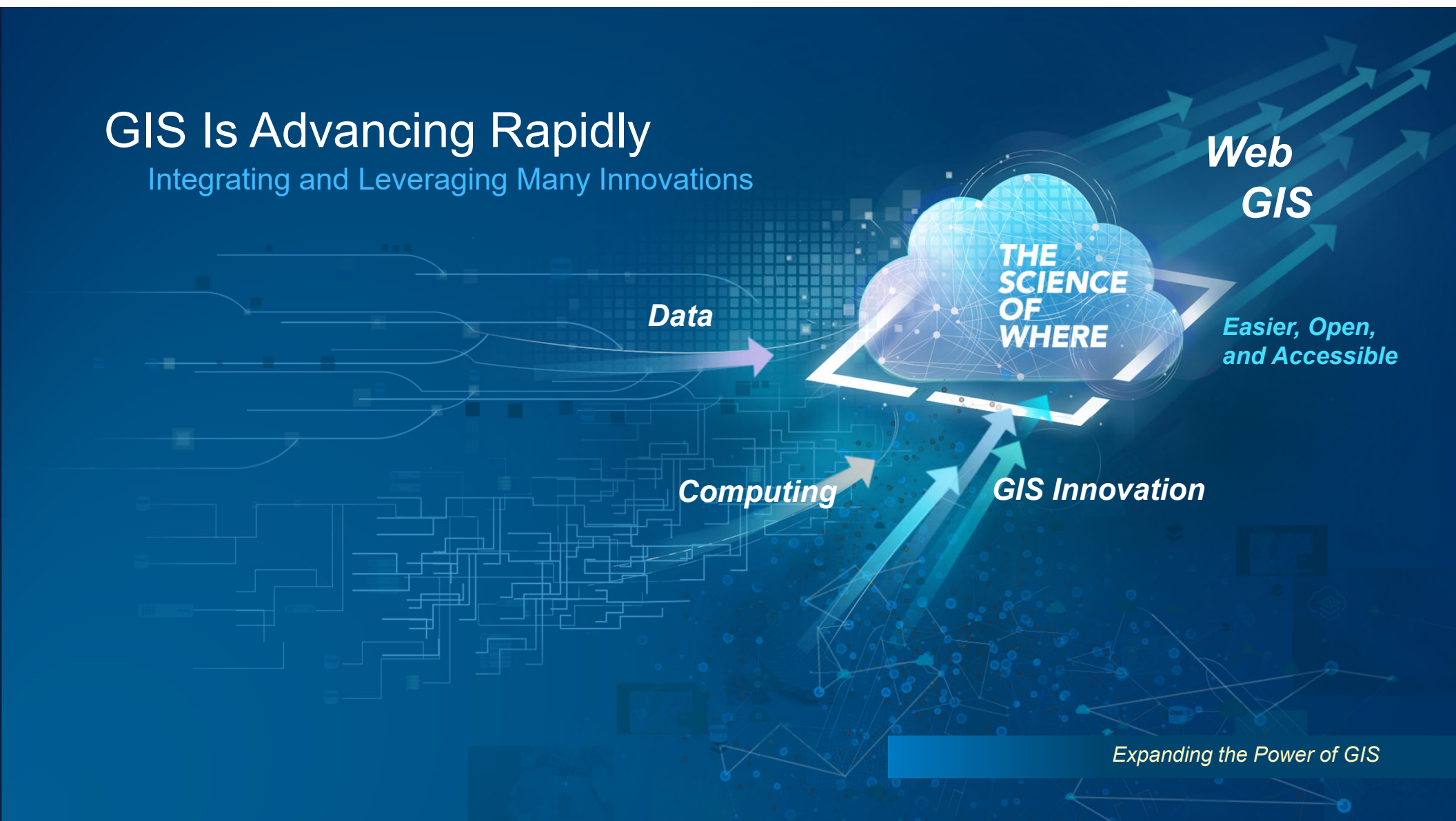
GIS Innovation

**Web
GIS**

*Easier, Open,
and Accessible*

**THE
SCIENCE
OF
WHERE**

Expanding the Power of GIS



GIS Is Advancing Rapidly

Integrating and Leveraging Many Innovations

Remote Sensing
Scientific Measurements
Demographics Drones
Weather Traffic 3D Imagery
Crowdsourcing
Lidar Real-Time IoT
Full-Motion Video

Data



**Web
GIS**

*Easier, Open,
and Accessible*

Computing

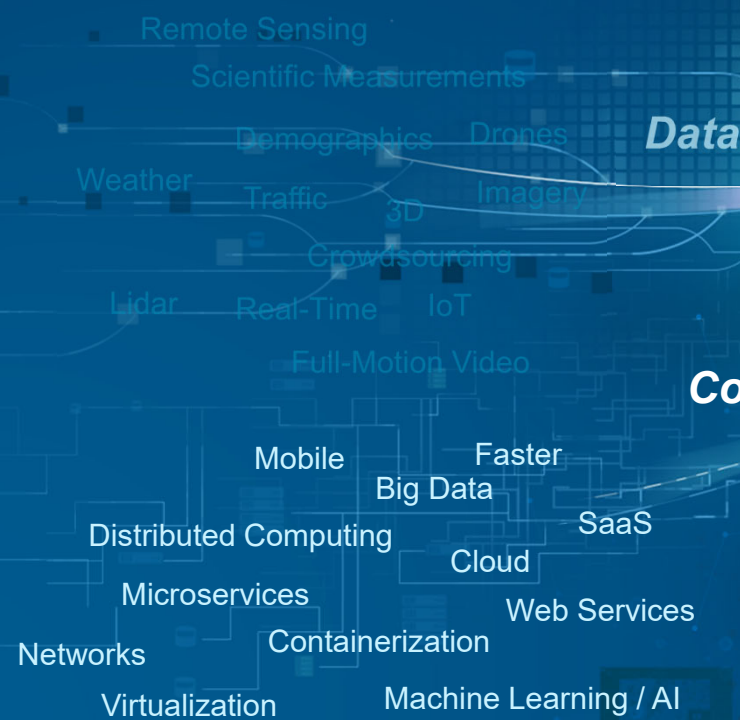
GIS Innovation



Expanding the Power of GIS

GIS Is Advancing Rapidly

Integrating and Leveraging Many Innovations



Data

Computing

THE SCIENCE OF WHERE

GIS Innovation

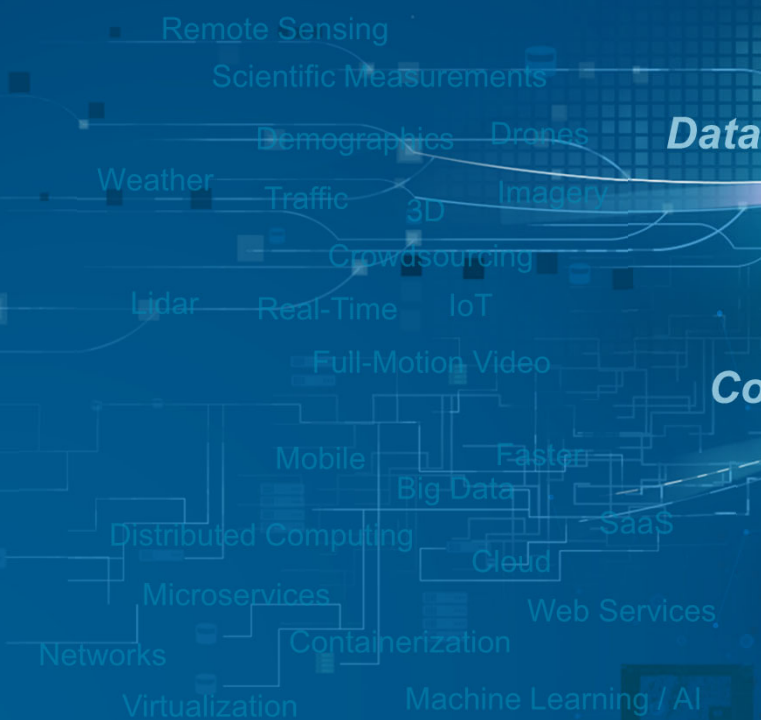
Web GIS

Easier, Open, and Accessible

Expanding the Power of GIS

GIS Is Advancing Rapidly

Integrating and Leveraging Many Innovations



Data

Computing



**Web
GIS**

*Easier, Open,
and Accessible*

GIS Innovation



Expanding the Power of GIS

Web GIS Is the Modern GIS Architecture

Helping Everyone Do Their Work Better

Distributed
... and
Interconnected

Leveraging
Web Services

Communities

Organizations

Departments

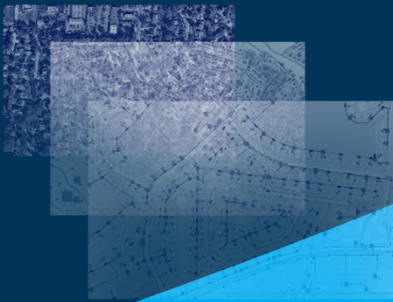
Teams

Individuals



Engaging
Everyone

Sharing and
Collaboration



Web GIS Engages and Interconnects . . . Everyone

Providing a Common Language

Supporting Communication
and Real-Time Awareness

People

Organizations

Communities

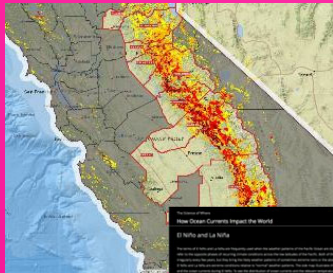
*A Common Framework . . .
for Collaborating and Problem Solving*



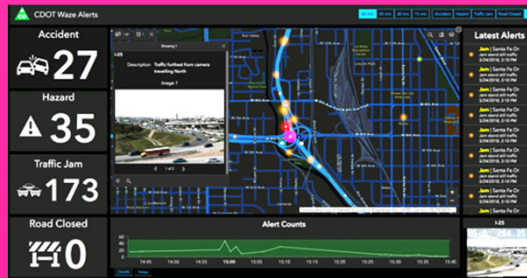
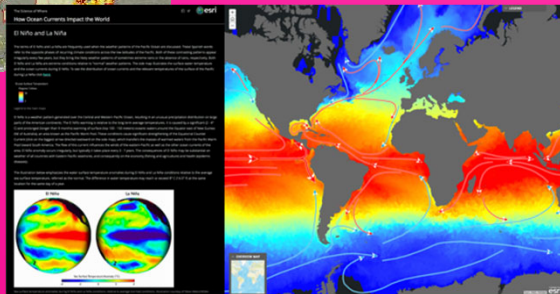
Apps Take The Science of Where . . . Everywhere

Making GIS Widely Available . . .

. . . Taking GIS to the Edge



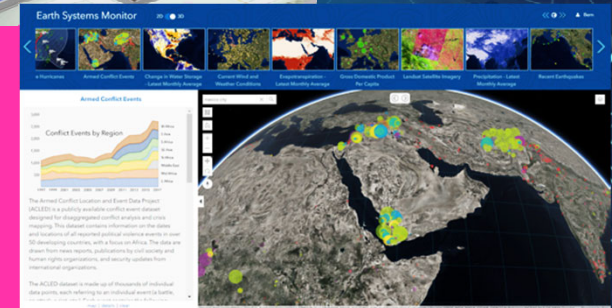
Story Maps



Dashboards



Field Apps



Web Apps

Location Intelligence Helps Us Understand Everything

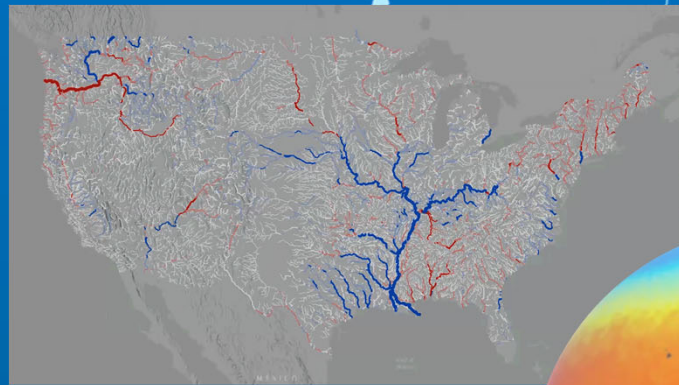


Insights

. . . Opening Spatial Analytics to Everyone

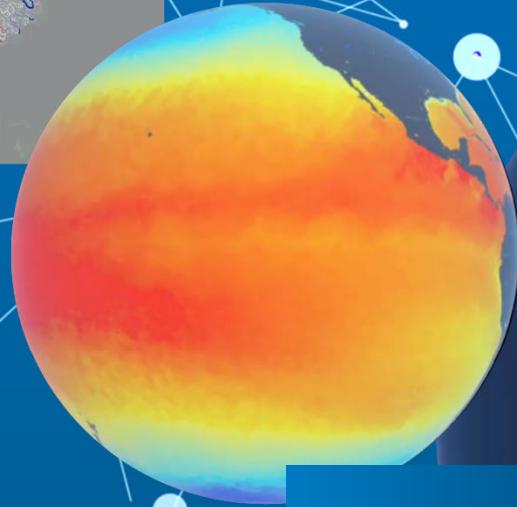
Earth Observations Combined with GIS and AI

Provide Real-Time Global Intelligence



Flood Prediction

Sea Surface Temperature



Ecological Land Units

Human Footprint

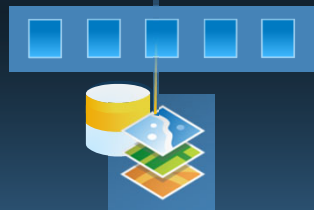


*Helping Us Understand, Predict, and Make Decisions . . .
. . . at Many Scales*

Web GIS Is Driving Digital Transformation

Interconnected Information, Processes, and Workflows . . .
. . . All Happening at the Same Time

Sequential Workflows



Digital
Transformation

Portal

*Using the Power of Location
to Integrate Everything*

Simultaneous
Integrated Operations

Creating Smart,
Dynamic Organizations

*Changing How Organizations as a Whole . . .
. . . Do Their Work*

What's Next? Massive Transformation . . .

Interconnected Information, Processes, and Workflows . . .

. . . All Happening at the Same Time



Creating Smart,
Dynamic Organizations

Using the Power of Location to Integrate Everything

Digital Transformation Is Just Beginning . . .

We Are Living in an Era of Exponential Technological Advancement

Artificial Intelligence
Autonomous Vehicles
Geodesign
Automation
Remote Sensing
Persistent Surveillance
Location Intelligence
Synthetic Biology
Geoplanning
Smart Devices
Geospatial Solutions
Real-Time Monitoring
Data-Driven Analytics
Predictive Analytics
Advanced Modeling
Pervasive Mapping
IoT
Efficiency and Collaboration
Immersive Experiences
Geoaccounting
Cloud Computing
Open Data Access and Transparency

Web GIS

Pervasive
Geographic
Understanding

Web GIS Is Already Playing a Fundamental Role . . .
. . . Integrating Geography Into Everything We Do

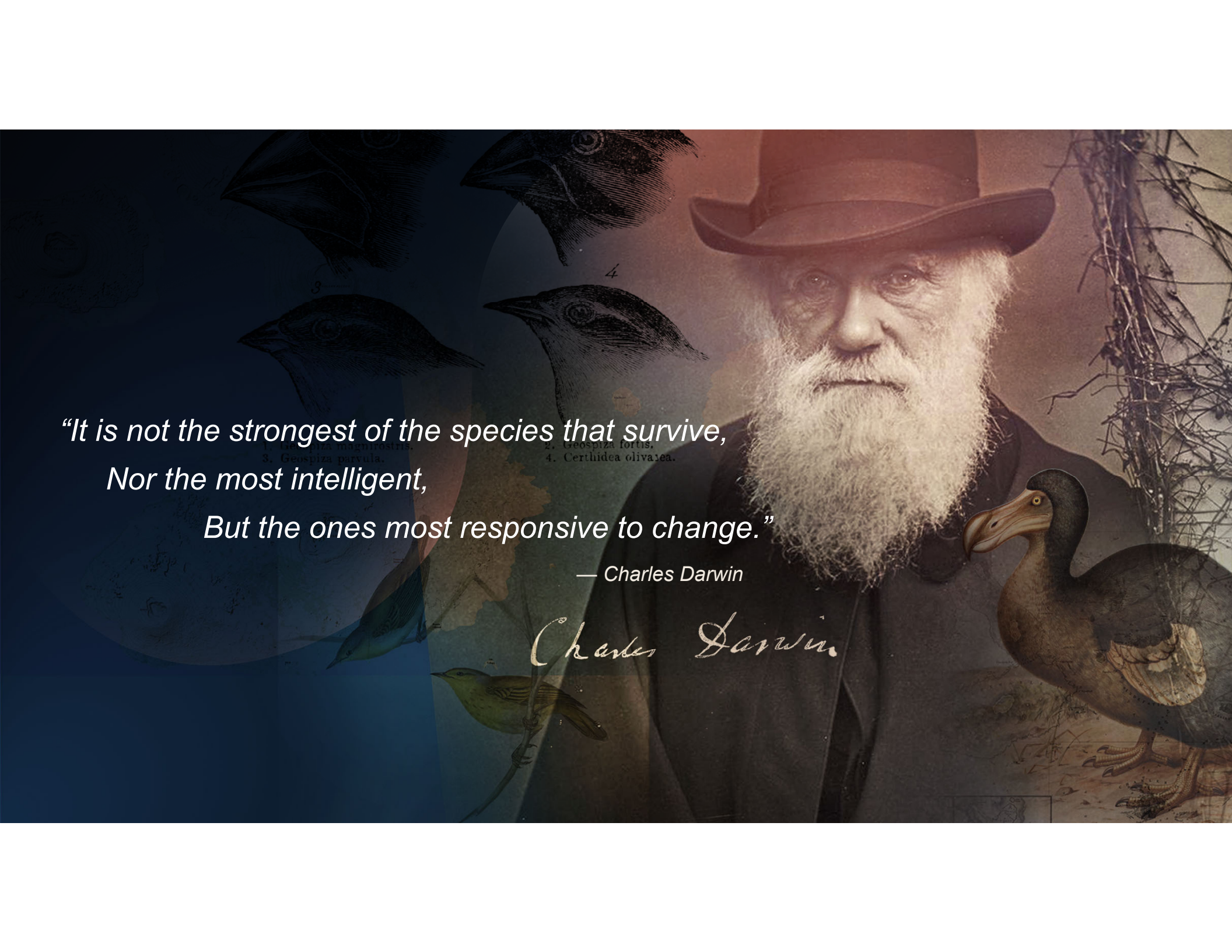
How Do We Take the Next Step?

Embrace Digital Transformation . . .
. . . and Leverage The Science of Where

*Envision a
Better Future*




. . . Create a Geoscience-Based Foundation for Our Future



*"It is not the strongest of the species that survive,
Nor the most intelligent,
But the ones most responsive to change."*

— Charles Darwin

Charles Darwin



We Are Exponentially Changing Our World . . .
Creating Many Problems . . .
Threatening Our Life Support Systems

We Need to Transform Our Understanding of the World . . .
And How We Carry Out Our Responsibilities

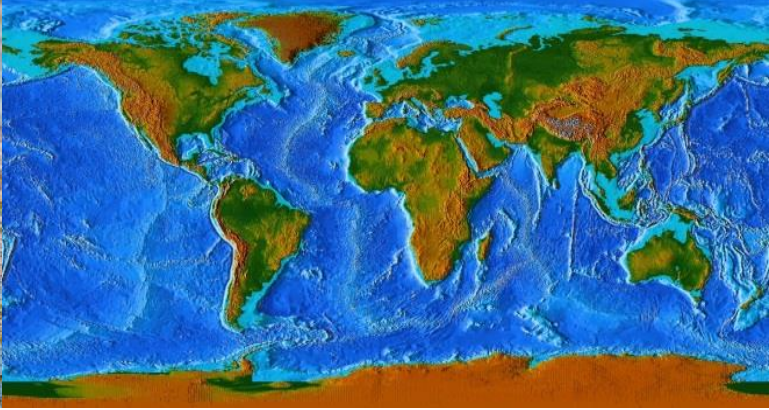
Geospatial Technology Provides the Best Platform .

To Rapidly Scale This Work

Our Collective Success Applying GIS . . . Will Help Create and Inspire . . .

. . . What's Next

... a Better World



4th Plenary of UN-GGIM: Europe

UN-GGIM: Strengthening the Global Data Ecosystem

Greg Scott

Global Geospatial Information Management
United Nations Statistics Division
Department of Economic and Social Affairs
United Nations, New York





**REQUIRES COURAGE TO COMMIT
STRENGTH IS IN THE IMPLEMENTATION**



UN-GGIM

United Nations Secretariat
Global Geospatial Information Management

Positioning geospatial information to address global challenges

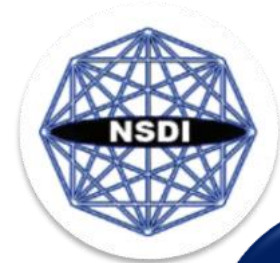
ggim.un.org

Strengthening the Global Data Ecosystem

ECOSOC Resolution 2016/27

- Acknowledged the considerable achievements and progress made by the Committee of Experts in the area of global geospatial information management, its contribution to the strengthening of geospatial information management capacities and utilization in developing countries, and recognized the relevance of geospatial information for the various United Nations policy agendas.
- Stressed the need to strengthen the coordination and coherence of global geospatial information management, in capacity-building, norm-setting, data collection, dissemination and sharing, among others, through appropriate coordination mechanisms, including in the broader United Nations system, building on the work of the Committee.
- Item on the Council's agenda changed from 'Cartography' to 'Geospatial information, and *invited the Committee to report on all matters relating to geography, geospatial information and related topics; and to report back to the Council within five years on the implementation of the present resolution.*





Digital Evolution



Digital Earth



Digital Transformation

Implementing Nationally Integrated Information Systems



Digital Maturity

Digital Divide



UN-GGIM

United Nations Secretariat
Global Geospatial Information Management

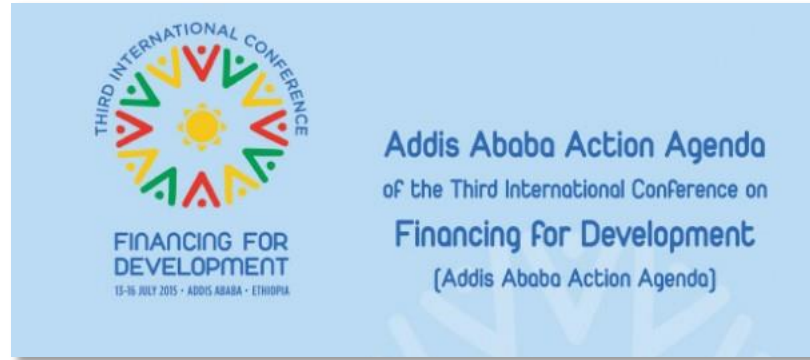
Positioning geospatial information to address global challenges

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Global development policy framework



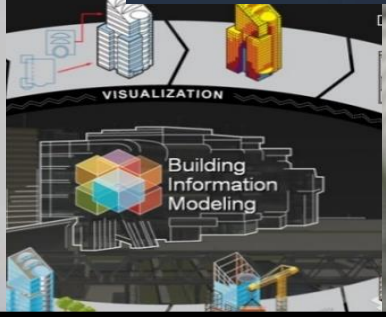
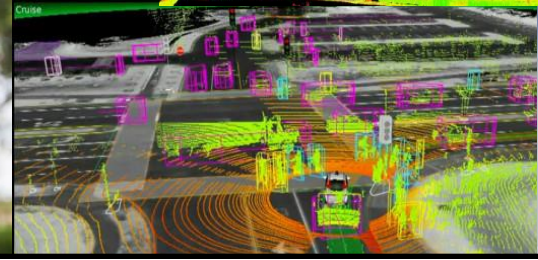
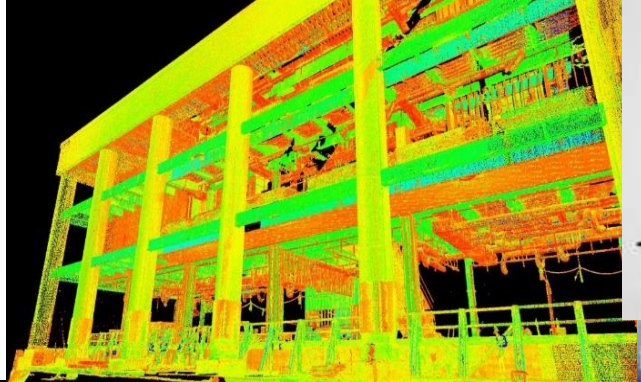
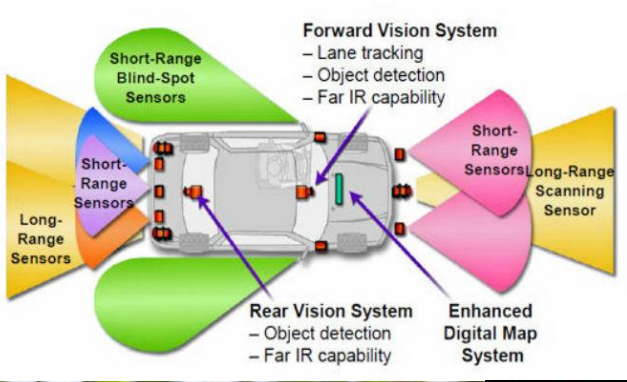
United Nations
Framework Convention on
Climate Change



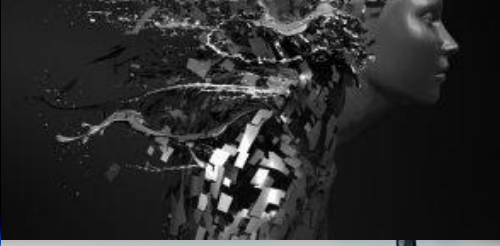
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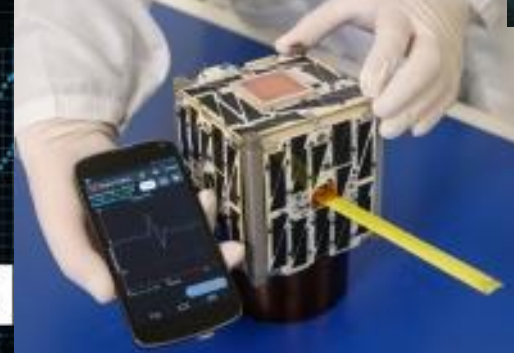




Technology and society are driving digital transformation, but are we yet leveraging this new 'data ecosystem' effectively?



Robotics







7 AFFORDABLE AND CLEAN ENERGY

6 CLEAN WATER AND SANITATION

11 SUSTAINABLE CITIES AND COMMUNITIES

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

14 LIFE BELOW WATER

17 PARTNERSHIPS FOR THE GOALS

8 DECENT WORK AND ECONOMIC GROWTH

1 NO POVERTY

4 QUALITY EDUCATION

Do we really understand the scale of the problems, where they are, whom they impact, what are the causes, and how they can be remedied?

13 CLIMATE ACTION

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

5 GENDER EQUALITY

10 REDUCED INEQUALITIES



7 AFFORDABLE AND CLEAN ENERGY

6 CLEAN WATER AND SANITATION

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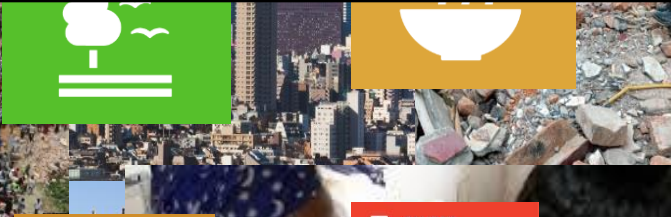
**Do we have the data for development??
Can we make it 'production ready' information for all?**

10 REDUCED INEQUALITIES

13 CLIMATE ACTION

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

5 GENDER EQUALITY



GLOBAL DEVELOPMENT POLICY FRAMEWORK

The 2030 Agenda for Sustainable Development

Sendai Framework for Disaster Risk Reduction 2015-2030

SIDS Accelerated Modalities of Action (SAMOA) Pathway

Paris Agreement on Climate Change

HABITAT III Urban Agenda

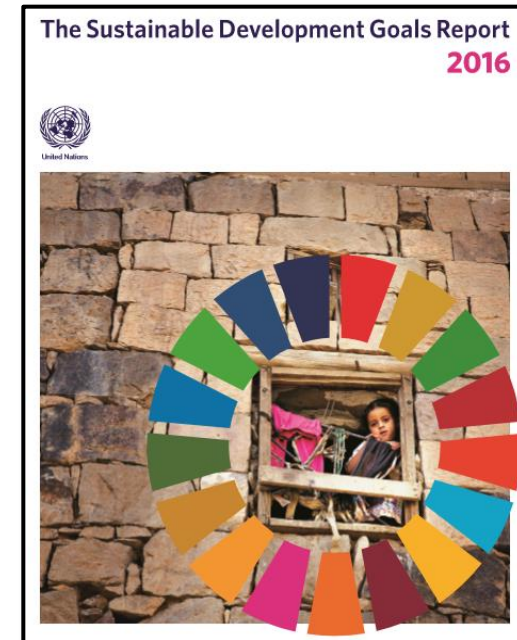
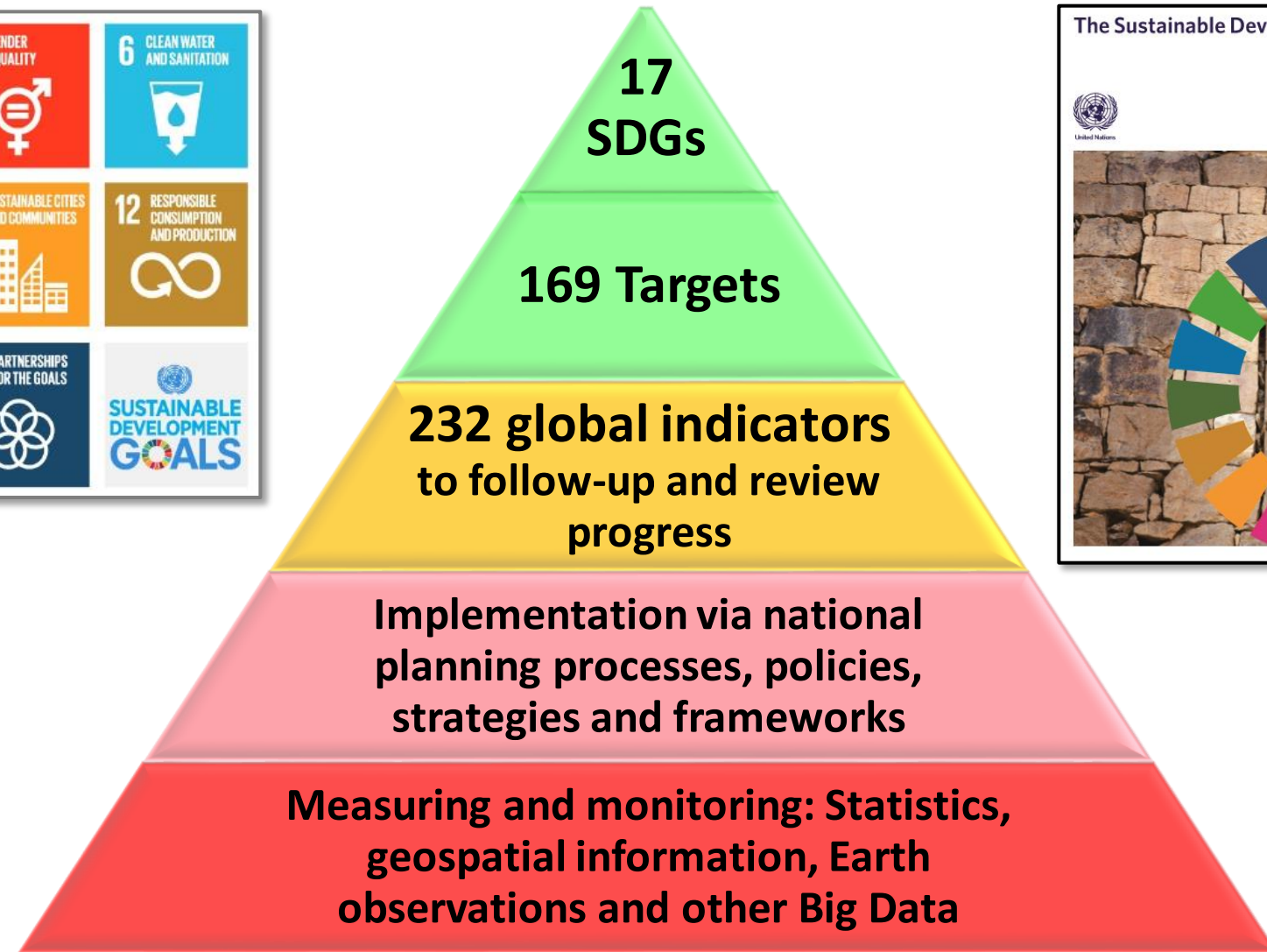
How does Digital Transformation enable the 'data ecosystem' to achieve Sustainable Development?



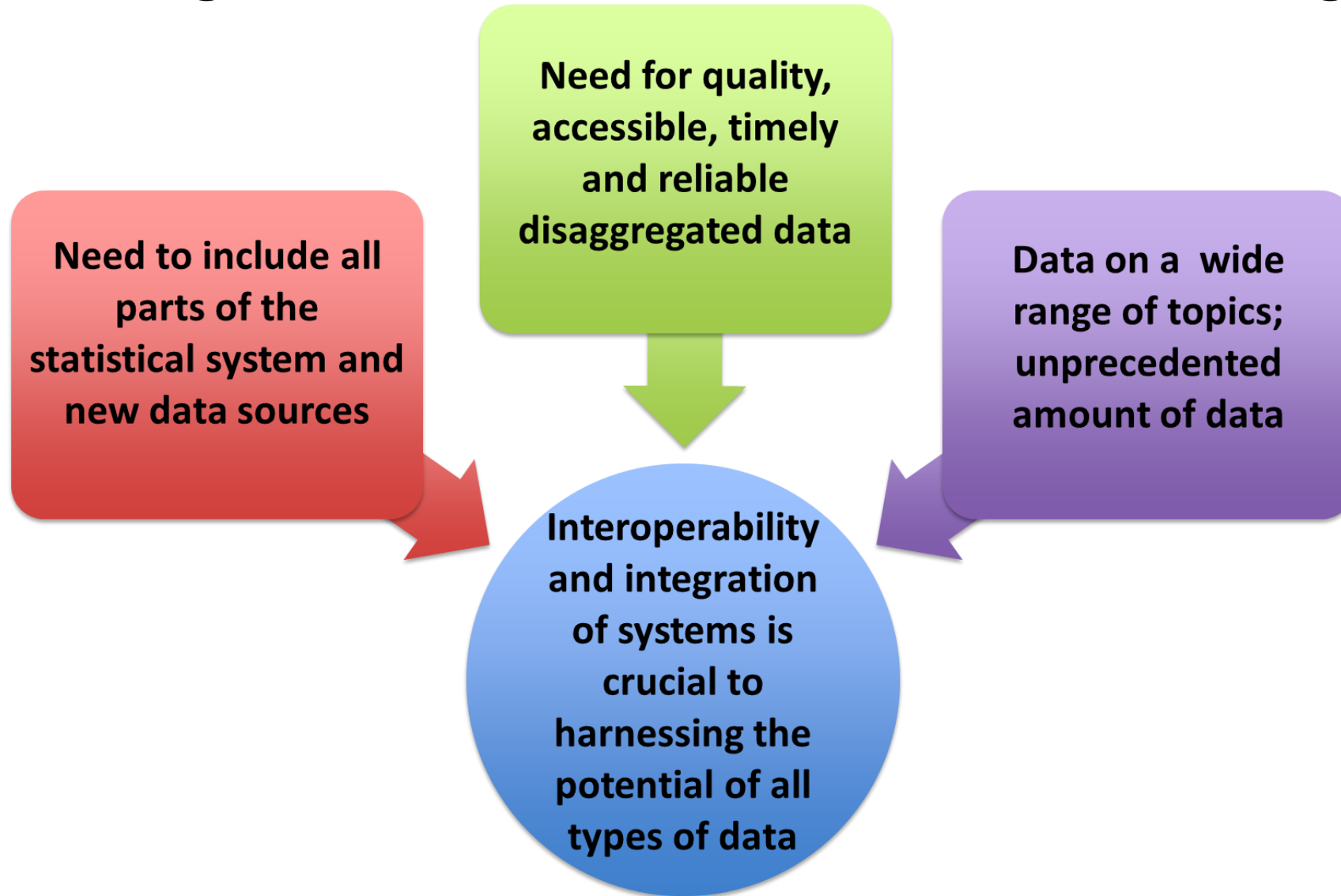
How do we bridge the Digital Divide?



2030 Agenda: Goals, targets, indicators



Addressing the data needs for the 2030 Agenda



Addressing the data needs for the 2030 Agenda

- The scope of the 2030 Agenda requires high-quality and disaggregated data that are timely, open, accessible, understandable and easy to use for a large range of users, including for decision making at all levels.
- There is a need for a reporting system on the SDGs that would have benefit from the sub-national (local) to the national level; and allow for global reporting that builds directly on the data shared by countries.
- Important to create an opportunity for countries to directly contribute to the global reporting. While the challenges are immense, the digital technology that is available today allows the necessary transformation.
- An aspiration is to strengthen countries' national geospatial and statistical information systems to facilitate and enable a '*data ecosystem*' that leverages an accessible, integrative and interoperable local to global system-of-systems.



Strengthening the Global Data Ecosystem

UN-GGIM: 2011-2016 - Develop the global understanding of geospatial information

UN-GGIM: 2017-2021 - Coordination, coherence and implementation

- Facilitate the strengthening and normative capacity building of global geospatial information management in support of the implementation of the 2030 Agenda.
- Efforts include promoting the use of geospatial information systems and services for modern mapping; methodological development; national and regional capacity-building; standards-setting; data collection, dissemination and sharing; and better integration of geospatial and statistical information systems for Member States.
- Regional Commissions provide relevant support, upon request and as appropriate, to the work of the regional committees of UN-GGIM, and that the outcomes and benefits of the activities be equally disseminated to all Member States in each region.



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Strengthening the Global Data Ecosystem

UN-GGIM: 2017-2021 - Coordination, coherence and implementation

1. Maturity: Moving from “GGIM 1.0 to GGIM 2.0” - determining our value proposition to ECOSOC in the next 2-3 year horizon.
2. Strategy and roadmap on the ECOSOC resolution and how we implement the new and strengthened mandate.
3. A new Strategic Plan for UN-GGIM that considers 2020 and beyond in 5 year time steps.
4. Raising more awareness, including political, of UN-GGIM and connecting the political - technical levels within Member States.
5. Connecting more to the activities of the regional committees, Regional Commissions, and relevant statistical bodies.
6. Ensuring effective coordination and linkages across global/regional Expert & Working Groups.
7. Seek extra-budgetary and funding options, including ways of implementation.
8. More capacity development for countries in next 5 years - developing guides, standards, methods and norms.



Strengthening the Global Data Ecosystem



2017-2021 Strategic Framework

CONTEXT	VISION	<i>Positioning geospatial information to address global challenges</i>				
	MISSION	<i>Operating within agreed policies and institutional arrangements, and as an interconnected global community of practice, the Committee of Experts will ensure that geospatial information and resources are coordinated, maintained, accessible, and able to be used effectively and efficiently by Member States and society to address key global challenges in a timely manner</i>				
	MANDATED STRATEGIC OBJECTIVES	Provide leadership in setting the agenda for the development of global geospatial information and to promote its use to address key global challenges	Provide a forum for coordination and dialogue with and among Member States and relevant international organizations on enhanced cooperation	Provide a platform for the development of effective strategies to build and strengthen national capacity and capability concerning geospatial information, especially in developing countries	Propose work-plans, frameworks and guidelines to promote common principles, policies, methods, standards and mechanisms for the interoperability and use of geospatial data and services	Make joint decisions and set the direction for the production and use of geospatial information within and across national, regional and global policy frameworks

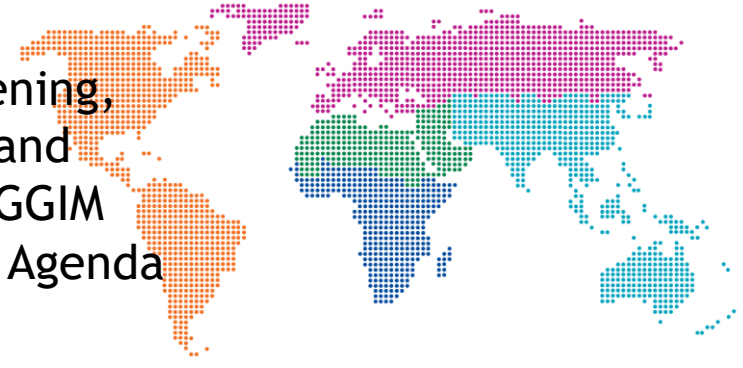


		Transforming our World: The 2030 Agenda for Sustainable Development						
		GLOBAL POLICY FRAMEWORK	Sendai Framework for Disaster Risk Reduction 2015-2030	SIDS Accelerated Modalities of Action (SAMOA) Pathway	Addis Ababa Action Agenda	Paris Agreement on Climate Change	HABITAT III Urban Agenda	
REQUIREMENTS	GEOSPATIAL CHALLENGES & DRIVERS	Environmental management Urban planning Land management Legal & policy	Disaster management Humanitarian assistance Climate change Health & welfare	Sustainable development Food security Water scarcity Poverty reduction	Oceans & marine Sustainable cities	Education Institutional governance Socio-economic metrics	Population National security	
	DIRECT NATIONAL BENEFITS & EFFICIENCIES	<ul style="list-style-type: none"> • Reduced duplication of effort in the capture, management, and delivery of fundamental geospatial information • Authoritative, reliable and maintained geospatial data available nationally, regionally, and globally • Increased return on investment through better coordination, use and reuse of data, information and systems • Better evidence-based decision making, supported by good data, science and policy • More open, accountable, responsive and efficient governments • Presentation and delivery of timely and 'fit for purpose' data in times of need • Increased collaboration and integration of national data and information systems across all levels of government • Best practices and use cases for enriching national processes on geospatial information management 						
	OPERATING PRINCIPLES	Sound Nat. Policies, Legal Frameworks & Institutional Arrangements	Provision of Fundamental Authoritative Data and Information	Agreed Standards, Methods, Guides and Frameworks	Principles on Geospatial Information and Open Data	Integration and Interoperability of National Information Systems	Information Sharing and Knowledge Transfer	Building Local to Global Capacity & Capability
DELIVERABLES	WORKING ACTIVITIES AND OUTPUTS	<ul style="list-style-type: none"> • Geospatial Information for Sustainable Development: 2030 Agenda, Sendai Framework, etc. • Integration of Geospatial & Statistical Information: Implement the Global Statistical Geospatial Framework • Geospatial Information and Services for Disasters: Implement Strategic Framework • Global Geodetic Reference Frame: Roadmap to Implement • Determination of global fundamental data themes • Marine geospatial information • Land administration and management • Legal and policy frameworks • National institutional arrangements • Implementation and adoption of standards for the global geospatial information community • National geospatial data and information systems 						




Frameworks, guides, norms, standards and methodological development

Normative strengthening, capacity building and implementation of GGIM in support of the 2030 Agenda





 Strengthening global geospatial information management


 Contribution of regional committees, thematic groups and networks


 Legal and policy frameworks and issues related to authoritative data

 Trends in national institutional arrangements

 Adoption of standards and technical specifications

 Strengthening collaboration with UNGEEN

 United Nations activities in geospatial information management

 Secretariat programme management

UN-GGIM: Strengthening the Global Data Ecosystem



The activities and efforts that contribute to the unique local-to-global value of UN-GGIM for Member States

 Global geodetic reference frame


 Global fundamental geospatial data themes

 Integration of geospatial, statistical and other information

 Geospatial information and services for disasters

 Land administration and management

 Geospatial information for sustainable development

 National geospatial data and information systems

 Marine geospatial information

Strengthening the Global Data Ecosystem



Strengthening global geospatial
information management

- Strategic Framework is presented as a starting point for discussion towards a strategic plan and road map that will enable the Committee to be better supported by the regional committee architecture and the Regional Commissions.
- Continue to work on global policies for geospatial information management in tandem with producing tangible outputs such as norms, handbooks, methodologies, standards and guidelines.
- Need for closer synergies with the activities of the regional committees and working groups, Regional Commissions, and relevant statistical bodies.
- Substantively improve and strengthen the national geospatial information management capacities of developing countries towards implementing the 2030 Agenda and other global policies.



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Strengthening the Global Data Ecosystem



National geospatial data and
information systems

- Effort by UNSD and the World Bank to explore and develop possible mechanisms for geospatial data, infrastructure and policies to be embedded more holistically within concessional financing, technical assistance and knowledge-sharing services and their subsequent implementation in developing countries.
- Recognizes the need for collaboration in developing an overarching geospatial framework that countries could reference when using geospatial information to develop national systems tailored to their own situations.
- The framework would include an action plan and road map on means for implementation, as well as elements such as the economic impact and value of geospatial information systems, investment needs and associated principles, tools, guides and good practices.



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An integrative data ecosystem



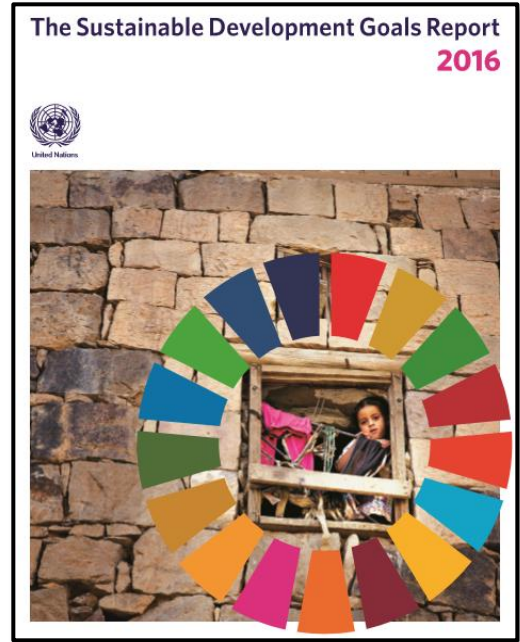
Global Outputs and Reporting

National Sustainable Development Indicators

National Information Systems

Data Inputs

Fundamental baseline data and new data sources





The fact is that no species has ever had such wholesale control over everything on earth, living or dead, as we now have. That lays upon us, whether we like it or not, an awesome responsibility. In our hands now lies not only our own future, but that of all other living creatures with whom we share the earth.

David Attenborough



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Geospatial Information Services to Support Emergency Response:

**Current situation (fact finding analysis)
and
way forward (strategic framework)**

Kyoung-Soo Eom

Chief UN Geospatial Information Section
(former UN Cartographic Section)

UN-GGIM Secretariat



UN-GGIM

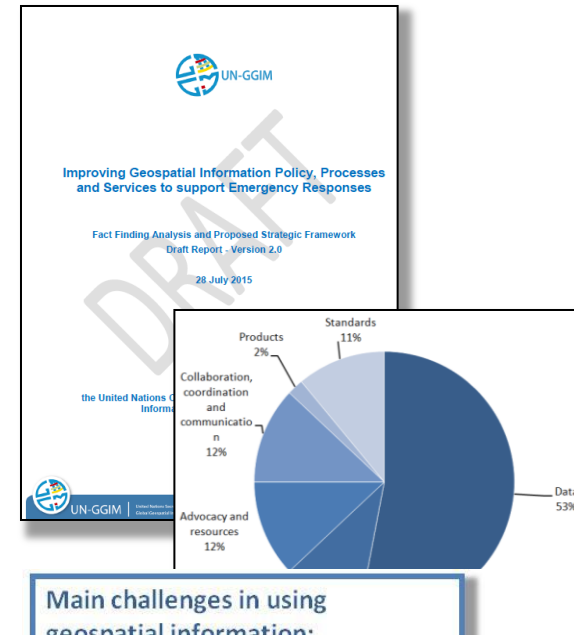
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Fact finding analysis

- Allowed identifying not only the **challenges** and **bottlenecks** encountered by stakeholders and partners during recent crisis but also the **major success factors** and **opportunities** to address them;
- These finding got crystallized into a **proposed strategic framework** which, if implemented, would allow for the necessary geospatial information and services to be **available, of quality and accessible** in a **coordinated way** to decision making and operations during disasters.

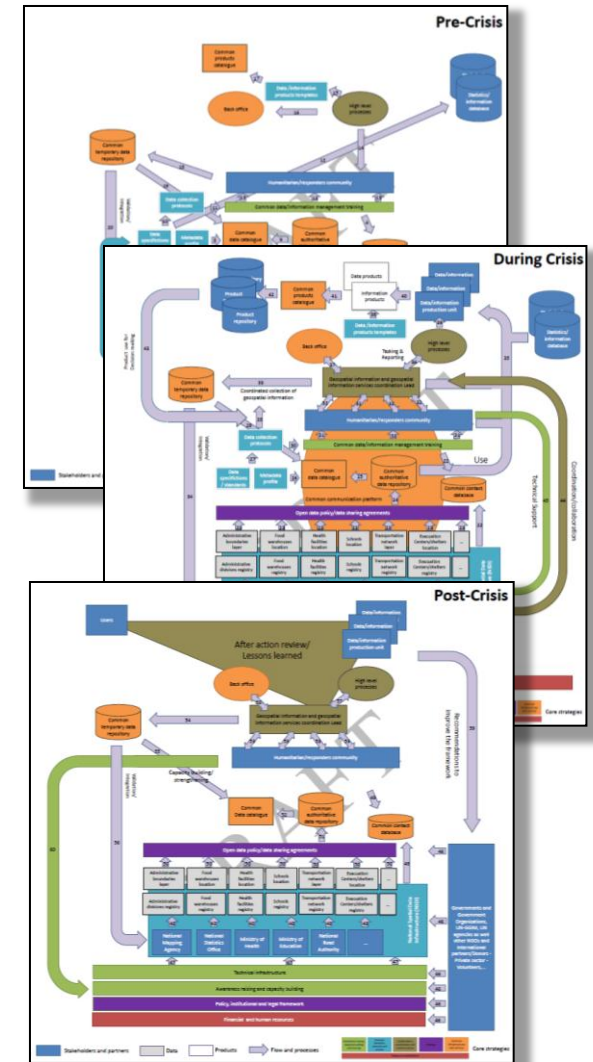
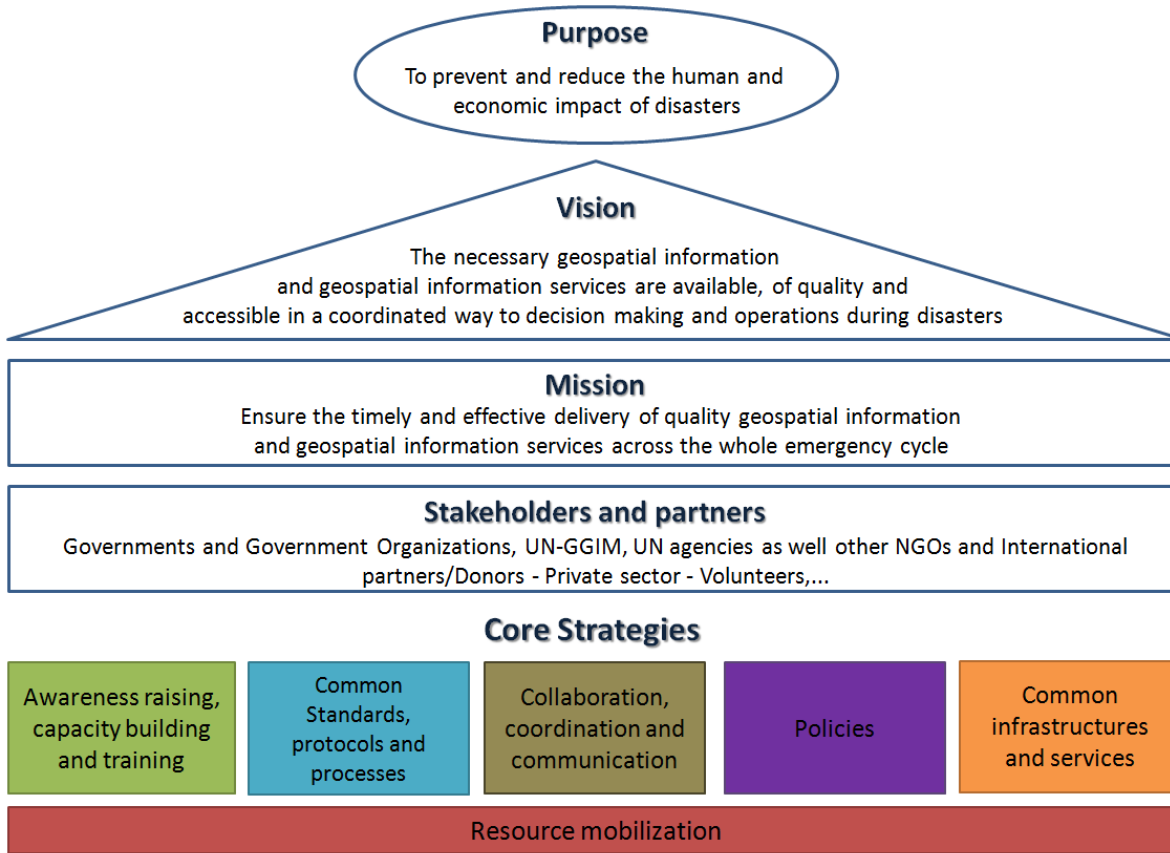


Main challenges in using geospatial information:
63% Conflicting or contradicting datasets
55% Metadata is not available
51% Data of poor quality

40% of the agencies think that the international community involved in the response **did not leverage enough** their existing geospatial information and/or technical capacities.



Proposed strategic framework and flowcharts



Side Event (3 August 2015)



- 55 participants;
- 25 countries;
- 4 presentations

The discussions that followed highlight the importance of:

- **Getting all the lead players** to agree on their respective roles and mandate regarding geospatial information and services during disasters;
- **Conducting drills** involving all the players prior to disasters;
- Looking at the **bigger picture** to ensure UN-GGIM does assist existing processes

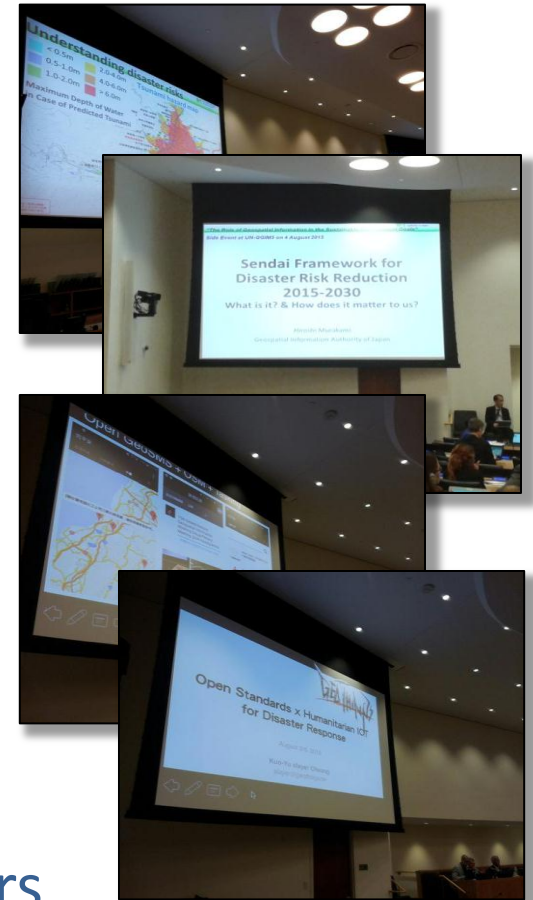


Other references to Disasters

Disaster Risk Reduction and/or **Disaster management** have been discussed and mentioned during several sessions including, but not limited to:

- The 22nd meeting of the **ISCGM** and led to resolution emphasizing how National Geospatial Information Authorities (NGIA) can contribute to Disaster Risk Reduction;
- The session on **Activities related to SD & Post 2015** where the link with the Sendai Framework and the geospatial role have been highlighted.

➔ Topic that federates, goes across sectors and talks to decision makers



UN-GGIM contribution

The **UN-GGIM, through its mandate**, is well placed to contribute to several of the core strategies included in the framework, and this starting with:

- **Raising the awareness of Member States** on the importance of data preparedness, National Spatial Data Infrastructure (NSDI) and open data policies;
- **Developing and promoting common standards, protocols and processes** aiming at improving data quality and data interoperability at the global level;
- **Developing and implementing policies** aiming at improving the availability, quality and accessibility of geospatial information and services.



Recommendations

For the UN-GGIM Committee to:

- Consider including **geospatial information and services in disasters** as a **formal UN-GGIM agenda item**;
- Establish a **Working Group on geospatial information and services in disasters** within UN-GGIM with the main objective to develop a **policy framework** to be presented to **ECOSOC** and the **General Assembly** for consideration;
- **Advocate** for **humanitarian** and **response community** to review the framework as a way to improve geospatial information and services to support disaster response.





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INFORMATION MANAGEMENT

Thank you for your kind attention!



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