PROCEEDINGS AND PRESENTATIONS

28 OCTOBER 2021

GEOSPATIAL INFORMATION FOR THE BENEFITS OF SOCIETY

Keynote: The Socio-Economic Benefits of Earth Observation
Steven Ramage, Head of External Relations, Group on Earth Observation, Switzerland

Socio-Economic Impact Assessment
Alan Smart, ACIL Allen, Australia

Data Ethics - Location Privacy and More
Denise McKenzie, Locus Charter Community, United Kingdom

NSDI in Norway
Arvid Lillethun, Advisory Director NSDI, Norwegian Mapping Authority, Norway

Development of NSDI in Croatia from Interoperability Perspective
Tomislav Ciceli, State Geodetic Administration, Croatia

Experiences from Poland on Open Data Policy
Marcin Grudzień, Head Office of Geodesy and Cartography of Poland

Fit-for-Purpose Land Administration
Gavin Adlington, Independent Land Administration Expert, United Kingdom

Digitalization Transformation in Serbia
Darko Vucetic, Republic Geodetic Authority, Serbia

Developing Moldovan NSDI through EU Twinning Project and other donors support
Maria Ovdii, Agency for Land Relations and Cadastre of Moldova
Sanja Zekušić, State Geodetic Administration, Croatia

Use of UAVs in Crisis Situations
Mats Mikalsen Kristensen, Vice President, Unmanned Systems, Andøya Space, Norway
Tore Jensen, Technical Advisor, Geodata, Norway

Experiences from Georgia: New Datasets
Galaktion Hahubia, National Agency of Public Registry, Georgia

Use of Geospatial Data by Local Public Authorities in Moldova
Alexandru Morcov, Congress of Local Authorities, Moldova

The Socio-Economic Benefits of Earth Observation

Steven Ramage, Head of External Relations, Group on Earth Observation, Switzerland

Steven Ramage
Head of External Relations
Group on Earth Observation
Switzerland

Steven leads external relations (communication and policy teams) at the Group on Earth Observations (GEO) Secretariat in Geneva, Switzerland. He is on the Governing Board of Digital Earth Africa, Digital Earth Pacific and is a member of the UK Space Agency Earth Observations Advisory Committee.

He was an owner and director of 1Spatial for 10 years working with national mapping and cadastre agencies globally. He then joined the Open Geospatial Consortium (OGC) as Executive Director before becoming Managing Director at Ordnance Survey International.

Steven has a long-standing understanding of the needs to demonstrate socio-economic and now environmental benefits.

Group on Earth Observation has 100 individuals (30 staff plus member representatives), working on 65 different activities in field of climate change mitigation. It operates through a regional level organisation similar UN GGIM. It has developed an open knowledge portal and is working through creating collateral along four tracks, starting with technology and data, then policy briefs and practical guidance and finally routes to finance.

The branding is **"the four Cs" capacity, communication, collaboration and commercial.**

Steve believes a key concept is human interoperability – not about technical skills but more about **motivation, incentives, and perception.**

GEO have achieved impressive grant funding from Microsoft ($3m) for the planetary computer project, Norwegian government ($50m) for tropical deforestation and close to $6m from Google.

GEO believes that to unlock finance, you must focus on **Results, Impact and Value** – a recent success of this approach was drought prediction work that triggered UN funding for improving food security.

Other developing world examples include work with the Honduras State Energy Authority identifying that release of water from major dams would mitigate a major flooding problem affecting 65% of GDP of the most productive valley in the country. He suggested that use for intelligence and insights such as these are useful, but the focus need to move to evidence to support good governance.

He moved on to explain the value of open data and the need to bring in NMCAs to support this.

In response to the question about practical measures to present a more joined up vision between GEO and UN GGIM, he said that GEO was open to closer collaboration on sharing experience and strategies for working together to open-up routes to finance.

October 2021

Earth observations: environmental and socioeconomic impact

Geospatial Information for Digital Transformation

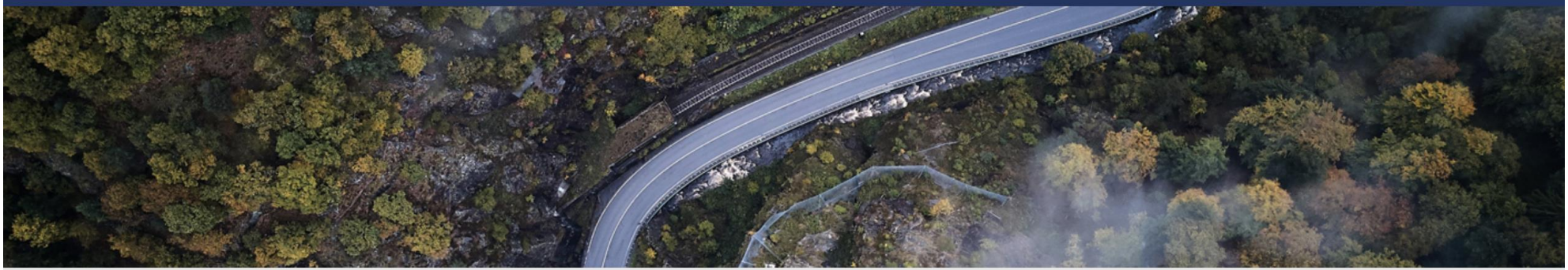
Steven Ramage, GEO Secretariat

What is geospatial information?

Land Information New Zealand (LINZ): GEO Principal

Geospatial information describes the location and names of features beneath, on or above the Earth's surface. At its simplest this can mean the basic topographical information found on a map.

On a more complex level it can include different location-related datasets **combined into layers** that show information, such as land use and population density.

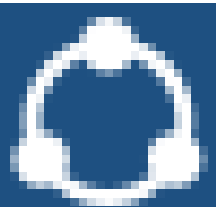


12 November 2020

The Evolving Role of National Mapping and Cadastral Agencies

"Successful NMCAs are beginning to proactively seek out and partner other government agencies, to seek out and enable the use of their data in support of **the public good**. This is a clearly how they must evolve in the future, if they are not already doing so, rather than to continue their historic role as a passive provider or supplier of mapping data. And if we look to the future and beyond the current pandemic, the big issue remains that of **climate change**. How NMCAs support our collective response to this critical global issue will determine their future relevance and their future value."

GEO Climate Change Working Group



SG1
Coordination of climate action across GEO Work Programme & synergies with stakeholders

SG2
Engagement with UNFCCC and IPCC

SG3
Enhancing the use of EO for Mitigation

SG4
Enhancing the use of EO for Adaptation and Loss & Damage

GEO Work Programme engagement with the UNFCCC

1

Contribution to annual Earth Information Day under the SBSTA/RSO negotiation track

2

GEO case studies for annual WMO's State of Climate Services report under Paris Agreement

3

Side events hosted in GEO member pavilions at Climate Conference (COP26) Glasgow, UK

GEO CC WG Milestone Events

https://www.earthobservations.org/geo_blog_obs.php?id=532

GEO Virtual Symposium 2021

UNFCCC COP26

Regional stakeholder workshops

16-17 June — **21-23 June**

21-23 Sept — **1-12 Nov**

22-26 Nov — **2022**

GEO-GFOI Workshop + IPCC,FAO

GEO Climate Policy + Finance Workshop

https://earthobservations.org/geo_blog_obs.php?id=529

GEO Week 2021

https://earthobservations.org/geoweek2021.php

GEO in numbers

7

CONTINENTS

112

COUNTRIES

130+

PARTICIPATING ORGANIZATIONS

15

ASSOCIATES

GEO in numbers

15+

YEARS

60+

WORK PROGRAMME ACTIVITIES

7k

DATA PROVIDERS

450m

OPEN EARTH OBSERVATIONS DATA AND INFORMATION RESOURCES

Regional GEOs

AfriGEO

AfriGEO provides a framework for African countries and organizations to access, leverage and coordinate Earth observation initiatives, creating synergies and minimizing duplication for the benefit of the continent.

AmeriGEO

The AmeriGEO community promotes cooperation among the GEO members in region. Focused on capacity building to support priority areas, this network is contributing to local, regional and national activities.

AOGEO

AOGEO coordinates activities in the Asia Oceania region with the aim to strengthen regional activities, support GEO's Foundational Tasks and deliver Integrated Priority Studies for the region.

EuroGEO

EuroGEO improves coordination among the members from Europe with a regional framework to promote the use of Earth observation data to improve the lives of citizens and guide evidence based decisions.

GEO Flagships

The Global Forest Observation Initiative supports countries to develop national forest monitoring systems and green house gas measurement, reporting and accounting.

The GEO Global Agricultural Monitoring Initiative improves food security through timely and accurate predictions of crop yields and agricultural production at regional, national and global levels.

The GEO Biodiversity Observation Network coordinates the management and delivery of biodiversity and ecosystem observations to decision makers and the scientific community.

The Global Observation System for Mercury contributes to the monitoring of mercury and its compounds using Earth observations to support the Minamata Convention on Mercury.

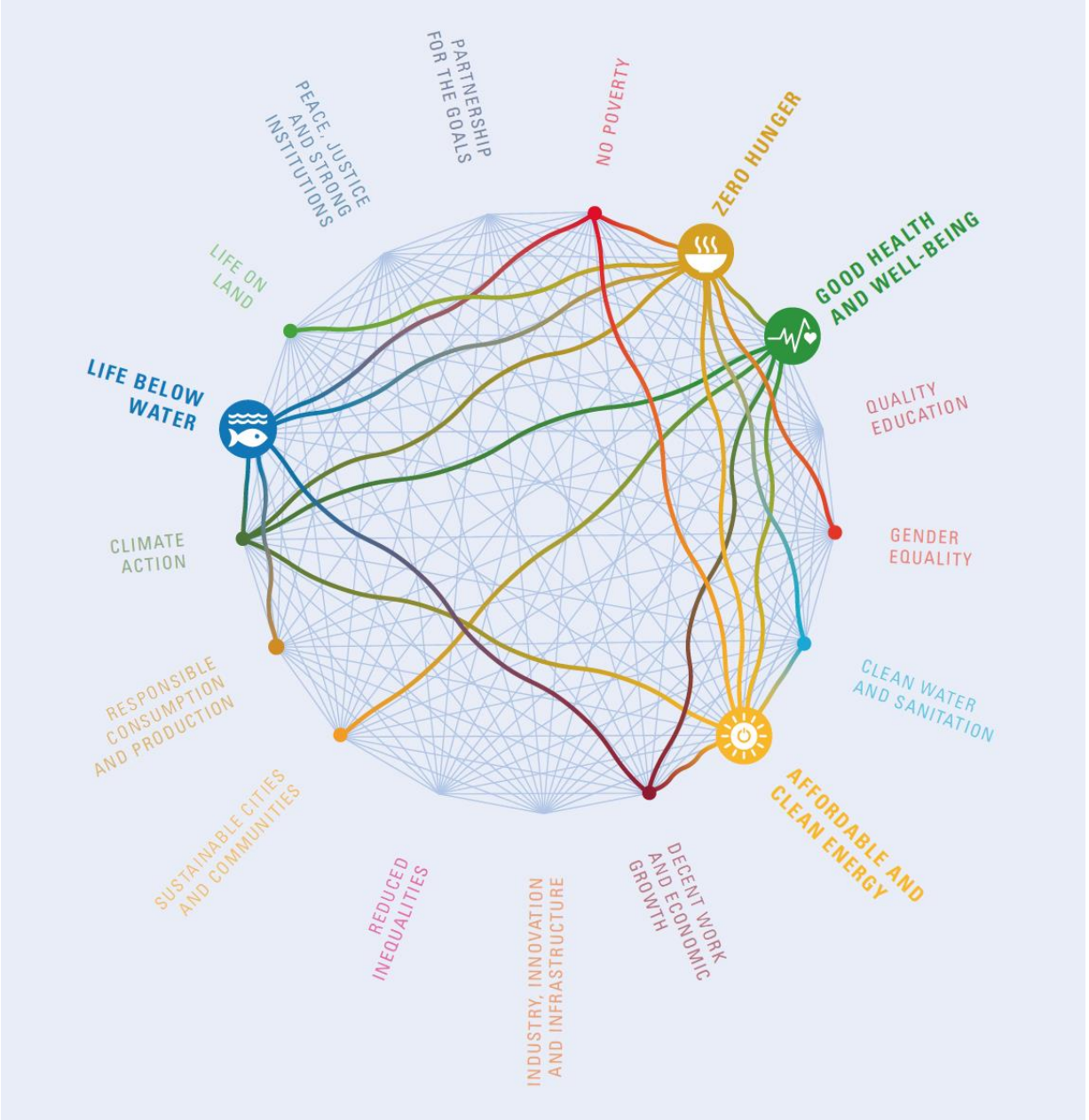
The GEO Indigenous Alliance - Strategic Pathways

CLIMATE ACTION/ DRR

WOMEN EMPOWERMENT/ EDUCATION

INDIGENOUS DATA SOVEREIGNTY

FOOD SECURITY



Source: International Science Council

Focus Areas

GEO works to improve the availability, access, understanding and use of Earth observations for the benefit of society.

1

Sustainable Development

2

Climate Action

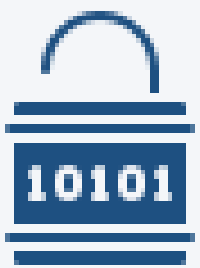
3

Disaster Risk Reduction

4

Urban Resilience (newest work)

Bridging the digital divide with open knowledge



1

Open Data

2

Open Software

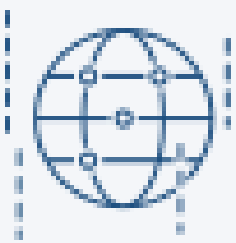
3

Open Standards

4

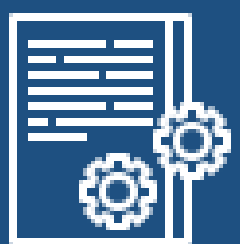
Open Science

Science, tech, data, policy and finance



1

Technology, data and knowledge



2

Policy briefs

3

Practical guidelines

4

Routes to finance

Technology, data and knowledge

CAPACITY

Translate science & tech for policy, decisions & action. Co-design & co-production of knowledge.

COMMUNICATIONS

Outreach, awareness raising, guidance and engagement.

COLLABORATION

Community contribution, human interoperability and work across regions.

COMMERCIAL

GEO Associates, platforms and value for public and private sectors.

GEO Knowledge Hub

GEO-MICROSOFT
PLANETARY COMPUTER
PROGRAMME
Open for Submissions
Microsoft
GEO
GROUP ON
EARTH OBSERVATIONS

32 PROJECTS

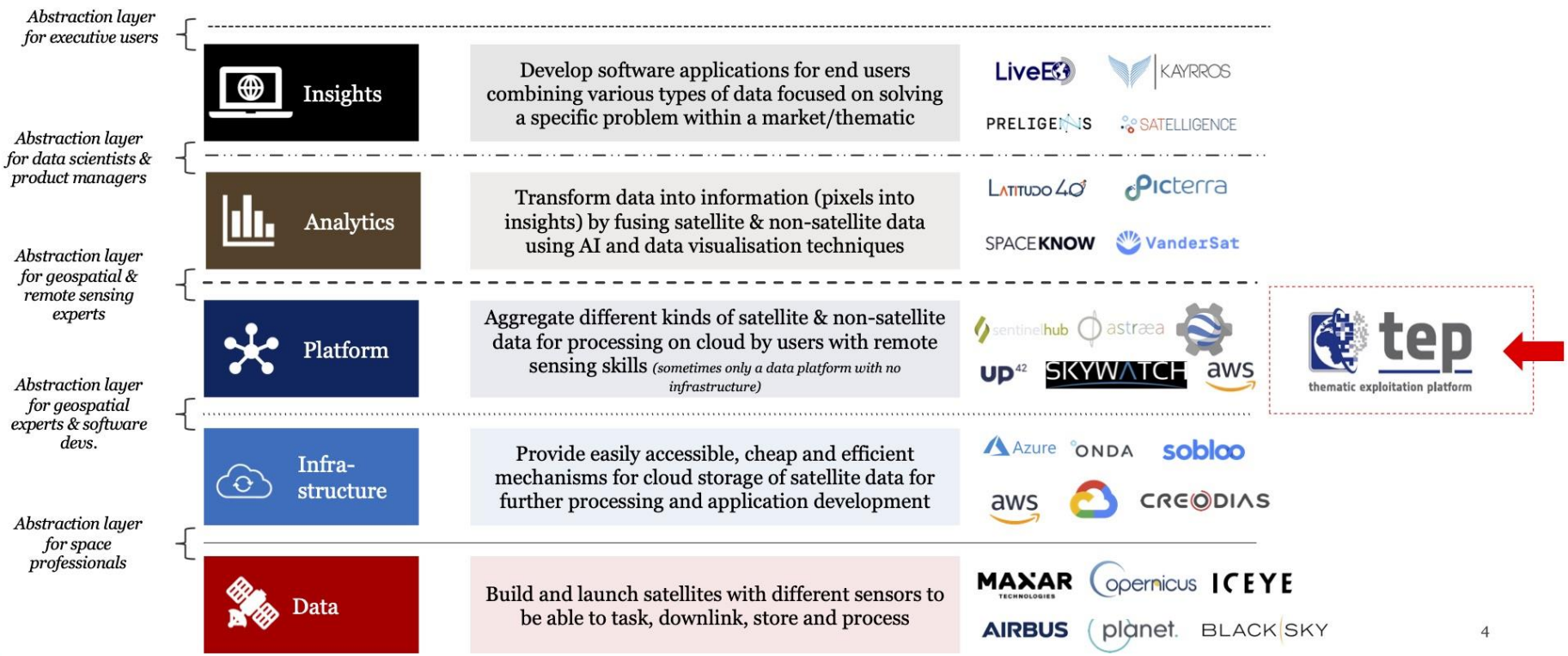
30+ COUNTRIES

$3 MILLION USD TOWARDS PRODUCTION LICENSES

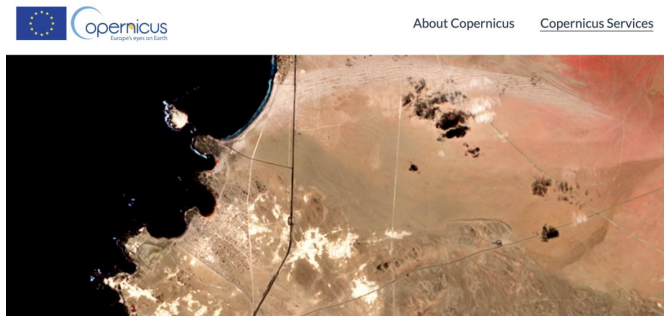
$1.5 MILLION USD IN TECHNICAL SUPPORT FROM EO DATA SCIENCE

The GEO-GEE Programme is supporting projects, including the United Nations Environment Programme (UNEP) and United Nations Economic and Social Commission for Western Asia (UNESCWA) to support climate change and disaster monitoring activities.

The Earth observation stack can be generally organised in 5 layers



Source: Aravind Ravichandran, TerraWatch Space



The Copernicus Atmosphere Monitoring Service (CAMS) provides continuous data and information on atmospheric composition.

The Copernicus Climate Change Service (C3S) supports society by providing authoritative information about the past, present and future climate in Europe and the rest of the World.

The Copernicus Emergency Management Service (Copernicus EMS) provides all actors involved in the management of natural disasters, man-made emergency situations, and humanitarian crises with timely and accurate geo-spatial information derived from satellite remote sensing and completed by available in situ or open data sources.

The Copernicus Land Monitoring Service (CLMS) provides geographical information on land cover and its changes, land use, vegetation state, water cycle and Earth's surface energy variables to a broad range of users in Europe and across the World in the field of environmental terrestrial applications.

The Copernicus Marine Environment Monitoring Service (CMEMS) provides regular and systematic reference information on the physical and biogeochemical state, variability and dynamics of the ocean and marine ecosystems for the global ocean and the European regional seas.

The Copernicus service for Security applications aims to support European Union policies by providing information in response to Europe's security challenges. It improves crisis prevention, preparedness and response in three key areas:

1. Border surveillance
2. Maritime surveillance
3. Support to EU External Action

Source: Stéphane Ourevitch, SpaceTec Partners

LAND DEGRADATION NEUTRALITY

Policy mandate from the United Nations Convention to Combat Desertification (UNCCD) to provide continuous and actionable information to policy and decision makers for managing land resources.

Supports UNCCD LDN Initiative (SDG indicator 15.3.1)
“Proportion of land that is degraded over total land area”.

Working Groups address three main challenge areas:
WG1: Capacity Development: Establishing a framework to provide effective and enduring capacity development.
WG2: Data quality standards: Specify minimum characteristics of datasets and analytical methods for use in land degradation neutrality (LDN).
WG3: Data Analytics: Develop open source systems and tools to assist countries to measure and monitor LDN and SDG 15.3.1

United Nations
Convention to Combat
Desertification

Switzerland's partners for Earth observation

Global coverage is one of the key assets of satellite Earth observation. Consequently, it is a technology that strongly relies on international partnerships. Such partnerships cover all activities from strategy and infrastructure to operations and exploitation. The list below is a brief summary of the organizations most relevant to Switzerland's Earth observation activities.

Global

- The United Nations and affiliated organizations operate global observing systems for climate, land surfaces and oceans.
- The Group on Earth Observations (GEO) is dedicated to connecting and merging existing Earth observation systems within a global network, GEOSS.
- The Committee on Earth Observation Satellites (CEOS) is responsible for the coordination of civil space-borne satellites of 52 associated organizations.

Sentinel-2 Mosaics of 2017, 2018, 2019 and 2020 of Switzerland and the surroundings

Sentinel-2 Mosaic 2018. Contains modified Copernicus Sentinel data 2018, swisstopo/NPOC

The NPOC has created freely available and usable satellite image mosaics of 2017, 2018, 2019 and 2020 of Switzerland and the surroundings to promote the use of Sentinel-2 data.

Info source: https://www.npoc.ch/en/about/tasks

Swiss participation in European satellite programme

The Remote Sensing Working Group proposed to raise two concerns in the interests of Switzerland: on the one hand, there should be **a stronger focus on land applications in future ESA satellite missions**, and on the other, the establishment of National Points of Contact should be promoted. This was the only way of ensuring the rapid transfer of satellite data to private, commercial and scientific customers.

‹ Back to Homepage

Satellite images for all: 40 years of National Point of Contact

For forty years, the National Point of Contact has been providing satellite image data from the European Space Agency to Swiss customers in a low-threshold manner. Find out here why this link between space and Earth was established in 1981.

03.06.2021 | frf

Result, impact and value: GEOGLAM

Result

The World Bank Disaster Risk Financing Program supported 300,000+ people to relocate in the Karamoja region of Uganda thanks to GEOGLAM (GEO's global agricultural monitoring).

Impact

Food security challenges, including the availability of food, related jobs and general welfare issues addressed due to GEOGLAM early warning.

Value

The Government of Uganda realized a saving of US $2.6M in a single financial year and tackled social challenges ahead of time. This avoiding loss of income and helping livelihoods.

Result, impact and value: GEOGloWS

Result

During Hurricanes Eta and Iota the Honduran state power company ENEE used the GEOGloWS ECMWF Streamflow Forecast Services to direct discharge of 200 million m3 of water in the El Cajón reservoir before Iota's arrival, creating flood storage while avoiding loss of power generation or worse.

Impact

The Sula Valley generates about 65% of gross domestic product (GDP), representing over 50% of Honduras exports. Direct and indirect impacts on roughly 2 million people (30% of the national population) residing in rural and urban areas within the valley would have been incalculable.

Value

The economic losses from Eta and Iota in 2020, when compared to those from Hurricane Mitch in 1998 that had a similar impact magnitude, were about 30% less due to the flood control provided by El Cajón, and the information from GEOGloWS that guided decision making.

Result, impact and value: GWIS

Result

The European Forest Fire Information System (EFFIS) supports wildfire systems in 43 countries, saving nations hundreds of millions of Euros in reduced losses. The extension of EFFIS at the global level developed into the Global Wildfire Information System (GWIS), a joint initiative of Copernicus and GEO.

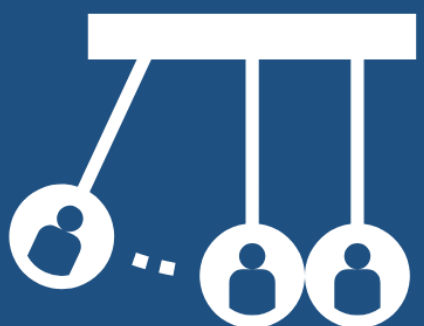
Impact

Every year, around half a million hectares of natural areas are burnt across the European Union. GWIS provides prediction of wildfire danger, seasonal fire weather monitoring, regular updates on ongoing fires daily, analysis of wildfire severity, and assessment of damages.

Value

Avoiding environmental and economic losses in Europe is estimated at around €390 million per year. A 10% reduction of environmental damage worldwide would avoid about €13 trillion of economic losses.

Policy Perspective on Impact



1

HUMAN IMPACT

2

ECONOMIC IMPACT

3

OPERATIONAL IMPACT

Evidence-based activities

GLOBAL POLICY ASPECTS

Earth observations for Sendai Framework for Disaster Risk Reduction. Support integrated risk assessment etc.

NATIONAL CONSIDERATIONS

Supplementary Guidance for National Adaptation Plans (NAPs). Agriculture monitoring for adaptation, impact of wildfires, ocean health etc.

GOVERNANCE COMPONENTS

Earth observations and G7, biodiversity COP, climate COP.

EO supports climate action, nature-based solutions, UN Decade of Ocean Science etc.

Promoting the value of open data sharing

https://earthobservations.org/open_eo_data.php

Open data for the benefit of humankind

@steven_ramage
sramage@geosec.org

Socio-Economic Impact Assessment

Alan Smart, ACIL Allen, Australia

Alan Smart is an engineer and economist with knowledge and experience in the economics of geospatial systems. He is a Senior Associate of ACIL Allen Consulting and Chair of the Tasmanian Spatial Information Council.

Alan is one of the foremost global experts in this topic. He started by explaining some of the economic principles underpinning assessment of value. The value of fundamental geospatial data as a public good, needs to be established - what value does it bring to the welfare of citizens. He explained the nature of value, we generally understand the concept of value of data in use, but ecological value, options and existence value are less well understood.

Existence value might be explained by using the example of the Great Barrier Reef in Australia; we may not visit it but recognise its value as a national asset and do not want it destroyed. Another aspect of value is bequest value – such as leaving the planet in a fit state to be enjoyed by generations to come. Alan also explained the concept of demand and supply and that consumer and producer surplus represents value to economy.

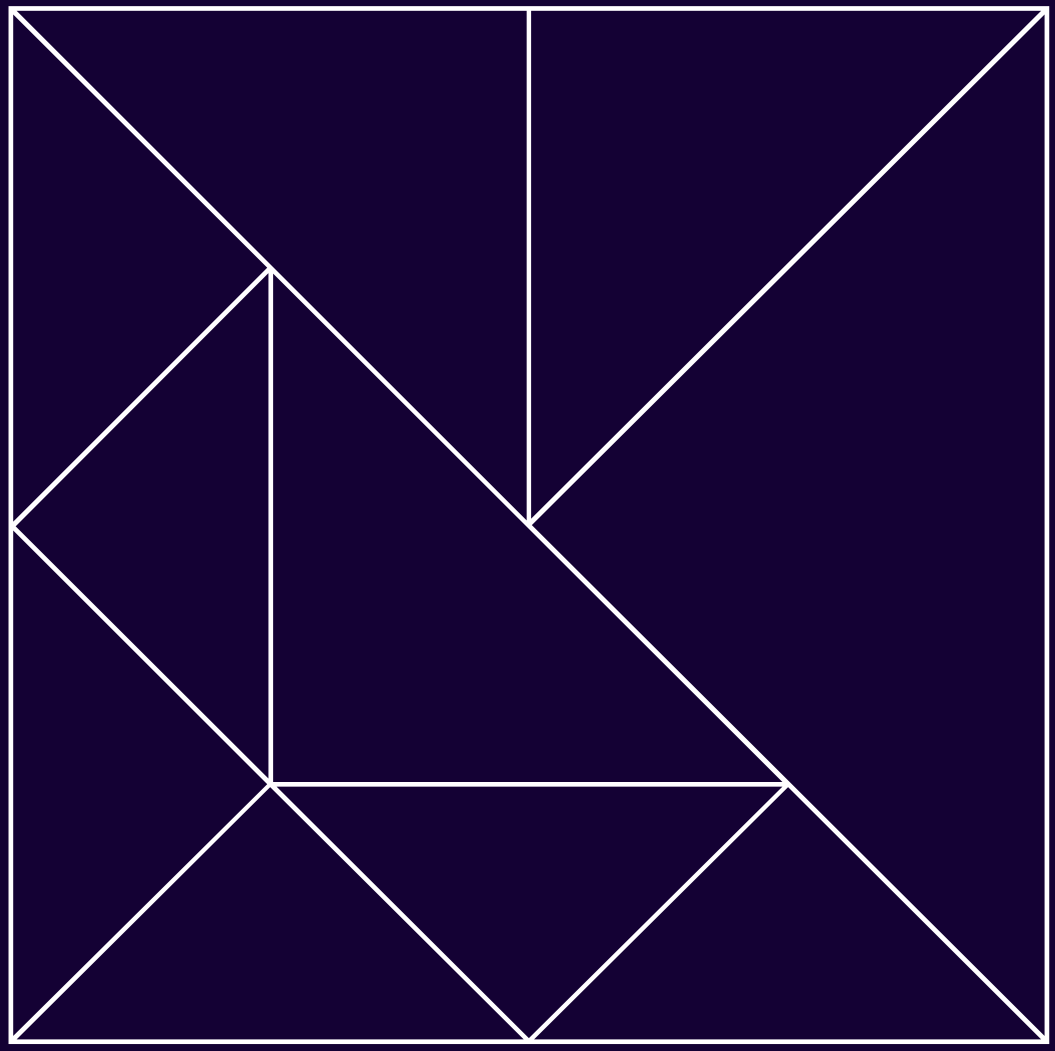
He explained that most studies focus on measuring productivity improvements from geospatial i.e. produce more for same resources. This was exemplified by use of such techniques to determine the value of digital twin creation to help master planning in Queensland, Australia, covering surveying, asset management and construction.

Another example was productivity improvements from use of augmented GNSS. Finally, he used the example of improved emergency response to save lives and how this can be expressed in monetary terms

24 June 2021

Socio economic impact assessment

Geospatial Information for Digital Transformation: Current Initiatives and Future Opportunities

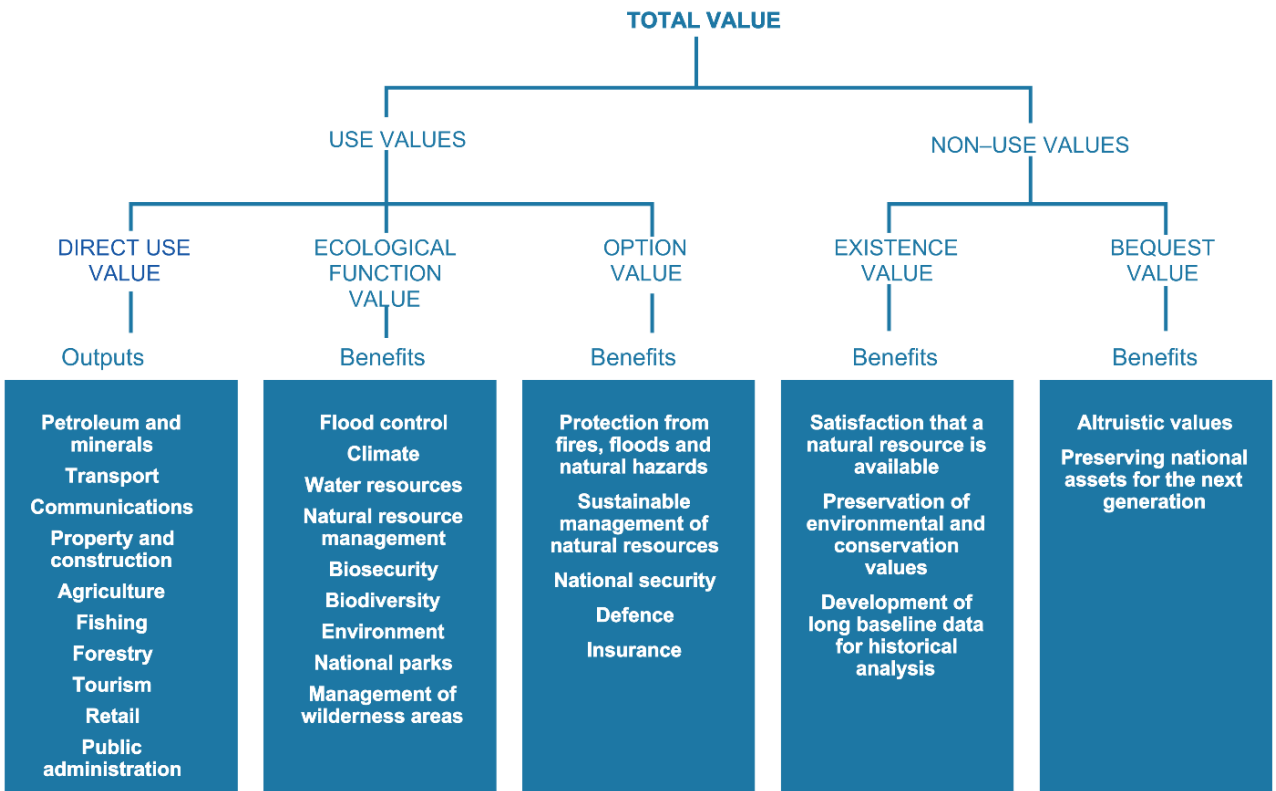


ACIL ALLEN

The nature of value

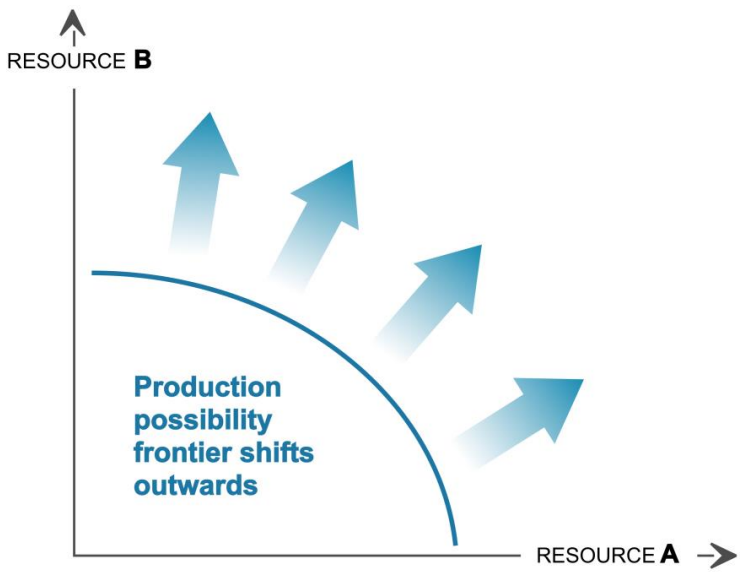
Can look at benefits to producers, consumers, the environment consumers, society, producers or all three

- Increased productivity or savings
- Value to producers from additional sales
- Value to consumers of additional consumption
- Value to society of improved quality of life, environment, biodiversity
- Preserving natural assets



Measures of economic impact – productivity effects

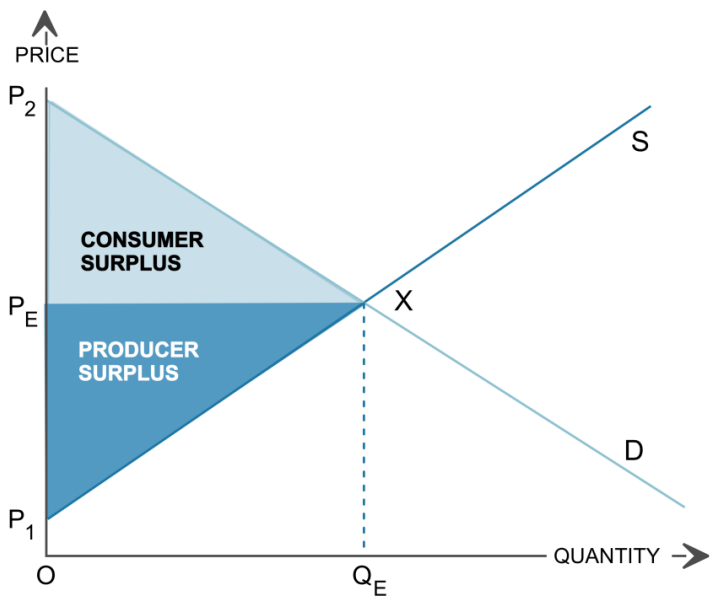
- Productivity impacts
- Productivity is output per unit of input
- Geospatial systems improve productivity in most sectors of the economy and in government



- Most of the studies will focus on productivity effects

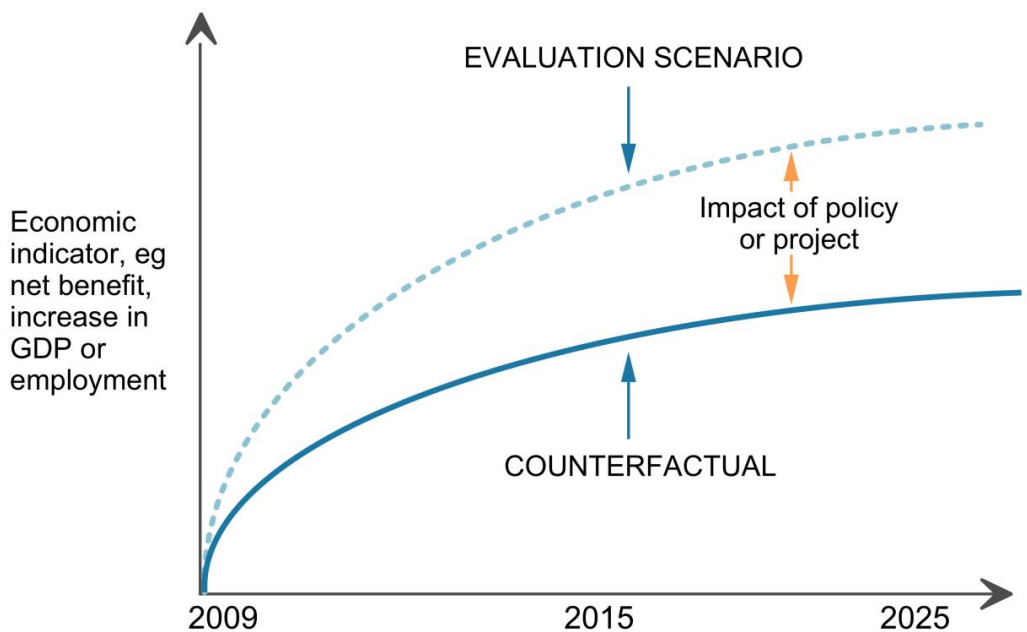
Measures of economic impact – welfare economics

- Estimates of producer and consumer surplus
- Producer surplus is the difference between the price a producer receives and the cost of production
- Consumer surplus is the difference between the value of a product or service to a consumer and the market price



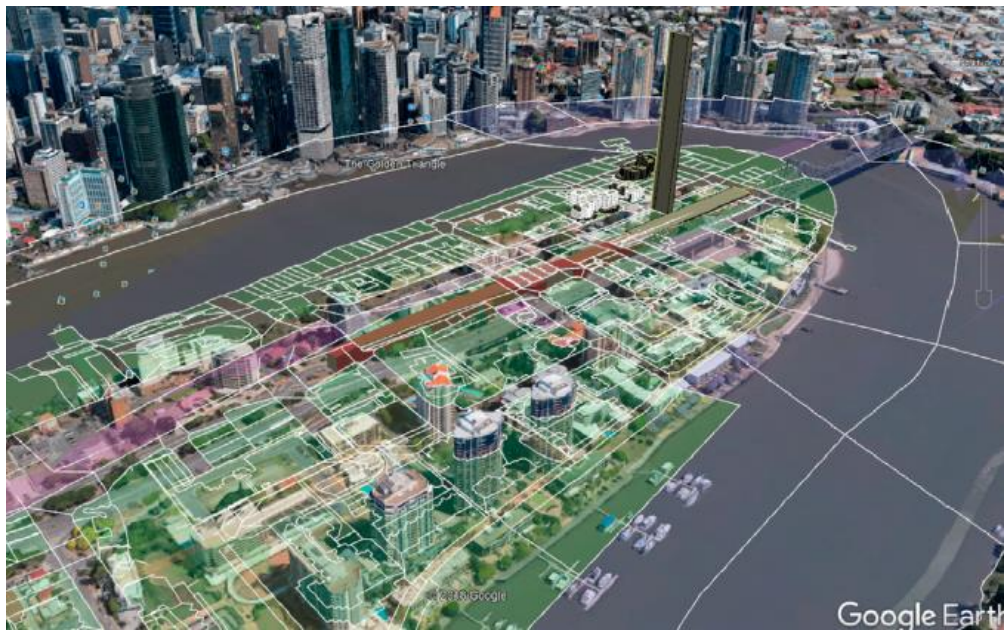
Measuring the impact

- Compare the situation with modern geospatial information systems to the situation without modern geospatial systems
- Counterfactual is the otherwise case or case without modern geospatial systems



The value of 3 dimensional digital models – digital twins

Category	Effect	Productivity impact	Net present value
Surveying	Time saved processing 3D data	15%	$58 million
Engineering and construction	Reduced time and errors through sharing 3 D data	1% to 5%	$338 million - $1,940 million
Asset and facilities management	Integration of 3D models with building management systems	1% - 2%	$78 million - $156 million
Total direct			AUS$524 million – AUS$ 2,154 million



Use of precise positioning in construction

Productivity impact

	Low case	High case
2012	0.431%	0.766%
2020 (estimate)	0.583%	1.053%

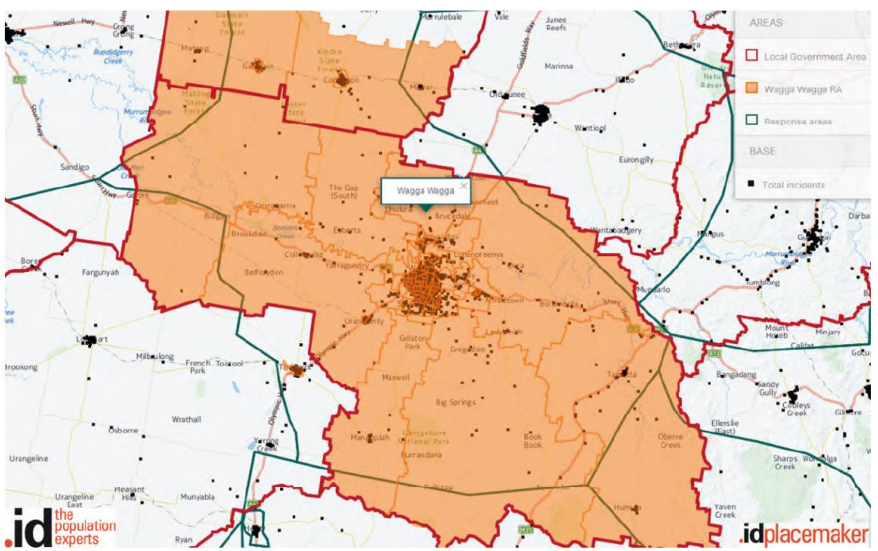
Impact on construction sector output

	2012	2020 estimate
Increase in output	$440m -$710m	$1,401m-$2,469m
Percentage of total output	0.1%-0.2%	0.3%-0.5%

Value of geospatial information for emergency services in New South Wales

	2017		2020	
	Value	Proportion of operating costs	Value	Proportion of operating costs
	$ million	$ million	$ million	$ million
Insurance industry	14.9	0.22%	17.6	0.26%
Emergency services	2.6	3%	5.2	7%
Total	17.5		22.8	
Value of lives saved from better Ambulance response times	322		386	

FIGURE 8.2 MAPPING ANALYSIS FOR A NEW AMBULANCE STATION



SOURCE: NSW AMBULANCE

For more information

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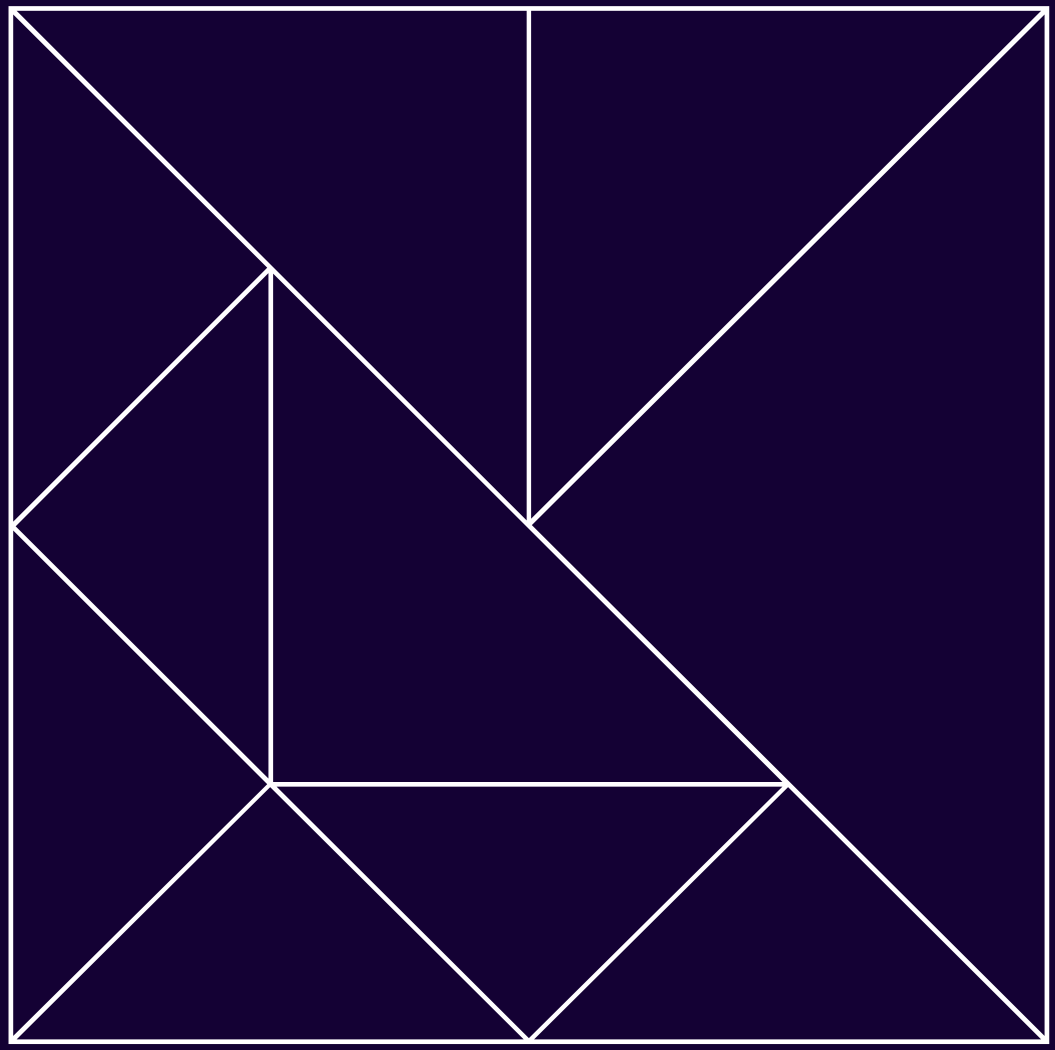
ACIL ALLEN



Data Ethics - Location Privacy and More

Denise McKenzie, Locus Charter Community

Denise is a strategic advisor, partnership builder, and presenter with over 20 years of experience with the global geospatial community. She works internationally to evangelise the benefits, value, and application of location data across Government, Private Sector, and Academia and her experience covers a broad range of domains including Smart Cities & IoT, Agriculture, Defence, Sustainability, Insurance and Development. This diversity ensures that she works where geospatial meets mainstream technology.

Denise explained the ethics is not just about privacy, although that would perhaps the topic that gets most "airtime". Other important aspects include responsibility and trust in what happens about data about us, also the need for transparency and accountability of those, using geospatial information.

She related an experience where data can get intrusive and "creepy". We tend to be happy to allow system to control our lighting but deeply uncomfortable if the system stores the information that it is my child turning on a light, which with IoT - Internet of Things, is entirely possible.

A further challenge relates to data retention. Tracing apps developed for combatting COVID-19 store a lot of personal information – however, it is not clear what will happen to that data after the need for pandemic purposes finishes.

Today we are expressing almost every aspect of our world through data – but there is a lack of balance emerging of who has access to what data and how it is being used. This do maters to us because geospatial information is becoming more and more important to decision-making about what happens to our world and us. As data producers and integrators need to make sure we are collecting the right information but whether we are doing that in the right way and for the right reasons. It is important to think about un-intended consequences of what we do.

The Locus charter of principles was developed to help practitioners avoid hurting anyone by what they collect and release, avoid bias that may lead to communities being disadvantaged financially and in other way. However, recognising it is important not to scare people or give them an excuse for not releasing data, so first principle is realizing potential to do good.

In the subsequent discussion, Denise stressed the danger of opting out of making your data available – by doing so, you risk becoming not visible and in consequence, decisions being made that do not take your view into account.

Location Data Ethics

Denise McKenzie

28 October 2021

LOCUS CHARTER

Denise McKenzie
@Spatialred

denise-mckenzie.com

Ethics

Responsibility

Privacy

Trust

Transparency

Accountability

When does cool become creepy?

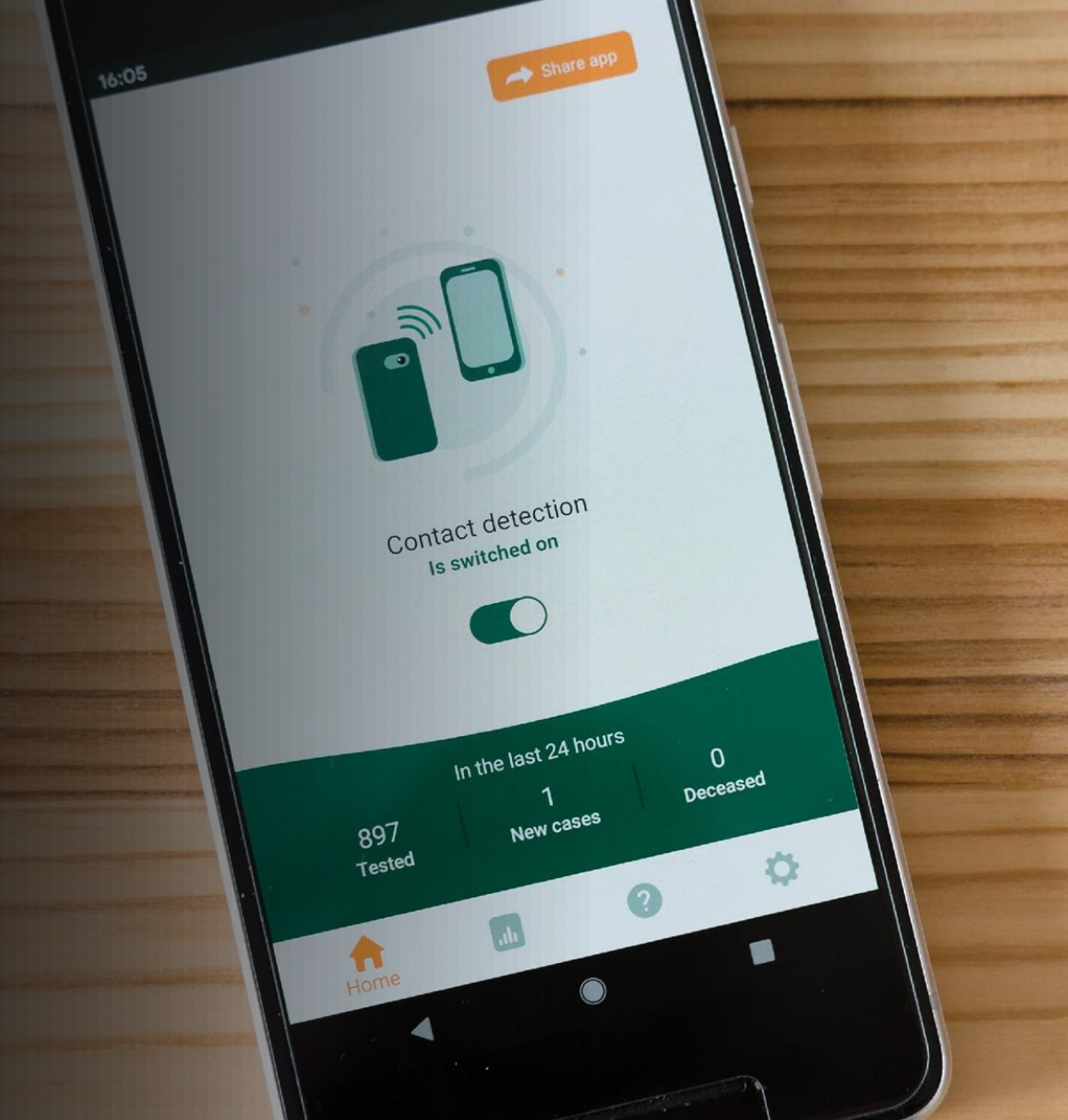
The IoT and mobile devices bring amazing opportunities for new tech to make our lives easier. But at what point does it do from innovation to creepy intrusion?

Cambridge Analytica

- In 2017 Cambridge Analytica's use of Facebook data broke, coming to a head in 2018
- The investigations raised many questions of trust and responsibility in the use of personal information including location data

Image source: Wikipedia

COVID-19 happened.....



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Coronavirus

Contact-tracing app for England and Wales 'hampered by loss of public trust'

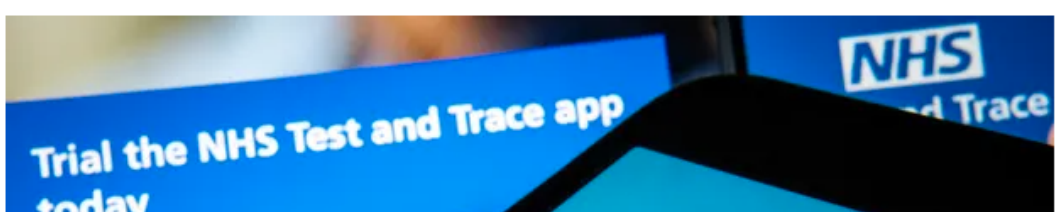
Summer of UK government scandals will reduce take-up of Covid-19 app, says expert

- Coronavirus - latest updates
- See all our coronavirus coverage

Alex Hern *UK technology editor*

@alexhern

Mon 21 Sep 2020 06.00 BST



National

Florida police raid house of fired data scientist who alleged state manipulated covid-19 stats

The Washington Post | LIVE
Race in America
The Power of Representation
Rep. Sharice Davids (D-Kan.)
Rep. Deb Haaland (D-N.M.)
REGISTER

LOCUS CHARTER

“Datafication” expressing and managing the world with data

Bias - Privacy - Market power and data colonialism

Complexity - Transparency - Trust

Why does this matter to you?

Benchmark Initiative

- Supported by PLACE (part of the Omidyar Network) and Ordnance Survey
- Complementary program in USA EthicalGeo

BENCHMARK
Raising Standards for Location Integrity

GEOVATION

PLACEFUND

ON
OMIDYAR NETWORK

EthicalGEO

Consequences and Harms

Values

Principles

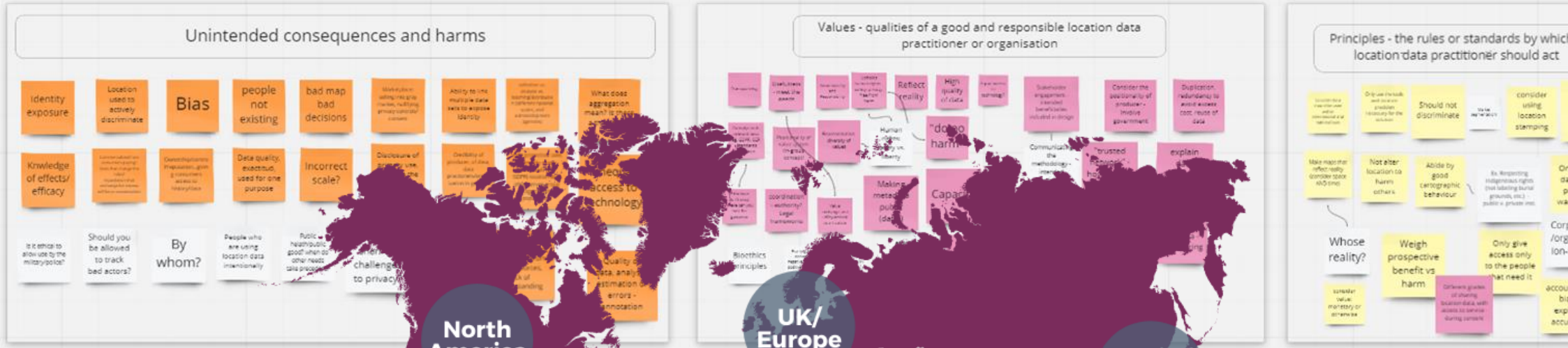
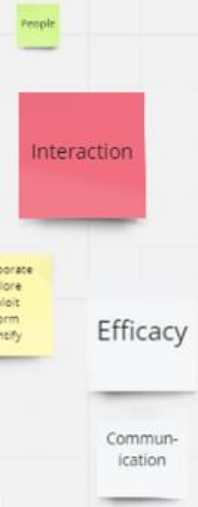


Table: Location Service Lifecycle



LOCUS CHARTER

OUR VISION

A world where location data is utilized for the betterment of the world and all species that live in it.

WHO WE ARE

An international collaboration of governments, organizations and individual practitioners seeking to ensure the ethical & responsible use of location data throughout the world.

LOCUS CHARTER

FOUNDING PRINCIPLES

#1 REALIZE OPPORTUNITIES

#2 UNDERSTAND IMPACTS

#3 DO NO HARM

#4 PROTECT THE VULNERABLE

#5 ADDRESS BIAS

#6 MINIMIZE INTRUSION

#7 MINIMIZE DATA

#8 PROTECT PRIVACY

#9 PREVENT IDENTIFICATION OF INDIVIDUALS

#10 PROVIDE ACCOUNTABILITY

LOCUS CHARTER

is pleased to announce support from

Radiant Earth Foundation
EARTH IMAGERY FOR IMPACT

agi THE ASSOCIATION FOR GEOGRAPHIC INFORMATION

EIS

OGC
Making location count
ogc.org

Royal Geographical Society with IBG
Advancing geography and geographical learning

PLACE

INEGI

RICS

THE AMERICAN GEOGRAPHICAL SOCIETY 1851

LOCUS CHARTER + ALBEDO

#SupporterSpotlight

Topher Haddad, CEO of Albedo says, "Albedo is excited to join the Locus Charter to help support our mission of realizing the unprecedented value of high quality satellite imagery. As a big data generator, Albedo takes a stance as a global steward, facilitating the creation of a greater world with our data, helping to fight climate change and supporting global humanitarian efforts, as well as addressing climate and economic security."

LOCUS CHARTER + We Robotics

#SupporterSpotlight

Sonja Betschart, Co-Founder and CEO of WeRobotics, says "We are glad to join the Locus Charter to further the responsible use of location data and to complement our Drone Code of Conduct for Social Good."

Ordnance Survey

Related initiatives

Activities	Document Type	Audience
Locus Charter (Benchmark Initiative & EthicalGEO)	Strategic Global Principles	Organisations (private & public) primarily, but can also be endorsed by individuals
ODI Data Ethics Canvas GEO – Data Working Group Ethics best practice Geonovum – Ethical Framework OGC – GeoEthics adhoc *(proposed working group)* OECD – Geospatial Lab Ethics Workstream	Frameworks / Best Practices	Organisations
W3C SDWWG – Responsible Use Guide Godan – Ethical Code Toolkit SDSN TReNDS – Contracts for Data Collaboration Omidyar Network - Ethics Explorer DevGRG – Development Research Ethical Guidelines Gather principles	Guides / Guidelines / Templates	Practitioners implementing on a daily basis
URISA / GISCI (USA) SSSI (Australia & NZ) RICS (UK) ASPRS (USA)	Codes of Ethics	Individuals, Professionals

What can you do?

- Use the Locus Charter to structure questions about practice and impacts
- Use the Charter as a basis for roundtables, training and organisational development
- Join the Community and the international conversation
- https://ethicalgeo.org/locus-charter/
- #locuscharter
- Share related initiatives in ethical use of local data

Be part of the community

Read the charter & join the community
https://ethicalgeo.org/locus-charter/

Contact the team info@ethicalgeo.org

Follow us on twitter @locuscharter

LOCUS CHARTER

NSDI in Norway

Arvid Lillethun, Advisory Director NSDI, Norwegian Mapping Authority

Arvid Lillethun work on national data infrastructure in Norway, both geoportal development, sharing arrangement, coordination of data flows, user requirements and contents management. He is a member of the EU Inspire Maintenance and Implementation Group. Arvid has extended experience with the NSDI development projects in many countries. He is competent in the Integrated Geospatial Information framework, UN GGIM global fundamental data, FAIR framework and environmental reporting.

Development of NSDI has been a 30-year journey for Kartverket. A rich data fabric has been created and a broad user community established. However, there is a recognition that the organization must move on and set new ambitious goals. New strategic directions from the Norwegian government concerning digital economy, sustainability, and data-driven economy, all of which recognise NSDI as a resource to support these strategies.

The importance of having got that recognition in these national strategies is significant and although not stated, has clearly taken a lot of effort to ensure their "placement" in these documents. In the new GI 2.0 strategy developed to intercept these national initiatives, the private sector has a key role to play in marketing the NSDI acting as ambassadors for innovation.

One of the uniquely successful aspects of NSDI in Norway is the Norway Digital concept (Geovekst-Geogrowth) central to which is cost sharing for development of particularly large scale basemaps under the slogan of "give a little, get a lot". As well as public sector organisations private sector telecoms, hydroelectric power and agriculture companies pay a substantial share of the overall cost in return for involvement in setting priorities.

The architecture of the national NSDI embodies sharing in both directions with many organisations contributing their data as well as receiving it. All this needs coordination and building and maintaining trust - this is the key role that Kartverket plays.

The needs of users are evolving fast, more use cases demand 3D data, dynamically maintained available through easy-to-use machine-to-machine APIs and 24/7 access. Their National Geoportal is not centralizing mechanism but harvests information from many sources and is interoperable with many other portals serving other sectors – it is part of a system of systems.

Key lessons learned in the process are need for long-term commitment, a sharing culture based on trust and respect, two-way stream of data exchange, joint funding, and adherence to standards - particularly useful are the new generation of OGC APIs.

Satellite images are also tightly integrated into the geoportal. Process of adding new drone data from construction projects into the NSDI, business case being developed to prove the value of sharing. Boundary between private and public sector is an open dialogue, but it must remain flexible.

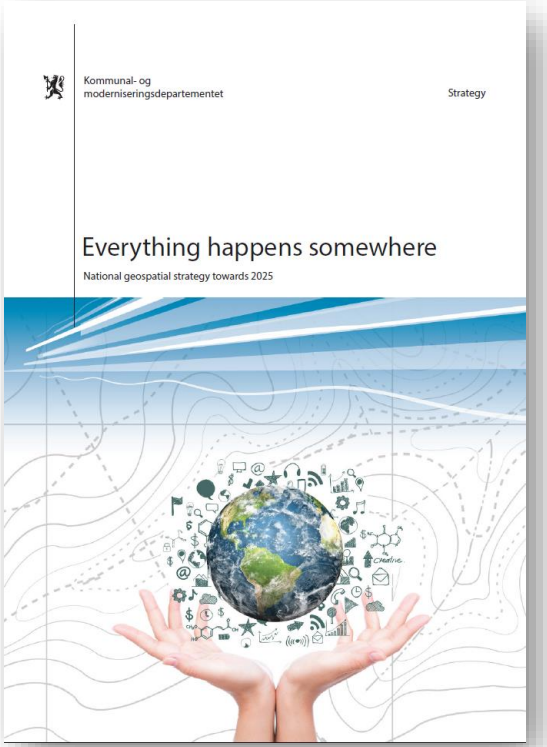
Norwegian NSDI: Strategies, Priorities, and Lessons Learnt

Geospatial Information for Digital Transformation Conference
28 October 2021

Arvid Lillethun, Norwegian Mapping Authority

Look to Norway!

“Norway shall be at the forefront in the use of geospatial information”



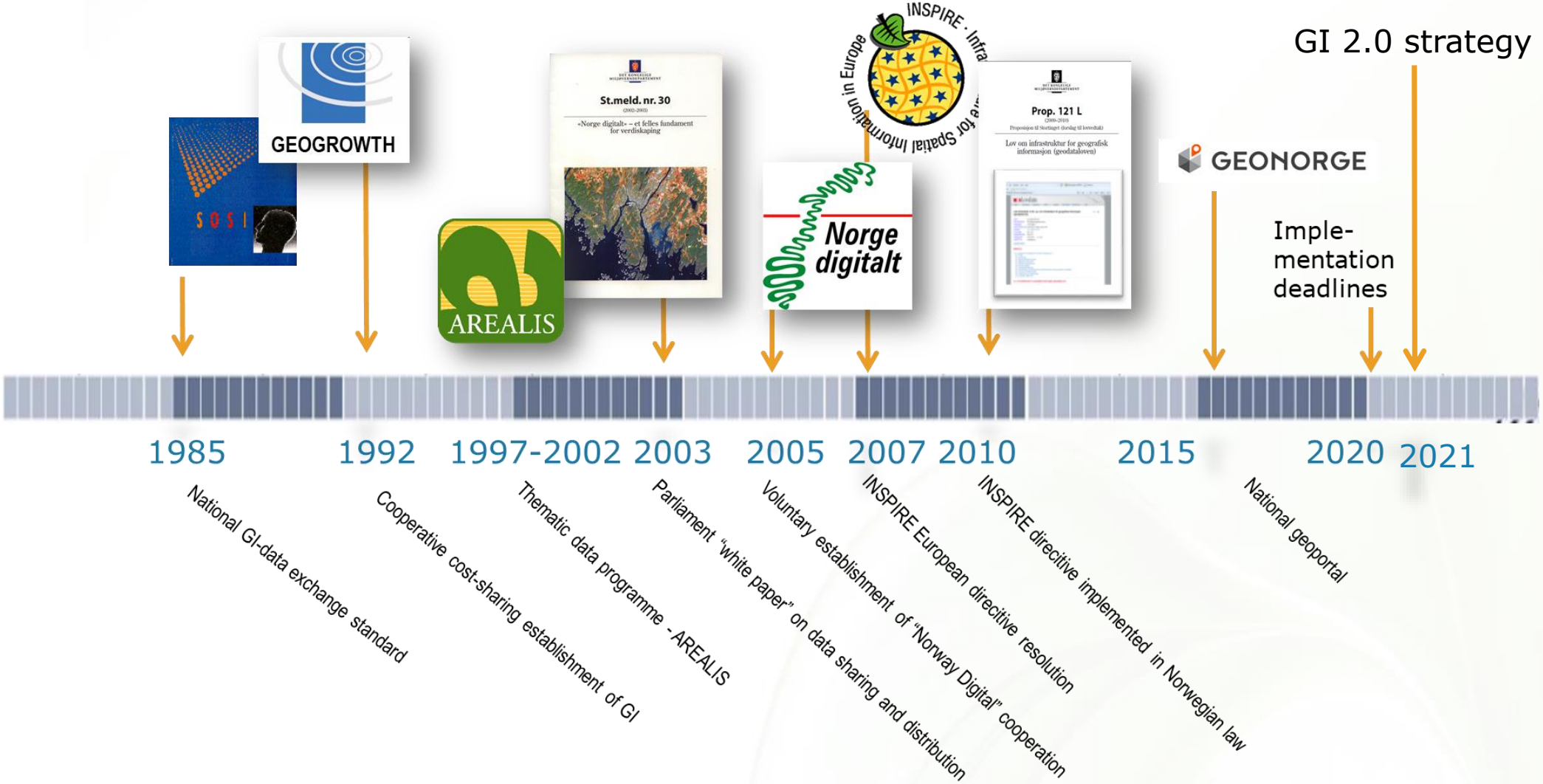
- Norway has a well-developed spatial data infrastructure
  - Rich in content
  - Widespread use
  - Well working community

- Our geodata strategy sets new and ambitious goals.

https://www.regjeringen.no/en/dokumenter/nasjonal-geodatastrategi---alt-skjer-et-sted/id2617560/

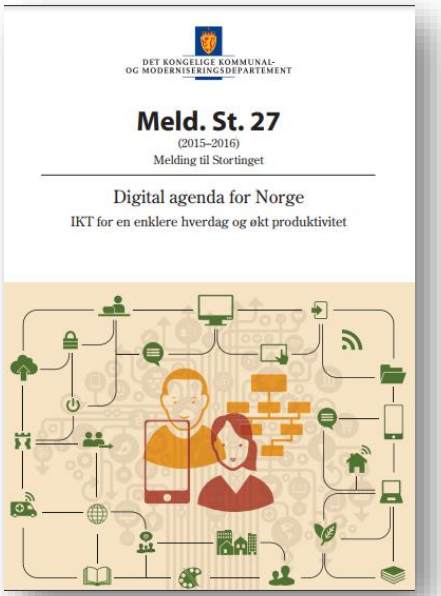
Strategic and legal foundation

NSDI –long term processes

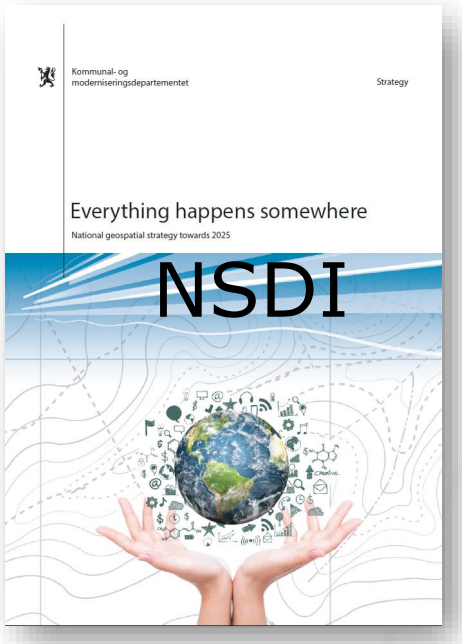


National spatial data strategy part of national digitization strategies:

«digitization of public sector»
«sustainability knowledge data hub»
«data driven economy – data as a resource»



2017



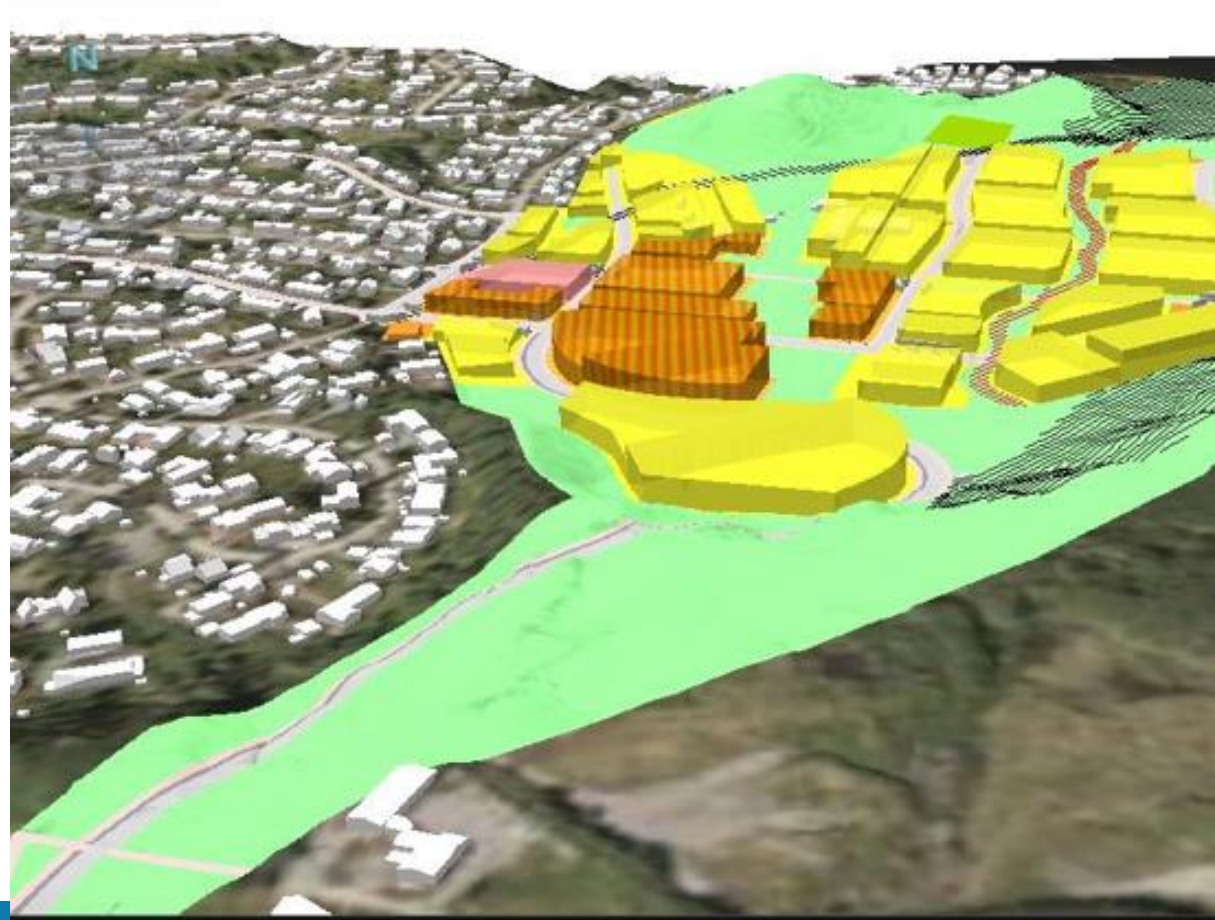
2018

2019

2021

Norwegian geospatial actions and investment - Support development of an effective public and private sector

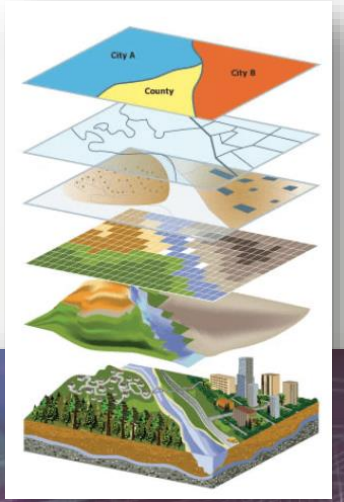
- predictable processes
- knowledge-based decisions
- participation
- tracability



Kartverket

Market
«the power of where!»

Digital transformation:
The power of where



KNOWLEDGE, WILL

- Spread good examples
- Disseminate know-how
- Sharing culture

INNOVATION POWER

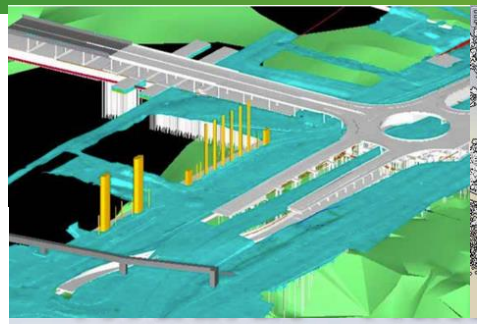
- Testing in test-labs
- Innovation in all sectors

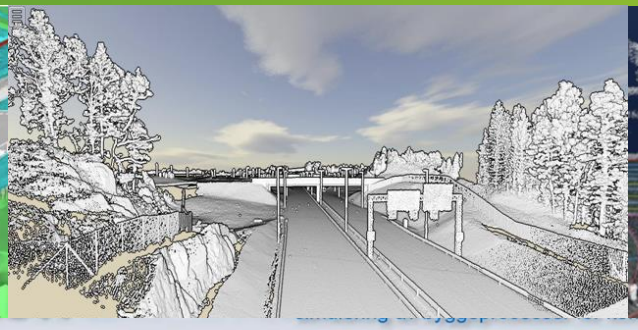
- **The value of solution vendors**

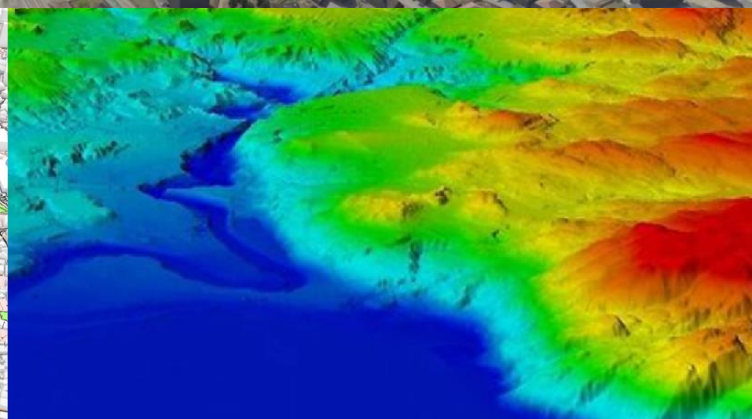
Kartverket

Power of where!

- Tool for urban and city development
- Tool for sustainable resourse use - land and sea
- Predicting natural hazards – climate mitigation



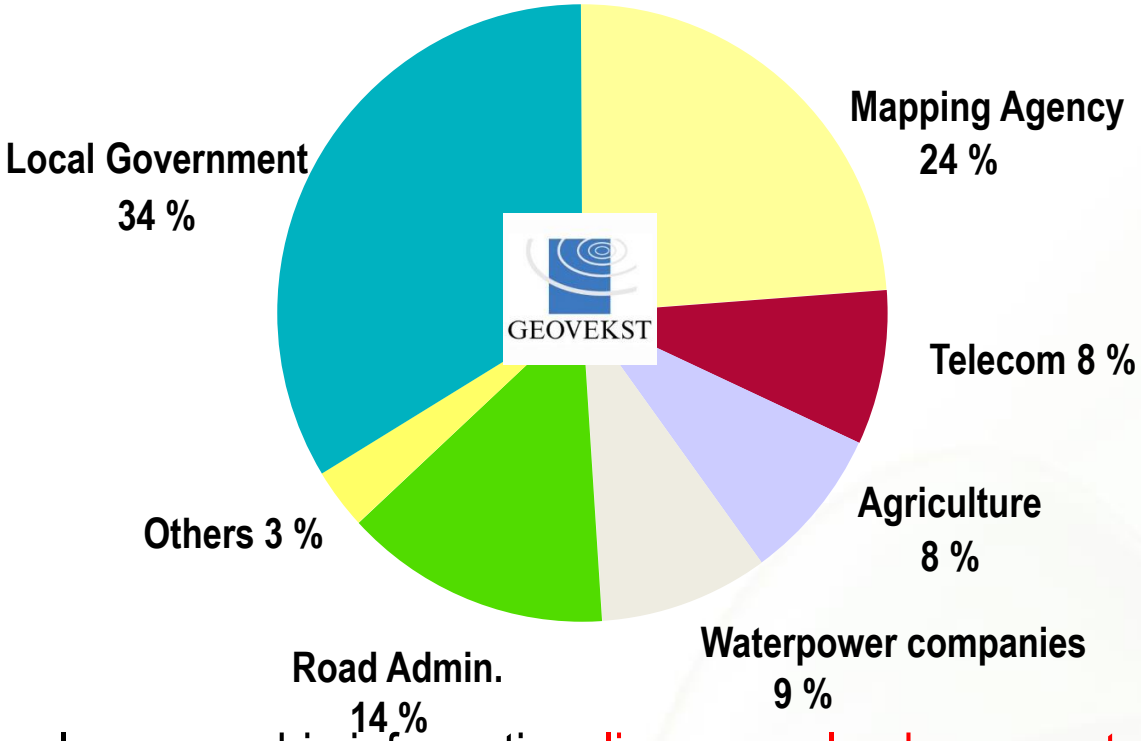




Kartverket

Cost sharing and funding regimes

Cost-sharing for production of spatial data
- data capture funded by public partners



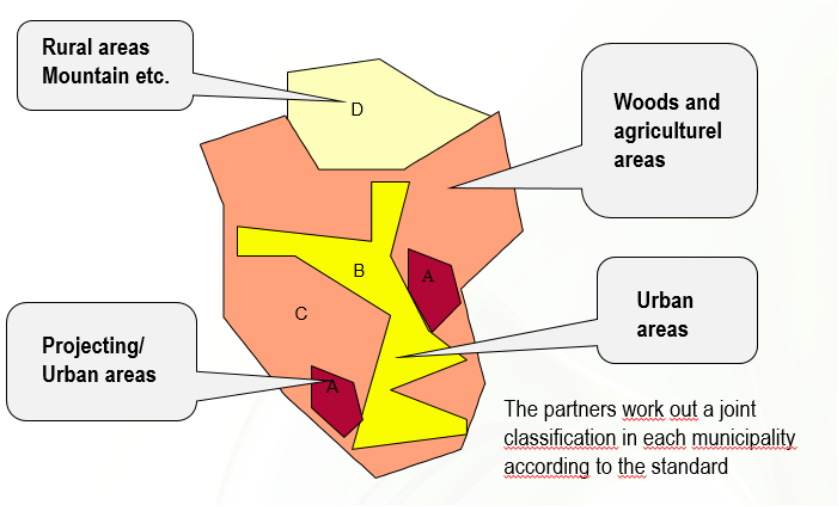
Large scale geographic information, line maps, land cover, ortophoto, lidar

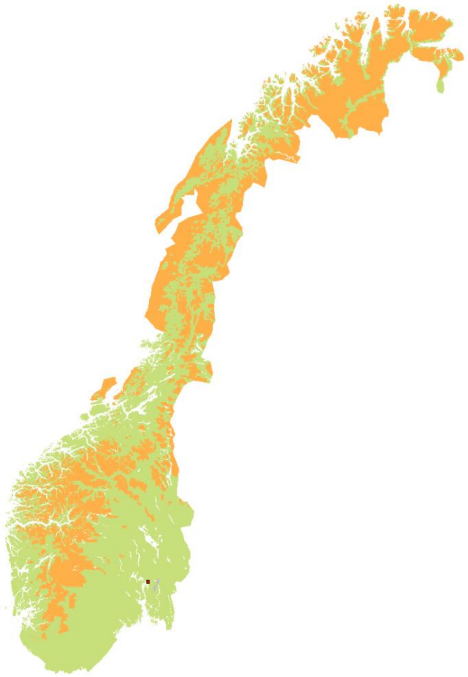
«Give a little - get a lot»

Kartverket

FKB - Most detailed Map database -1993-2021->

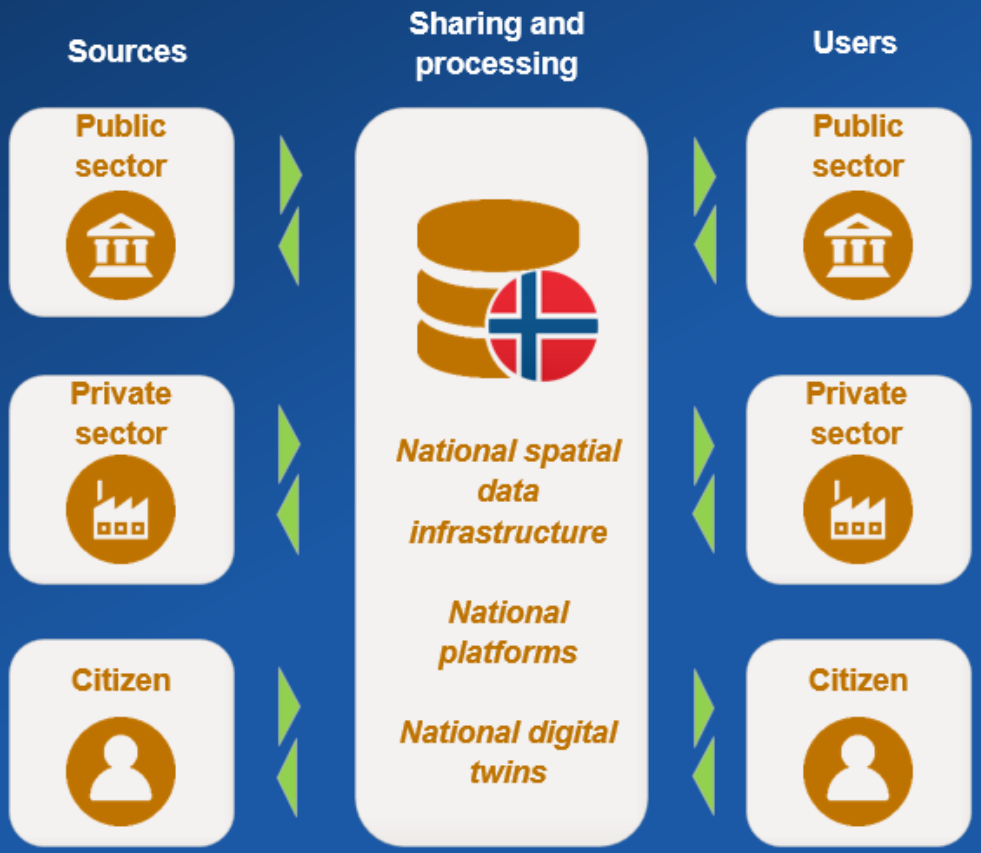
- Large scale geographic information, line maps, land cover, ortophoto, lidar
- Cover approx. 60% of the country (not the mountain area)
- Main database for geographic data in scales (1:500 - 1: 5,000)
- Different qualities in different areas





Kartverket

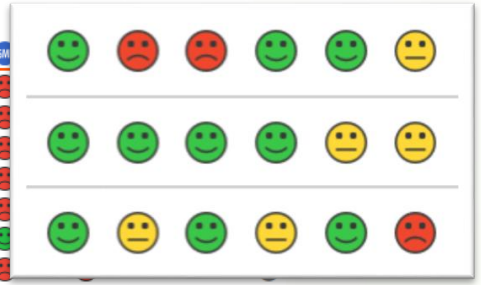
Public – public and public – private

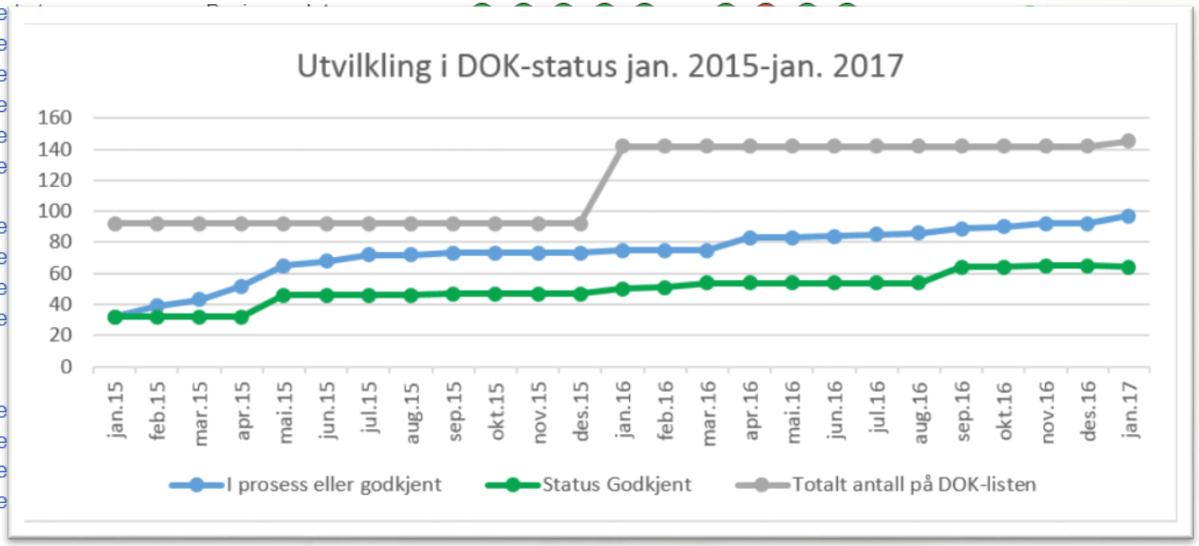


Constant follow up of contributors and systems
Maintaining a geodata coordination role is crucial

Tittel	Eier	Temagruppe
Administrative enheter	Kartverket	Basis geodata
Barnetråkk	Kartverket	Befolkning
Digitale ortofoto	Kartverket	Basis geodata
DTM 10	Kartverket	Basis geodata
Dybdedata	Kartverket	Basis geodata
Markagrensen	Kartverket	Plan
Matrikkelen - Adresse	Kartverket	Basis geodata
Matrikkelen - Bygningspunkt	Kartverket	Basis geodata
Matrikkelen - Eiendomskart	Kartverket	Basis geodata
Matrikkelen, Norges offisielle eiendomsregister	Kartverket	Basis geodata
N1000 Kartdata	Kartve	
N20 Bygning	Kartve	
N250 Kartdata	Kartve	
N50 Kartdata	Kartve	
N5000 Kartdata	Kartve	
Navn fra Sentralt Stedsnavnregister (SSR)	Kartve	
Norges maritime grenser	Kartve	
Sjø terrengmodeller	Kartve	
Sjøkart raster	Kartve	
Statlige planretningslinjer for differensiert forvaltning av strandsonen langs sjøen	Kartve	
Tilgjengelighet - friluft	Kartve	
Tilgjengelighet - tettsted	Kartve	
Tur- og friluftsruter	Kartve	
Vbase	Kartve	

Viser 1 - 24 av 24 treff





Kartverket

Developing content to support major challenges in society

«data hub for sustainable development»

Geospatial data to support sustainable growth

NSDI & Geoportal

- **Secure investment in data**
  Secure availibility

Kartverket

Understand flooding patterns

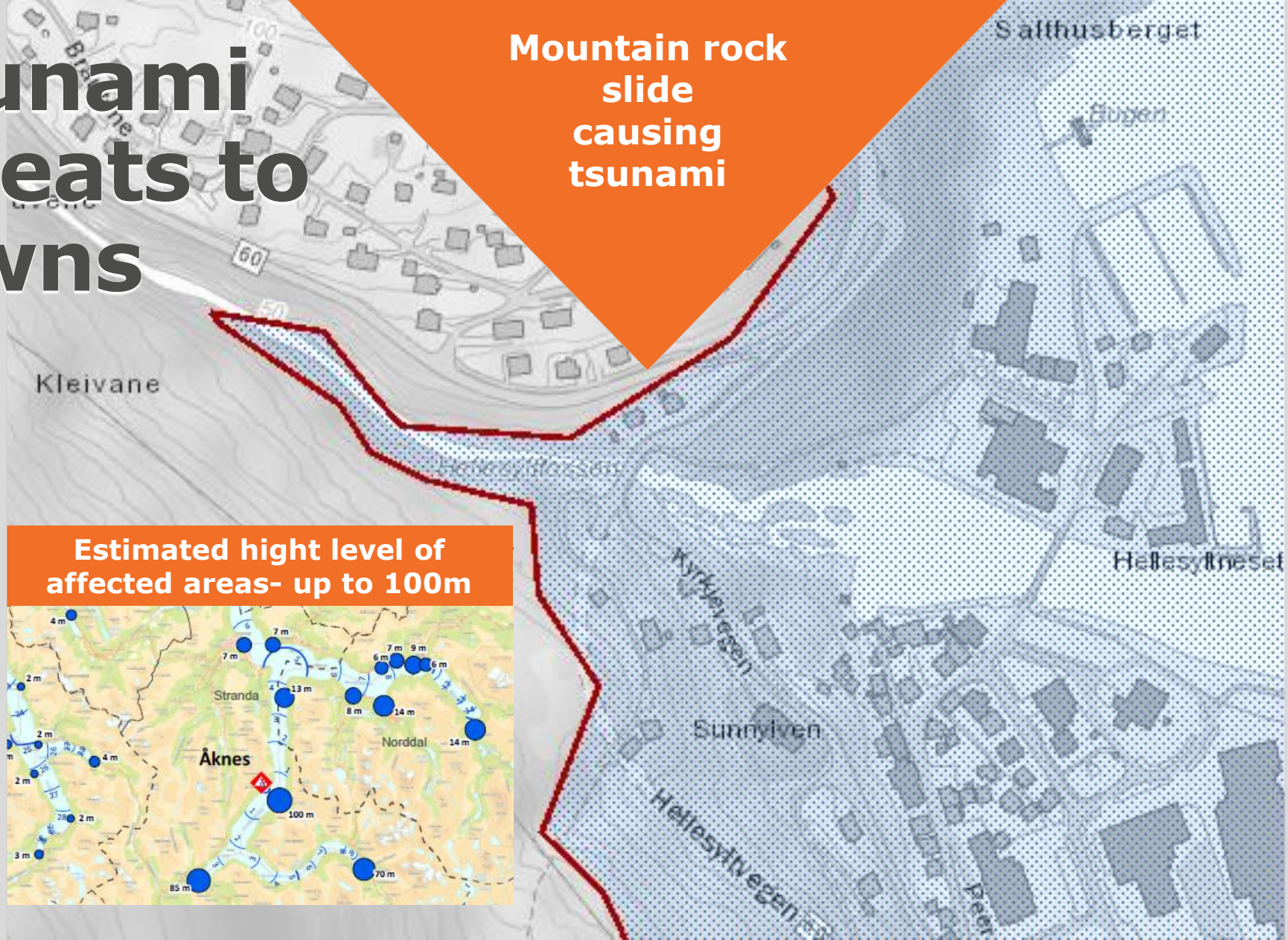
- risk assessment

NSDI & Geoportal

Kartverket

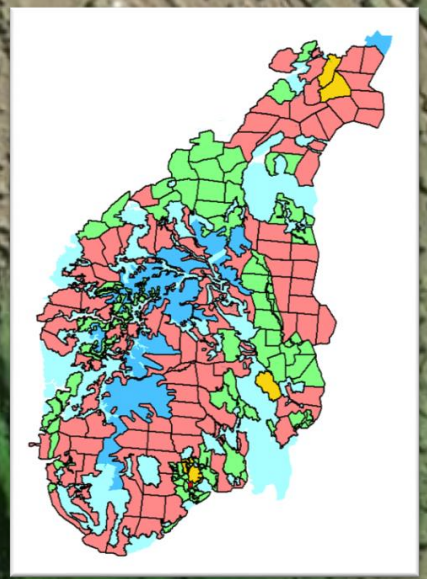
Tsunami threats to towns

Mountain rock slide causing tsunami

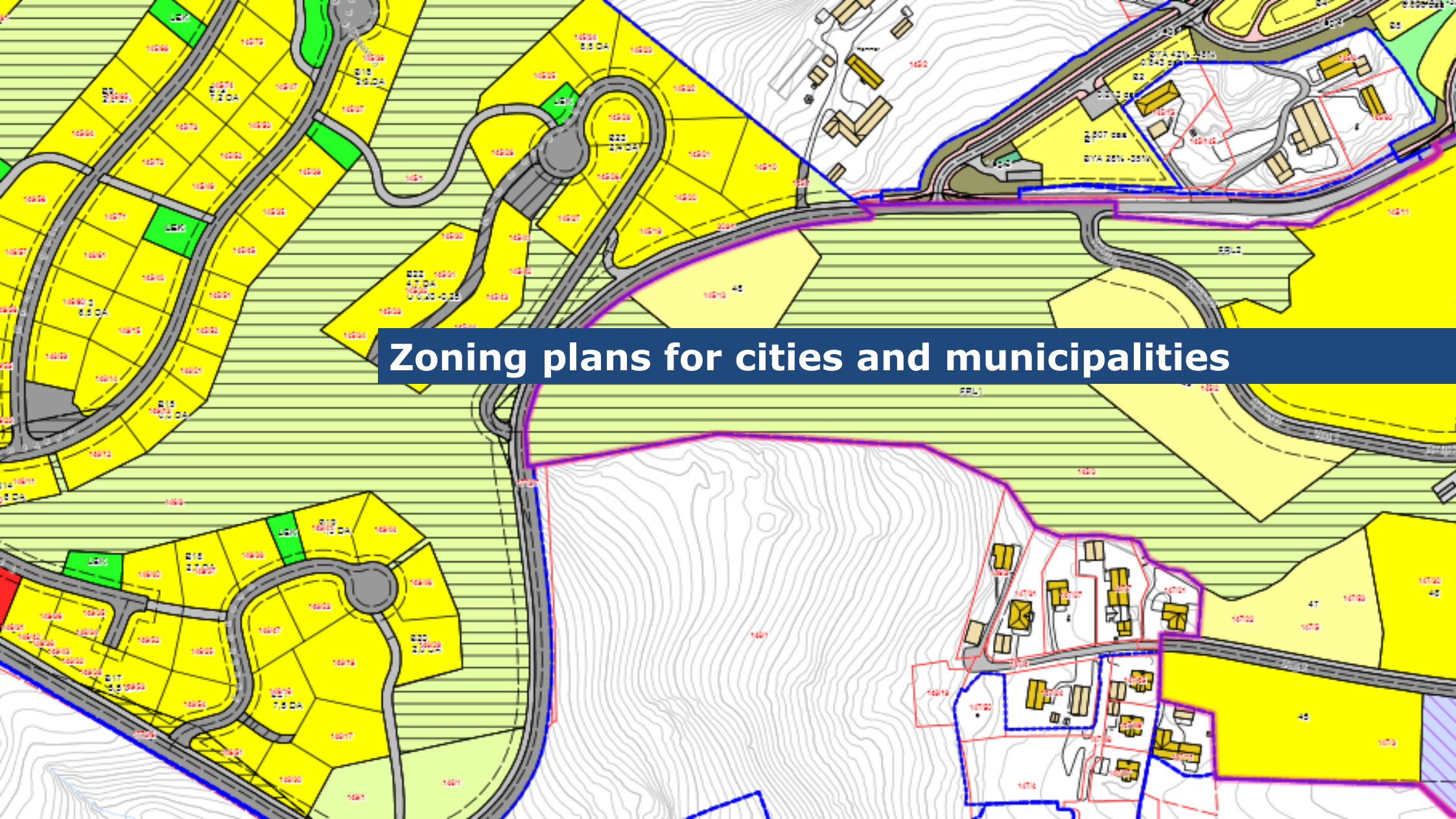


Estimated hight level of affected areas- up to 100m

Data establishment- example lidar – 2003 - 2021 – stepwise approach - every square meter!



- **Great user potential**
- **Important in climate mitigation**
- **High cost-benefit-ratio**

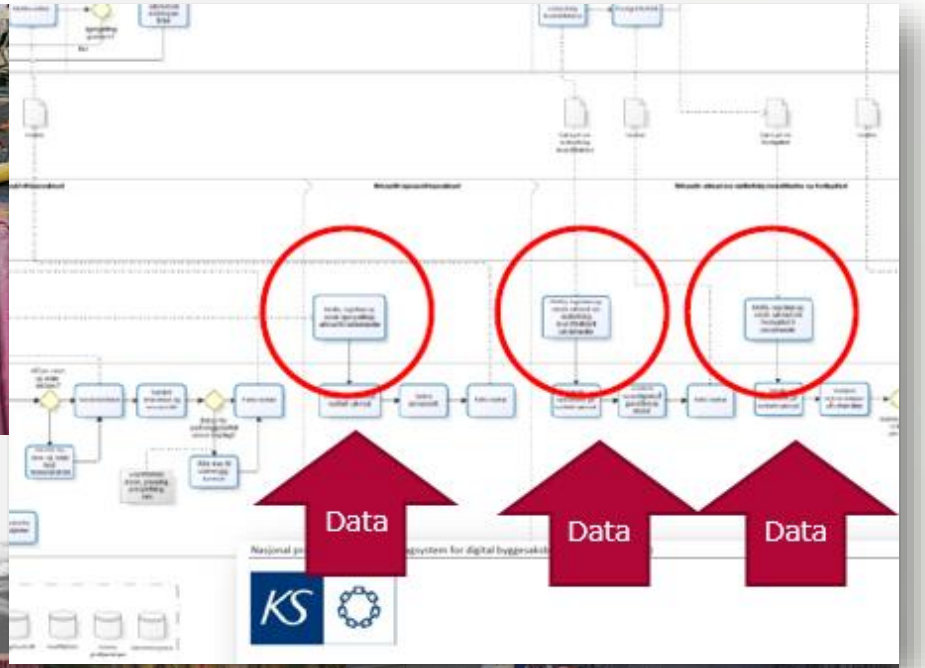

Zoning plans for cities and municipalities

User needs are changing

Requests from all sectors

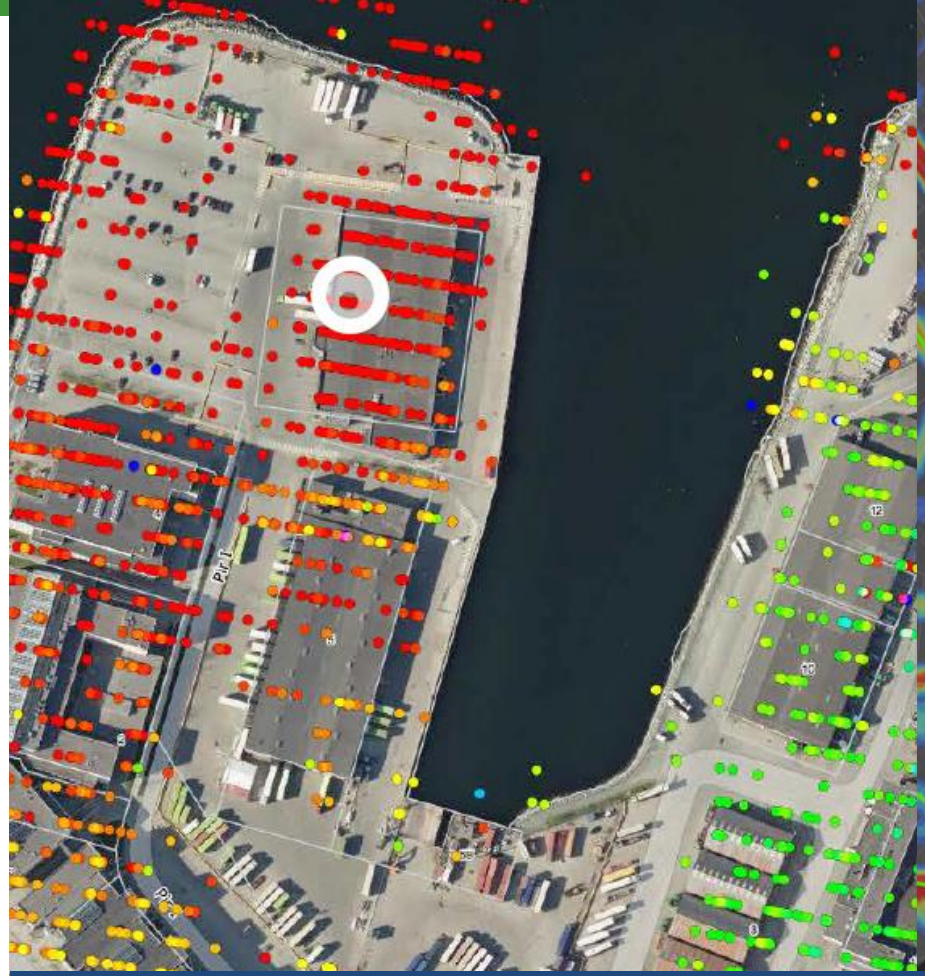
Data become crucial input in 24/7 fully digitized work flows

New themes, high resolution, 3D, dynamic data, easy to use api's

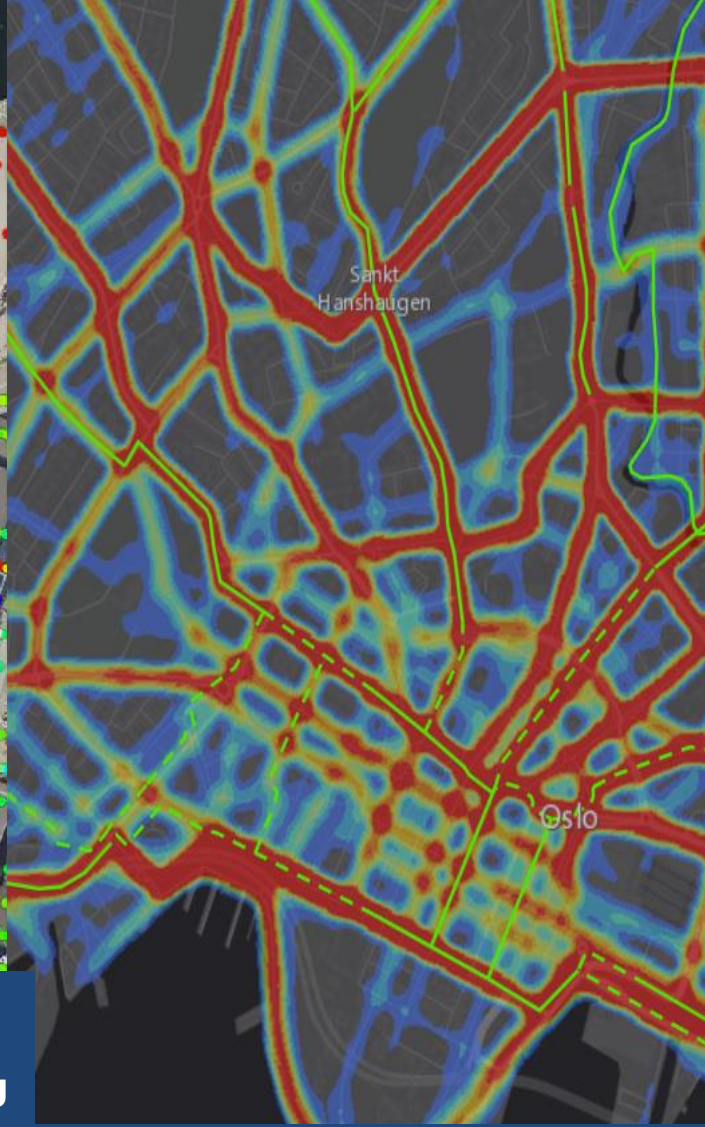


Kartverket

- **Utilize new sources**
- **Use crowd sourced data**



INSAR Satellite data
detailed ground stability
Source: Norwegian geological Survey NGU



Bike activity - bike lanes
Source: Geodata as/ Oslo Municipality

Kartverket

Digital transformation

necessary technology development

Geoportal – node functions

Magnitude of sources and organisations

Geoportal

National node function

Magnitude of users

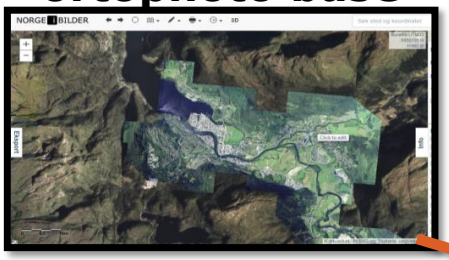
Platform for sharing

Tools to help implement

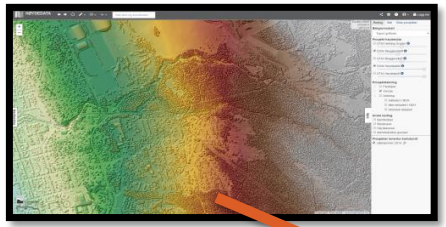
Platform access

Capture once-- use many times

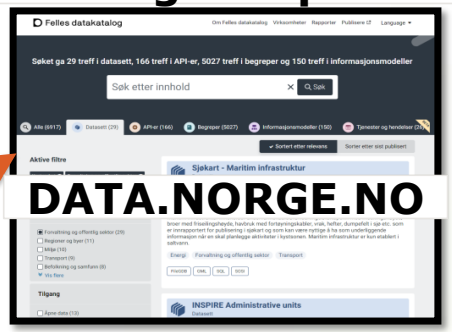
National ortophoto base



National hight data base



Norwegian open data port

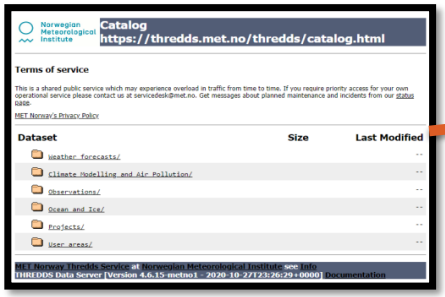


CSW:ISO

CSW:ISO

DCAT

National dynamic data system



Metadata inn

CSW:ISO

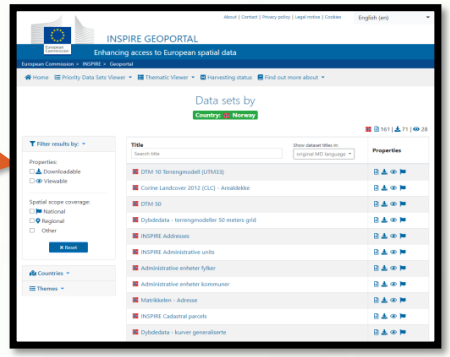
GEONORGE

Kartkatalogen

Metadata ut

CSW:ISO

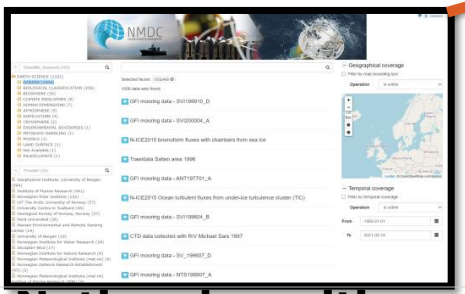
Europes INSPIRE-PORTAL



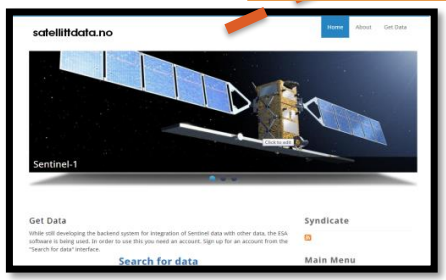
OAI PMH

CSW:ISO

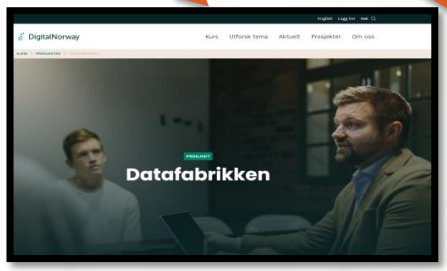
CSW:DC



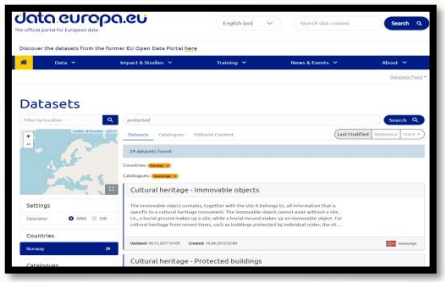
National maritime research system



National Satellite data platform



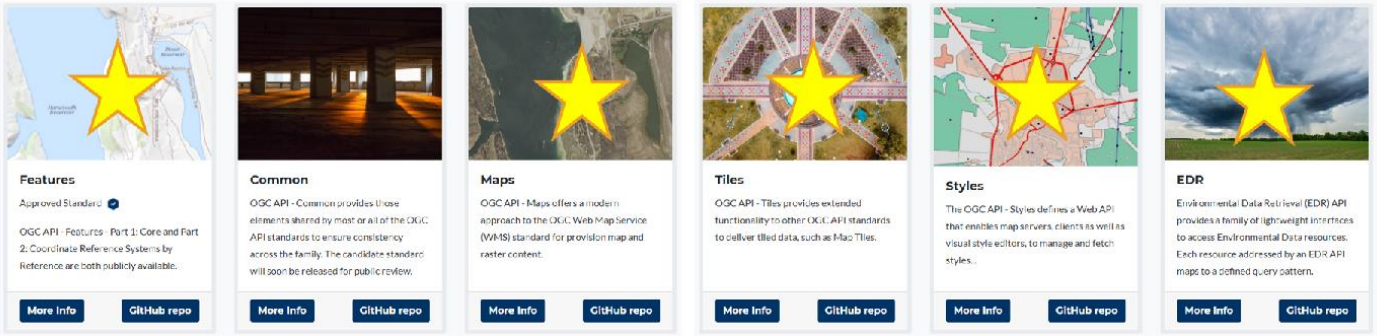
SME DATAFABRIKKEN



EUROPEAN OPEN DATA PORTAL

Digital transformation:

New generation of global open APIs



Opens up for easy use

Open API specification

In line with Europe's policy

Kartverket

SDI fully supports the digital transformation

Lessons learnt

Long-term commitment necessary

Start small – step by step

Culture - to share

Trust, respect

Stick to standards

A two way stream - collaboration / joint effort

Arvid Lillethun
Advisory director SDI
Land Mapping Division
Norwegian Mapping Authority

arvid.lillethun@kartverket.no

Links

- Geodata strategy:
  - https://www.regjeringen.no/en/dokumenter/nasjonal-geodatastrategi---alt-skjer-et-sted/id2617560
- SDI Country report – Norway- UN-GGIM
  - https://ggim.un.org/country-reports/documents/Country_Report_Norway_2019.pdf
- Norway digital SDI community
  - https://www.geonorge.no/en/infrastructure/norway-digital/
- Geoportal:
  - https://www.geonorge.no/en
- National SDI registers
  - https://register.geonorge.no/?lang=en
- Fair register and validation tool
  - https://register.geonorge.no/mareano-statusregister?lang=en
- Geoportal – apis for developers
  https://www.geonorge.no/en/for-developers/apis/
- Geoportal github repository
  - https://github.com/orgs/kartverket/repositories
- Norwegian Mapping Authority
  - https://www.kartverket.no/en

Development of NSDI in Croatia from Interoperability Perspective

Tomislav Ciceli, State Geodetic Administration, Croatia

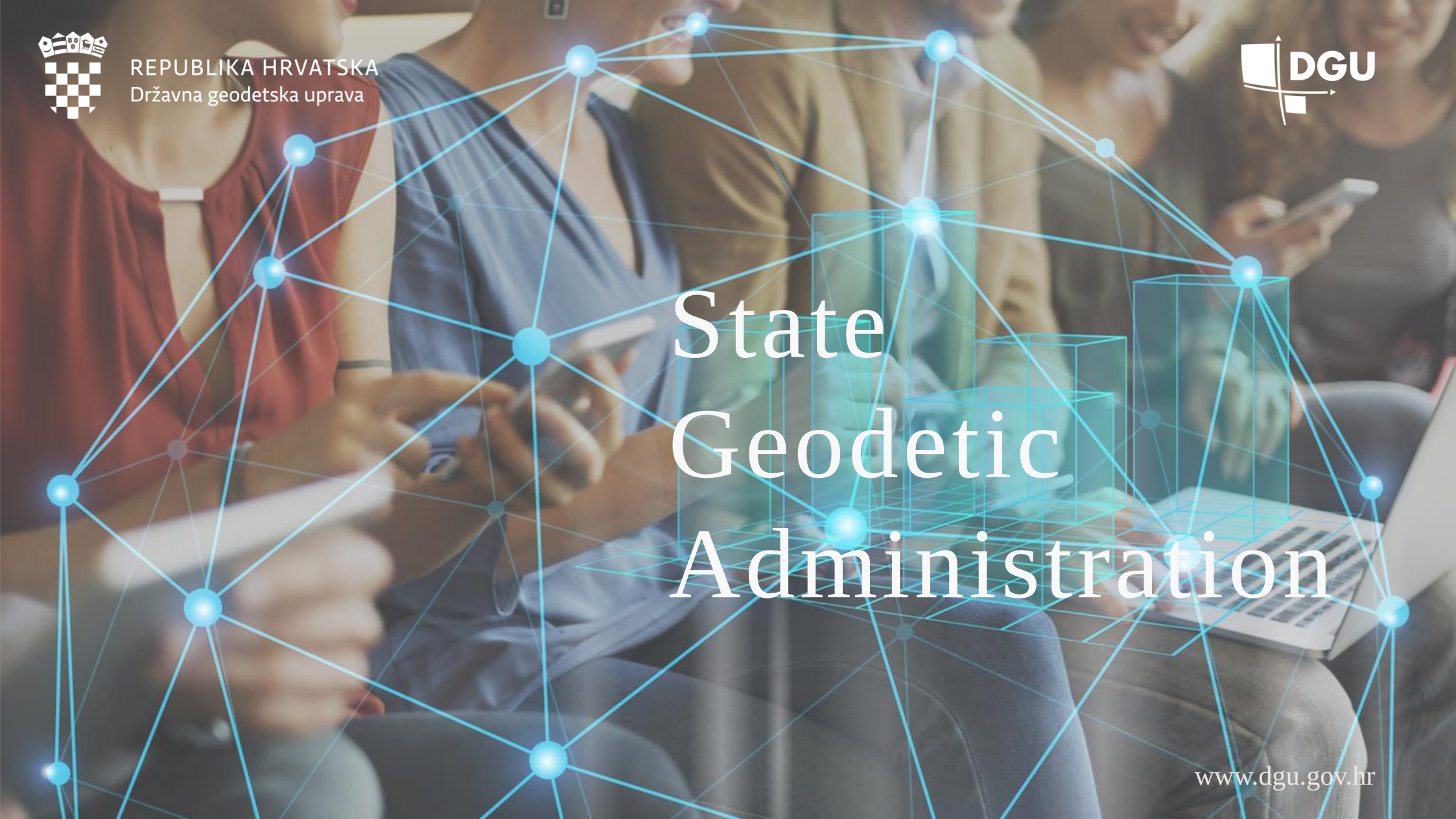
Since 2011, Tomislav has been working intensively in the field of spatial data infrastructures at the national level as the Head of the NSDI Division in the State Geodetic Administration of Croatia. He participates in all activities important for the establishment of the NSDI; from organizational through work in NSDI bodies; I am the Secretary of the NSDI Council and was the leader of the Working group dedicated to spatial data, through technical segments related to the development of the national geoportal and knowledge transfer activities through conferences and workshops. Before that, for a period of about 10 years, I worked in the field of photogrammetry, remote sensing and GIS during my engagement at the University of Zagreb. Tomislav's motto is "Personal contribution to the creation of a digital Earth".

Tomislav explained that interoperability has several levels, each of which must be operationalized before the next one will be successful.

In Croatia, they started with tackling legal interoperability; establish a policy and legal framework. This was followed with organisational interoperability achieved through building trust between stakeholders. Only after this did they reach the semantic and technical interoperability needed to create their national geoportal. The overall process has taken from 2007 to now. However, they have now created a system where 54 separate organizations are sharing their data through the geoportal, 590 metadata records are maintained and 287 services.

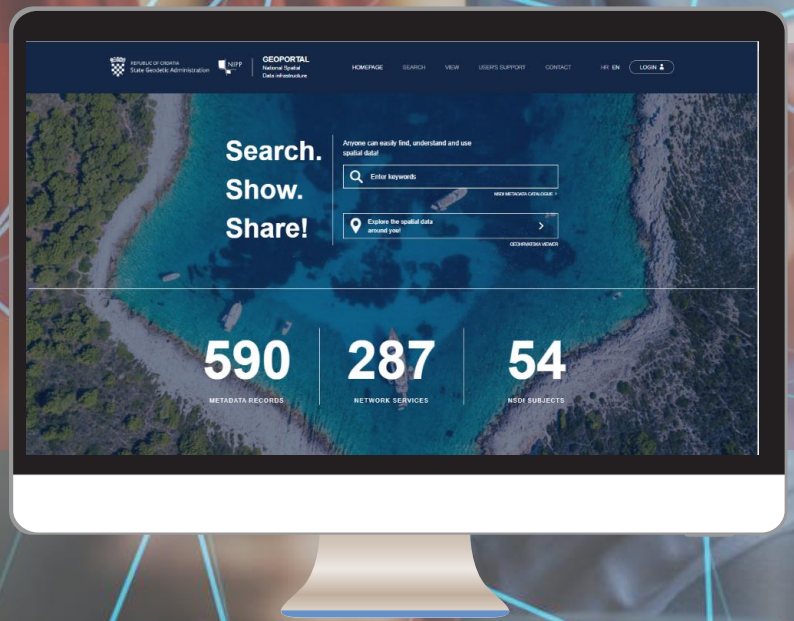
Tomislav also "unpacked" the complexity of what we mean by quality, from the expert view of harmonization and error detection to the ordinary user where quality is defined by ease of use. He stressed the need to continuous work on raising awareness at many levels. To finish, he quoted David Schell, the founder of OGC in saying, **"interoperability appears to be about integration of information, but it is really about the coordination of organisational behaviour".**

In discussion, on determining "fitness-for-purpose" it was recognised that only narrow range of users need millimetric accuracy. Further, perceived lack of quality is often used as a reason not to publish data failing to appreciate that as people use the data, quality will be improved by their feedback.


REPUBLIKA HRVATSKA
Državna geodetska uprava
DGU
State
Geodetic
Administration
www.dgu.gov.hr

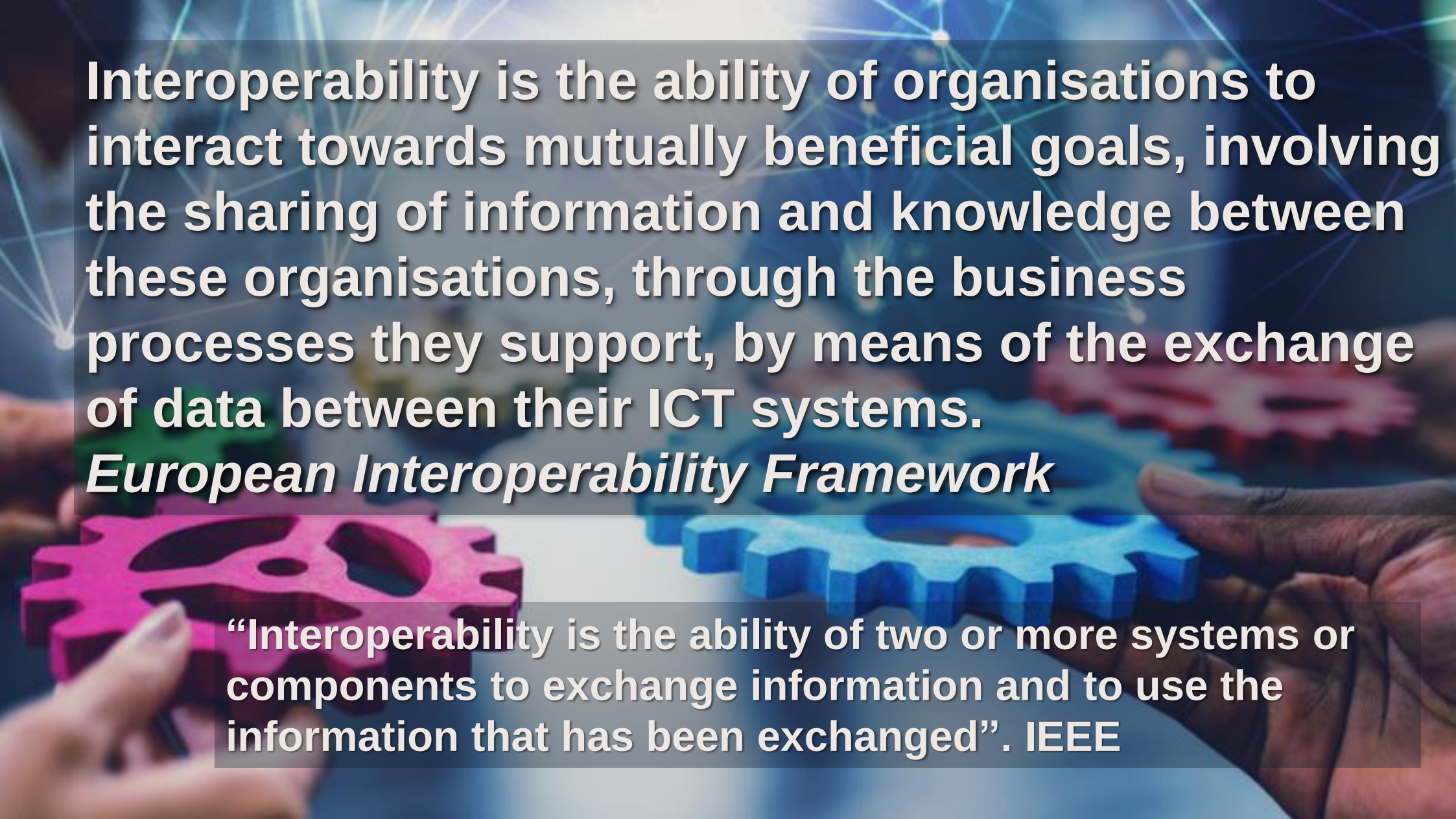
REPUBLIKA HRVATSKA
Državna geodetska uprava

DGU



Tomislav Ciceli

Development of NSDI in Croatia from Interoperability perspective

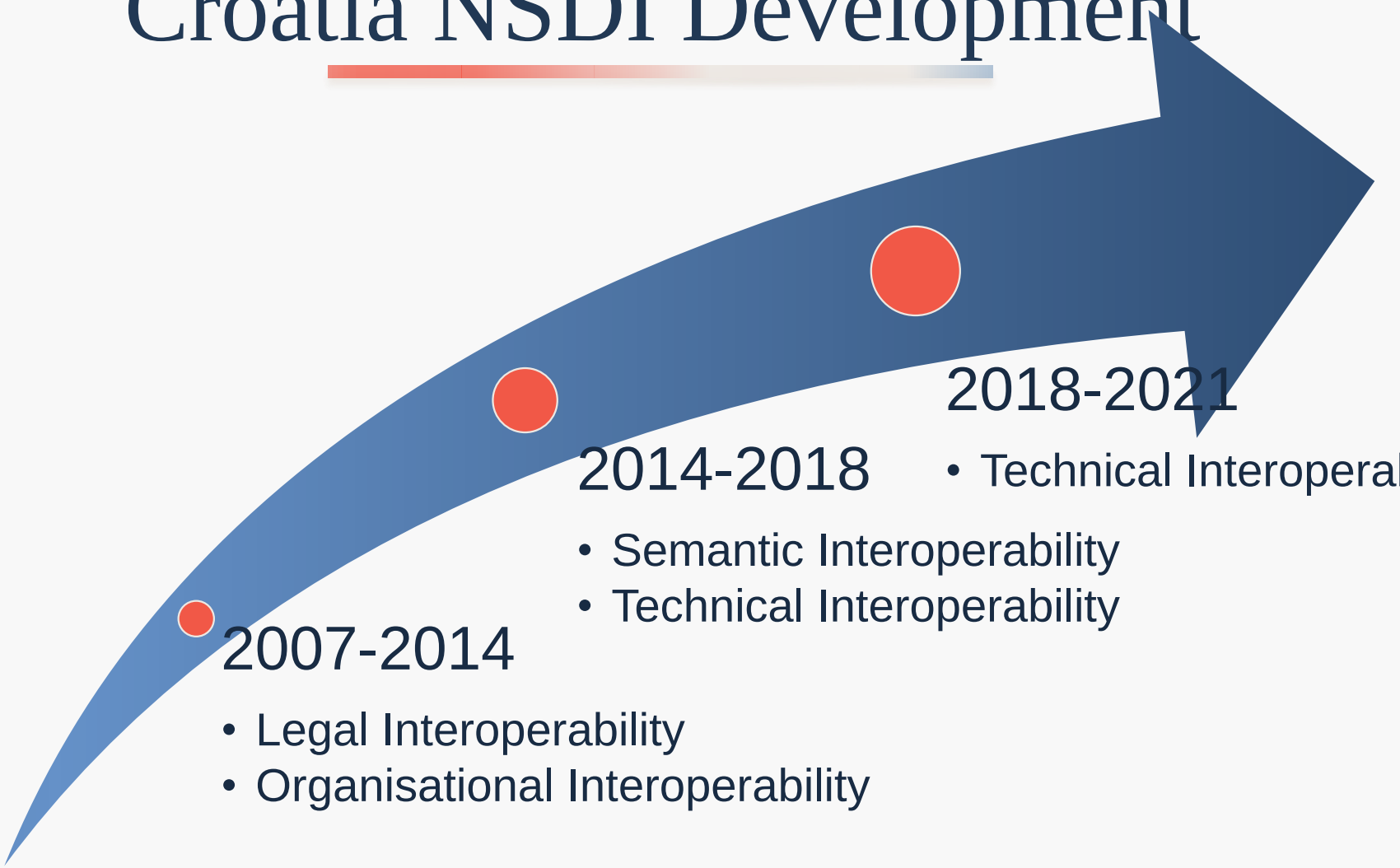


Interoperability is the ability of organisations to interact towards mutually beneficial goals, involving the sharing of information and knowledge between these organisations, through the business processes they support, by means of the exchange of data between their ICT systems.
European Interoperability Framework

“Interoperability is the ability of two or more systems or components to exchange information and to use the information that has been exchanged”. IEEE

Interoperability levels

Croatia NSDI Development



2007-2014

- Legal Interoperability
- Organisational Interoperability

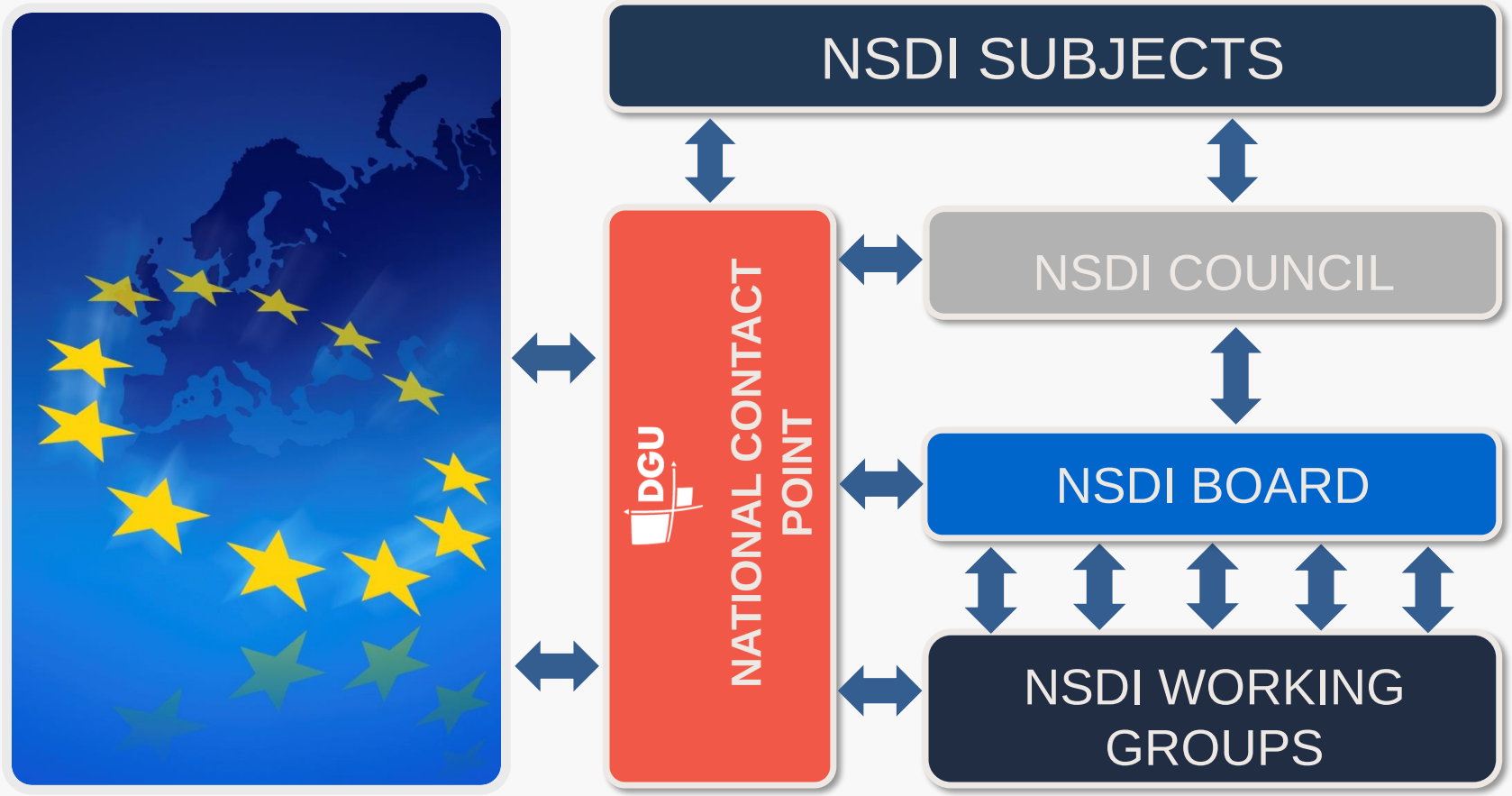
2014-2018

- Semantic Interoperability
- Technical Interoperability

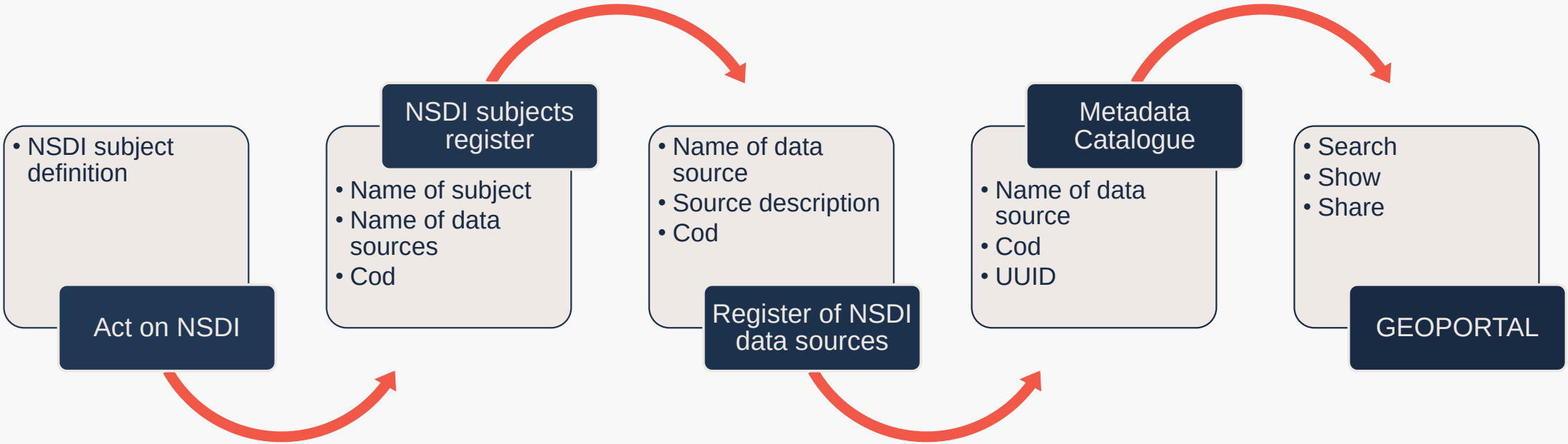
2018-2021

- Technical Interoperability

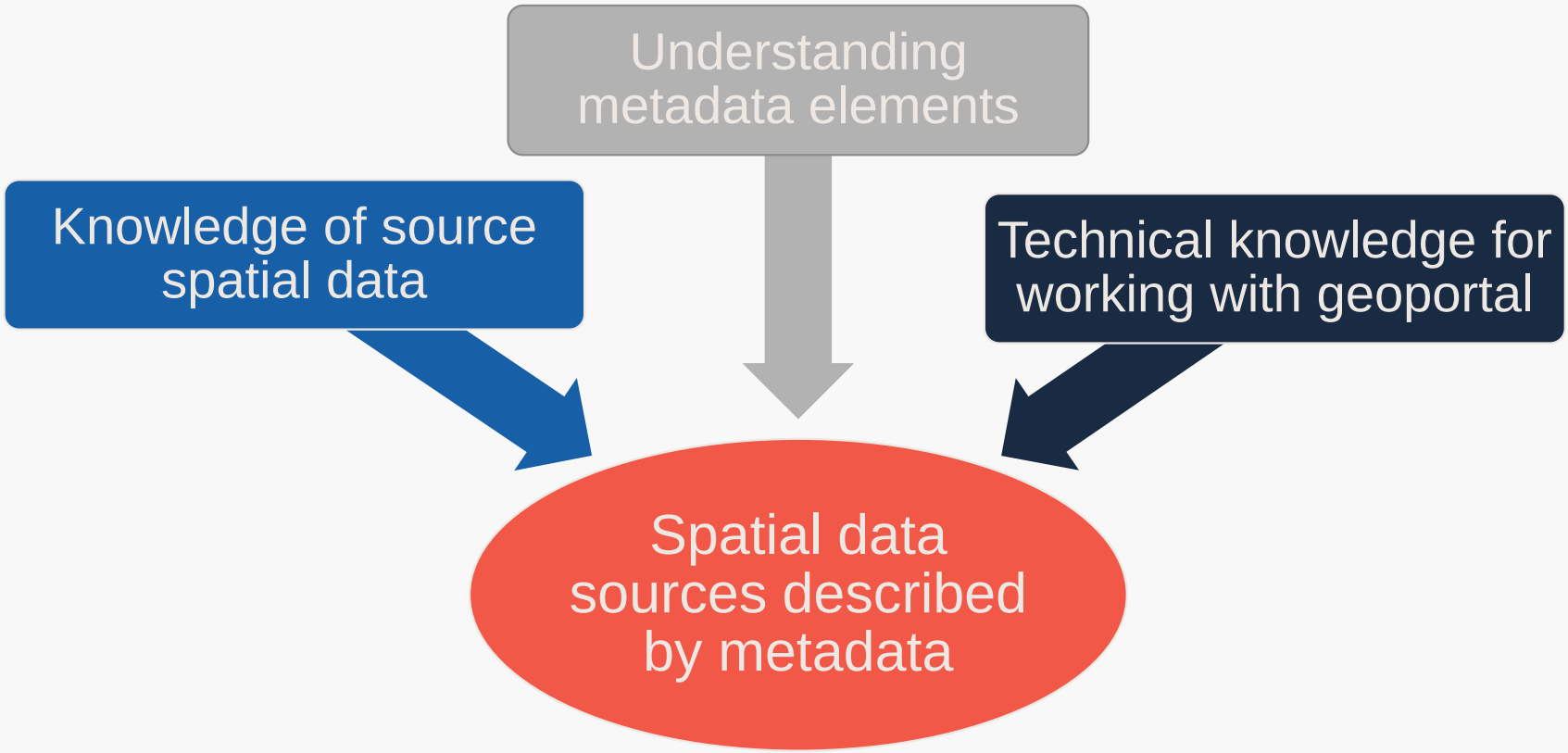
NSDI Organisational structure

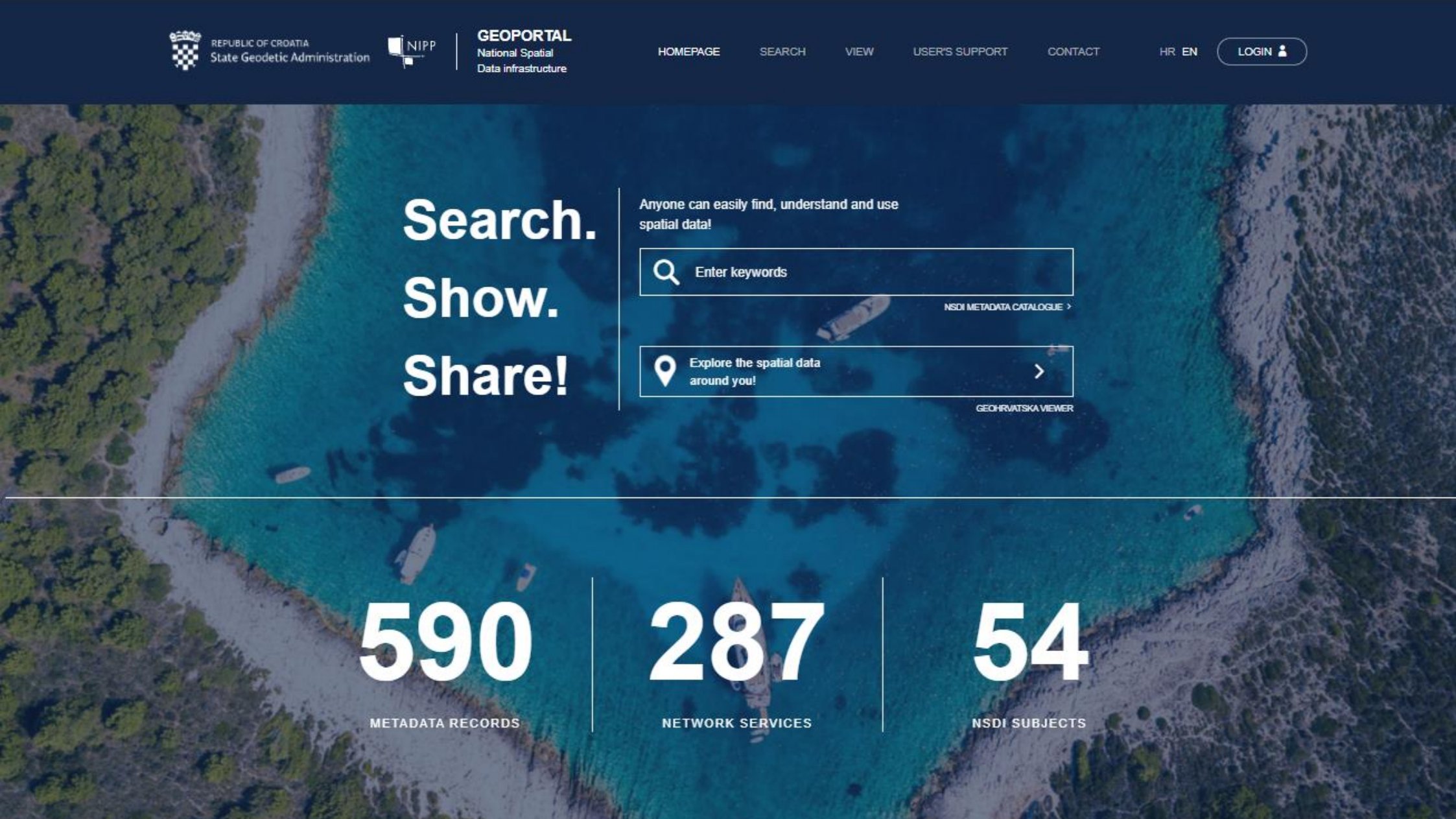


From NSDI Act to NSDI Geoportal

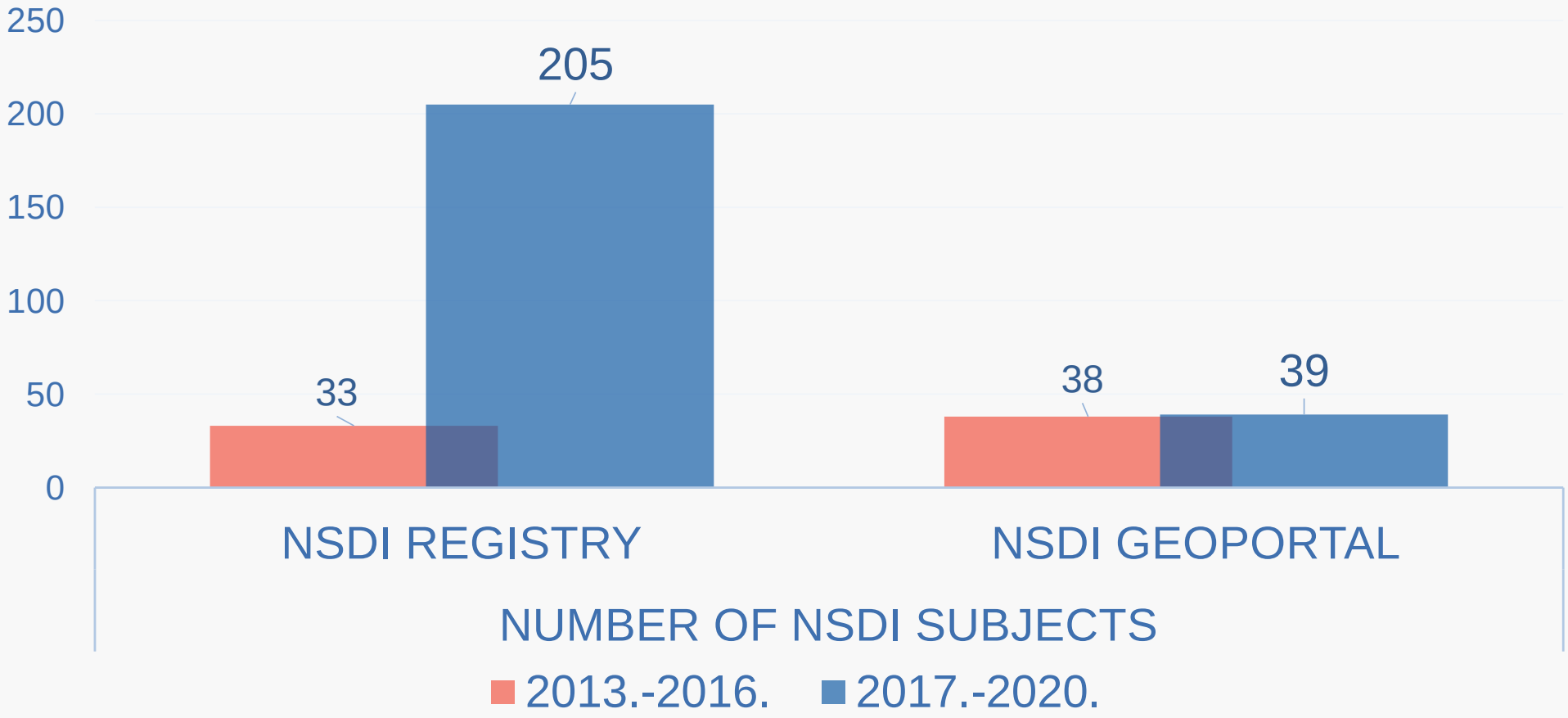


Required knowledge

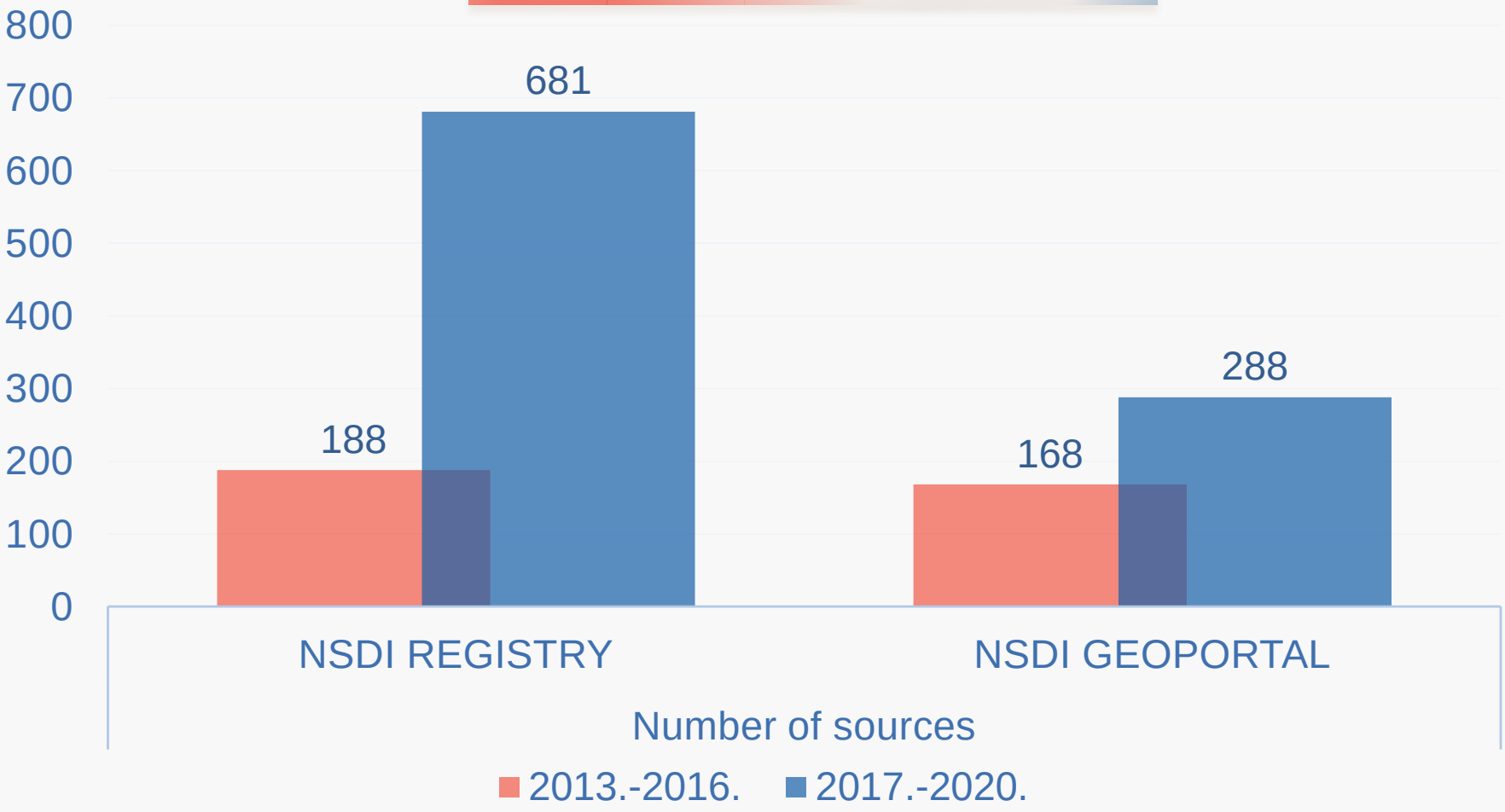



REPUBLIC OF CROATIA
State Geodetic Administration
NIPP
GEOPORTAL
National Spatial
Data infrastructure
HOMEPAGE
SEARCH
VIEW
USER'S SUPPORT
CONTACT
HR EN
LOGIN
Search.
Show.
Share!
Anyone can easily find, understand and use spatial data!
Enter keywords
NSDI METADATA CATALOGUE >
Explore the spatial data around you!
GEOHRVATSKA VIEWER
590
METADATA RECORDS
287
NETWORK SERVICES
54
NSDI SUBJECTS

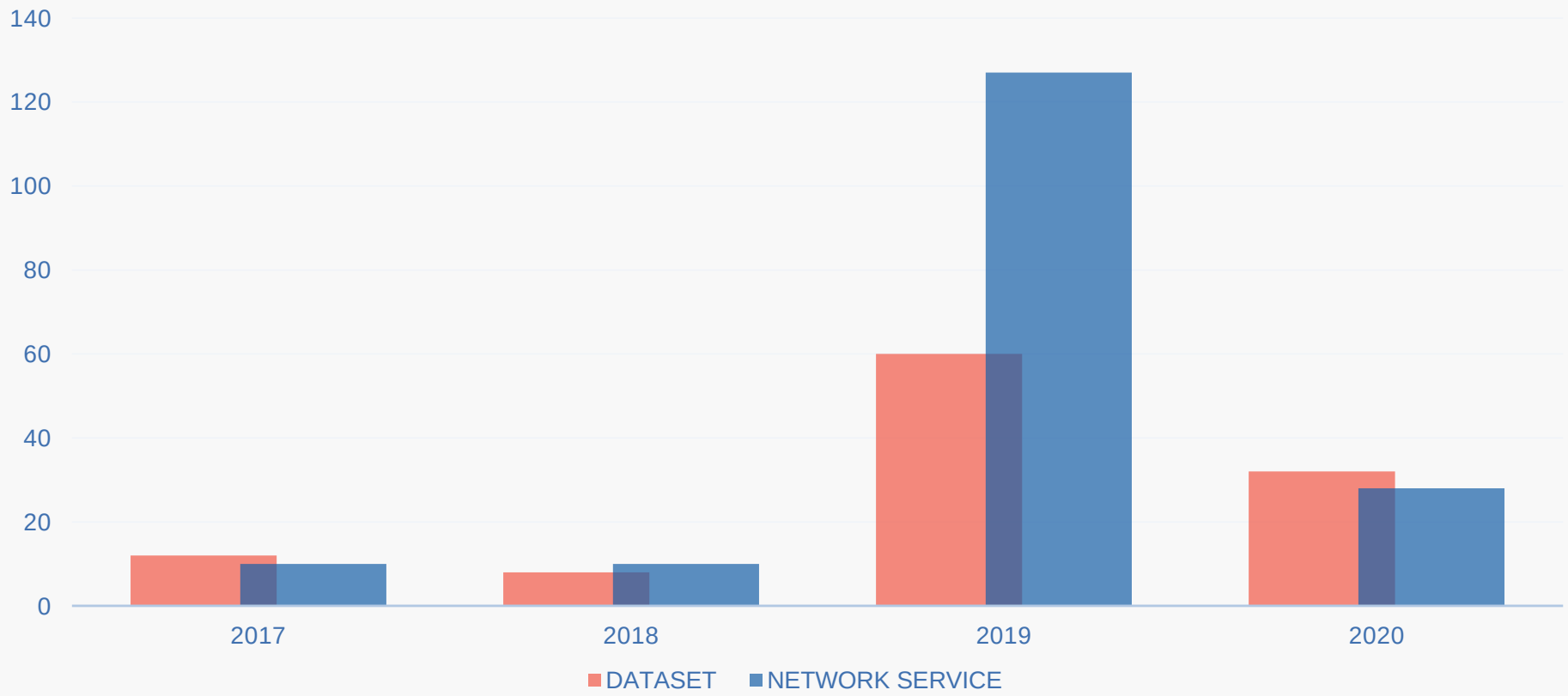
Number of NSDI Subjects



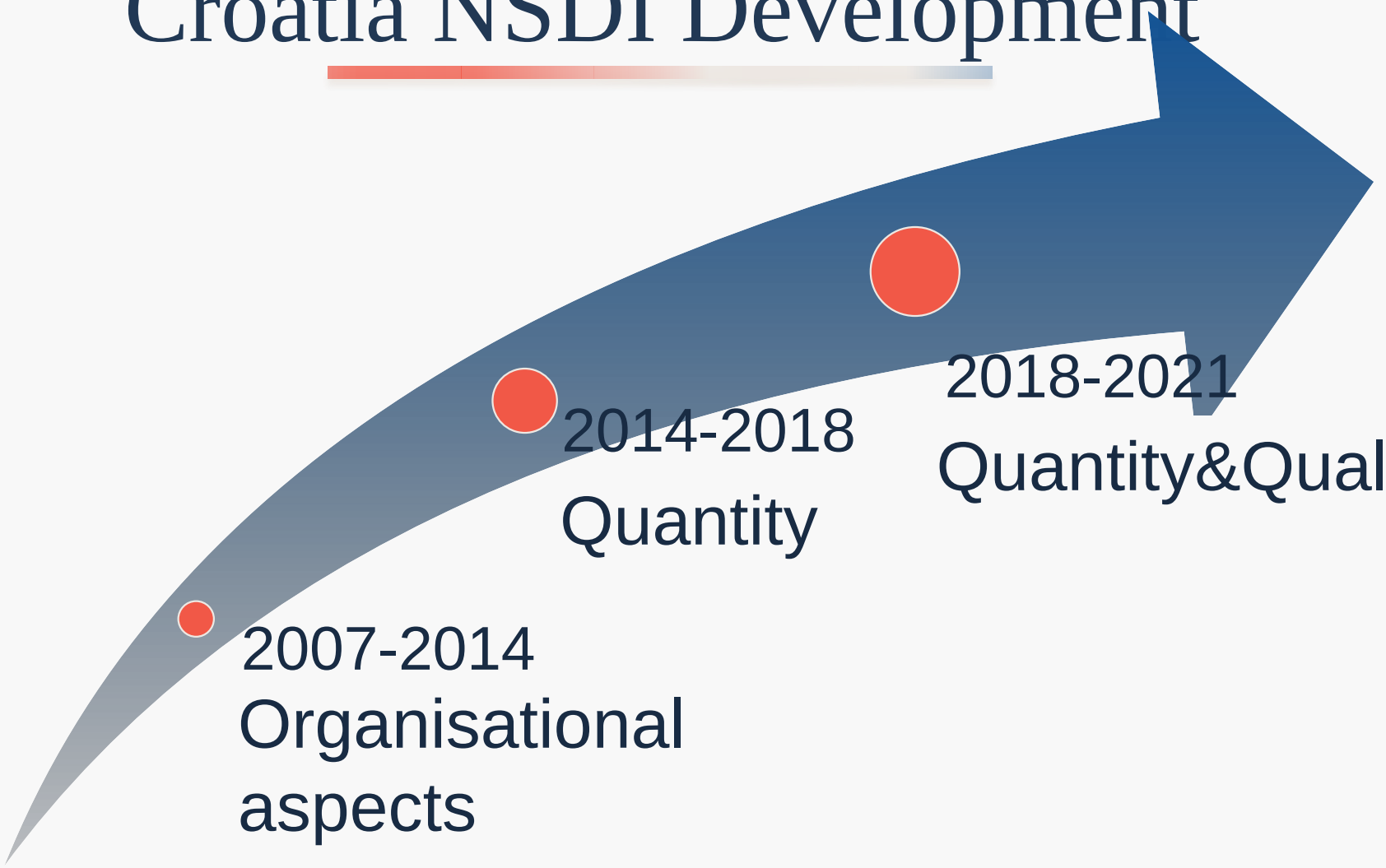
Number of data sources



Metadata records in NSDI Geoportal



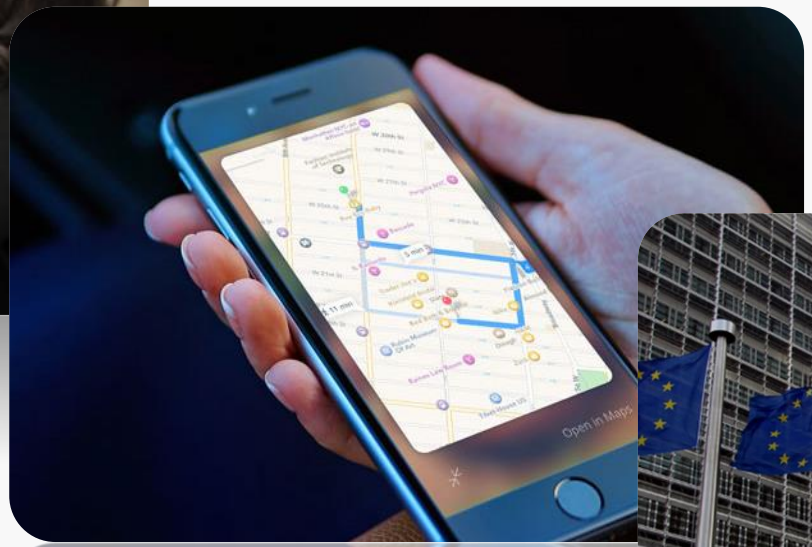
Croatia NSDI Development



User perspective!

Quality is suitability for use..

Jospeh M. Juran

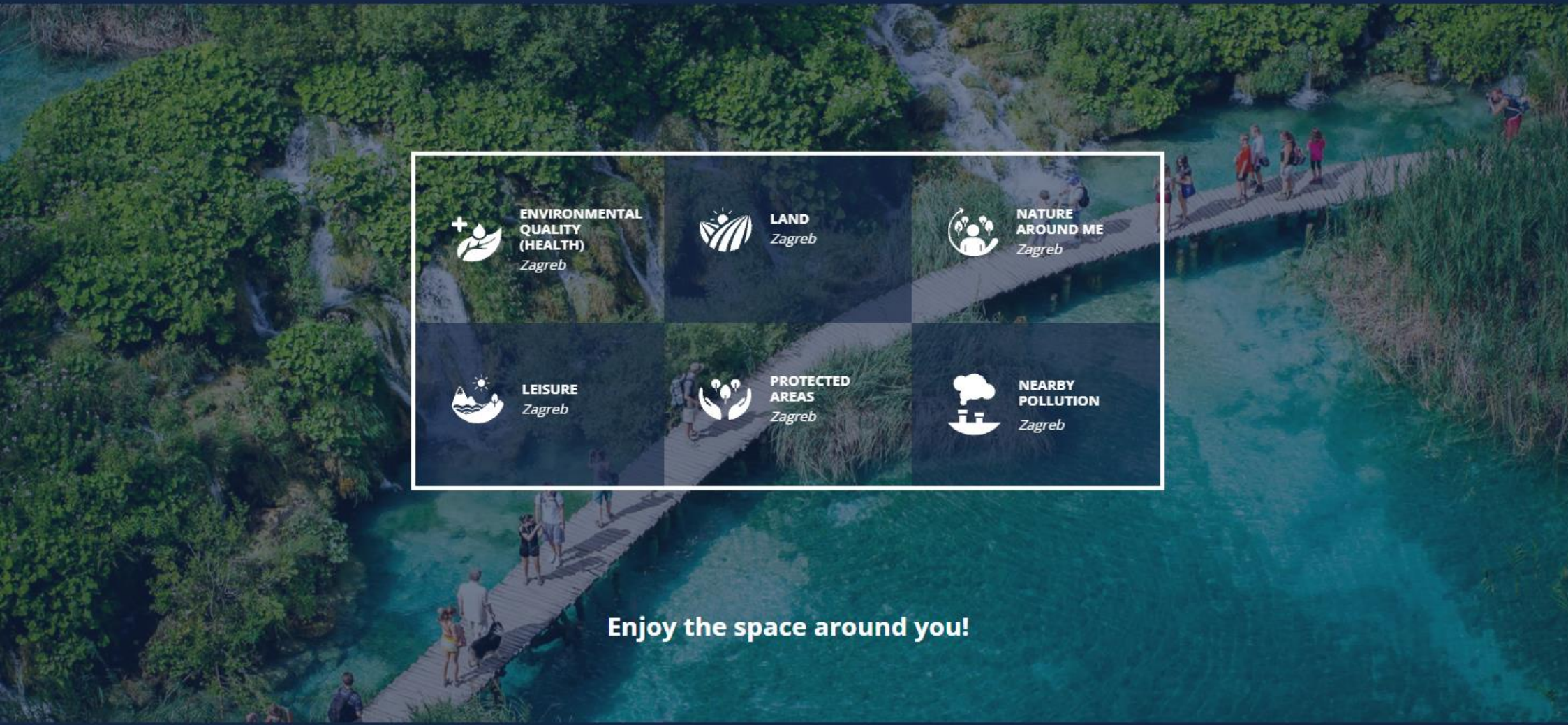


Quality is meeting requirements.

Philip Crosby

Quality is error prevention.

W. Edwards Deming



Enjoy the space around you!

National contact point for NSDI and INSPIRE
State Geodetic Administration
Gruška 20 10 000 Zagreb, Croatia

Optimized for: IE11+, Edge, Firefox, Chrome, Safari
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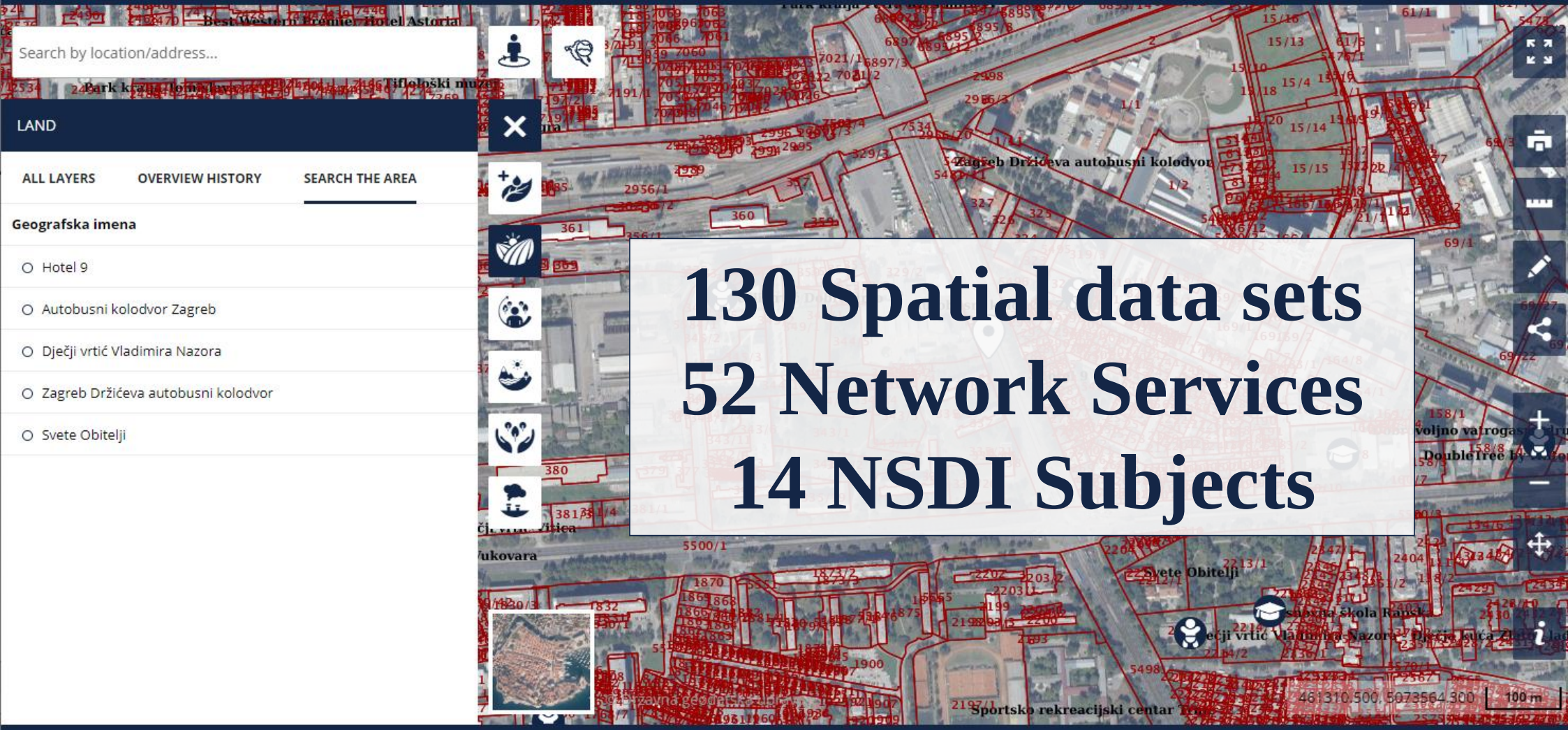

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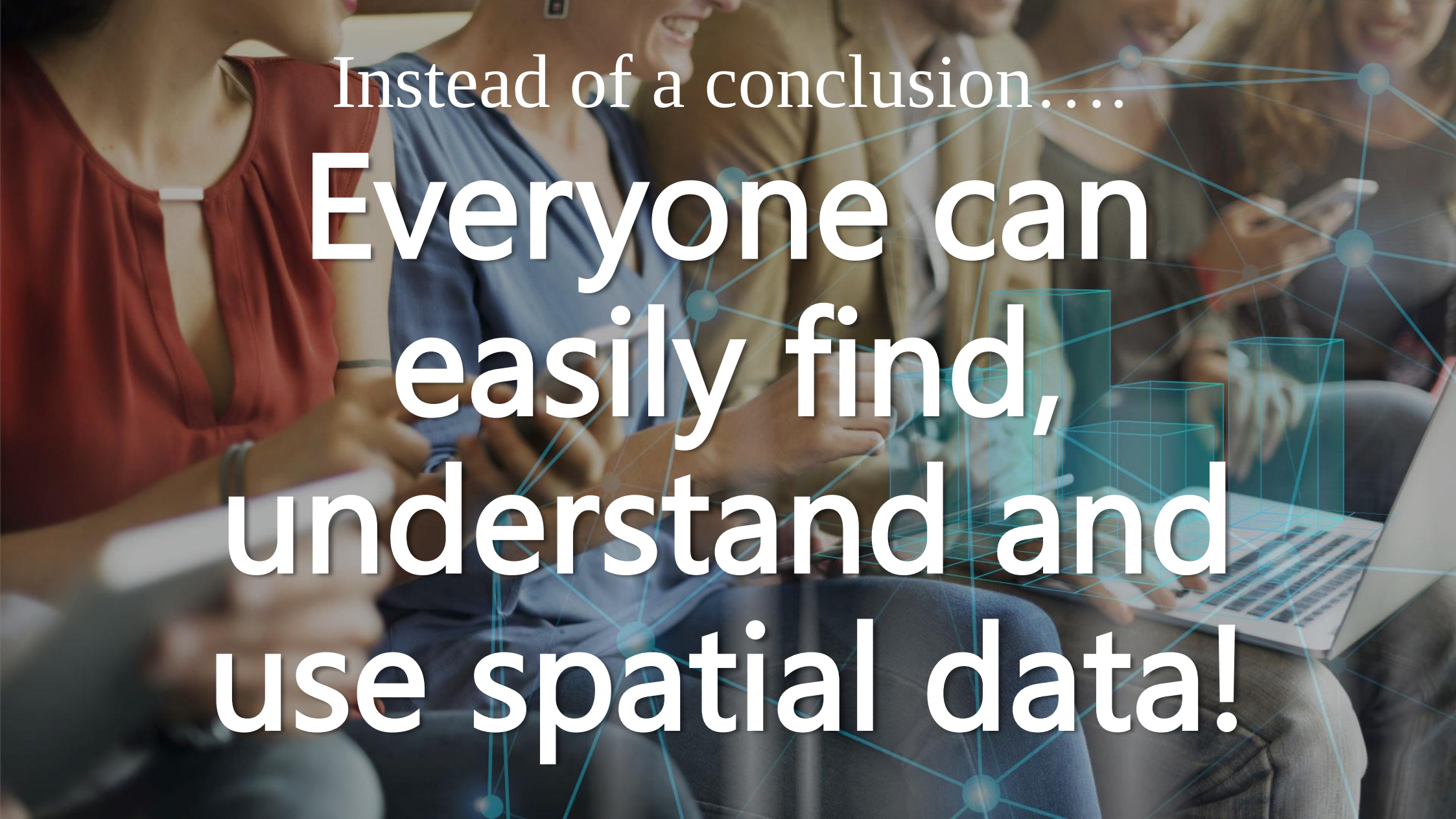
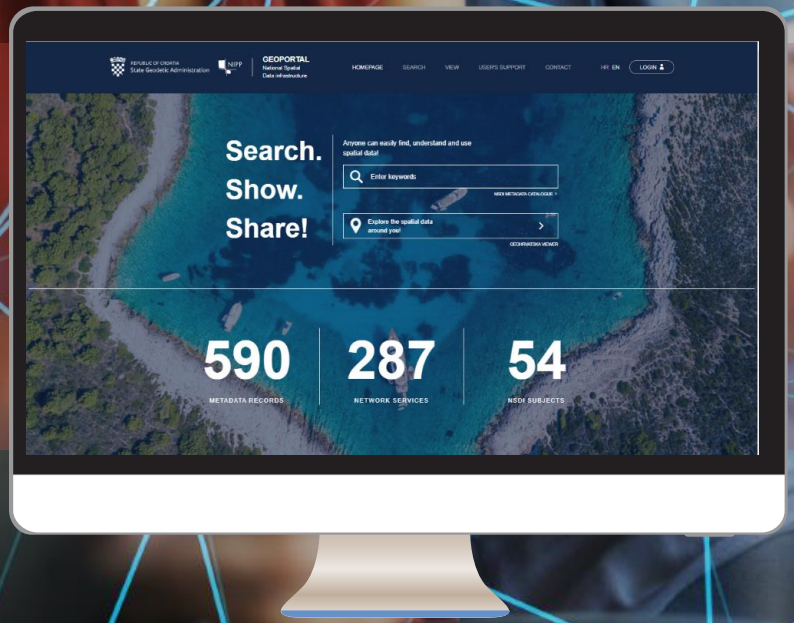
12 Conferences
31 Workshops


Instead of a conclusion….
Everyone can easily find, understand and use spatial data!

“Interoperability seems to be about the integration of information. What it’s really about is the coordination of organizational behavior.”
David Schell, Founder and Chairman of the OGC

REPUBLIKA HRVATSKA
Državna geodetska uprava

DGU



Thx for your attention!

tomislav.ciceli@dgu.hr;

infonipp@dgu.hr

Experiences from Poland on Open Data Policy

Marcin Grudzień, Head Office of Geodesy and Cartography of Poland

Marcin is a specialist in data analysis. He has taken an active part in building the fourth-biggest public sector IT system in Poland, addressing its stakeholders' technical, semantic, operational, and legal aspects. Marcin has extensive experience in all tasks related to complex IT-system development processes: from initial phase - analysis of cross-sector user requirements, standards and available data sets, identification of requirements including data analysis, through development and implementation including supervising of contractors and quality control of deliverables, up to daily administration and maintenance of a big IT GIS system.

Currently, he works in the National Mapping Authority of Poland as a Deputy Director of the Strategy and International Cooperation Department. He is also the Chair of EuroGeographics' INSPIRE Knowledge Exchange Network.

Marcin works at the head office of the Geodesy and Cartography (GUGiK) in Poland, the National Mapping Authority, which is responsible for 15 INSPIRE themes.

He explained the reasons for making data open are essentially two-fold. Firstly, if the data is free then many private sector organisations create services using it, this generates new revenues, employment for additional people and, through them paying their taxes, more income to Government. The second reason is that in many cases they found that the revenues to Government departments from selling the data was greater than the cost of administering the collection of the fees.

GuGiK started their journey in 2014 by making addresses, administrative boundaries, geographical names and low-resolution DTMs open. This was successful and in 2020, most of the datasets were opened including 1:10K topographic basemaps, Orthoimagery, DEM (including LiDAR), geodetic network points. Cadastral parcels and building footprints were also partially opened.

He described the extensive set of services that have been developed for viewing and downloading the open data and its simultaneous publication on the Polish open data portal. The increase in usage since the services went live is impressive. GuGiK are helping local governments integrate their data with over 80% of the 380 municipalities now publishing cadastral parcels of buildings. GuGiK wish to open aerial imagery and large-scale topographic maps, but this requires changes to laws, which will take some time.

Marcin invited the audience to look at their website and to follow the links to where they have shared on GitHub their processes, which will be a useful resource to other countries looking to follow their example.

GŁÓWNY URZĄD GEODEZJI I KARTOGRAFII

Experiences from Poland on Open Data Policy

Marcin Grudzień

Geospatial Information for Digital Transformation

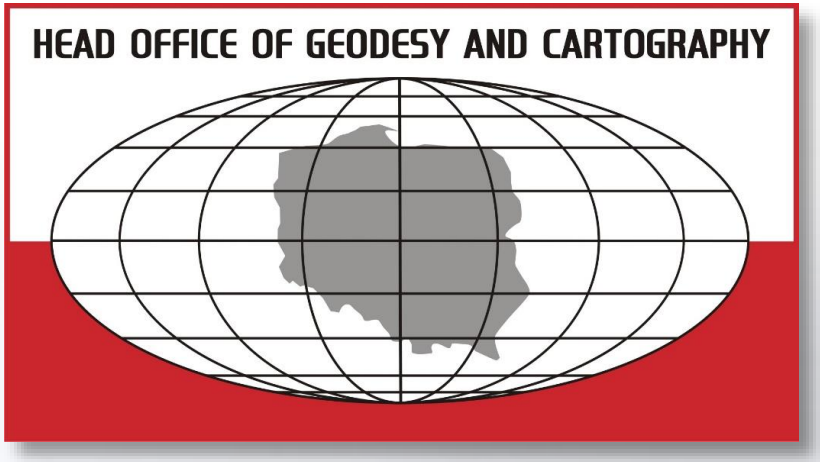
28 November 2021

Agenda

- Who are we?
  - Organisational structure
- Why Open Data?
- Short history of data opening
- Ways of downloading the Open Data
  - Download statistics
- Advantages and disadvantages of Open Data
- Plans

Who are we?

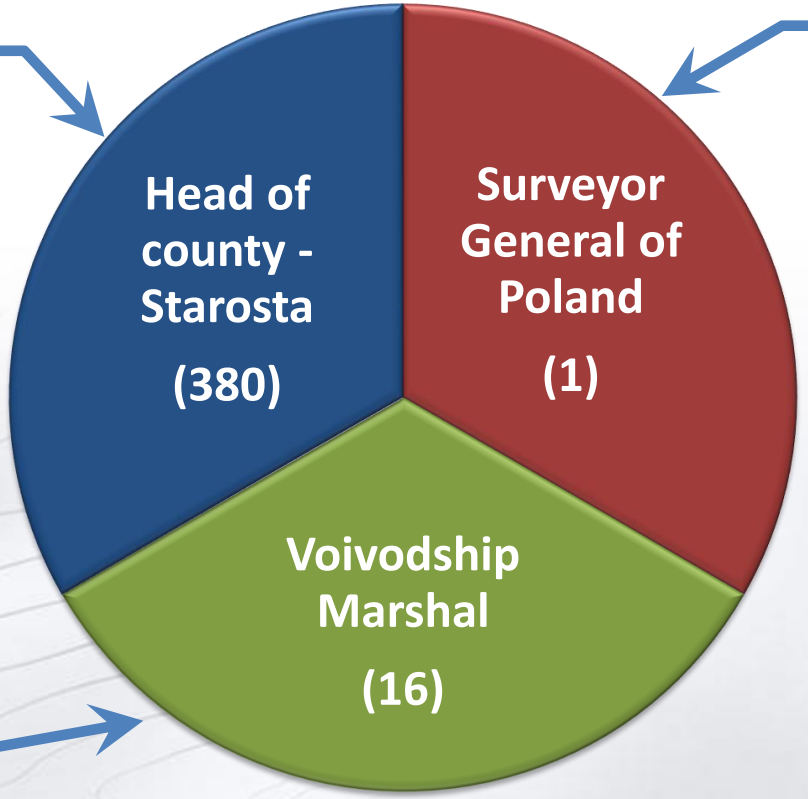
- The Head Office of Geodesy and Cartography (GUGiK) is Polish National Mapping and Cadastral Authority
- The Head of GUGiK is the Surveyor General of Poland (GGK) who is also the Head of the Polish Geodetic and Cartographic Service
- GGK coordinates INSPIRE implementation in Poland
- GGK is directly responsible for the harmonisation of datasets for 15 INSPIRE themes



Polish Geodetic and Cartographic Service

Cadastral parcels and buildings
Utilities
Large scale topographic databases

Basic map



Small scale topographic databases
Orthoimagery
DEM and DTM
Territorial units
Addresses

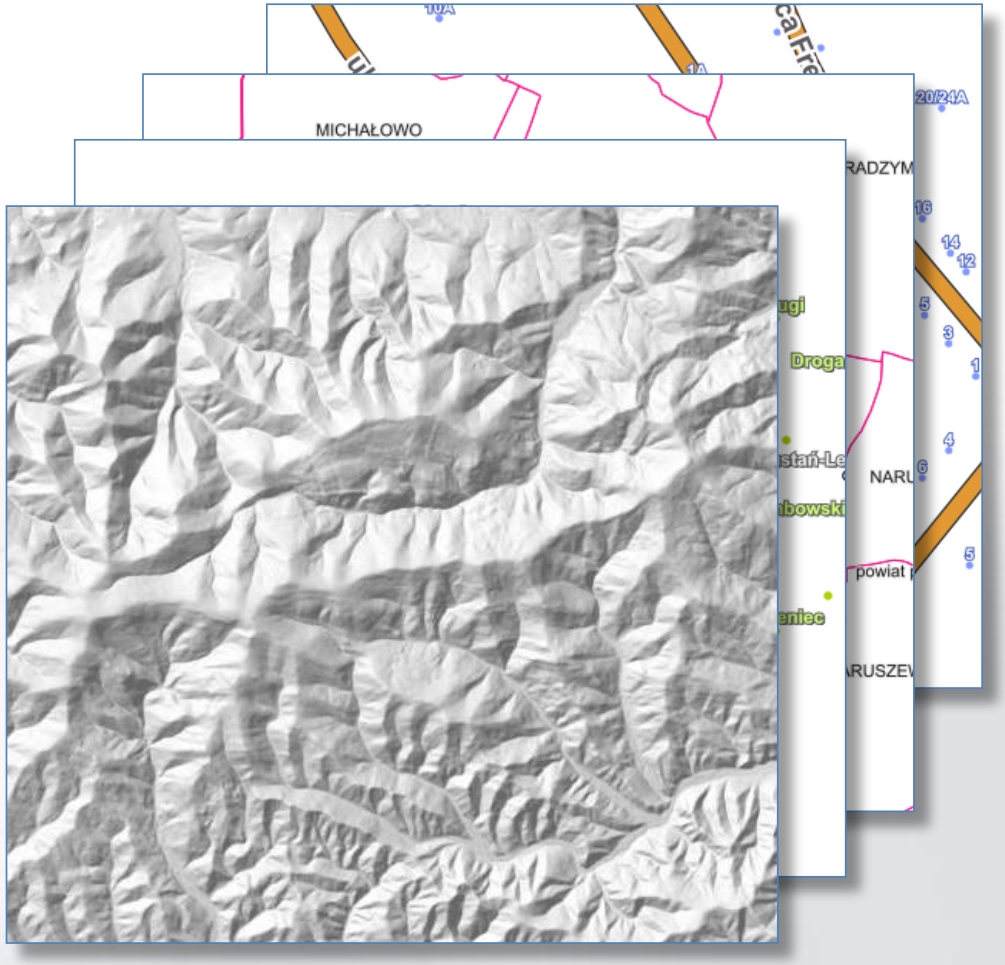
Medium scale topographic databases

Why we opened our data?

- Strategic
  - *"Every Polish Zloty spend on publicly available Open Data returns multiplied to the state budget"*
- Organisational
  - In many cases, money spent on maintaining staff and tools responsible for selling data was higher than income from the data

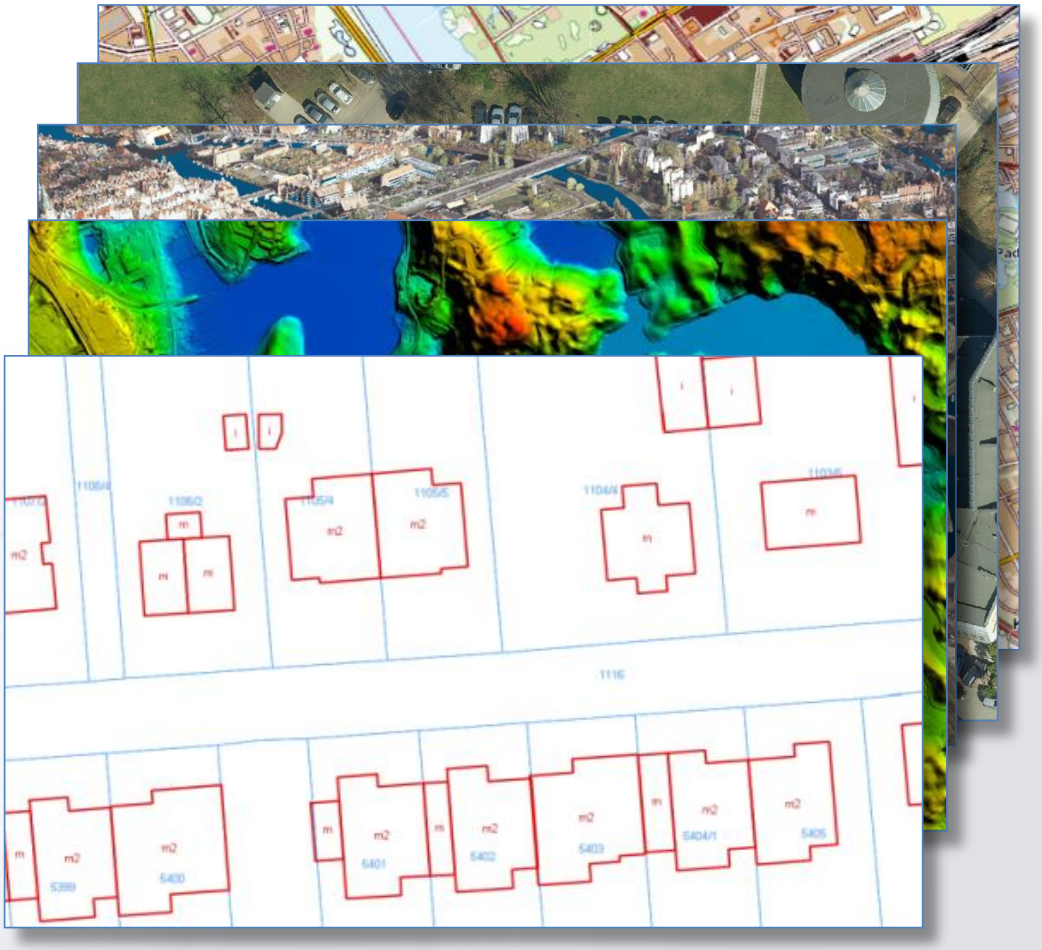
History of data opening (1)

- In July 2014 following data sets were opened
  - Addresses
  - Territorial Units
  - Geographical Names
  - Digital Elevation Model (100 m only)



History of data opening (2)

- In July 2021 following data sets were opened
  - Medium Scale Topographic Database (10k)
  - Orthoimagery
  - Digital Elevation Model
    - DTM, DSM and LIDAR
  - Geodetic Network Points
  - Cadastral Parcels
    - Only geometry (boundaries) and IDs
  - Buildings
    - Only geometry, IDs and classification



Opened Data – current state

Cadastral parcels and buildings

Utilities

Large scale topographic databases

Basic map

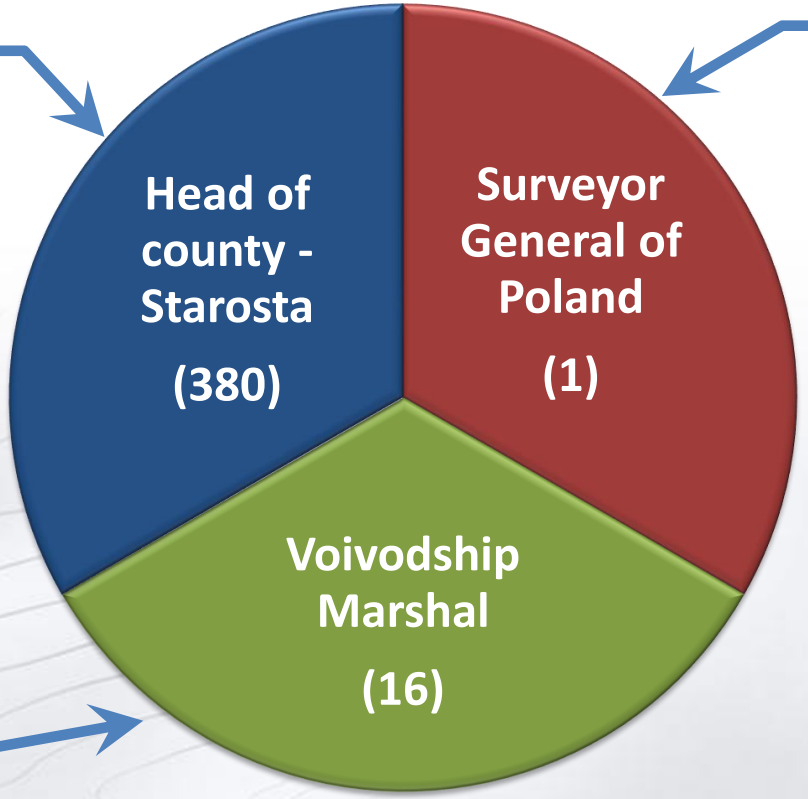
Small scale topographic databases

Orthoimagery

DEM and DTM

Territorial units

Addresses



Medium scale topographic databases

Fully opened data

Partially opened data

Data not opened

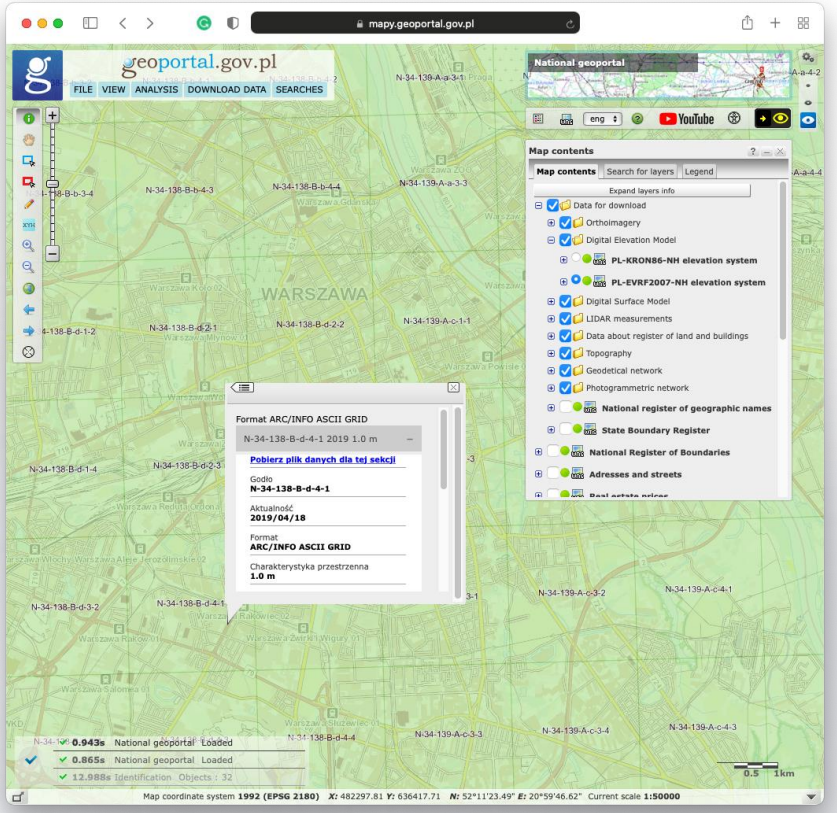
Open Data volumes

Data set	Volume (GB)*
Addresses	4
Boundaries	8
DTM, DSM (including LIDAR)	**153 000 (LIDAR 119 000)**
Geodetic Control Network Points	150
Geographic Names	0.8
Medium Scale Topographic Database	14
Orthoimagery	**49 000**
Small Scale Topographic Database	0.15

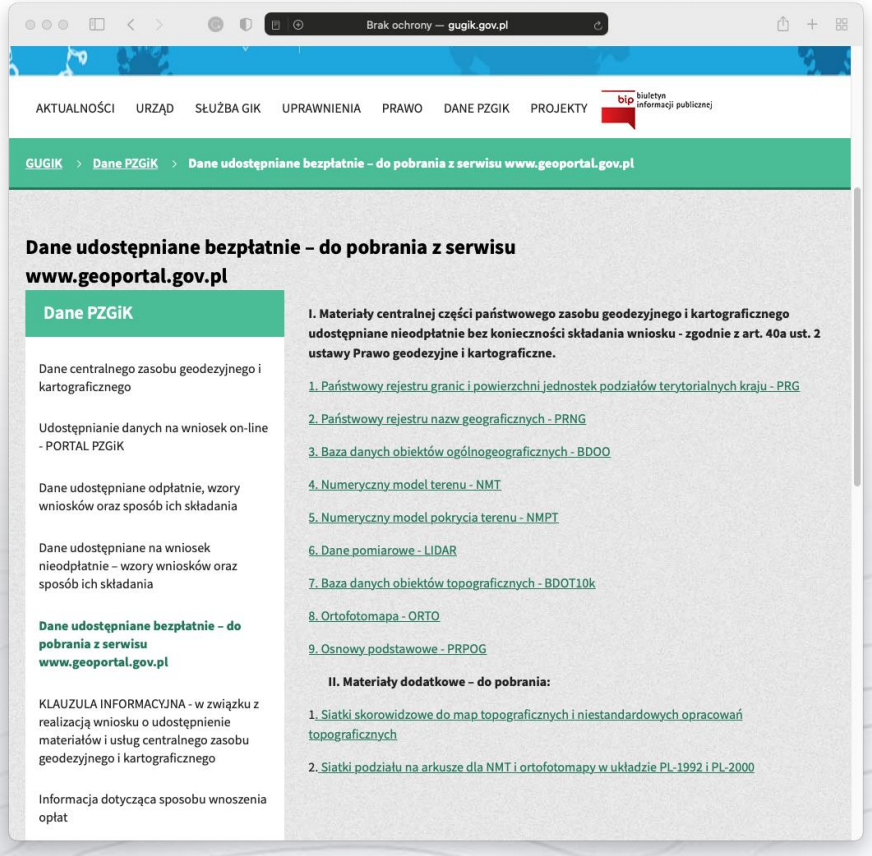
* values obtained on the 12th of October 2021

Ways to download the data (1)

- View services publishing download links
  - View WMS service publishes index map containing polygon objects covering a spatial extent of data subsets
  - Attributes of each object contain URL (link) allowing to download particular data subset and metadata describing the subset
  - View services integrated with National Geoportal. However, third parties software utilising the services exists.
  - This way of publishing spatial data was proposed as INSPIRE Good Practice
  - Video explaining the approach



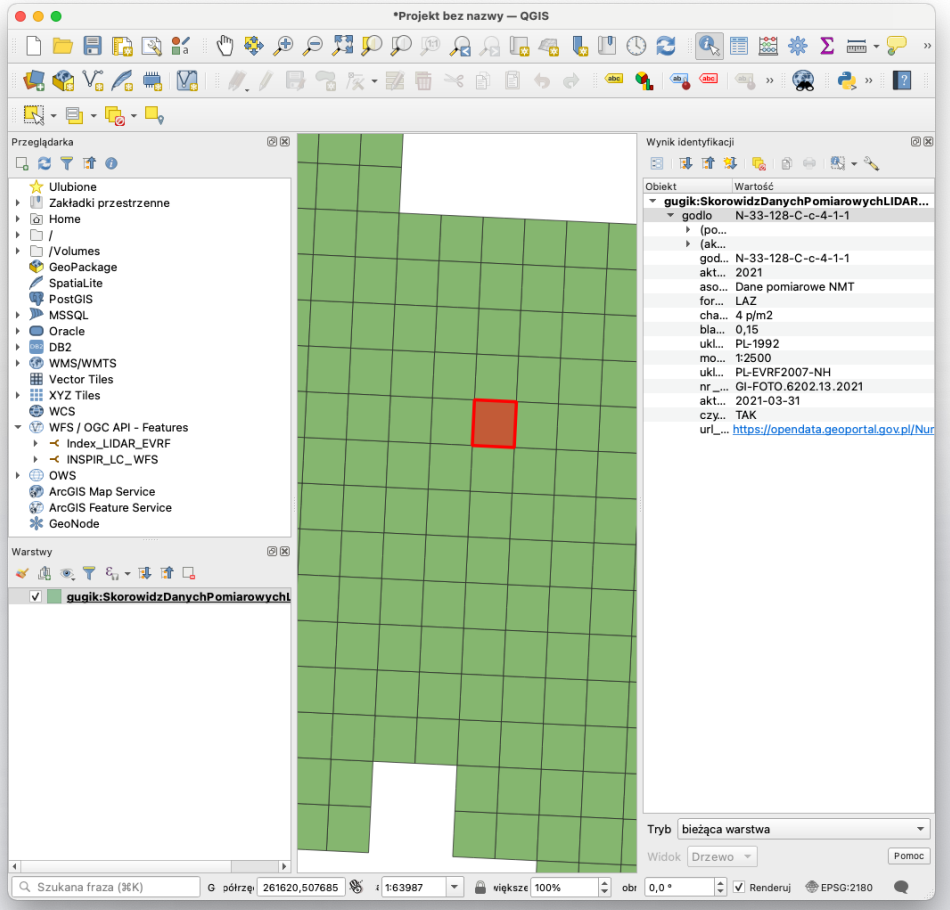
Ways to download the data (2)



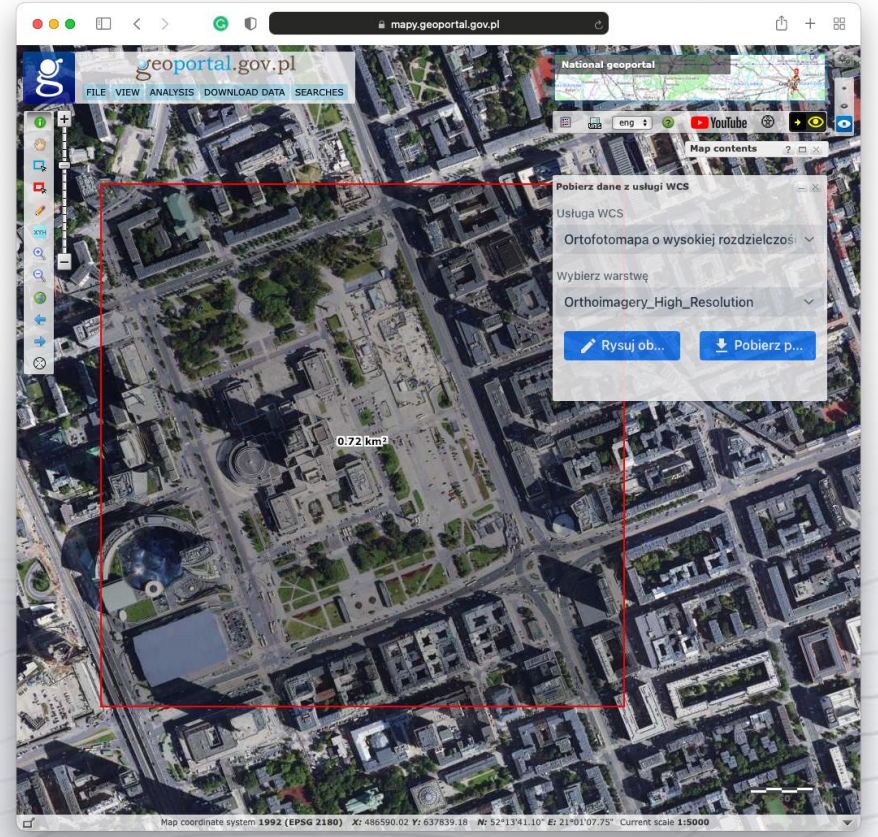
- Links on the websites
  - Links allowing to download some of the data are available on the GUGiK website
  - Links also available on Polish Open Data Portal

Ways to download the data (3)

- Download WFS services publishing map indexes with links to data subsets
  - WFS service publishes index map containing polygon objects covering a spatial extent of data subsets
  - Attributes of each object contain URL (link) allowing to download particular data subset and metadata describing the subset
  - Most suitable for bulk download
  - URLs of the download services can be found on the National Geoportal website

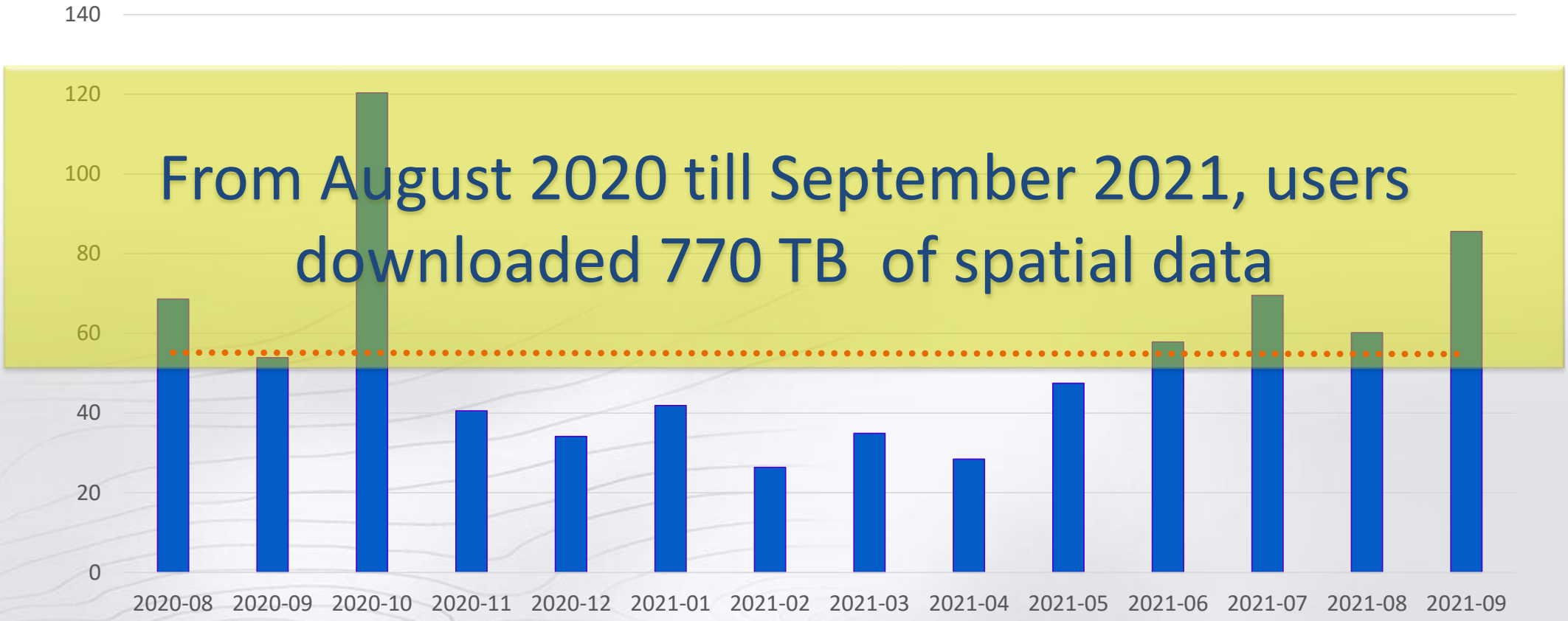


Ways to download the data (4)

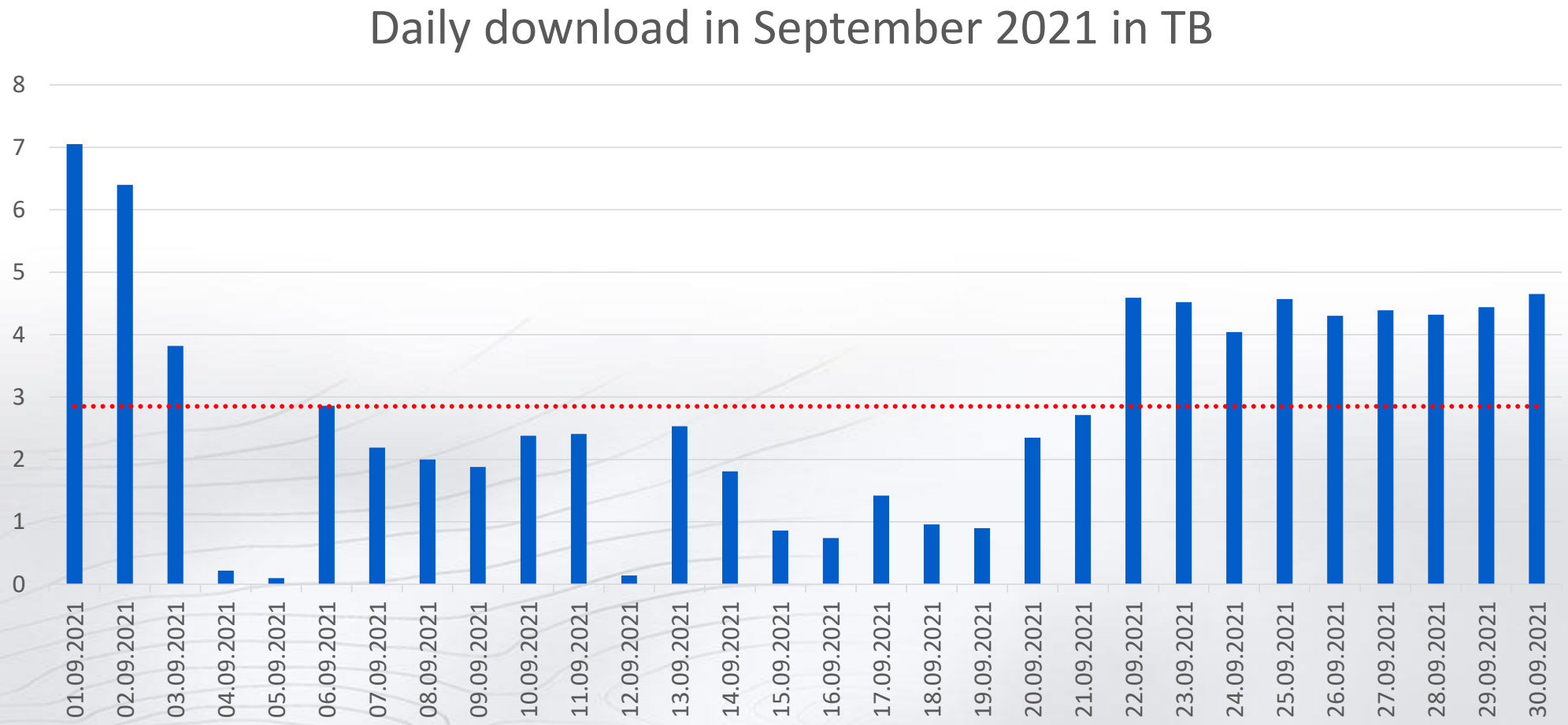


- Standard download services
  - Web Feature Service (WFS)
  - Web Coverage Service (WCS)
  - ATOM feeds
  - WFSs and WCSs integrated with National Geoportal, allowing to download the data using user-friendly GUI
  - ATOM feeds user-friendly client application available

Download statistics (1)



Download statistics (2)

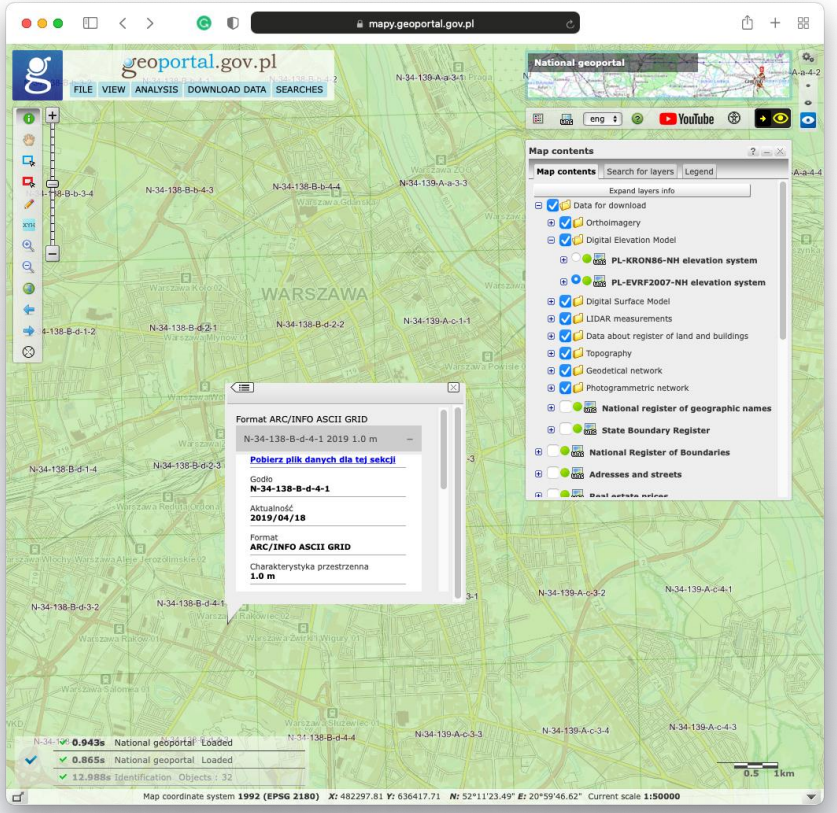


Open Data on the local level

- Publishing of Open Data is more challenging to local governments (counties)
- On the 13th of October, 292 counties (out of 380) publish WFS services with cadastral parcels and buildings

Integrating view services

- GUGiK integrates local WMS services published by local governments (counties)
- Integrating service allows users to access cadastral parcels and buildings data from one endpoint instead of 380 local endpoints
- This way of integrating spatial data was proposed as INSPIRE Good Practice



Advantages and disadvantages (1)

User perspective

Advantages

- Free online access to the vast collection of spatial data
- No logging in or registration required

Disadvantages

- None

Advantages and disadvantages (1)

Data publisher (GUGiK) perspective

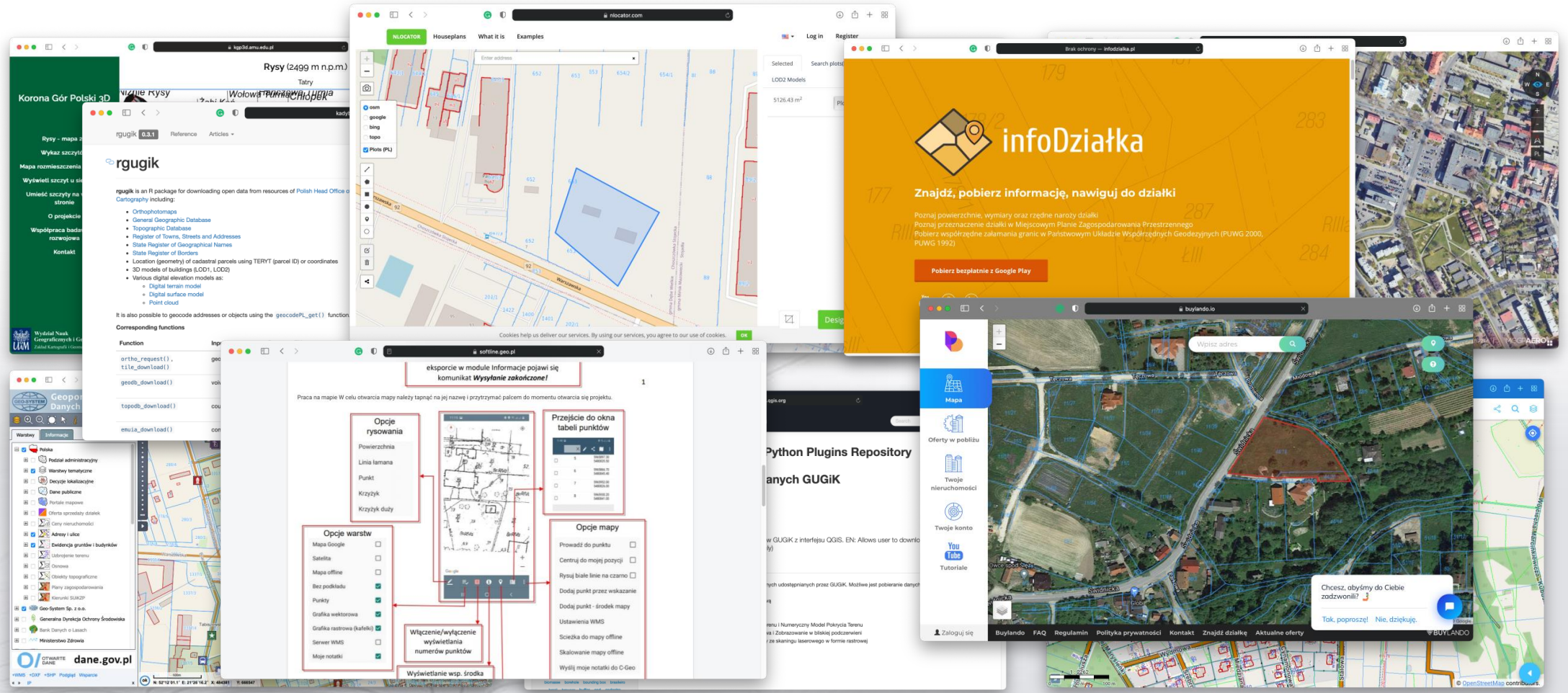
Advantages

- Wider utilisation of spatial data managed by the organisation
- Liberation of human resources that can be allocated to other vital tasks, e.g. data capture, data quality assurance, etc.

Disadvantages

- No income from the data sale

Wide utilisation of Open Data



Plans

- GUGiK plans further data opening
  - Aerial photography
  - Topographic and thematic maps

Thank you for your attention

mapy.geoportal.gov.pl

marcin.grudzien@gugik.gov.pl

Fit-for-Purpose Land Administration

Gavin Adlington, Independent Land Administration Expert

Over the years Gavin Adlington has developed a unique breadth of knowledge and a deep understanding of all matters relating to land registration and cadastre systems, especially with regard to the successful implementation of projects involving mass systematic registration of title and the establishment of institutions that can successfully manage real estate registration and cadastres.

Gavin spent over 20 years with the World Bank during which time he undertook land administration projects in 46 countries and advise another 20 – he modestly described his job during that time as trying to make projects work. Establishing where the parcels are is the most basic need of land administration. Fit-for-Purpose land administration is what he has done where projects have been successful. The technical aspects of survey are complex but the legal and institutional issues, at scale are far more challenging.

Remembering that the customer is the citizen is a key principle, he described fit for purpose as **SCARF – Simple, Cheap, Accessible, Reliable and Fast.**

The need to be a professional, who not only knows the rules but also can interpret them in the context of the country in which they are working, is key to fitness for purpose. He gave practical examples from different continents and pointed to the recent free book written on Real estate registration and cadastre: Practical Lessons and experiences, which contains many more (gadlandreg.org) which has been downloaded in more than 120 countries.

In the discussion session he identified that some of the biggest barriers were often lawyers and surveyors with a vested interest in preventing land registration. At the core of resistance to change was often corruption.

Many of the projects that Gavin advised on or led were in the Eastern Europe and Central Asia region where major reforms were being implemented following the collapse of the socialist systems and change over to market economies in the early 1990's, but he covered many countries in other regions as well. He has worked primarily for the World Bank through the last 20+ years of his career, eventually becoming the global lead specialist for land and geospatial matters worldwide for the World Bank. He retired in 2015 but has since then continued to work as a consultant in the same sector.

In December 2013, Gavin received the Michael Barrett Award from the Royal Institution of Chartered Surveyors of the United Kingdom "to the person whom in the opinion of the panel/ division has contributed most to the understanding of the subjects of land transfer, registration and administration, encroachments, cadastre and boundary issues, or the administration of the laws regarding them with the UK and overseas". This is a prestigious award given once per year to one individual worldwide.

FIT-FOR-PURPOSE LAND ADMINISTRATION

Guiding Principles for Country Implementation

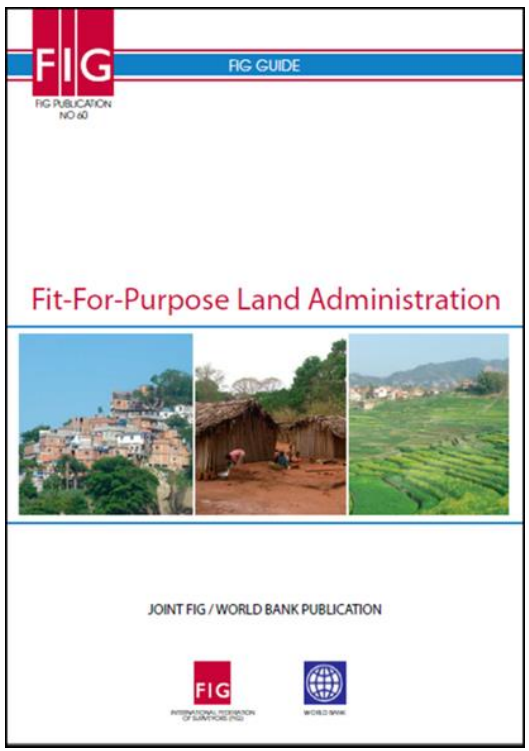
Reflections on the principles and content by Gavin Adlington FRICS

Authors of the book : Stig Enemark, Robin McLaren and Christiaan Lemmen

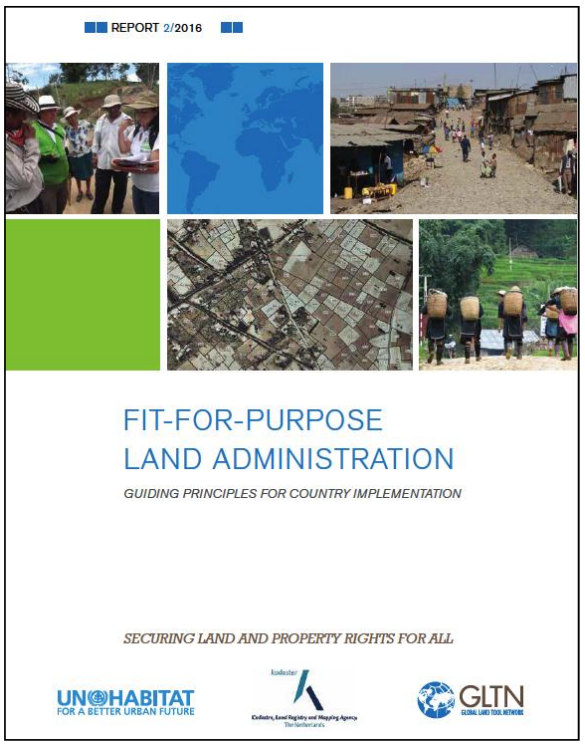
Online Conference GEOSPATIAL INFORMATION FOR DIGITAL TRANSFORMATION:
CURRENT INITIATIVES AND FUTURE OPPORTUNITIES Oslo, 27-29 October 2021

Fit-For-Purpose Land Administration

2014



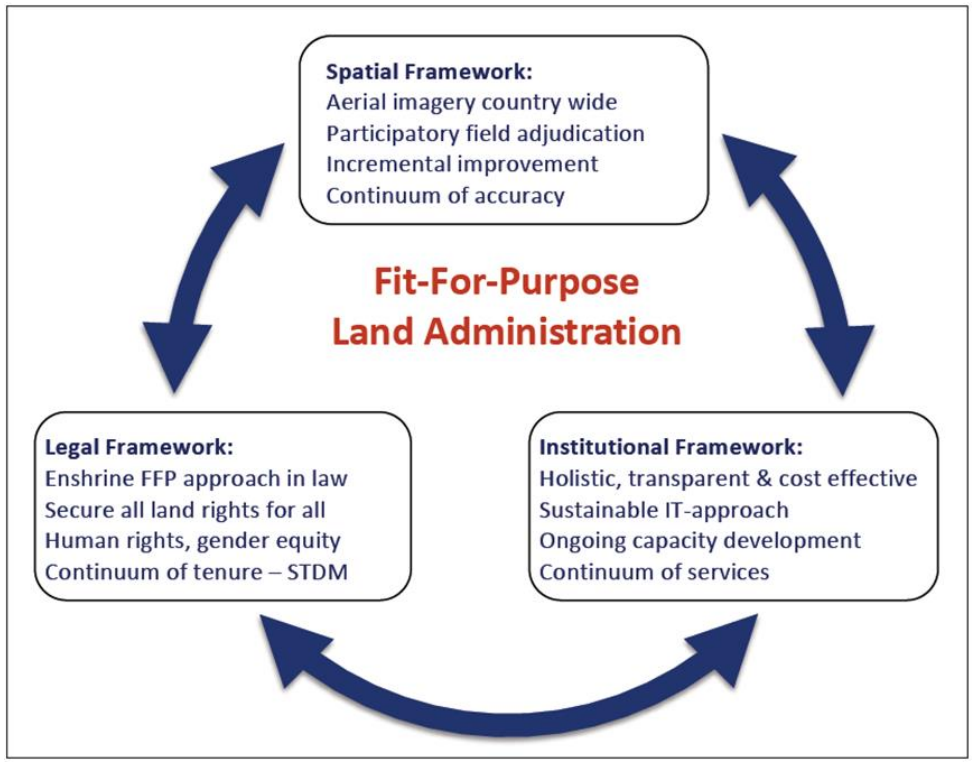
2016



The phrase FFP is commonly used for any intervention or activity that is appropriate, and of a necessary standard, for its intended use

Slide from Stig Enemark

Fit-for-Purpose Land Administration – the Concept



Three characteristics:

- Focus on the Purpose
- Flexibility
- Incremental Improvement

KEY PRINCIPLES		
Spatial Framework	**Legal Framework**	**Institutional Framework**
▪ Visible (physical) boundaries rather than fixed boundaries ▪ Aerial / satellite imagery rather than field surveys ▪ Accuracy relates to the purpose rather than technical standards ▪ Demands for updating and opportunities for upgrading and ongoing improvement	▪ A flexible framework designed along administrative rather than judicial lines. ▪ A continuum of tenure rather than just individual ownership ▪ Flexible recordation rather than only one register ▪ Ensuring gender equity for land and property rights.	▪ Good land governance rather than bureaucratic barriers ▪ Holistic institutional framework rather than sectorial siloes ▪ Flexible IT approach rather than high-end technology solutions ▪ Transparent land information with easy and affordable access for all

Slide from Stig Enemark

Key Principles

Spatial Framework	Legal Framework	Institutional Framework
Visible (physical) boundaries rather than fixed boundaries.	A flexible framework designed along administrative rather than judicial lines	Good land governance rather than bureaucratic barriers
Aerial Satellite imagery rather than field surveys	A continuum of tenure rather than just individual ownership	Holistic institutional framework rather than sectoral siloes
Accuracy relates to the purpose rather than technical standards	Flexible registration rather than only one register	Flexible IT approach rather than high end technical solutions
Demands for updating and opportunities for upgrading and ongoing improvement	Ensuring gender equity for land and property rights.	Transparent land information with easy and affordable access for all.

Key Principles
Remember the Customer!

Spatial Framework	Legal Framework	Institutional Framework
Visible (physical) boundaries rather than fixed boundaries.	A flexible framework designed along administrative rather than judicial lines	Good land governance rather than bureaucratic barriers
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Demands for updating and opportunities for upgrading and ongoing improvement	Ensuring gender equity for land and property rights.	Transparent land information with easy and affordable access for all.

Are you a Professional of a Technician?

Late 1950's - 1960's - Kenya
Hedge planting followed by aerial photography

Kenya and hedge planting

1. Owners required to plant fast growing hedges
2. Hedge inspectorate ensured that they complied
3. Junior surveyor identified hedges on aerial photographs in the field.
4. These unrectified records were then used to prepare the cadastre map.
5. Government official noted owners and adjudicated rights
6. Several million hectares simply registered
7. Several hundred thousand owners registered

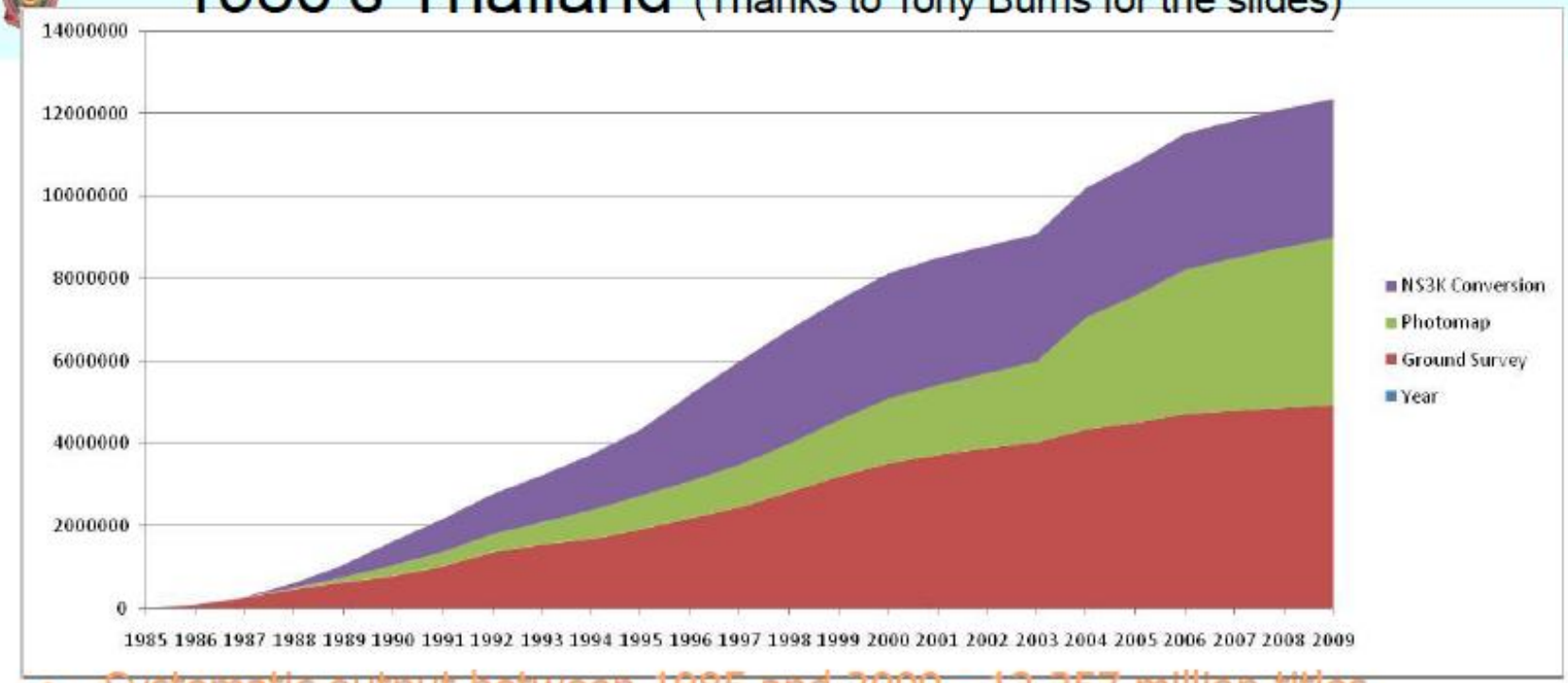
Rwanda

Map 4.1 from the FFP book showing how fields and properties can easily be identified on the aerial imagery.

Source: Didier Sagashya, Rwanda

Bagong Silang informal settlement. Quezon City, Philippines. Photo © UN-Habitat/ John Gitau. (Taken from the FFP book)

1980's Thailand (Thanks to Tony Burns for the slides)



- Systematic output between 1985 and 2009 - 12.357 million titles
  - Ground survey 4.919 million (39.8%)
  - Photomap survey 4.078 million (33.0%)
  - NS3K Conversion 3.361 million (27.2%)
- Title register in 1984 was about 4.4 million; in 2009 was 26.898 million and currently 34 million
- Sporadic titles issued between 1985 and 2009 – about 10.14 million titles

Selected Others:

Peru – Over 1 million properties surveyed and registered in 1998 using total stations. Urban area. 75% female ownership!

Laos – 770,000 registered properties since 1997 and effective registration system established nationwide. Survey done primarily with photomaps.

Caribbean – British Directorate of Overseas Surveys used 'General boundaries' used since the 1950s - In Africa and the Caribbean - Antigua, British Virgin Islands, Turks and Caicos Is, Anguilla, Cayman Is, and St. Lucia. Completed the islands.

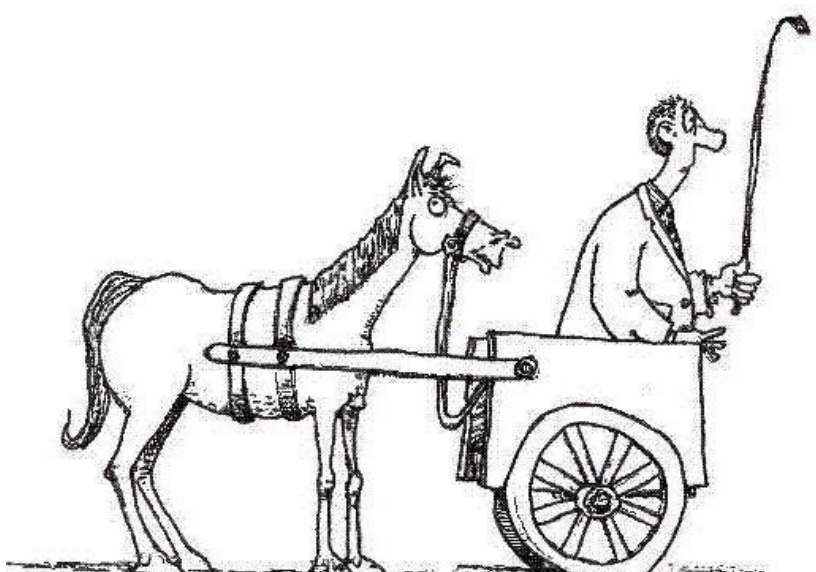
Cambodia – 1.5 million properties surveyed using orthophotomap interpretation and total stations when necessary.

Gov asks professions:

What needs to be done?
How much will it cost?
How long will it take?

Gov tells professions:

This is what needs to be done.
This is how much money you have.
This is when it must be completed.



Digitalization Transformation in Serbia

Darko Vucetic, Republic Geodetic Authority, Serbia

Darko Vucetic is a Head of the Centre for Geospatial Information Management at the Republic Geodetic Authority of Serbia. His main activity is to seek and provide the most optimal solutions based on geospatial data management to all public sector institutions within the NSDI and to ensure strategic approach for geospatial data use at the national level.

The Centre apply innovative approach and technologies, develop fit-for-purpose solutions, methodologies and business processes, and provide capacity building and awareness rising for usage of geospatial data.

Darko has been with the Republic Geodetic Authority (RGA) for 10 years and during that time has, with his colleagues, achieved truly transformational change. At the start, there over 4.5 million buildings had not been registered. The business processes needed to implement registration laws were a tangled mess, duplication was extreme and there was a lack of trust and transparency.

A rapid programme of digital transformation to implement a range of e-services is estimated to have saved 6 million hours of public time and yielded government efficiency of €38 million.

The digitization also supported many of the changes necessitated by the arrival of the COVID pandemic, enabling the real estate market to continue to perform at similar levels to pre-pandemic. Using the same infrastructure, the Geoserbia platform was used to assemble the data on schools, buildings, medical facilities, and social welfare to provide the evidence-base for decision making on finding disease hot spots, protecting vulnerable people and keeping supply chains operational.

Darko observed that registration is never popular or high profile, so a strong communication team is essential, much of his task is to keep their successes in the news. This was recently recognised by their director receiving the digital reformer of the year award for Serbia.
In the Questions and Answers, when asked about sustainability he called out the World Bank loan as having been critical. They have also recently completed a socio-economic impact assessment using the IGIF principles and demonstrated a 5:1 Return on Investment for their work on NSDI. This will be a valuable tool in their advocacy of continued investment

REPUBLIC GEODETIC AUTHORITY OF SERBIA

Центар за управљање геопросторним подацима
Center of Geospatial information management
www.geosrbija.rs

Републички геодетски завод : : Republic geodetic authority
Булевар војводе Мишића 39 : : Bulevar vojvode Mišića 39
11000 Београд : : 11000 Belgrade : :
www.rgz.gov.rs

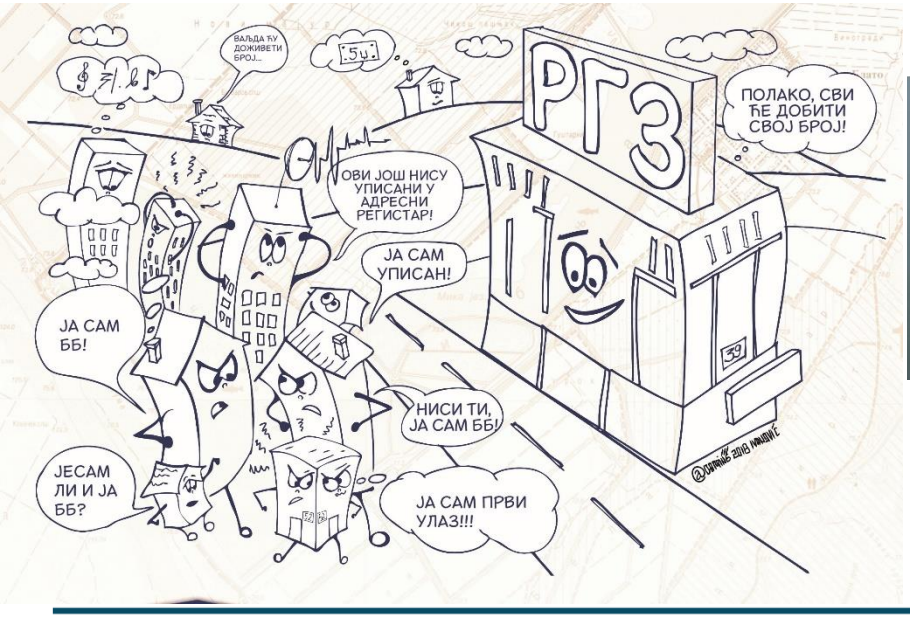
Republic Geodetic Authority

By the official **Law on state survey and cadaster RGA is** national geospatial data provider **responsible** for:

- ✓ NSDI;
- ✓ Geodetic Reference Systems;
- ✓ State Survey;
- ✓ Real-estate cadastre;
- ✓ Utillity cadastre;
- ✓ Registry of administrative Units;
- ✓ Addresses Registry;
- ✓ Topography and Cartography;
- ✓ Real-estate Mass Valuation;
- ✓ Registry of Geographic Names;
- ✓ Professional supervision and licensing of geodetic organizations;
- ✓ Geomagnetism and aeronomy;
- ✓ ....

Address register (2016)

- **Population: 7,020,858**
- 2.676.898 citizens leave in street without name and house number
- 3.028.020 citizens leave in street without house number
- 60.500 streets are not registered - estimation



Poštovani/a,

Čast nam je da Vas pozovemo da nam se pridružite na svečanom prijemu povodom tradicionalne konferencije Sinergija 18.

Svečani prijem će biti održan na Belom dvoru, Prijanina Baja bb, Beograd, 25. oktobra 2018. sa početkom u 20h.

Srdačan pozdrav,

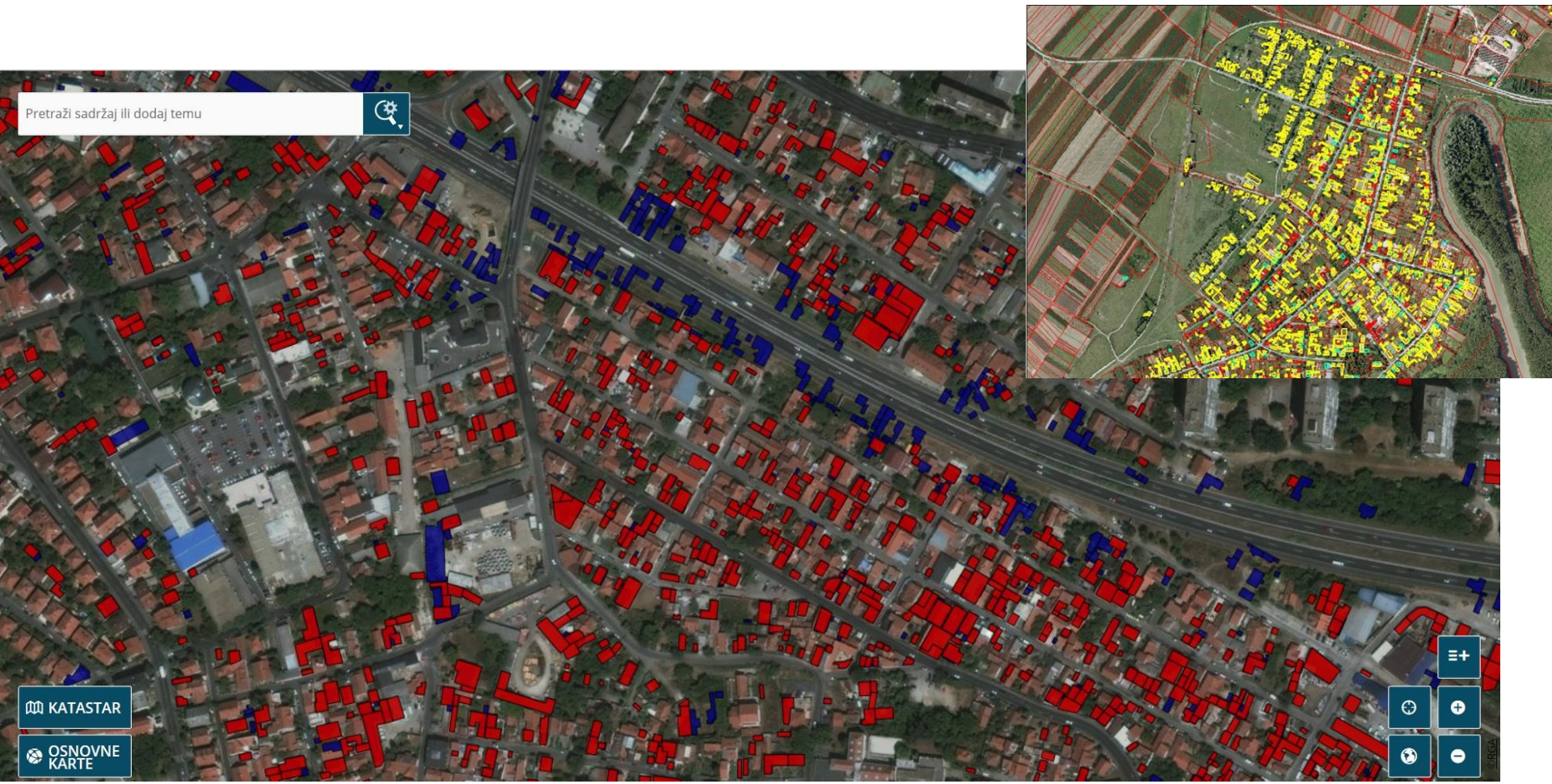
Željko Vujinović
Generalni direktor
Microsoft Srbija

Molimo Vas da svoje prisustvo potvrdite emailom na vip@sinergija18.rs do 20. oktobra.

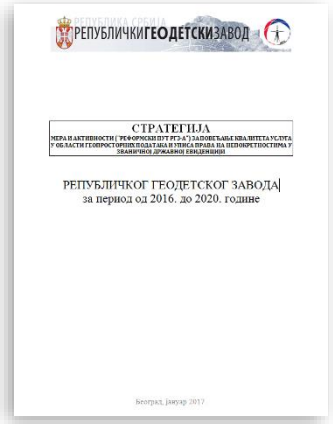
*pozivnica je na lično ime i važi za jednu osobu

Real Estate Cadastre (2016)

- Over 4,5 millions buildings are not registered - INFORMAL !!!



RGA Strategy 2016-2021



The **overall goal** - **support the economic reform** of the Government by effective provision of information in the sphere of real-estate and geospatial related activities for the **fast, easy and rightfull decision-making at all strategic levels.**

KEY PILLARS OF RGA REFORMS

Participatory

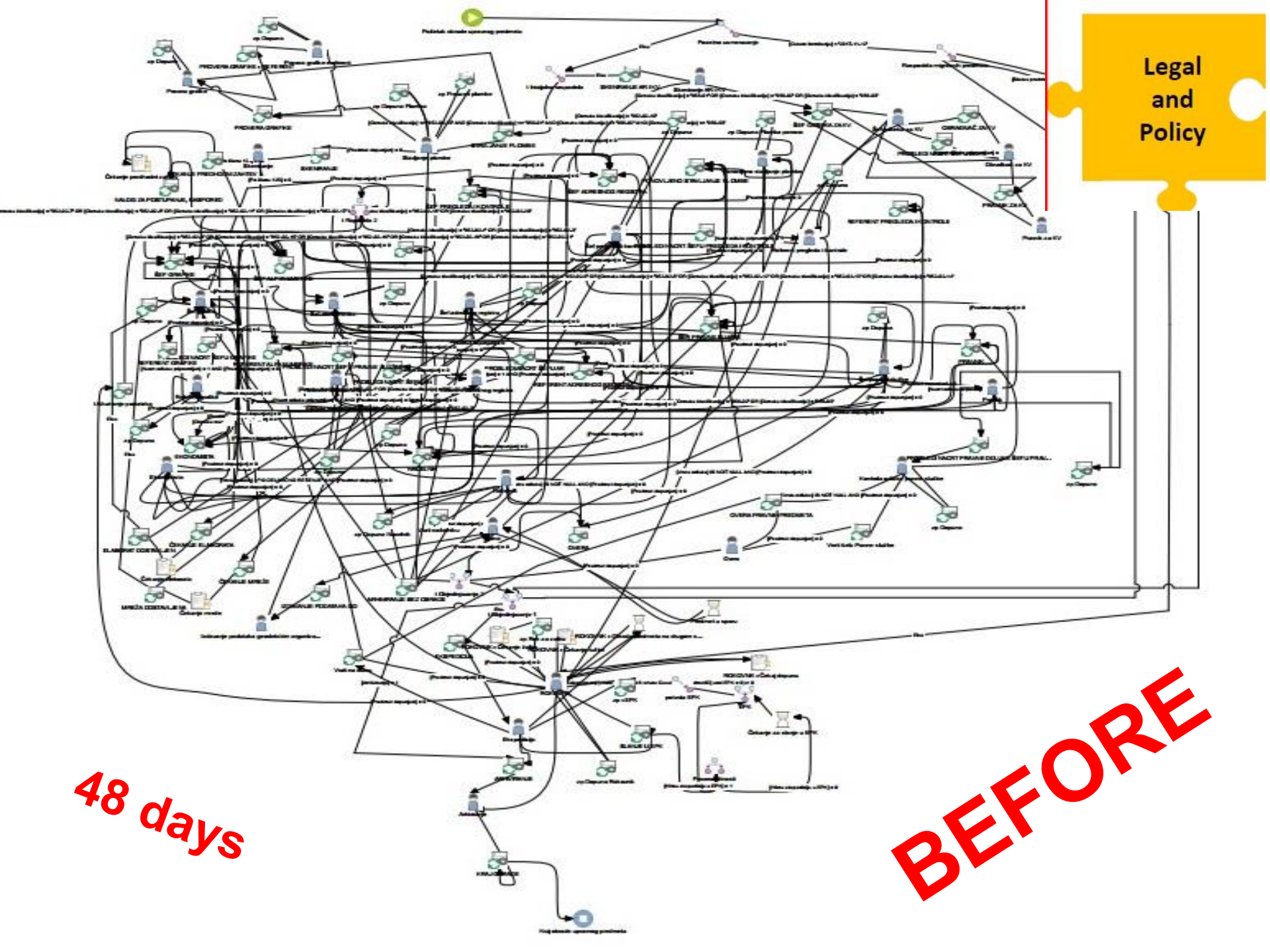
Transparency

Equal access to information

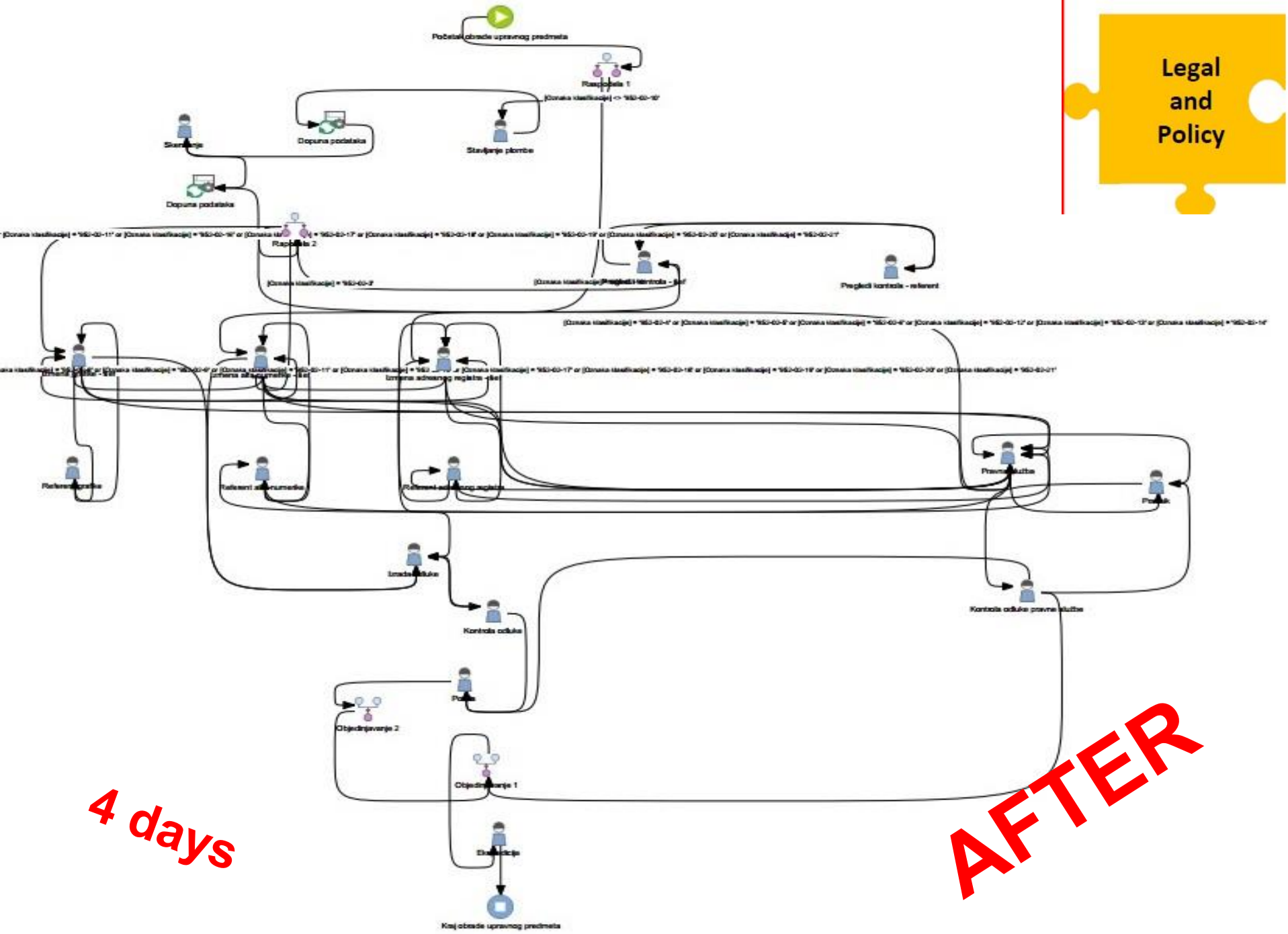
Efficiency

Gender equality

Accountability


Legal and Policy
48 days
BEFORE

Legal and Policy



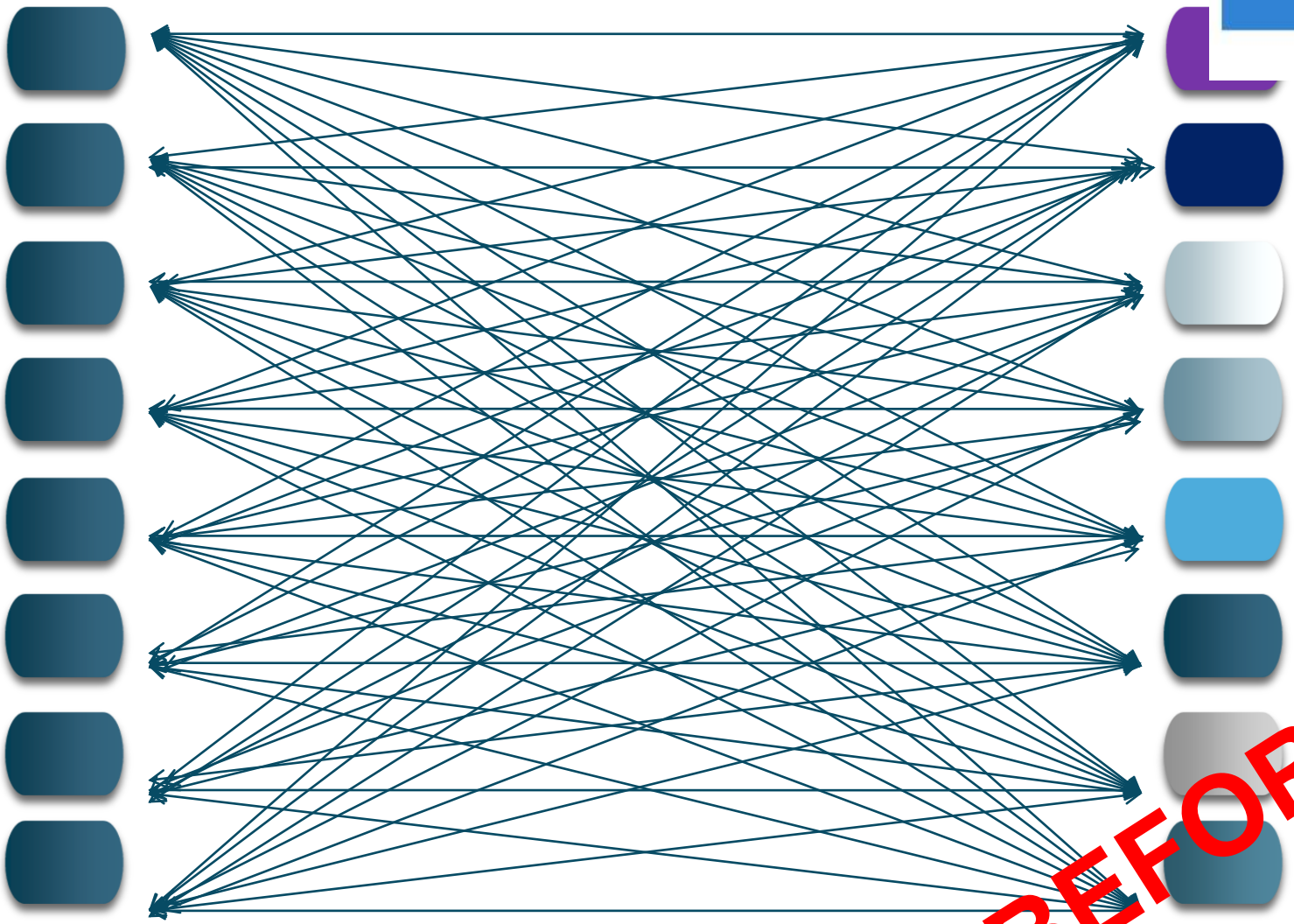
4 days

AFTER

Inefficient Model in Geosector

Governance and Institutions

DATA OWNERS AND PROVIDERS



DATA USERS AND SOLUTION PROVIDI

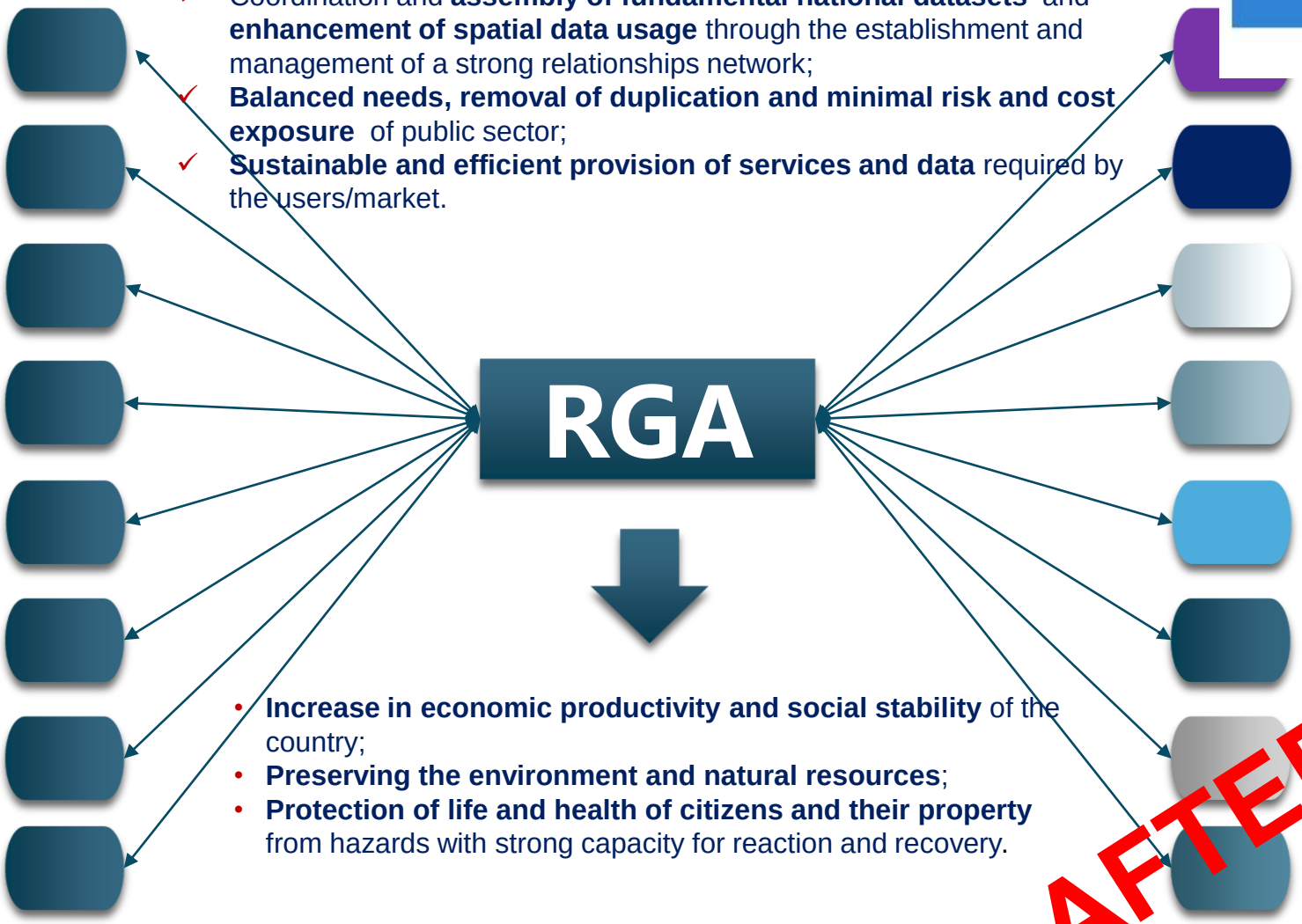
BEFORE

Efficient Model in Geosector

Governance and Institutions

- ✓ Coordination and **assembly of fundamental national datasets** and **enhancement of spatial data usage** through the establishment and management of a strong relationships network;
- ✓ **Balanced needs, removal of duplication and minimal risk and cost exposure** of public sector;
- ✓ **Sustainable and efficient provision of services and data** required by the users/market.

DATA PROVIDERS



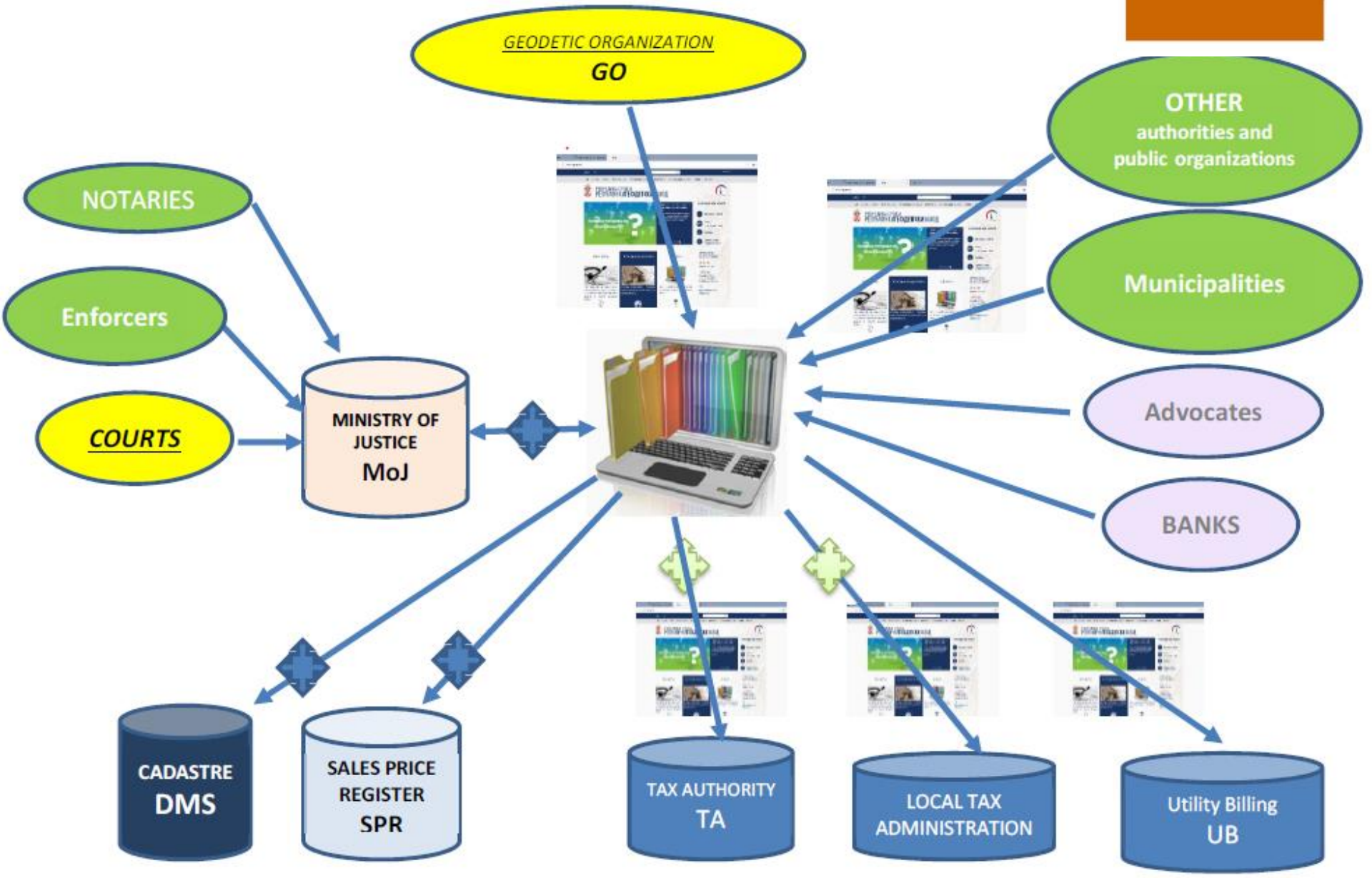
SOLUTION PROVIDERS

- **Increase in economic productivity and social stability** of the country;
- **Preserving the environment and natural resources**;
- **Protection of life and health of citizens and their property** from hazards with strong capacity for reaction and recovery.

AFTER

eFrontDesk and eServices

Partnerships



Public Sector Services

Communication and Engagement

- Data sharing Information system for Public Sector in Serbia
- Digitalization, efficiency, automatisation of business processes
- eGovernment
- More then 250 institutions
- Data sharing information system:
  - **Geodetic companies**
  - **Advocates**
  - **Notaries**
  - **Bailiffs**
  - **Courts**

6 000 000 hours in cue was saved for our citizens

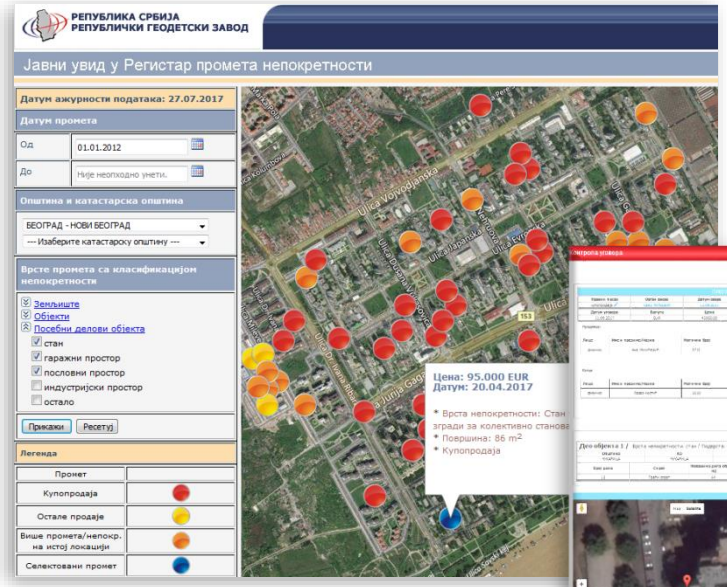
32M euros saved for citizens with electronic communication

Price Register and Mass Valuation

Data

Real-estater Mass Valuation System upgrade

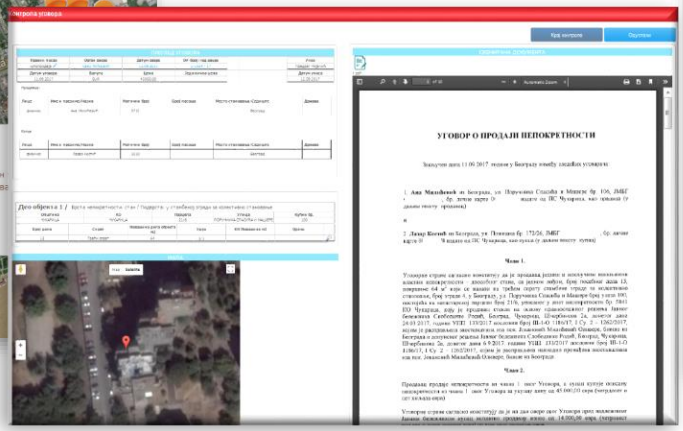
UN FAO Supports Development of Module for Sale Contract verification and collection of additional quality data designed for RGA needs

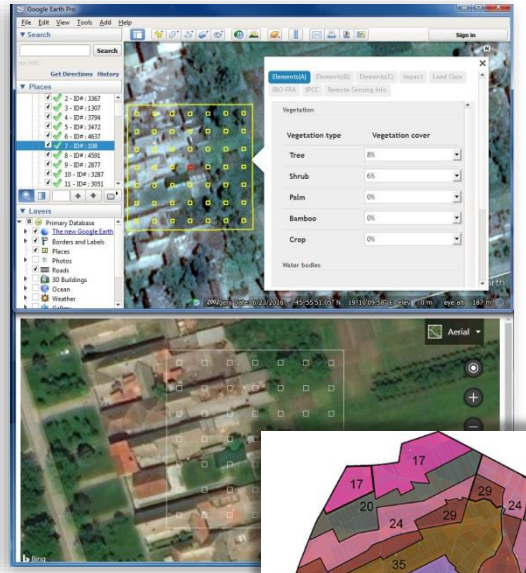


Sales Price Register

Food and Agriculture Organization of the United Nations

Module for Sale Contract control



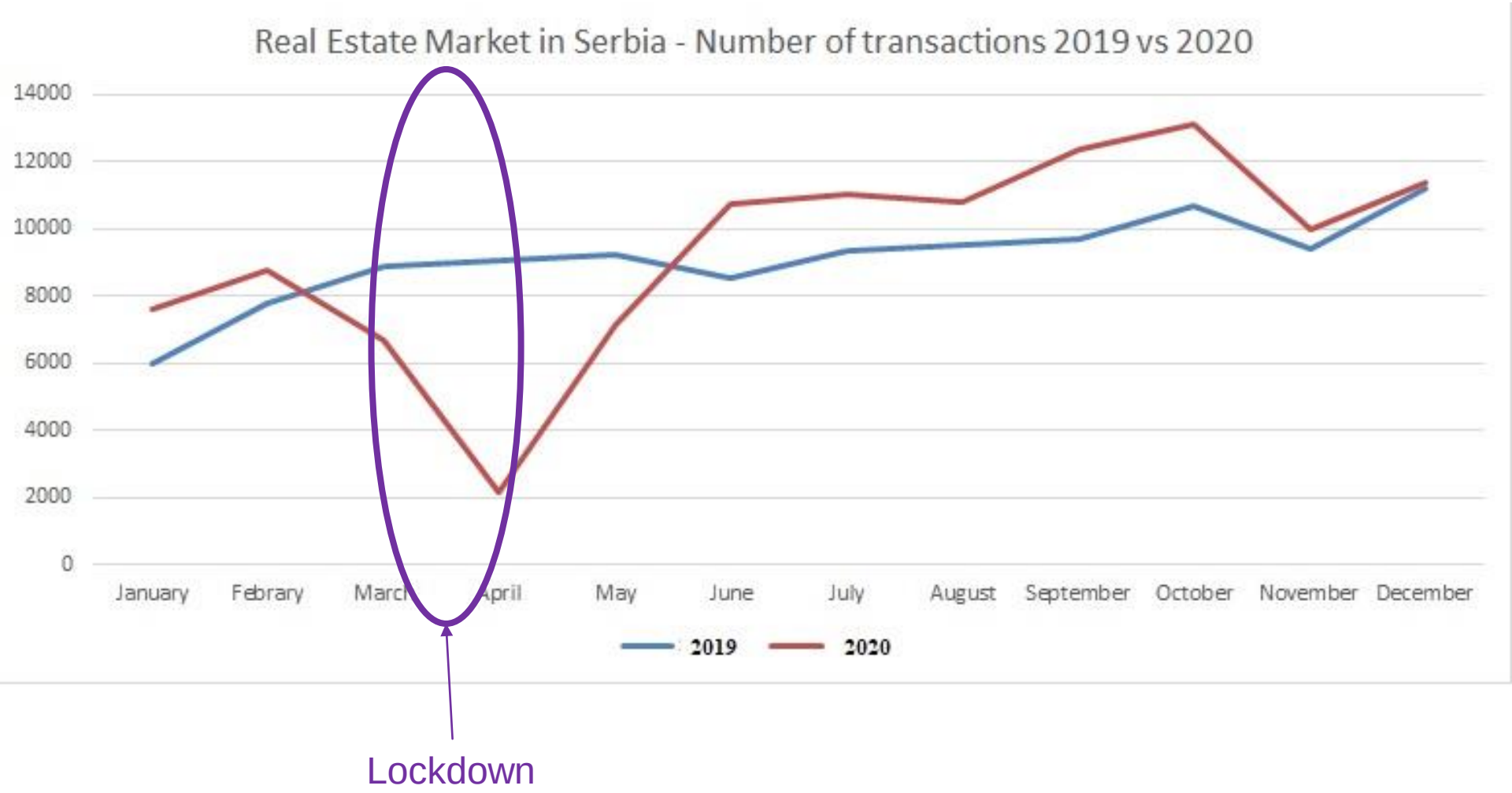


- ✓ **Sales Price Register:** data on sales, cadaster's data, quality data for valuation;
- ✓ **Building Registry as add base linked to SPR**– data for all objects: cadaster's and quality data
  - → reliable source for fair mass valuation system definition;
  - → changes in the taxation system generating additional and regular income;
- ➢ **Module for data verification** under development (national data sets, available external sources);
- ➢ **Planned introduction of Register of real-estate offers (sale and lease).**

RESULT DURING COVID?

- **All RGA employees started to work remotely from home**
- **All RGA services were online:**
  - **eCadaster**
  - **eFrontDesk with additional users (around 1900 advocates and geo organisations)**
  - **Online Support / Online Chat App with RGA info centre**
  - **Online check of the case status**
  - **eCompliance**
  - **Online service for downloading decision document**
  - **etc**
- **Focus on Sales Price register**
- **DETAILED WEEKLY REPORTS ON REAL ESTATE MARKET CONDITIONS!**

REAL ESTATE MARKET DURING COVID 19



NEW!!! WATCHDOG SERVICE - DZEKI

Help the owners/buyers to protect their Real Estates or Transactions in Real Time!!

Watchdog tracking based on the number of an active case in the Real Estate Cadaster database.

Watchdog tracking based on real estate data

FREE OF CHARGE!!!

GEOSPATIAL INFRASTRUCTURE

GEOSPATIAL DATA ACCESS

GEOSRBIJA - GEOSPATIAL PLATFORM

"a plug-and-play business model that allows multiple participants (producers and consumers) to connect to it, interact with each other and create and exchange value. **Also collections of services used for hosting, processing and distributing geospatial data are called platforms."**

Key components of the platform:

- Data standardisation – data schemas, quality rules, life-cycle rules, collection guidelines
- Data tools for the producers –data life-cycle management, error reporting, data updating tools
- Data portal – finding, evaluating data – situational picture, metadata search, quality dashboards
- Data distribution services, APIs, Analysis and processing services
- Support (community)
- Management of the ecosystem

New geospatial platform Geosrbija launched - **December 2017**

over 330 data sets

Last month: over 500.000 unique users

and over 15M requests/month

Innovation

GEOSERBIA - GEOSPATIAL PLATFORM

Services

Metadata catalog

A national application enables searching, creating, maintaning and sharing metadata for spatial data sets, spatial data set series and spatial data services.

Collaborative platform

National portal enables the cooperation between relevant national and regional communities, support, trainings and informing.

Digital platform

The national web GIS application enables the display, search, analysis, transformation, creation, sharing and maintenance of geospatial data of Serbia.

Geosrbija mobi

Crowd SDI

OGC servises

Rest api

Stakeholdes

Training

Geoserbia mobi

Android application that represents a fast link to the Digital Platform.

Download

Service for downloading standard data sets for easier exchange.

Harmonization

We create standard registers together! Assistance in the preparation of methodological guidelines for harmonization

Open data

3D view. Web application based on the Cesium platform.

crowdSDI

We create spatial registers together! Mobile application for data collection.

OGC Services

Overview of currently available standard OGC data exchange services.

REST API

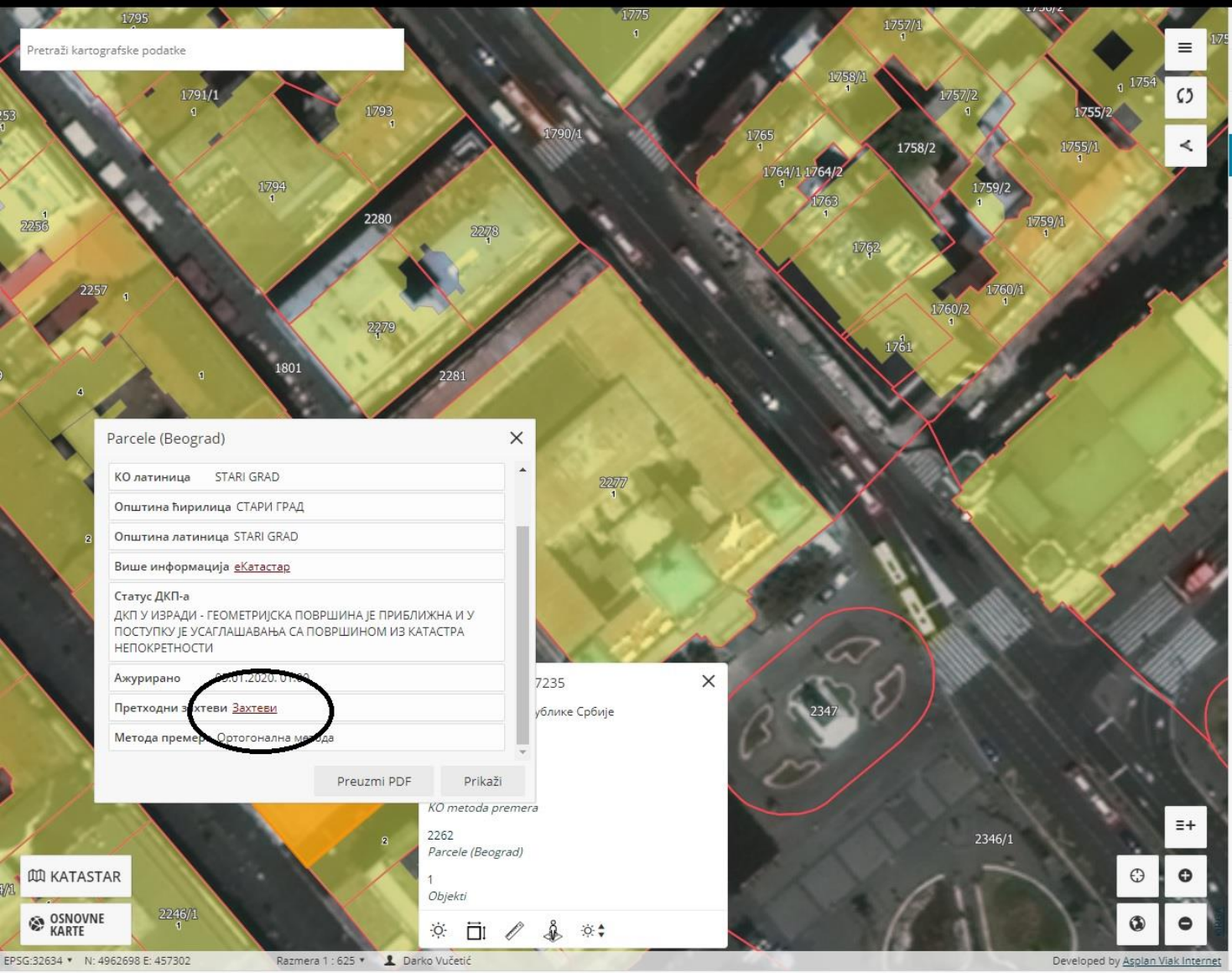
An overview of the currently available standard REST services for networking registers.

Transformation

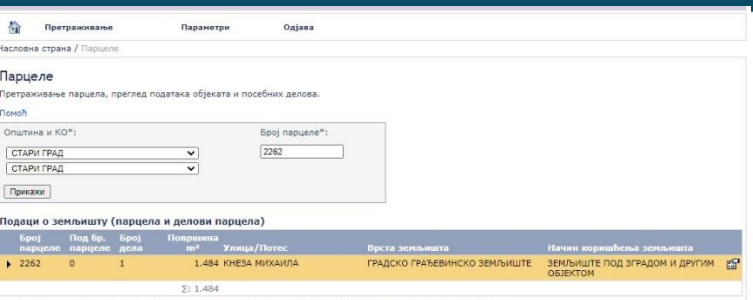
Spatial data transformation service and change of exchange formats.

REAL ESTATE REGISTER

Data



GEOSRBIJA I EKATASTAR



Парцеле

Претраживање парцела, преглед података објеката и посебних делова.

Помоћ

Општина и КО*: СТАРИ ГРАД / СТАРИ ГРАД

Број парцеле*: 2262

Прикажи

Подаци о земљишту (парцела и делови парцела)

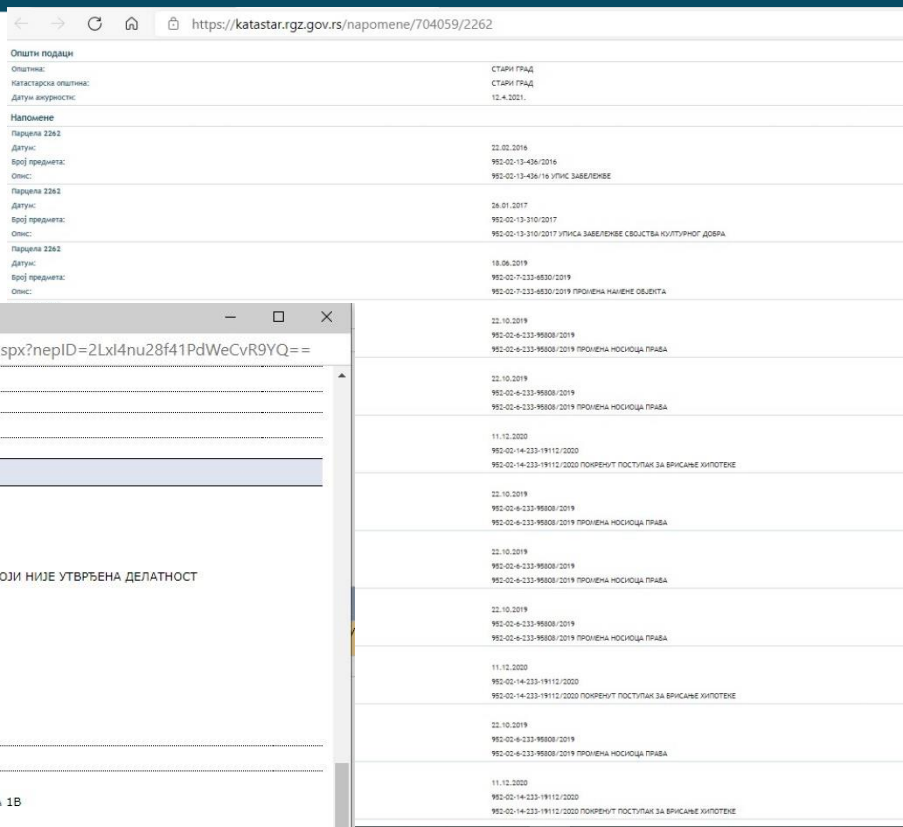
Број парцеле	Под бр. парцеле	Број дела	Површина m²	Улица/Потес	Врста земљишта	Начин коришћења земљишта
2262	0	1	1.484	КНЕЗА МИХАИЛА	ГРАДСКО ГРАЂЕВИНСКО ЗЕМЉИШТЕ	ЗЕМЉИШТЕ ПОД ЗГРАДОМ И ДРУГИМ ОБЈЕКТОМ
			Σ: 1.484			

Подаци о зградама и другим грађевинским објектима (објекти на изабраном делу парцеле)

Улица	Кућни број	Кућни под. број	Површина m²	Начин коришћења објекта	Статус о
КНЕЗА МИХАИЛА	14-16		1484	ЗГРАДА ТРГОВИНЕ	ОБЈЕКАТ КЊИГЕ

Посебни делови изабраног објекта

Евид. број	Бр. улаза	Бр. стана	Под.бр. стана	Начин коришћења посебног дела	Корисна површина (m²)
1	3-5	ББ		ПОСЛОВНИ ПРОСТОР ЗА КОЈИ НИЈЕ УТВРЂЕНА ДЕЛАТНОСТ	45
2	3-5	ББ		ПОСЛОВНИ ПРОСТОР ЗА КОЈИ НИЈЕ УТВРЂЕНА ДЕЛАТНОСТ	45
3	3-5	ББ		ПОСЛОВНИ ПРОСТОР ЗА КОЈИ НИЈЕ УТВРЂЕНА ДЕЛАТНОСТ	47
4	3-5	ББ		ПОСЛОВНИ ПРОСТОР ЗА КОЈИ НИЈЕ УТВРЂЕНА ДЕЛАТНОСТ	402
5	3-5	ББ		ПОСЛОВНИ ПРОСТОР ЗА КОЈИ НИЈЕ УТВРЂЕНА ДЕЛАТНОСТ	401
6	3-5	ББ		ПОСЛОВНИ ПРОСТОР ЗА КОЈИ НИЈЕ УТВРЂЕНА ДЕЛАТНОСТ	334
7	3-5	ББ		ПОСЛОВНИ ПРОСТОР ЗА КОЈИ НИЈЕ УТВРЂЕНА ДЕЛАТНОСТ	364
8	3-5	ББ		ПОСЛОВНИ ПРОСТОР ЗА КОЈИ НИЈЕ УТВРЂЕНА ДЕЛАТНОСТ	359
9	14-16	ББ		ПОСЛОВНИ ПРОСТОР ЗА КОЈИ НИЈЕ УТВРЂЕНА ДЕЛАТНОСТ	1068
10	14-16	ББ		ПОСЛОВНИ ПРОСТОР ЗА КОЈИ НИЈЕ УТВРЂЕНА ДЕЛАТНОСТ	889
11	14-16	ББ		ПОСЛОВНИ ПРОСТОР ЗА КОЈИ НИЈЕ УТВРЂЕНА ДЕЛАТНОСТ	678



https://katastar.rgz.gov.rs/napomene/704059/2262

Општи подаци

Општина: СТАРИ ГРАД
Катастарска општина: СТАРИ ГРАД
Датум ажурности: 12.4.2021.

Напомене

Парцела 2262
Датум: 22.02.2016
Број предмета: 952-02-13-436/2016
Опис: 952-02-13-436/16 УПИС ЗАБЕЛЕЖБЕ

Парцела 2262
Датум: 26.01.2017
Број предмета: 952-02-13-310/2017
Опис: 952-02-13-310/2017 УПИСА ЗАБЕЛЕЖБЕ СВОЈСТВА КУЛТУРНОГ ДОБРА

Парцела 2262
Датум: 18.06.2019
Број предмета: 952-02-7-233-6830/2019
Опис: 952-02-7-233-6830/2019 ПРОМЕНА НАЧИНЕ ОБЈЕКТА

22.10.2019
952-02-6-233-95808/2019
952-02-6-233-95808/2019 ПРОМЕНА НОСИОЦА ПРАВА

22.10.2019
952-02-6-233-95808/2019
952-02-6-233-95808/2019 ПРОМЕНА НОСИОЦА ПРАВА

11.12.2020
952-02-14-233-19112/2020
952-02-14-233-19112/2020 ПОКРЕНУТ ПОСТУПАК ЗА БРИСАЊЕ ХИПОТЕКЕ

22.10.2019
952-02-6-233-95808/2019
952-02-6-233-95808/2019 ПРОМЕНА НОСИОЦА ПРАВА

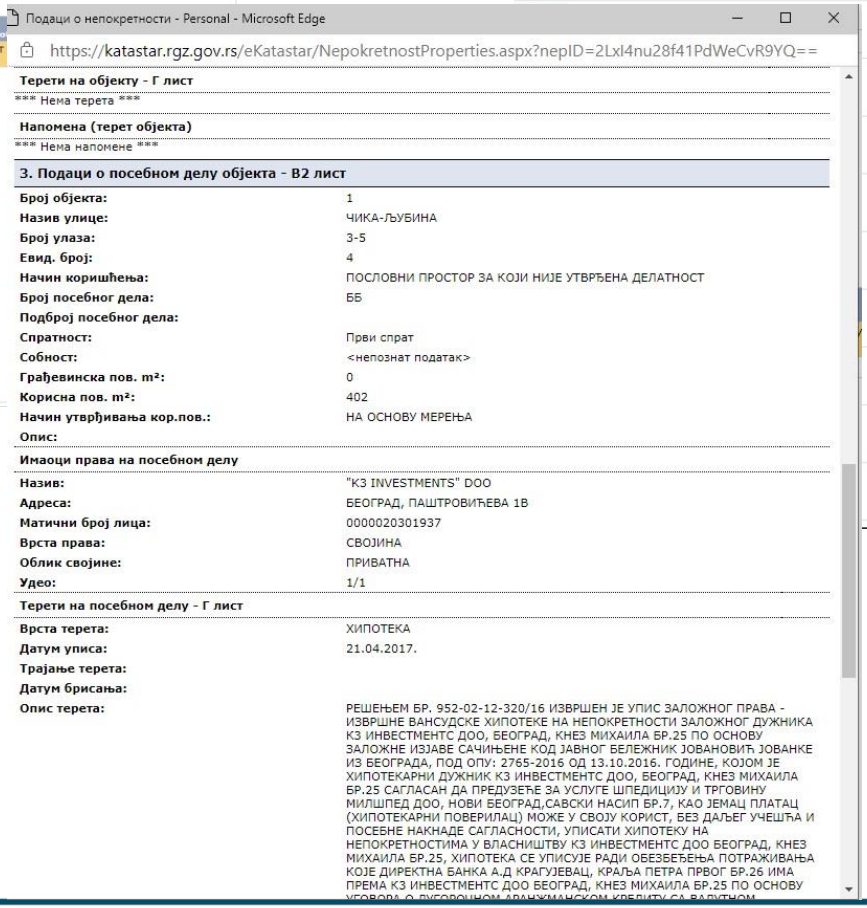
22.10.2019
952-02-6-233-95808/2019
952-02-6-233-95808/2019 ПРОМЕНА НОСИОЦА ПРАВА

22.10.2019
952-02-6-233-95808/2019
952-02-6-233-95808/2019 ПРОМЕНА НОСИОЦА ПРАВА

11.12.2020
952-02-14-233-19112/2020
952-02-14-233-19112/2020 ПОКРЕНУТ ПОСТУПАК ЗА БРИСАЊЕ ХИПОТЕКЕ

22.10.2019
952-02-6-233-95808/2019
952-02-6-233-95808/2019 ПРОМЕНА НОСИОЦА ПРАВА

11.12.2020
952-02-14-233-19112/2020
952-02-14-233-19112/2020 ПОКРЕНУТ ПОСТУПАК ЗА БРИСАЊЕ ХИПОТЕКЕ



Подаци о непокретности - Personal - Microsoft Edge

https://katastar.rgz.gov.rs/eKatastar/NepokretnostProperties.aspx?nepID=2Lxl4nu28f41PdWeCvR9YQ==

Терети на објекту - Г лист

*** Нема терета ***

Напомена (терет објекта)

*** Нема напомене ***

3. Подаци о посебном делу објекта - В2 лист

Број објекта:	1
Назив улице:	ЧИКА-ЉУБИНА
Број улаза:	3-5
Евид. број:	4
Начин коришћења:	ПОСЛОВНИ ПРОСТОР ЗА КОЈИ НИЈЕ УТВРЂЕНА ДЕЛАТНОСТ
Број посебног дела:	ББ
Подброј посебног дела:	
Спратност:	Први спрат
Собност:	<непознат податак>
Грађевинска пов. m²:	0
Корисна пов. m²:	402
Начин утврђивања кор.пов.:	НА ОСНОВУ МЕРЕЊА
Опис:	

Имаоци права на посебном делу

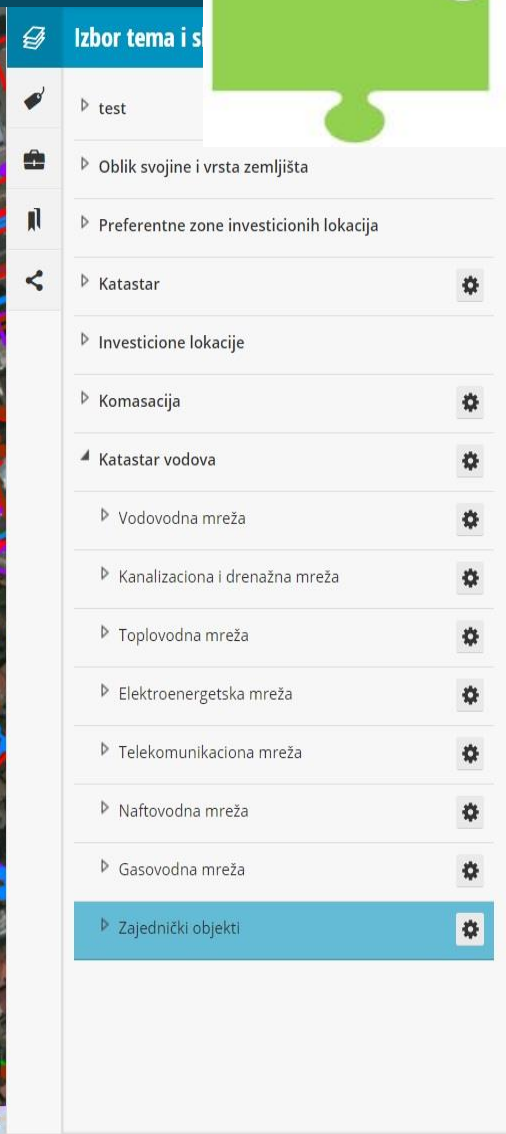
Назив:	"K3 INVESTMENTS" DOO
Адреса:	БЕОГРАД, ПАШТРОВИЋЕВА 1В
Матични број лица:	0000020301937
Врста права:	СВОЈИНА
Облик својине:	ПРИВАТНА
Удео:	1/1

Терети на посебном делу - Г лист

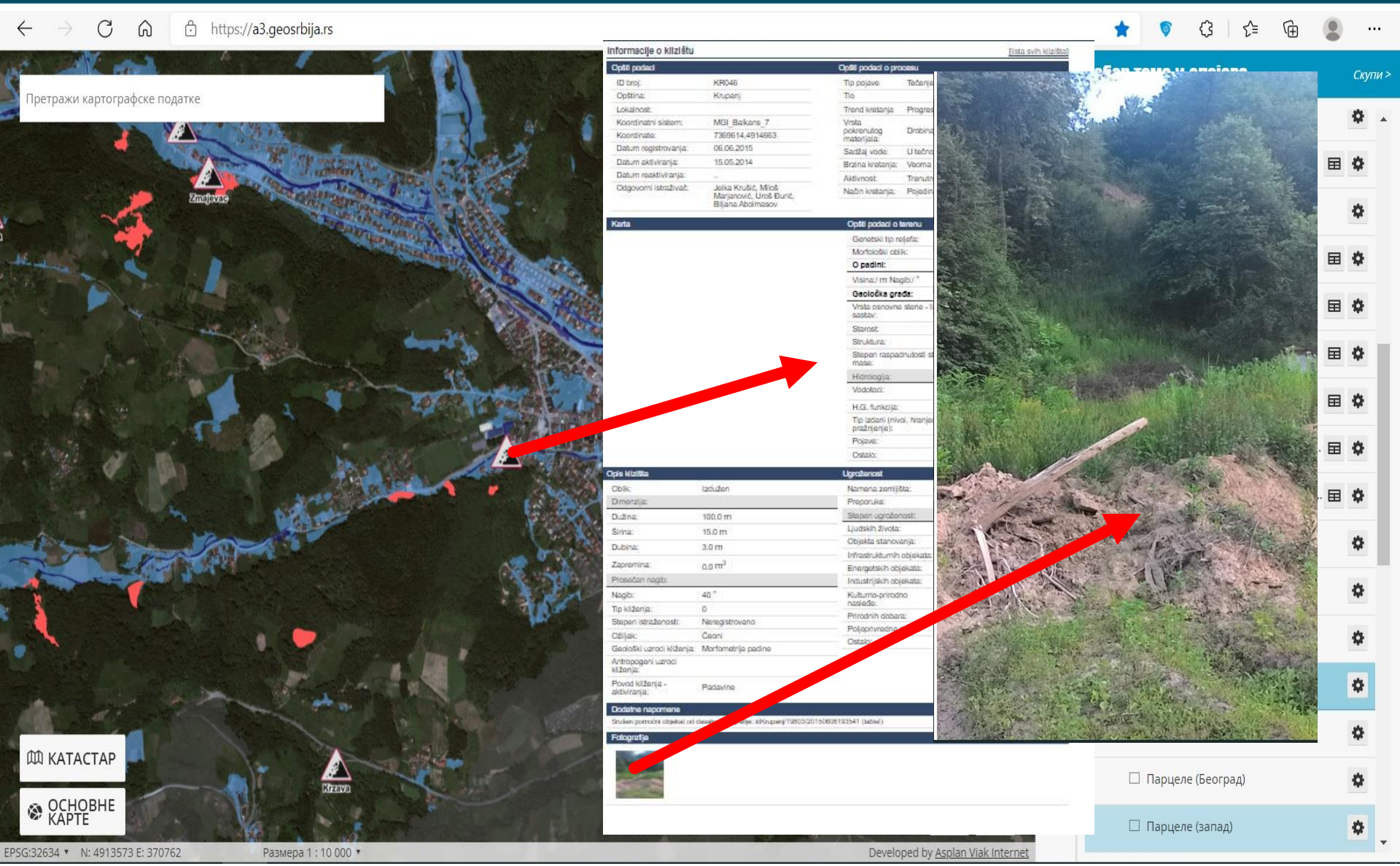
Врста терета:	ХИПОТЕКА
Датум уписа:	21.04.2017.
Трајање терета:	
Датум брисања:	
Опис терета:	РЕШЕЊЕМ БР. 952-02-12-320/16 ИЗВРШЕН ЈЕ УПИС ЗАЛОЖНОГ ПРАВА - ИЗВРШНЕ ВАНСУДСКЕ ХИПОТЕКЕ НА НЕПОКРЕТНОСТИ ЗАЛОЖНОГ ДУЖНИКА К3 ИНВЕСТМЕНТС ДОО, БЕОГРАД, КНЕЗ МИХАИЛА БР.25 ПО ОСНОВУ ЗАЛОЖНЕ ИЗЈАВЕ САЧИЊЕНЕ КОД ЈАВНОГ БЕЛЕЖНИК ЈОВАНОВИЋ ЈОВАНКЕ ИЗ БЕОГРАДА, ПОД ОПУ: 2765-2016 ОД 13.10.2016. ГОДИНЕ, КОЈОМ ЈЕ ХИПОТЕКАРНИ ДУЖНИК К3 ИНВЕСТМЕНТС ДОО, БЕОГРАД, КНЕЗ МИХАИЛА БР.25 САГЛАСАН ДА ПРЕДУЗЕЋЕ ЗА УСЛУГЕ ШПЕДИЦИЈУ И ТРГОВИНУ МИЛШПЕД ДОО, НОВИ БЕОГРАД,САВСКИ НАСИП БР.7, КАО ЈЕМАЦ ПЛАТАЦ (ХИПОТЕКАРНИ ПОВЕРИЛАЦ) МОЖЕ У СВОЈУ КОРИСТ, БЕЗ ДАЉЕГ УЧЕШЋА И ПОСЕБНЕ НАКНАДЕ САГЛАСНОСТИ, УПИСАТИ ХИПОТЕКУ НА НЕПОКРЕТНОСТИМА У ВЛАСНИШТВУ К3 ИНВЕСТМЕНТС ДОО БЕОГРАД, КНЕЗ МИХАИЛА БР.25, ХИПОТЕКА СЕ УПИСУЈЕ РАДИ ОБЕЗБЕЂЕЊА ПОТРАЖИВАЊА КОЈЕ ДИРЕКТНА БАНКА А.Д КРАГУЈЕВАЦ, КРАЉА ПЕТРА ПРВОГ БР.26 ИМА ПРЕМА К3 ИНВЕСТМЕНТС ДОО БЕОГРАД, КНЕЗ МИХАИЛА БР.25 ПО ОСНОВУ УГОВОРА О ДУГОРОЧНОМ АРАНЖМАНСКОМ КРЕДИТУ СА РАЗЛИЧИТИМ

UNDERGROUND ASSETS REGISTER

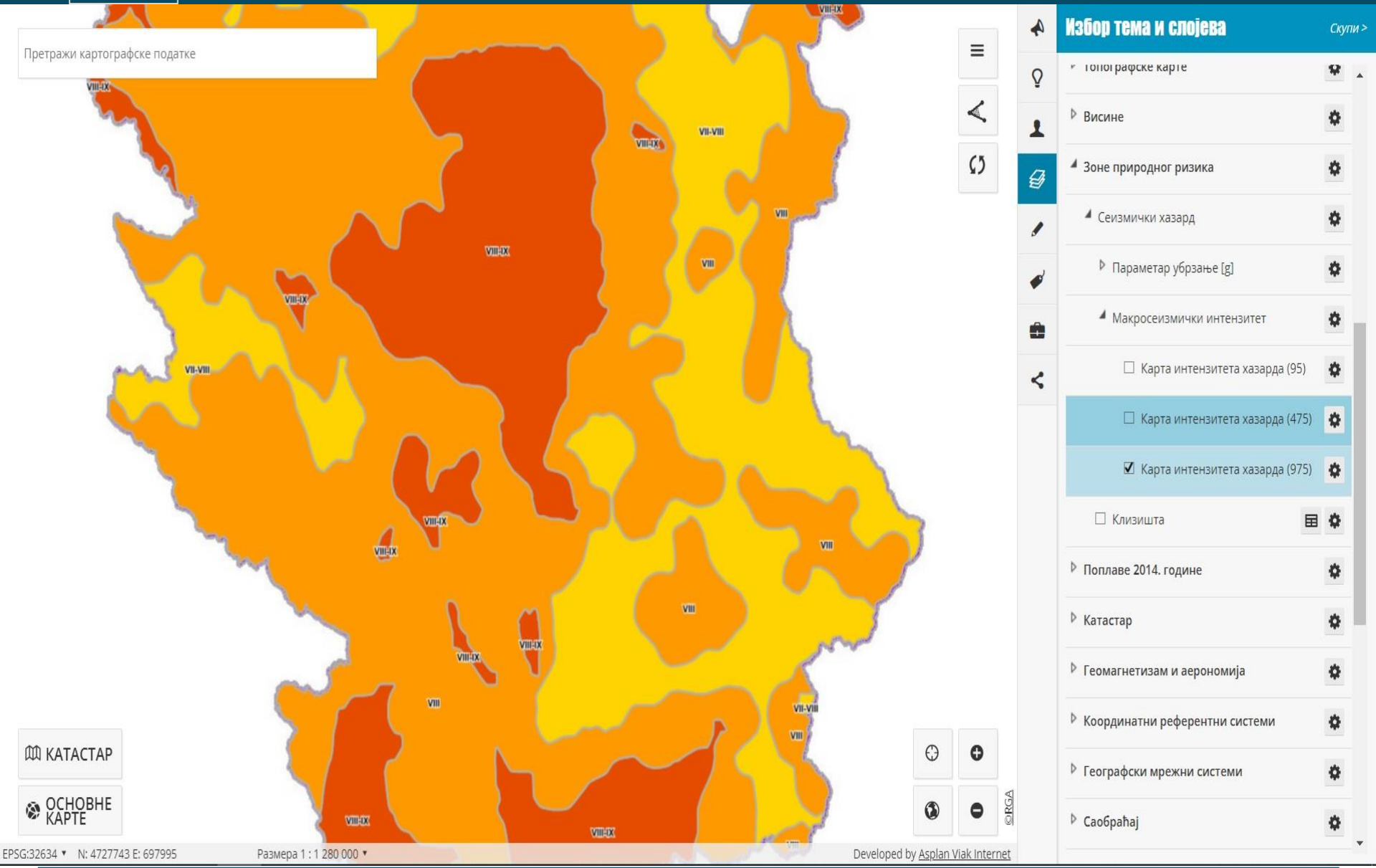
Data



LandSlides, Flood Prone Areas, Geology, Seizmic Hazards etc



LandSlides, Flood Prone Areas, Geology, Seizmic Hazards etc



Crowdsourcing – collaborative work!

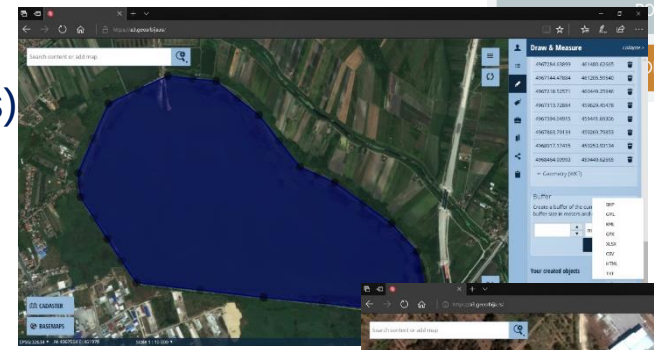
Innovation

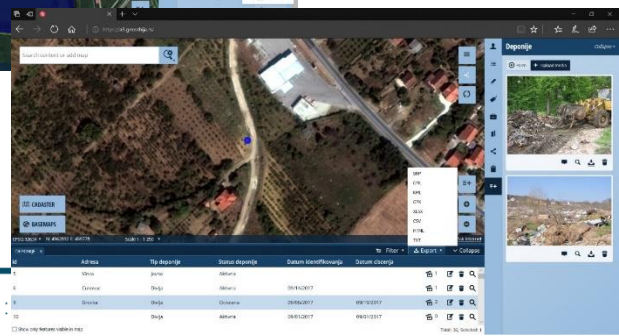
Mobile App – crowdSDI

- ☑ Mobile app for crowdsoursing
- ☑ Android and iOS
- ☑ Geolocation and secure connection
- ☑ Verification of collected data
- ☑ Crowd Sourcing functionality
- ☑ Link with geoSrbija
- ☑ Link with data owners

WEB Desktop App – crowdSDI

- ☑ Digitalization
- ☑ Media attachment (pictures, video, text files)
- ☑ Editing existing data
- ☑ Colaborative work
- ☑ Crowdsourcing functionality
- ☑ Collect and create new data sets
- ☑ Link with data owners
- ☑ Export Files
- ☑ Import external web services
- ☑ Import external data (link with Open Data portal)



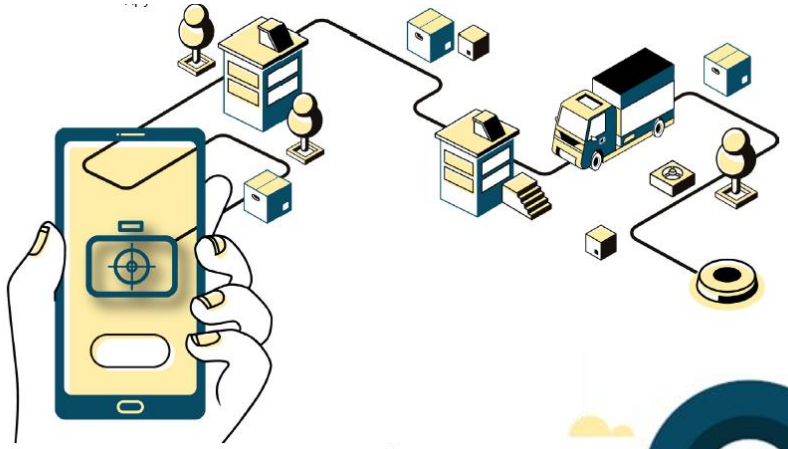


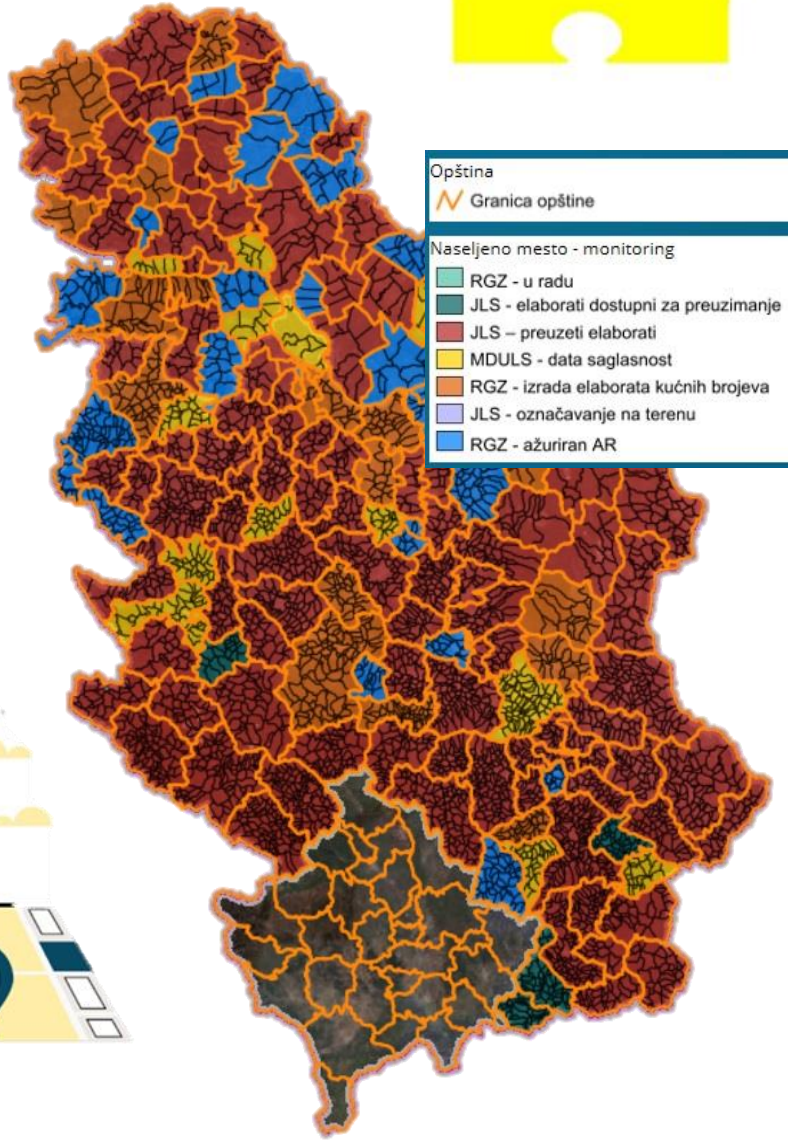
Address Register

Innovation

Geosrbija for street system
crowdSDI for demarcation of house numbers

1,5 YEAR = UPDATED ADRESS REGISTER!!





RESULT DURING COVID?

RESPONSE TO COVID 19

HEALTH AND SOCIAL

ECONOMIC RECOVERY

Critical datasets

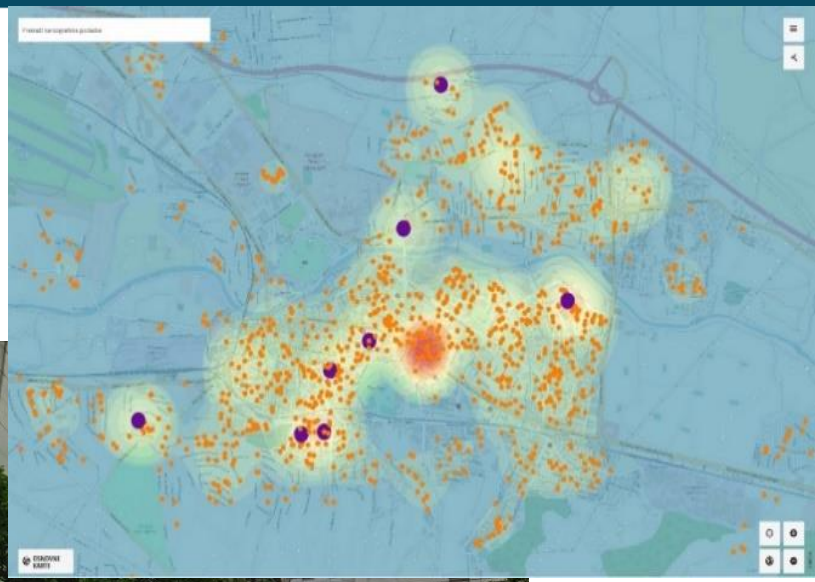
1. Address
2. Building register
3. Cadastre parcels
4. Satellite imagery
5. Statistics
6. Utilities
7. Schools, nursing homes, social welfare
8. Covid ambulances,
medical institutions and infrastructure

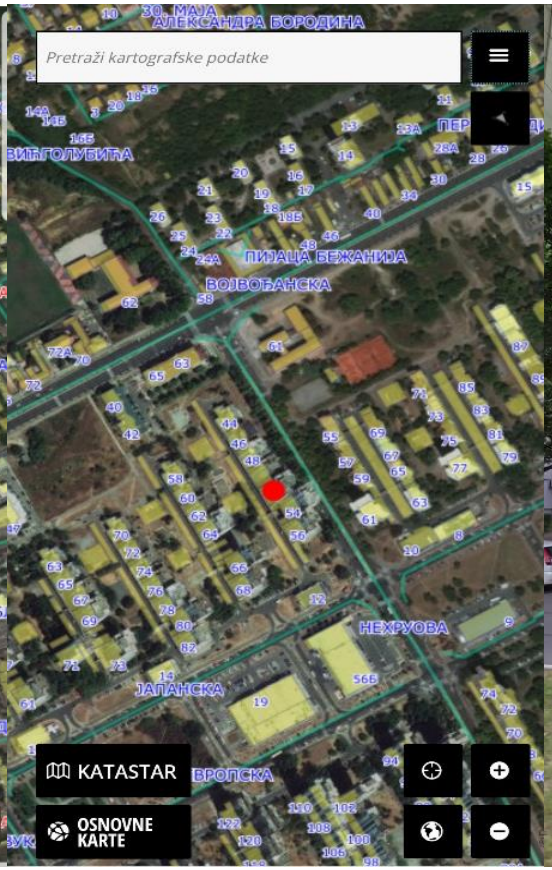
Critical systems

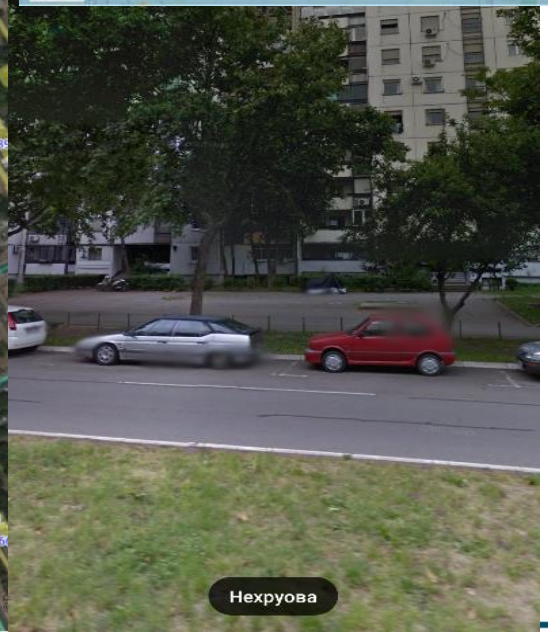
1. Geosrbija
2. Crowdsourcing
3. Mobile apps
4. Cadaster and property registration system
5. Sales Price Register

COVID 19 NEW SERVICES

- Guiding Lock-down
- Track isolation
- Definition of high risk zones
- Providing data to agriculture
- Vulnerable group protection
- Efficient economic decision





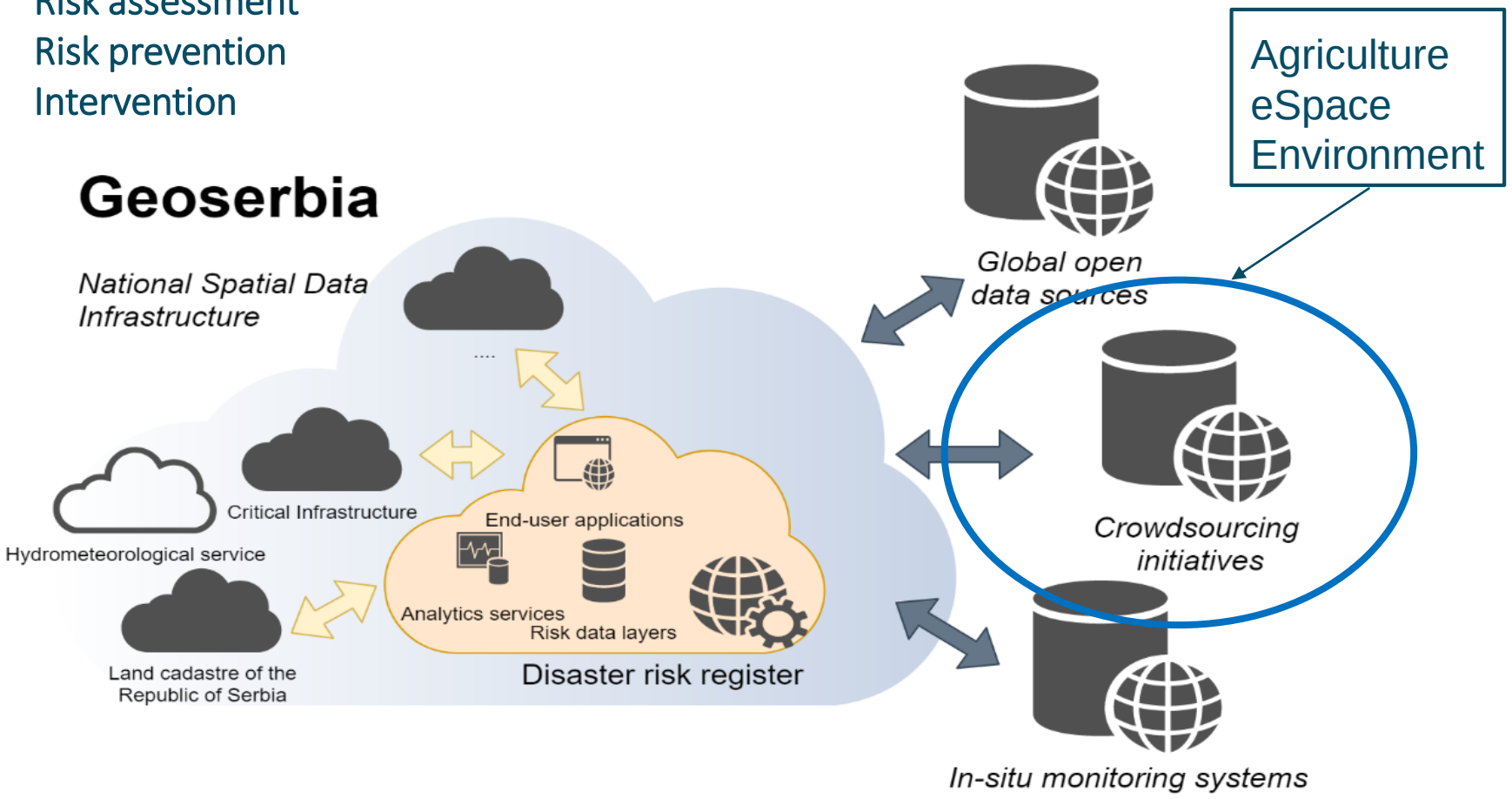


How we can build better?

DISASTER RISK REGISTER SYSTEM

CONCEPT OF DISASTER RISK REGISTER

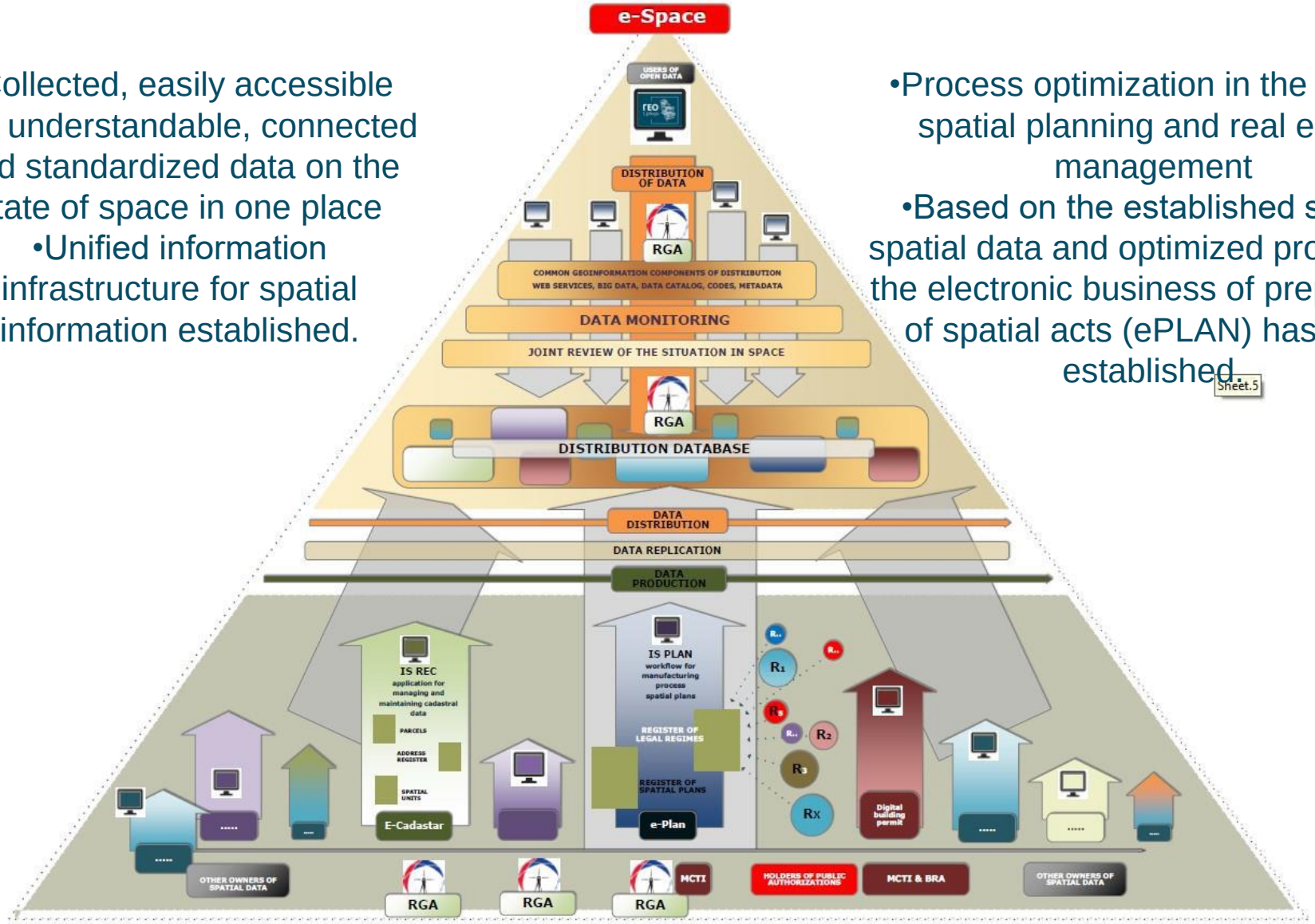
Risk assessment
Risk prevention
Intervention



eSPACE as a part of European Digital Space

•Collected, easily accessible and understandable, connected and standardized data on the state of space in one place

•Unified information infrastructure for spatial information established.



•Process optimization in the field of spatial planning and real estate management

•Based on the established sets of spatial data and optimized processes, the electronic business of preparation of spatial acts (ePLAN) has been established.

Sheet.5

SOCIO-ECONOMIC BENEFITS STUDY
CITIZENS AND PRIVATE SECTOR SATISFACTION

- Conducted within WB project "Improvement of land administration in Serbia" in the period June 2020-April 2021.

BENEFIT RATION 1:5

Alexa An amazon.com company

12	Polovniautomobili.com
13	Instagram.com
14	Halooglasi.com
15	Live.com
16	Oglasi.rs
17	Rgz.gov.rs
18	Nova.rs

22.12.2020.

Највише поверење грађана у војску, цркву, полицију и РГЗ

Поверење грађана у Србији у институције у порасту је у односу на пре две године, најновији су подаци Агенције за истраживање „Дип дајв" (ДЕЕП ДИВЕ), а највише се верује војсци, цркви, полицији и Републичком геодетском заводу (РГЗ).

Поверење у РГЗ у константном је порасту. У истраживању које је спроведено у октобру 2020. године 58% корисника оценило поверење у Завод двема највишим оценама (4 и 5), док је у базичном испитивању, које је спроведено у фебруару 2017. тај проценат износио 46.

CITIZENS HAVE THE MOST TRUST IN THE ARMY, CHURCH, POLICE AND **RGA**

10th in Europe and 14th in World on **Prindex** list for tenure security

Gender equality in property rights – leader in Western Balkan and 3rd in World

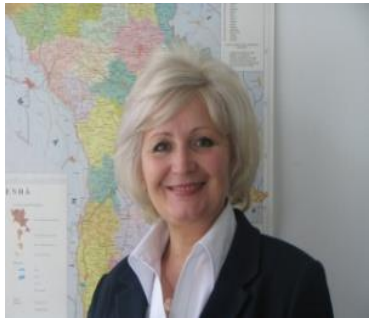
Director of RGA – Reformer of the year 2019 for digitalisation and economic development

THANK YOU FOR YOUR ATTENTION!

www.rgz.gov.rs
darko.vucetic@rgz.gov.rs
www.geosrbija.rs

Developing Moldovan NSDI through EU Twinning Project and Other Donors' Support

Maria Ovdii, Agency for Land Relations and Cadastre of Moldova
Sanja Zekušić, State Geodetic Administration, Croatia



Maria Ovdii is a Head of NSDI department and a secretary to NSDI committee in Moldova, working for the Agency for Land Relations and Cadastre (ALRC). She has been instrumental in gaining and coordinating support from a wide range of donors over many years including Kartverket, the World Bank, US AID, JICA and most recently the EU Twinning project.

She explained that a 15-year collaboration and capacity development assistance provided by Kartverket has been extensive including support for two generations of Orthoimagery production, digital terrain modelling and digital base mapping of the whole territory. It had recently been extended to cover the production of an IGIF Country Action Plan for Moldova. The USAID project has over a 5-year period focused on support for local government.

Sanja Zekusic is a Senior Consultant at the State Geodetic Administration of Croatia. Since 2006, she has been responsible for preparation and implementation of projects funded by the EU and other donors, including international development cooperation. Since 2015, she has been involved in the implementation of the EU funded Twinning land administration projects in Moldova.

Sanja explained how EU twinning project, which she manages, is focused on improving spatial data services with the involvement of experts from NMAs in the Netherlands, Croatia, and Poland. In year 1 (2021) they have been focusing, amongst other topics, on establishing a strategic framework of the geoportal including guidelines on data specifications, GIS training of over 100 government staff and identifying necessary legislative changes. Next year they are moving on to look at the NSDI business model, licensing policy, the university geospatial programs and to initiate pilot projects and study visits.

In discussion, Maria expressed the intention to publish the guidelines and other deliverables of the EU Twinning project publicly once agreed. The coordination of a wide group of stakeholders to fully realise the benefits of this work was proving challenging and a major priority was increasing capacity at the agency.

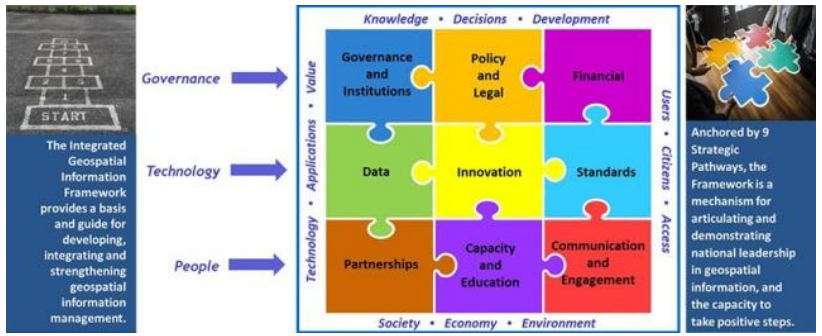
GEOSPATIAL INFORMATION FOR THE BENEFIT OF SOCIETY

Development of NSDI in Republic of Moldova through EU Twinning Project and other Donors support

Maria OVDII,
Agency for Land Relations and Cadastre of Moldova
e-mail maria.ovdii@arfc.gov.md

Sanja ZEKUŠIĆ,
State Geodetic Administration of Croatia
e-mail sanja.zekusic@dgu.hr

NSDI development through collaboration with Donors



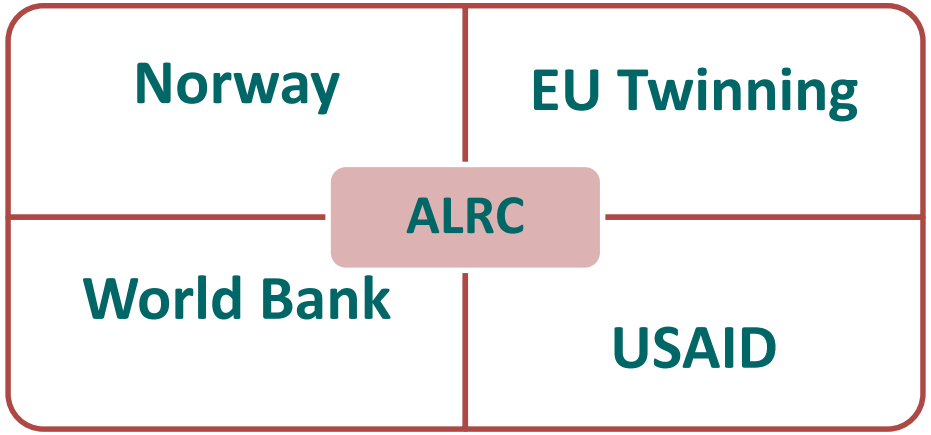
Strategic Partners:

- ✓Government of Moldova
- ✓Norwegian Government
- ✓World Bank
- ✓USAID
- ✓EU Twinning
- ✓JICA

Priority activities :

1. Governments and Institutions
2. IGIF Action Plan and programme
3. Standards
4. Data
5. Business and Finance
6. Communication and Engagement
7. Capacity development
8. Innovation (Geoportal)
9. Thematic datasets

On-going cooperation in ALRC Projects

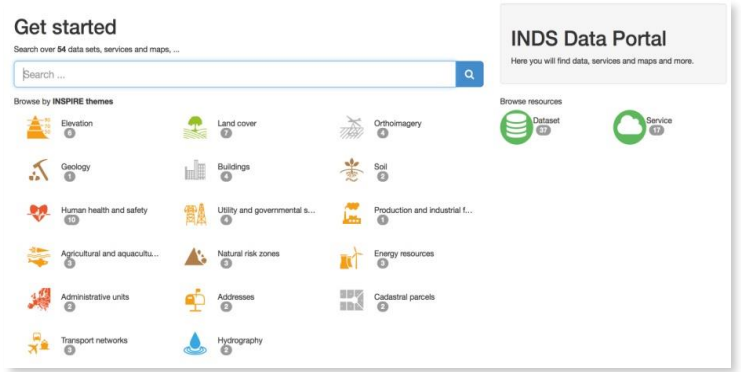


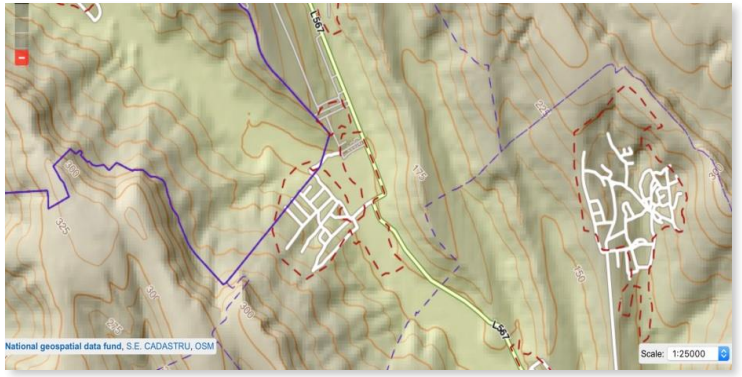
Moldova: NSDI–World Bank Support

WB Project for Registration and property valuation Project $35 million 2019-2024

Component 3. Support to the National Spatial Data Infrastructure ($1.4 million)

- Expansion of the current NSDI Geoportal Pilot project and Integration with EU INSPIRE Geoportal
- NSDI Standard
- Core Datasets
- Capacity building in NSDI
- Implementyation of NSDI Business Plan
- CORS Network support





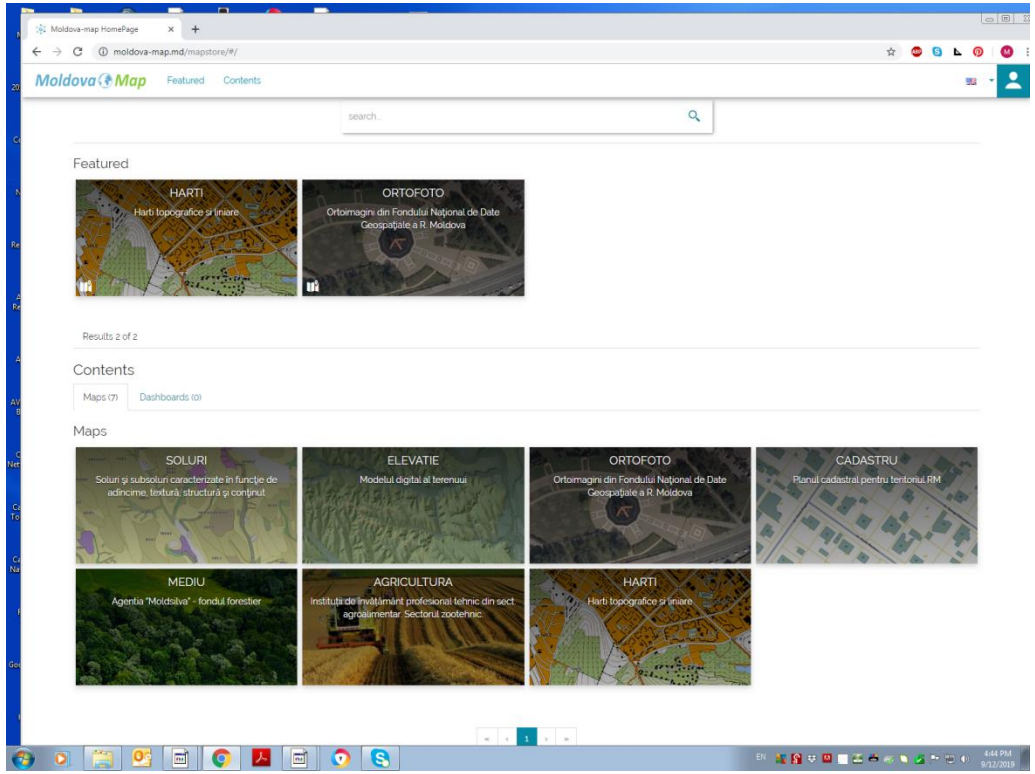
http://www.geoportalinds.gov.md/

Moldova: NSDI – Norwegian Support

Kartverket

Moldova: Norwegian Technical Support for NSDI 2006-2022

- Orthophoto images 2007
- Digital Terrain Model 2007
- GNSS MoldPOS Net
- Digital Maps for risk area
- MoldLIS in Cadastre
- Orthophoto images 2016
- Digital Terrain Model 2016
- Base Maps for Sustainable Development 2019-2022



https://moldova-map.md/mapstore/#/

Moldova: NSDI – European Union Support

2014-2016:	EU Twinning project – “Organization, Streamlining and Computerization Process in Mapping in the Republic of Moldova” partners - SWEDESURVEY and Croatian State Geodetic Administration

EU Twinning Project main results:

√ NSDI Law, created in line with the EU INSPIRE requirements;
√ Regional and Local level SDI demonstrations for Pilot region;
√ A demonstration of the network services showing the possibilities of data sharing
√ First Moldovan Prototype NSDI Geoportal.

Funded by the European Union

EU Twinning project: Improving Spatial Data Services in the Republic of Moldova following EU standards

Geospatial Information for Digital Transformation, 27-29/10/2021

Funded by the European Union

Improving Spatial Data Services in the Republic of Moldova following EU standards

1/9/2020 - 31/10/2022

Project partners

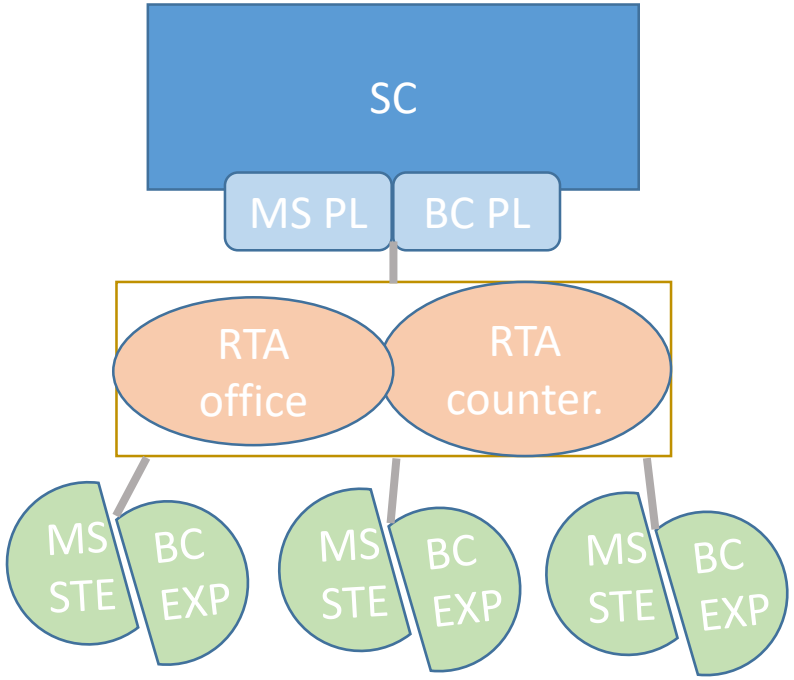
EU ENI 2020 Twinning project: MD 16 ENI OT 01 19
”Improving Spatial Data Services in the Republic of Moldova following EU standards”

TWINNING

Funded by the European Union

Area of support / impl. methods

- Twinning:
  - aims at upgrading the administrative capacities of the public administration
- Project objective:
  - to enhance e-government through improved spatial data sharing
    - Support in NSDI development



Funded by the European Union

1st year: results

Analysis & Strategic framework

- ❑ 5-year NSDI Program;
- ❑ Action Plan 2022-2024;
- ❑ Recommendations on institutional framework (NSDI Council/working groups)

Business model

- ❑ Report on NSDI cost assessment

Data & geoportal

- ❑ Guidelines:
  - ✓ on analogue to digital conversion,
  - ✓ on geo-referencing,
  - ✓ for data specifications,
  - ✓ on data modelling,
  - ✓ for creation and maintenance of metadata.
- ❑ TS for NSDI Metadata Geoportal

Training & Awareness

- ❑ 35-hour online training "Introduction to Spatial Data Infrastructure and QGIS", over 100 participants,
- ❑ Communication Plan in the NSDI sector

Legislative framework

- ❑ Analysis of existing NSDI legislative framework;
- ❑ Amendments to the Law on NSDI
- ❑ Data sharing policy

Situation Report Analysis, Training plan

Funded by the European Union

2nd year: plan

- ❑ Amendments of the NSDI Council/Working groups legal framework
- ❑ Policy for licencing

- ❑ Benefits report
- ❑ Business model
- ❑ Business plan

- ❑ Support in development of NSDI Metadata Geoportal
- ❑ Support in transition to the new thematic geoportal
- ❑ Data harmonization plan

- ❑ Review of universities' programs on NSDI related topics
- ❑ Awareness campaign incl. NSDI conference 2022

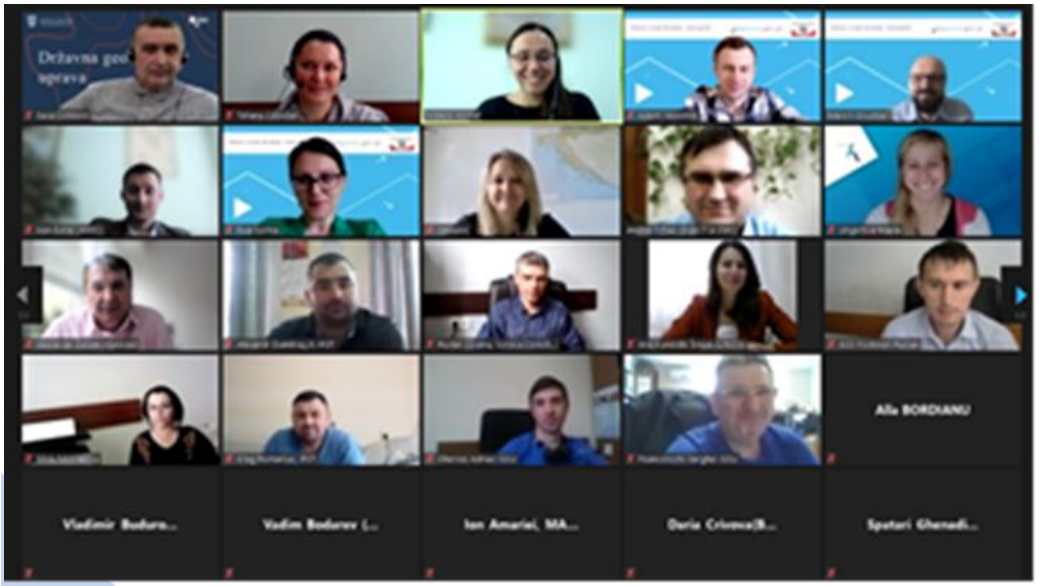
- ❑ Amendments to the existing NSDI regulation
- ❑ Model for MoU
- ❑ Technical protocols for data sharing

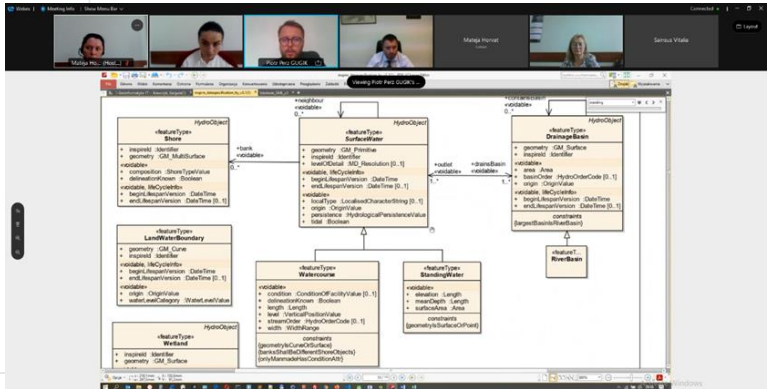
Pilot project, study visits

Funded by the European Union

Working methods

Basic principle: close partnership (MS & BC experts) + detailed planning + high level of expertise





EU ENI 2020 Twinning project: MD 16 ENI OT 01 19
”Improving Spatial Data Services in the Republic of Moldova following EU standards”

Funded by the
European Union

Thank you for your attention!

Use of UAVs in Crisis Situations

Mats Mikalsen Kristensen, Vice President, Unmanned Systems, Andøya Space, Norway
Tore Jensen, Technical Advisor, Geodata, Norway

Mats is from the government owned company Andøya Space. As Vice President of Andøya Space Unmanned, he gets to work with the best team in the drone business and enjoys having some of the most advanced technology.

Tore Jensen (picture below) is a Technical Adviser at Geodata – the Esri distributor in Norway. He has long experience with Esri software. Since 2005, Tore has been specialized in GIS in Public Administration, Emergency Preparedness, Police, Fire, Defence and Health.

They very cleverly weaved their story together, presenting almost alternate slides. They explained the components of their capability, the drone platform, range of sensors, pilots (still needed by regulation although autonomous operation is technically feasible) and the imagery processing augmented with machine learning. They can integrate all the drone imagery into existing 3D models as well as link to parcel and road information in the immediate vicinity and more widely.

For emergency planning, the capability enables them to perform desktop rehearsals, identify access points for vehicles, responders and assess hazardous materials. Accurate DTMs can also be created for flood risk areas. They also use the system, implemented in ArcGIS, to assess who need to be evacuated if an incident should occur.

The system was put into active use for emergency management, following a massive landslide in Gjerdrum, just north of Oslo. The slides show graphically the position that faced rescuers with very poor weather and many air and ground assets needing to be deployed simultaneously.

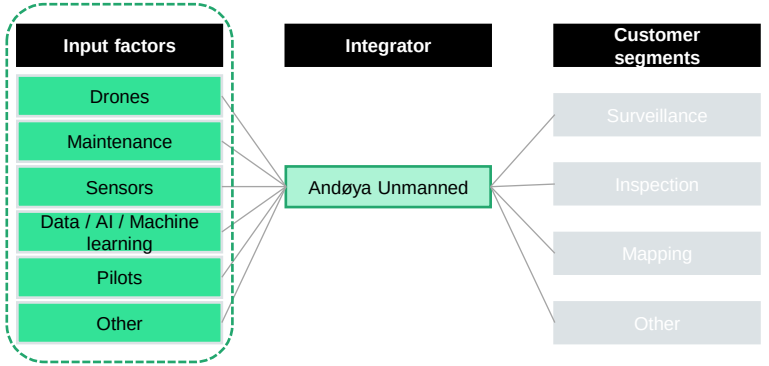
The drones used by Andøya Space were not able fly immediately the team arrived at the incident, because of rescue helicopter traffic, so it was dark when airspace was available. Fortunately, the team had researched use of thermal imaging sensors and were able to successfully map the area despite very poor weather. They completed a survey of the main rescue area, where 10 houses had been destroyed, in just over an hour using two drones. The imagery was then processed, and imagery assembled within a further two hours. This allowed the position of these houses to be pinpointed for rescuers to focus their search. In addition, the system was used to calculate the volume of the slide (1.4 million cubic metres of material). The imagery was also used by the National Geotechnical Institute to help identify the causes of the landslide.

Andøya Space Unmanned

Use of UAV`s in Crisis Situations

GEODATA

Summary of input factors



Drones:
Technology develops at an incredible speed, making drones more cost-efficient to use. The use of autonomy is continuously lowering the skills required for operations within the small drone segment

Regulations:
We see regulatory restrictions as one of the main competitive barriers for market entry. Obtaining the license is one thing, but tailoring the right drone with the right equipment for the specific task to ensure a smooth regulatory process will require in-depth skill and experience.

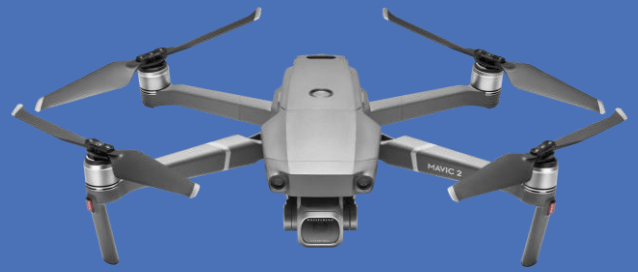
Other:
- Capacity Assistance
- Training facility
- Manual interpretation and the reporting of drone data captured
- Test facilities for larger UAV over-controlled ground and air area
- Approved Design Organization – Certifying of Drones.

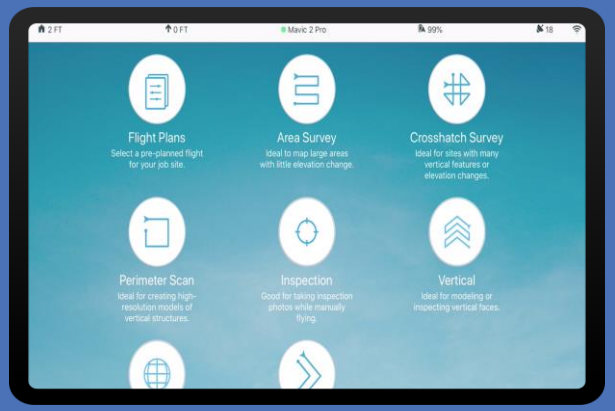
Maintenance:
Drones needs maintenance to be airworthy of operation

Pilots:
Professional pilots are required for drone operators to be able to perform complex operations. In the future, more operations are likely to be conducted remotely and partly autonomous.

Sensors:
Sensors technology is developing fast and mainly supplied by large producers with high volume.

Data / ML / AI:
The development of AI is experiencing exponential growth. As data processing already stands for a significant amount of the income from drone operations, utilizing the development of AI to deliver quicker and more precise results will be a competitive advantage but require significant investments in technical expertise which also has high maintenance requirements.





SiteScan for ArcGIS

Drone2Map

ArcGIS Online/
Enterprise

esri

GEODATA

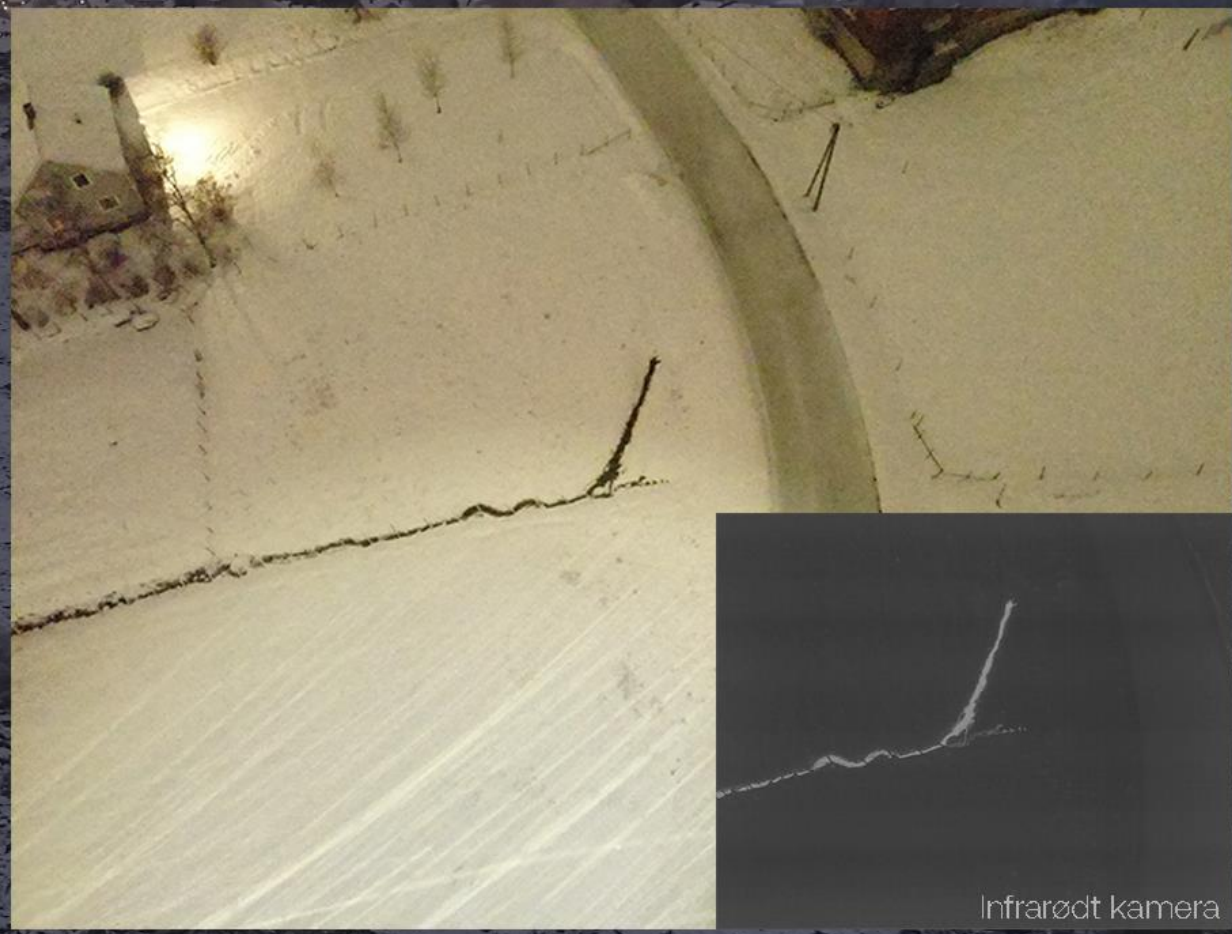
03:59
22.10.2021
Andøya
Space

18:54
22.10.2021
Andøya
Space

Drone 1 - Grid Flyvning

22.10.2021

Drone 2 - Manuell Flyvning



19:50

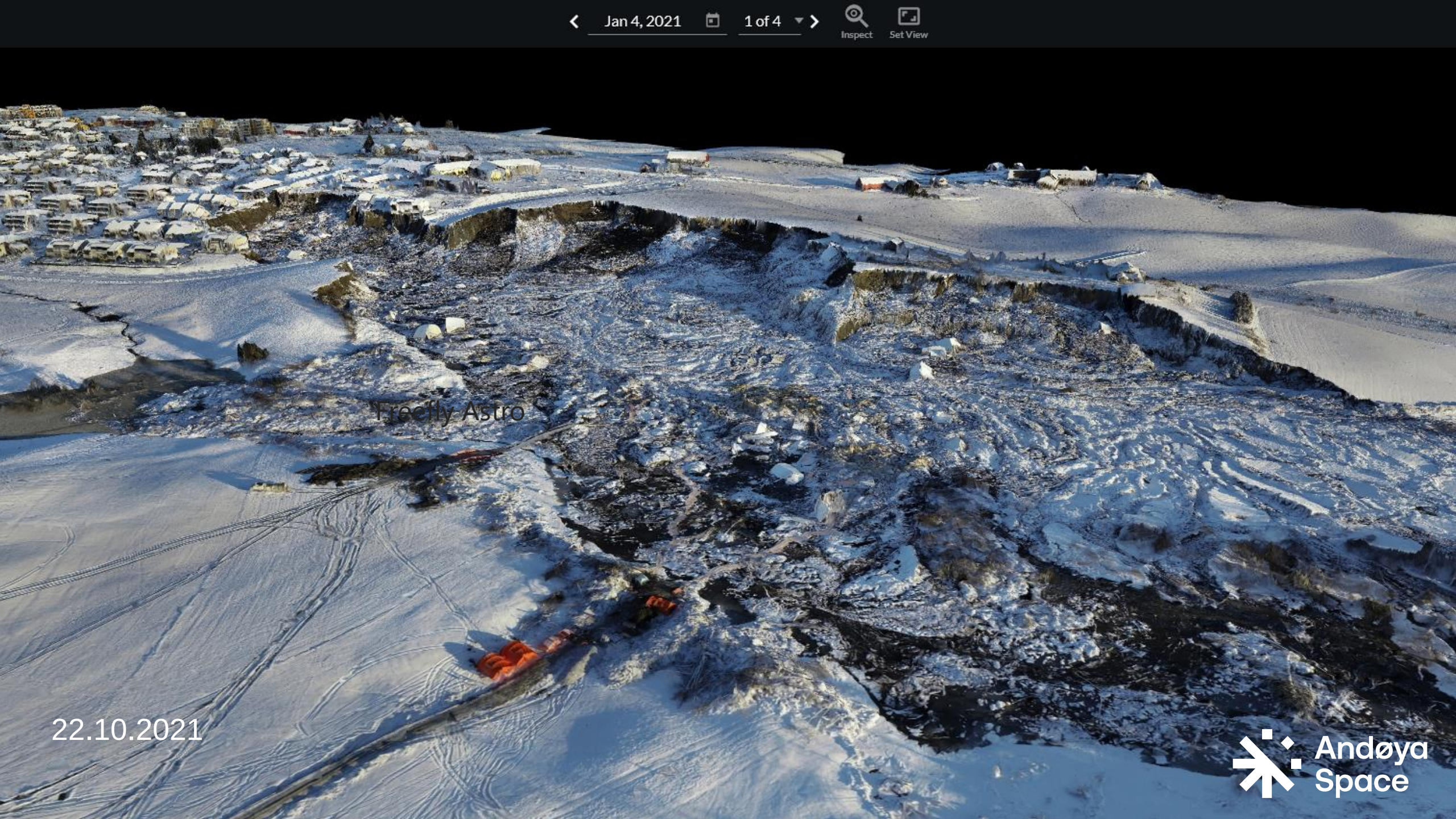
Andøya Space

21:45
22.10.2021
20 m
100 ft
Andøya
Space

22.10.2021
IR_FirstMap
EO_RaskOversiktHele
Andøya Space

Gjerdrum
05/01/2021, 00:00 EO...
2D
Timelino
Cloud
Mesh
LAYERS
FILES
MEASURE
Ground Control Points
Photos (1,903)
Elevation Data
Orthomosaic
22:45
Gjerdrum
Ask
Kyken
Hønsi
Kommandoplass (KO)
Nordre Brådal
Hammar
Søndre Brådal
Nordre Flatby
22.10.2021
200 m
600 ft
Andøya Space

Gjerdrum
05/01/2021, 00:00 EO...
2D
Timeline
Cloud
Mesh
LAYERS
FILES
MEASURE
Ground Control Points
Photos (1,903)
Elevation Data
Orthomosaic
Leguan bro
Vei av isopor matter
22.10.2021
20 m
100 ft
Andøya Space


Jan 4, 2021
1 of 4
Inspect
Set View
Firefly Astro
22.10.2021
Andøya Space

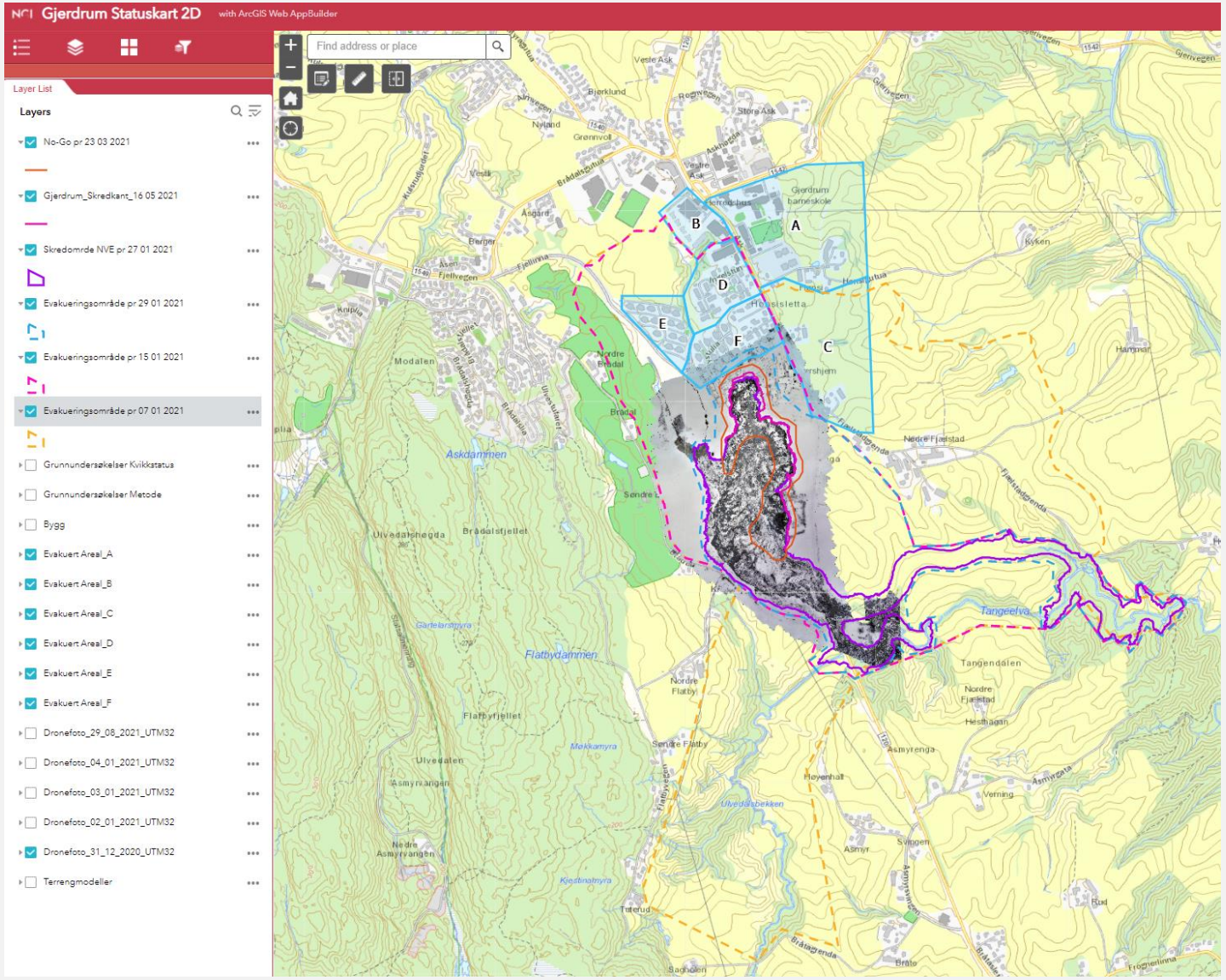
Joint map solution in ArcGIS Online as a support tool during and after Gjerdrum-landslide

Joint map solution in the acute phase:

- NVE (The Norwegian Water Resources and Energy Directorate)
- NGI (Norwegian Geotechnical Institute)
- Multiconsult

Content:

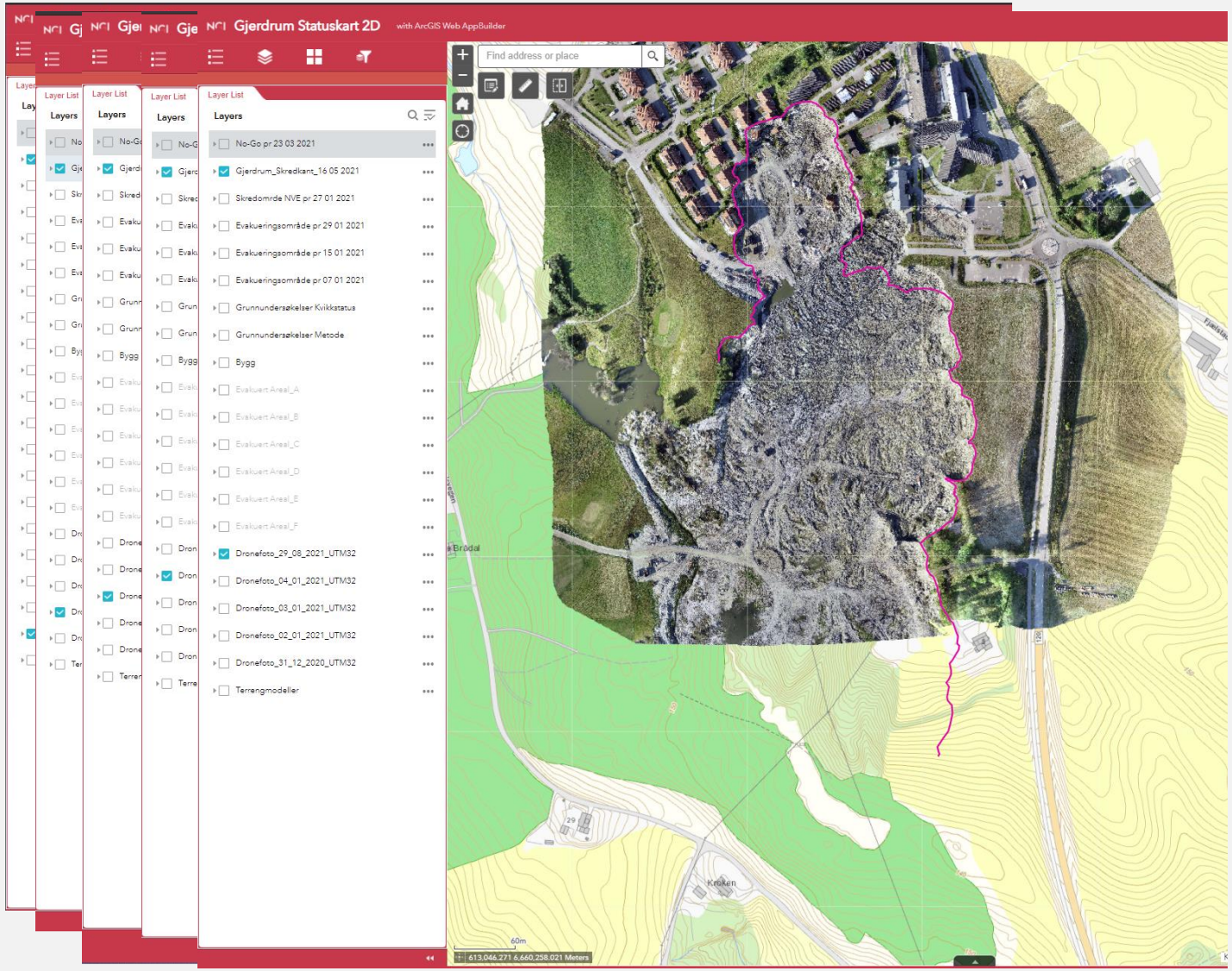
- Landslide area
- Evacuated area
- No-Go areas
- Ground investigations
- Other zones



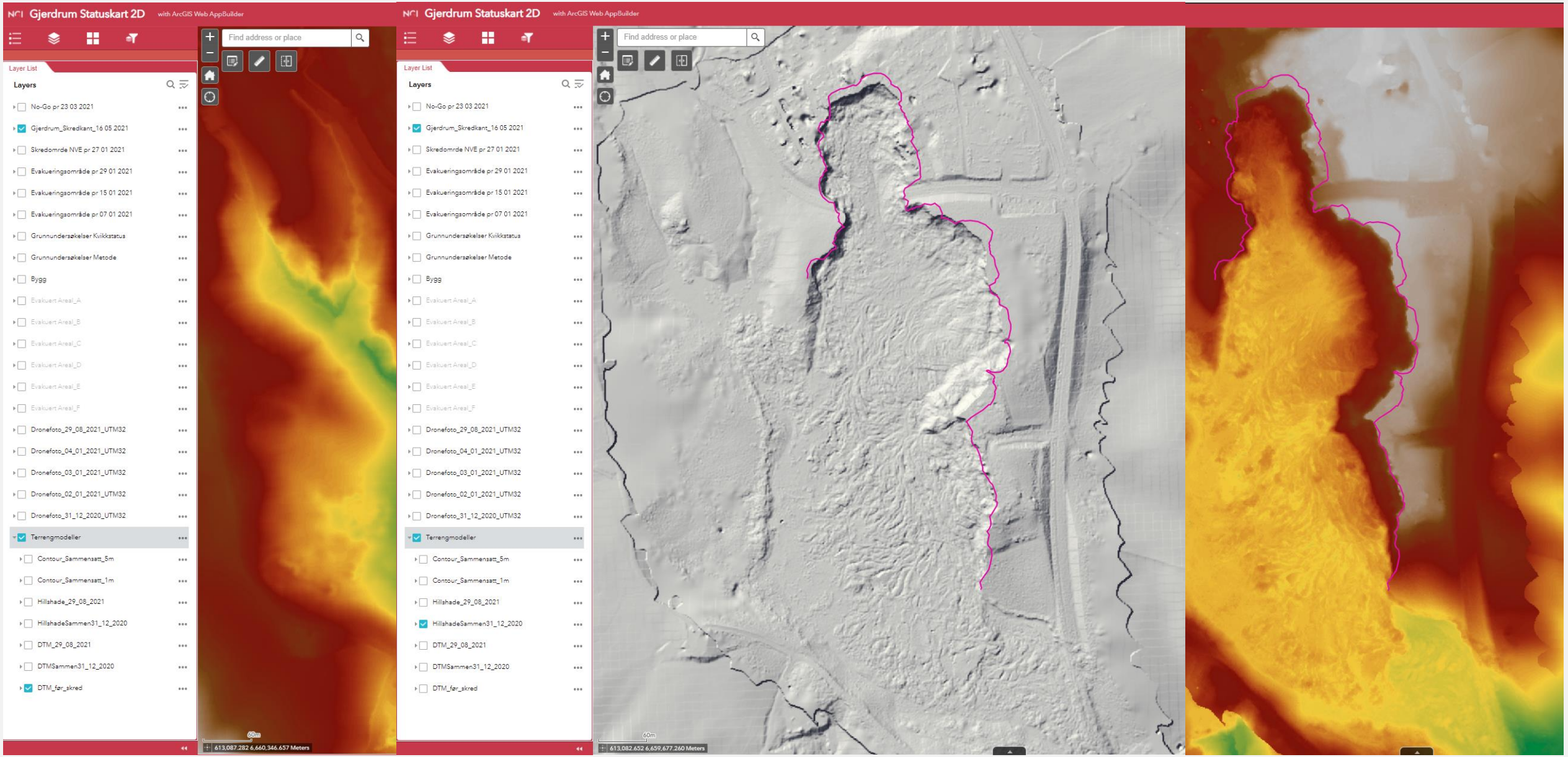
(Norwegian Geotechnical Institute)

Followed the development of the landslide

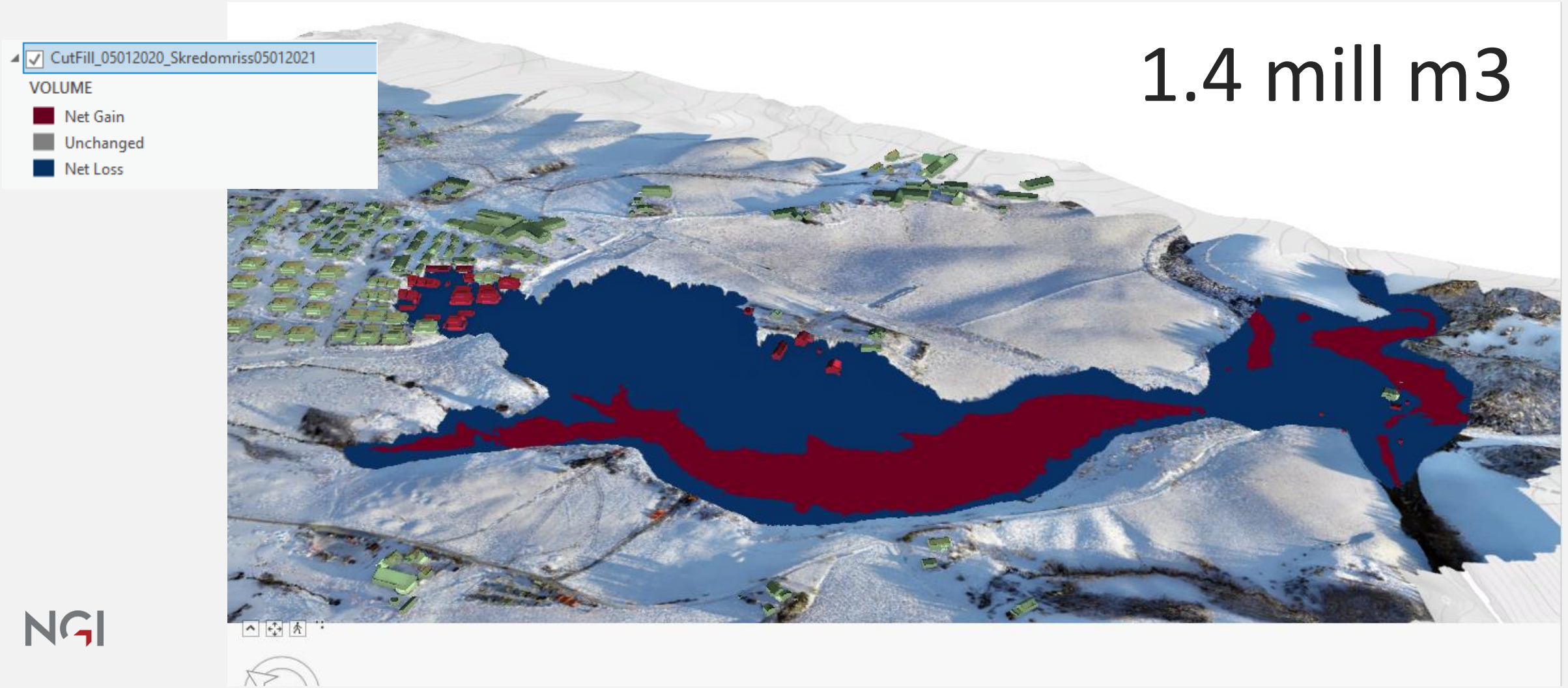
During the acute phase, NGI regularly received new drone photos that were added to the solution



Terrain models from drone photos



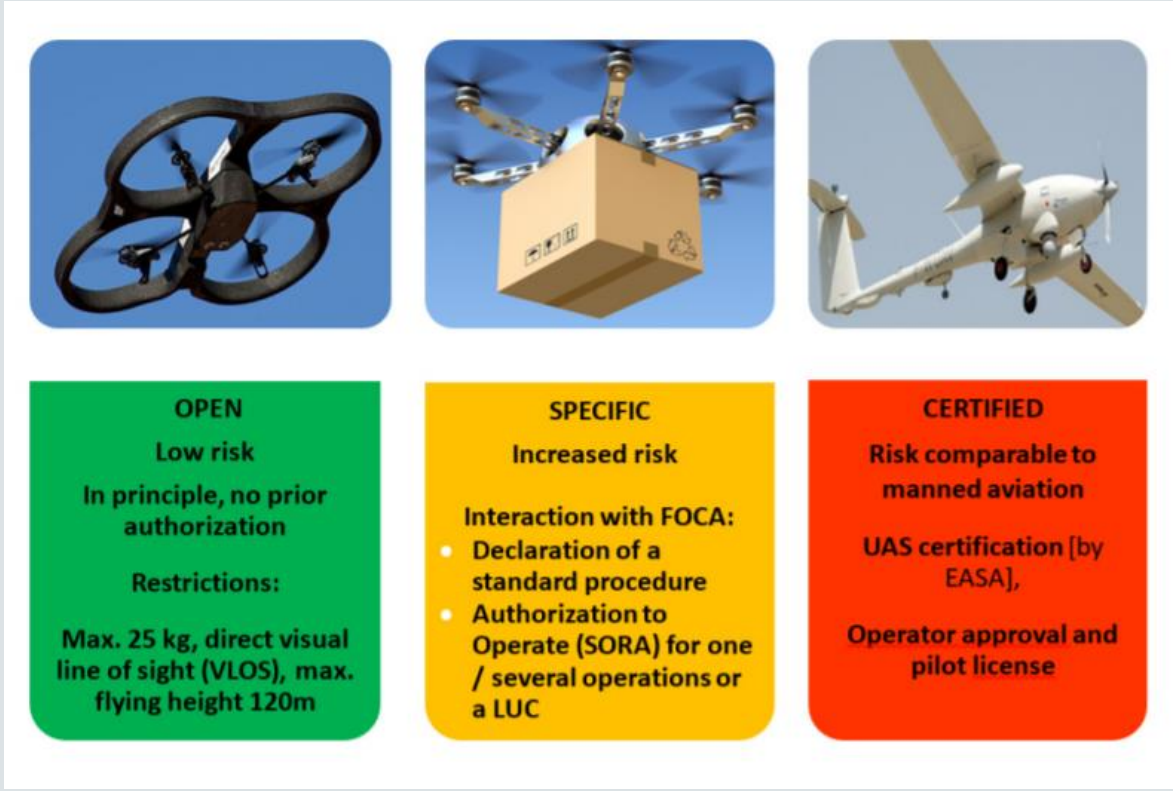
Volume calculation using terrain model from the drone images



EASA drone regulations

Risk based process evaluating the potential ground risk vs air risk – combined with risk reducing methods as:

- Maturity and technical airworthiness of UAV
- Skill and knowledge level at pilot
- Risk reducing technology as parachute, emergency land, etc



Andøya Space

Geodata AS & Andøya Space drone solution

- Open or Specific Operational UAV approval
- Short or long term lease of UAV
- Trough ArcGIS plattform a complete solution for procedures, planning- and execution of UAV missions, data processing and sharing of data to rest of the organization in the most efficient way
- Daily operational expertice support for planning and conduction of UAV flight, ensuring the best data-set quality and safe operation within the regulatory framework
- Special courses within inspection, streaming, sensor use and mapping

GEODATA

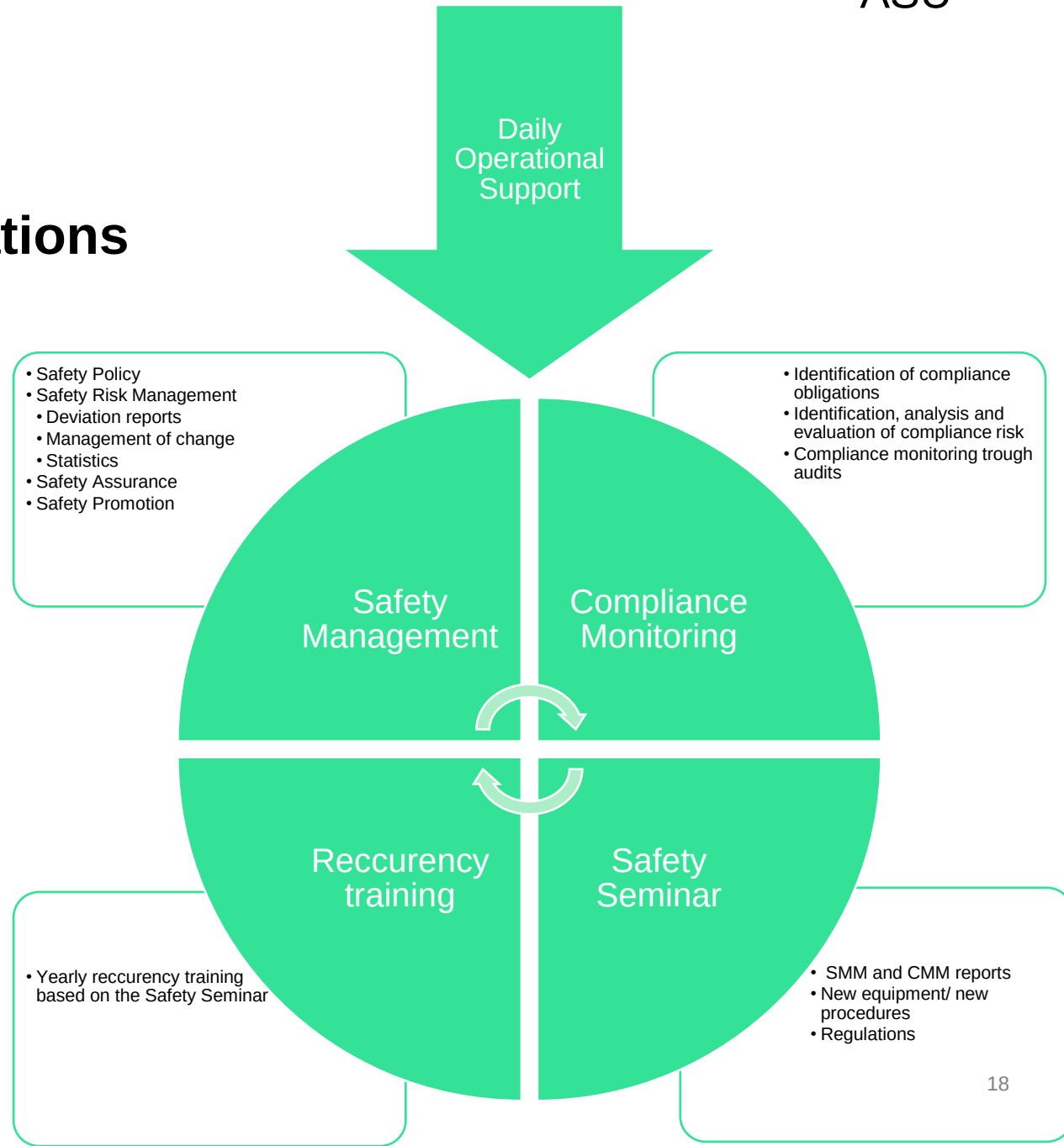
Capacity assistance providing

The safe and easy way of drone operations

Basic Training and evaluation of operational concept

SORA CONOPS EASA Specific Manual

Specific training according to CONOPS



Experiences from Georgia: New Datasets

Galaktion Hahubia, National Agency of Public Registry, Georgia

Galaktion works at the National Agency of Public Registry of Georgia as a Geodesy and Cartography Coordinator. He is also engaged in the Norwegian funded projects as a Technical Manager responsible for quality assurance of geospatial data and mapping database.

In his presentation, Galaktion addressed the extensive series of projects undertaken in Georgia with the support of Kartverket, under a project called Maps for Sustainable Development. The main work had been the capture of aerial imagery for 45.000 sq.km of Georgia.

The imagery was used to produce orthophotos and contour maps initially. This was extended to the production of digital topographic base maps at varying level of detail in urban and rural areas.

The maps are now approaching completion and will be uploaded onto their geoportal and made available as open data. Thanks to Norwegian support, Georgia has received an up-to-date reference data – orthophotos, Digital Terrain Model and digital large-scale topographic maps needed for their National Spatial Data Infrastructure.

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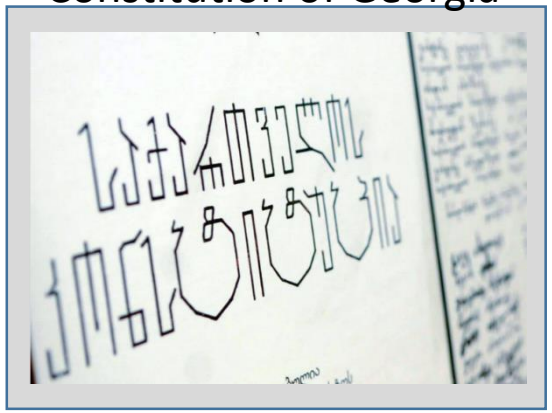
New Datasets

Galaktion Hahubia, NAPR

Online from Georgia
28.10.2019

NAPR - Geodesy and Cartography Division

Constitution of Georgia



Ministry of Justice of Georgia

National Agency of Public Registry

Law of Georgia on Geodetic and Cartographic Activities

www.napr.gov.ge

Geodesy and Cartography Division

- State geodetic and cartographic works
- Remote sensing, aerial and satellite imagery
- Defining strategy
- Elaboration of specifications and normative documents of a particular field
- Establishment and development of state geodetic framework

info@napr.gov.ge

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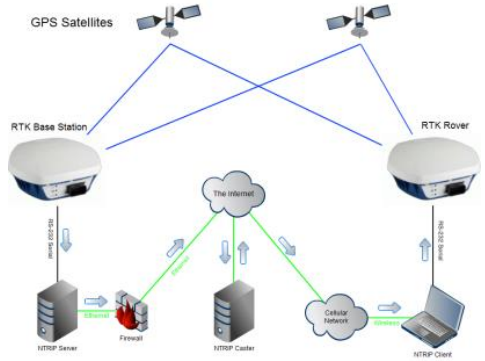
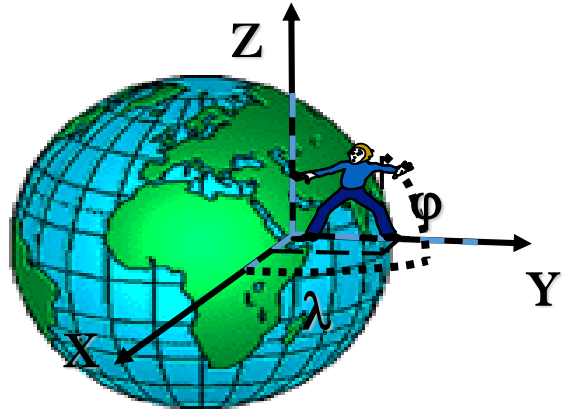
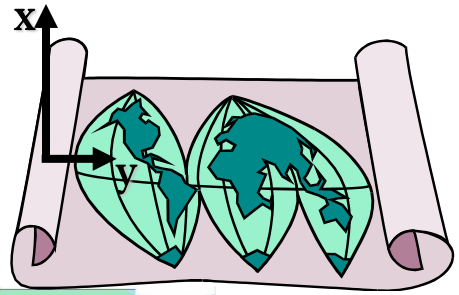
Geodesy

Kartverket



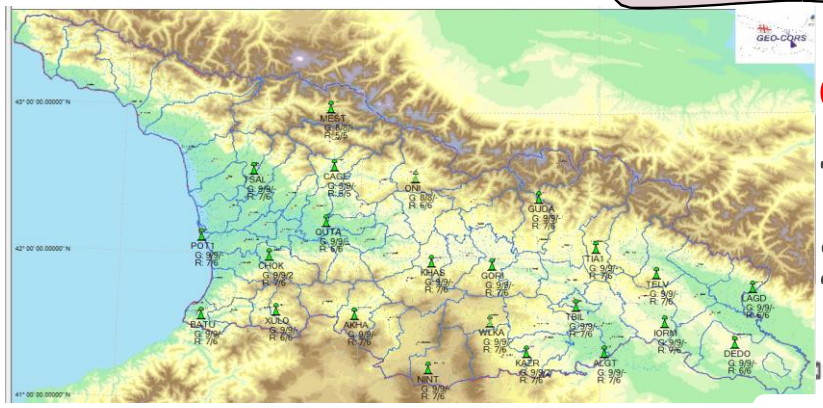




- **Georgian Quasi Geoid model 2012**
  - **Geoquasigeoid2012**

800Users

Reconstruction of geodetic network



CORS stations

7 A class

23 B class

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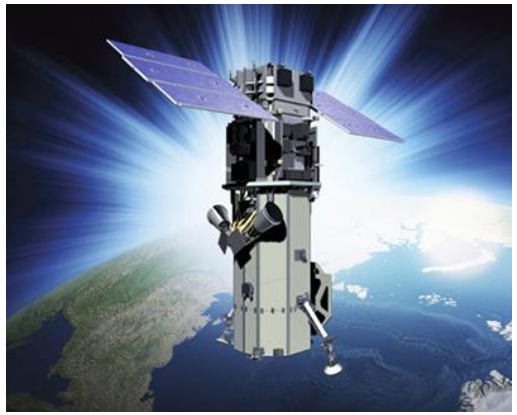
Remote Sensing

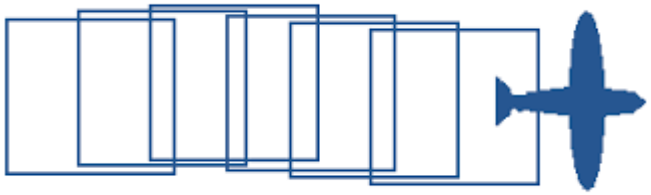
Satellite imagery

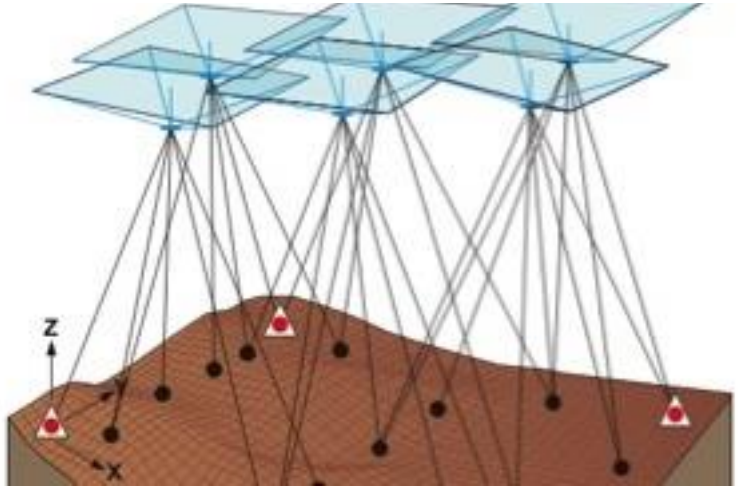


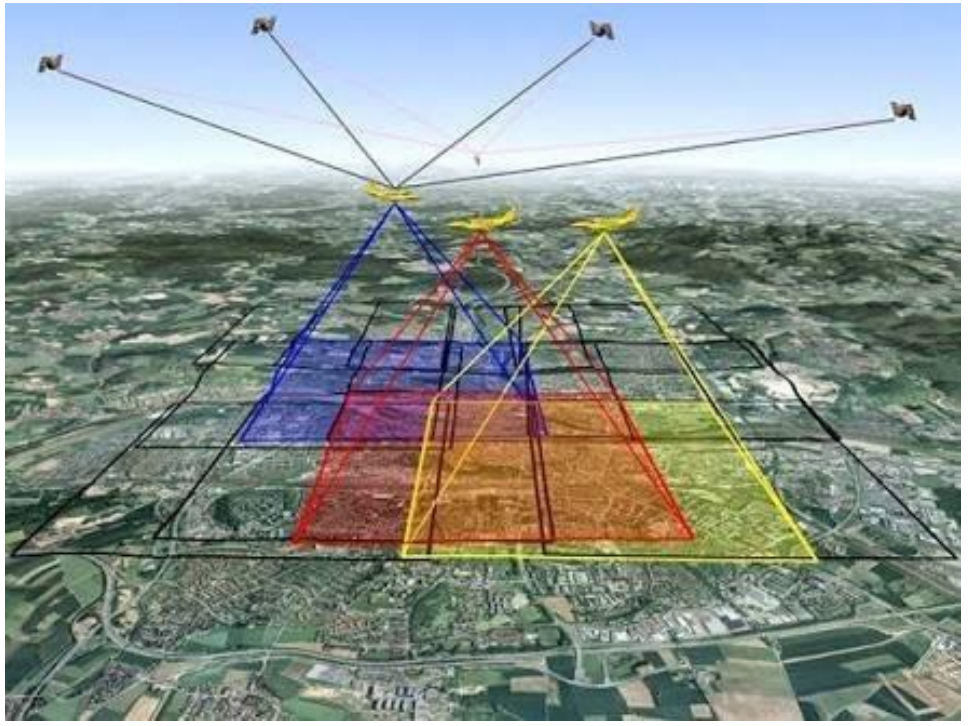
Territories near state border or occupied by Russia

Small areas

Aerial photography







Main part of Georgia

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Norwegian Projects

Kartverket

VERE RIVER

GEORGIA ORTHOPHOTO

MAPS FOR SUSTAINABLE DEVELOPMENT IN GEORGIA

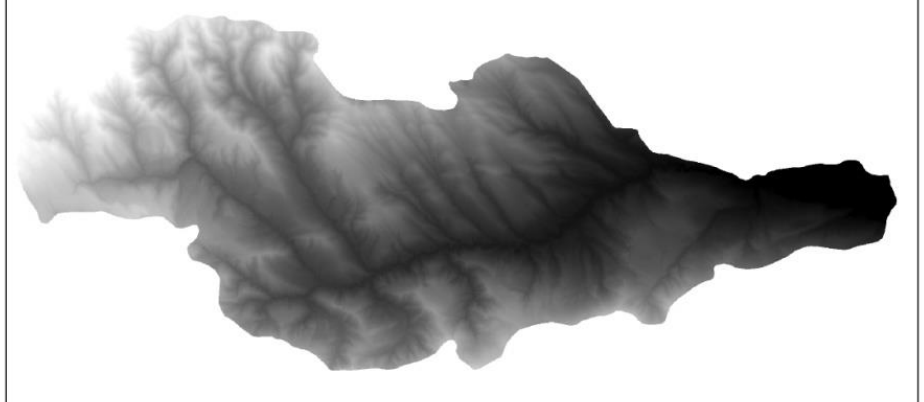
NATIONAL AGENCY of PUBLIC REGISTRY

Kartverket

VERE RIVER
2015

200 sq.km

GSD = 10cm



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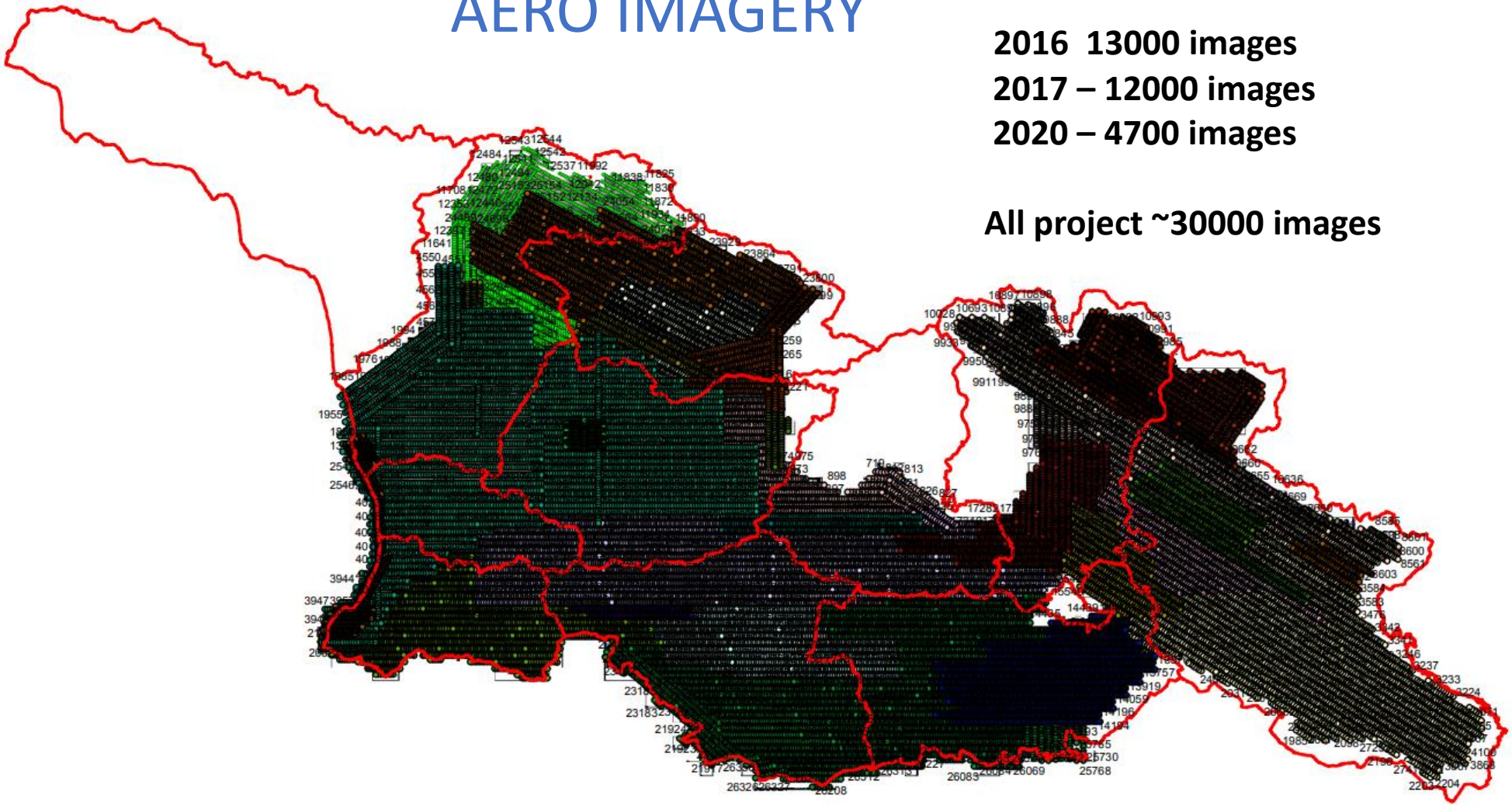
GEORGIA ORTHOPHOTO AERO IMAGERY



2016 13000 images
2017 – 12000 images
2020 – 4700 images

All project ~30000 images

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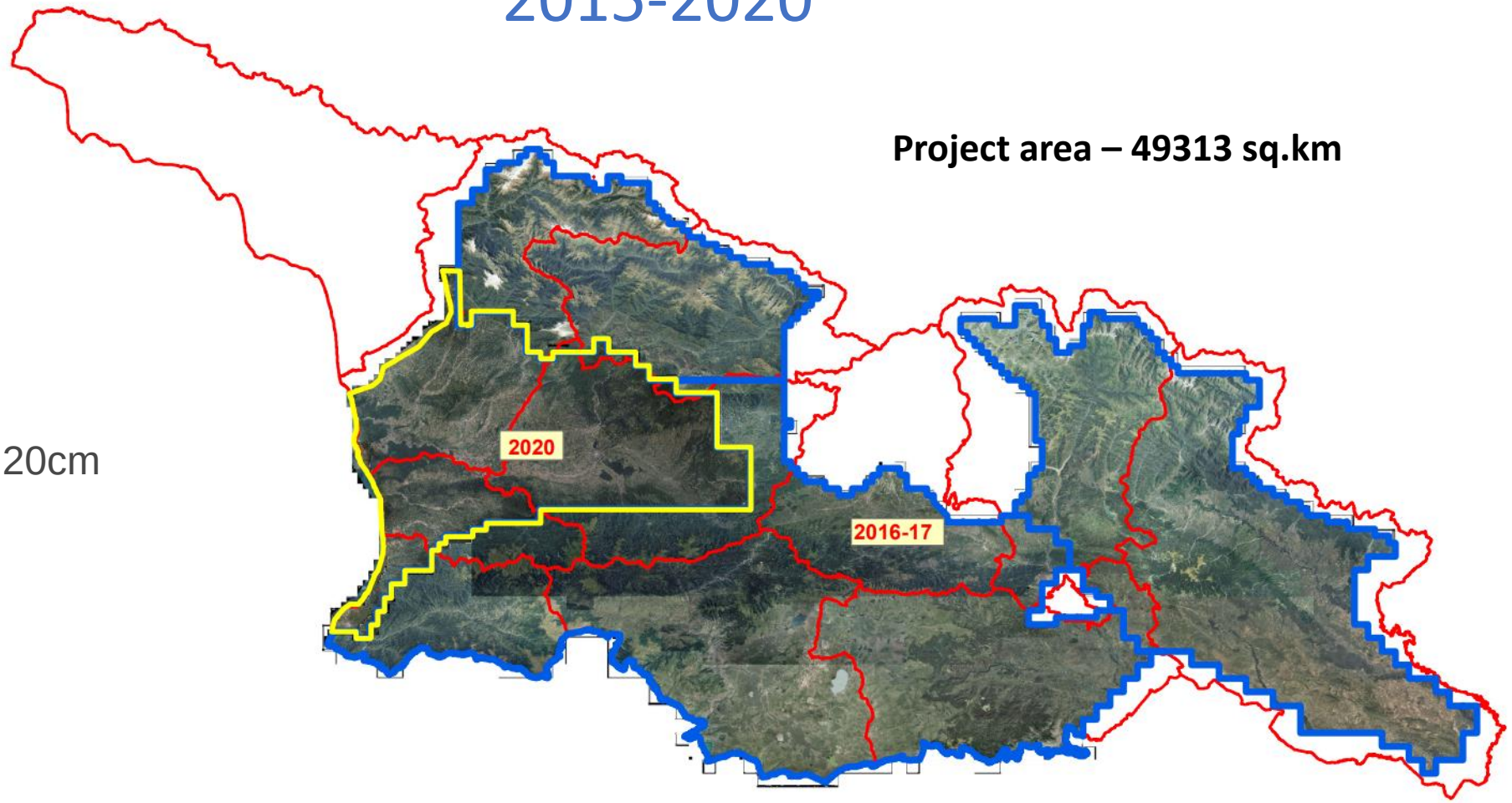
GEORGIA ORTHOPHOTO 2015-2020

Project area – 49313 sq.km

GSD = 20cm



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AERO IMAGE

Kartverket

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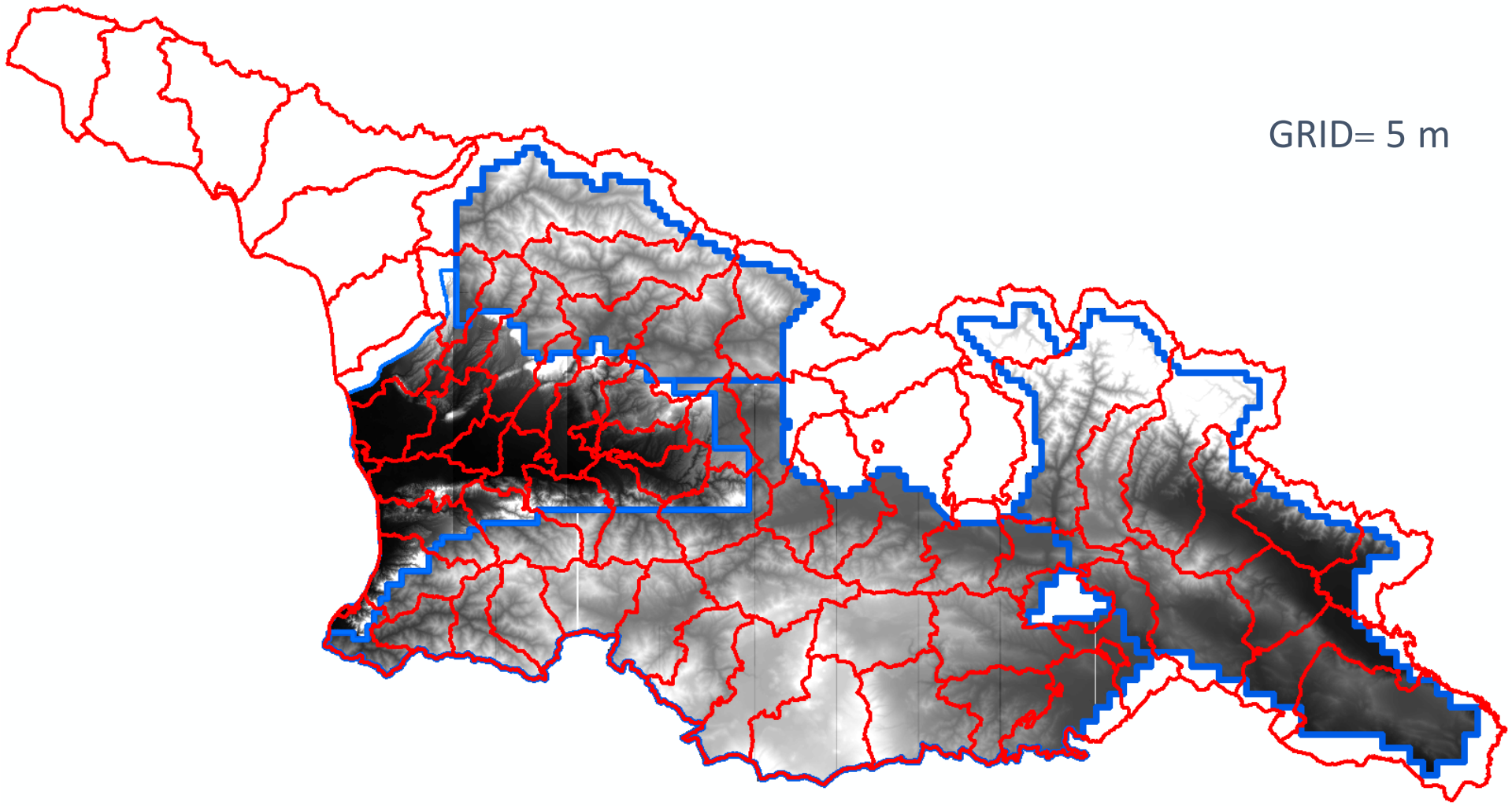
Kartverket

RESULTS OF PROJECT



GRID= 5 m

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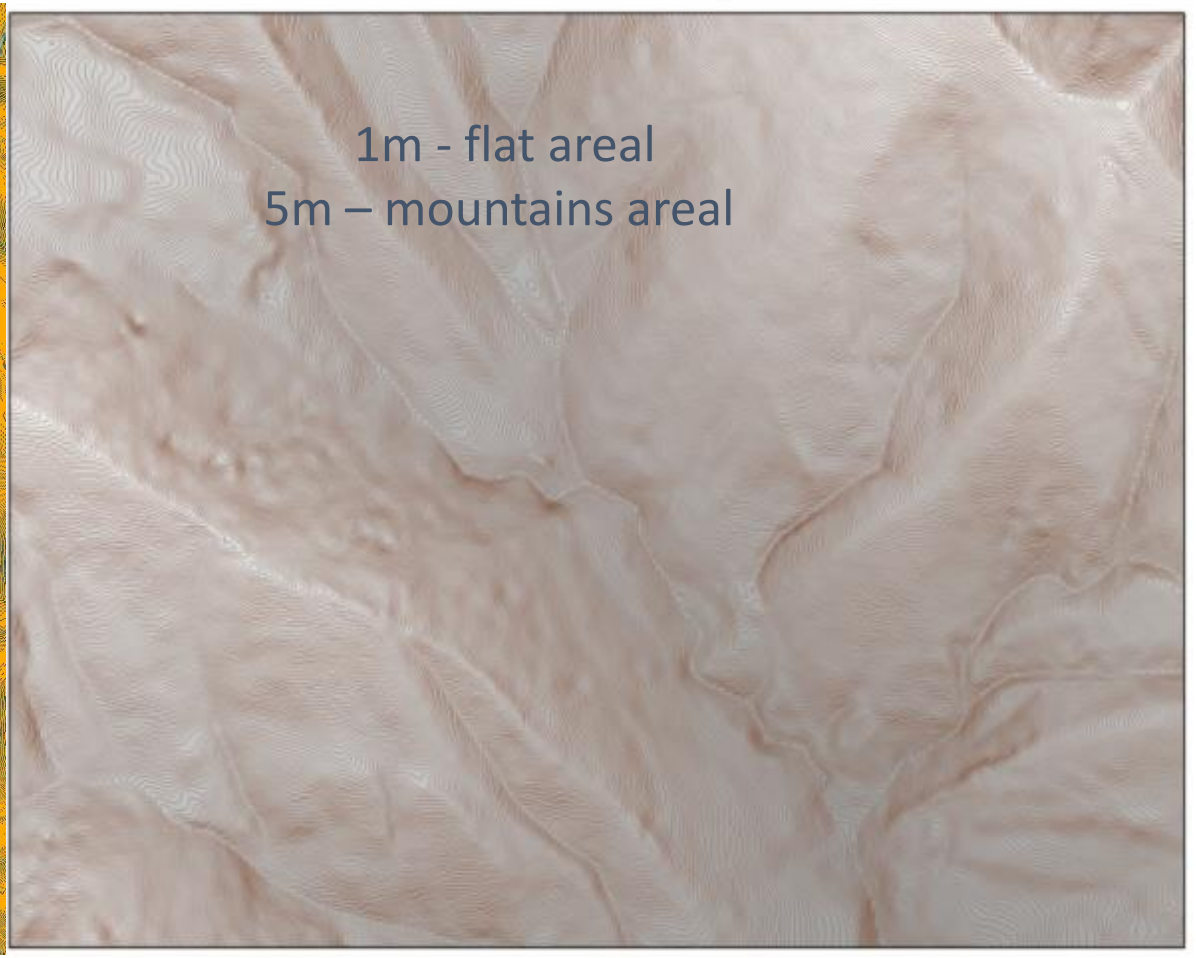
RESULTS OF PROJECT

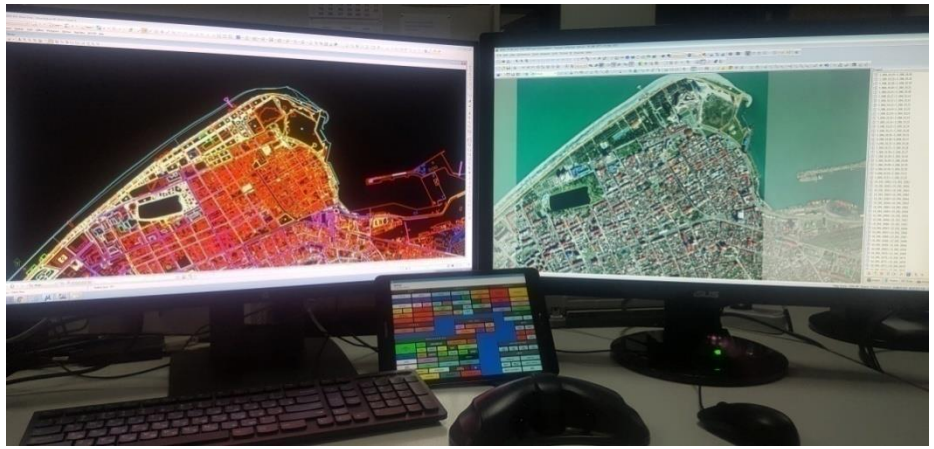
Kartverket



IMPROVED COPACITY

- 1 license of Match AT
- 1 license of DTMaster
- 3 license of Enterprise Architect
- 5 license of Summit Evolution
- 5 license of MicroStation with DATEM
- 1 license of FME

5 photogrammetric stations



Knowledge for quality control

Trainings

www.napr.gov.ge

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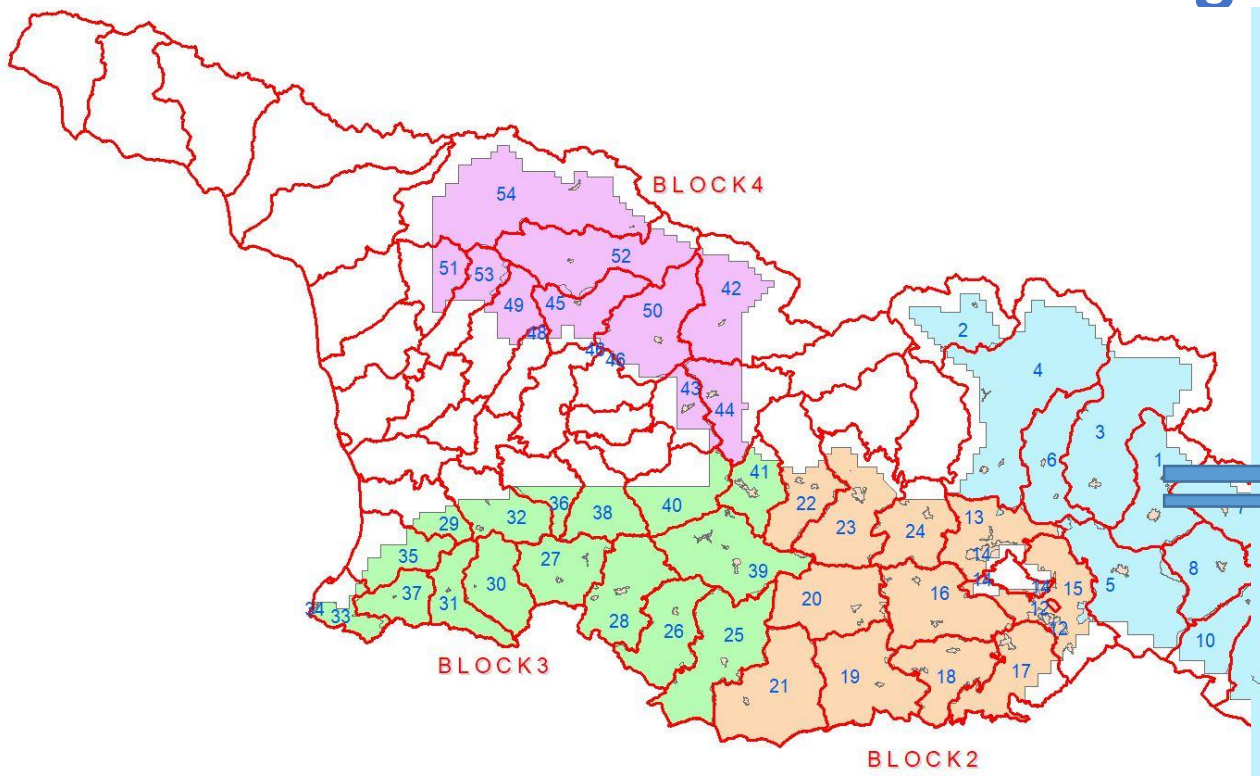
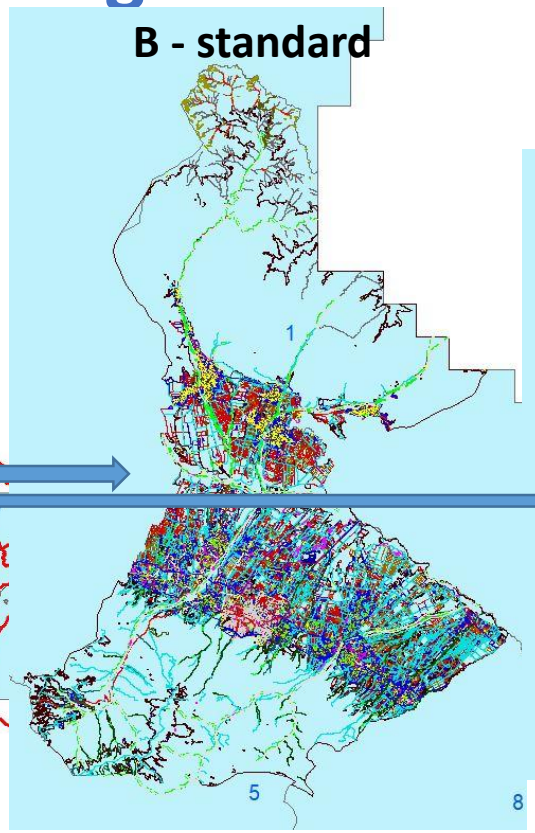
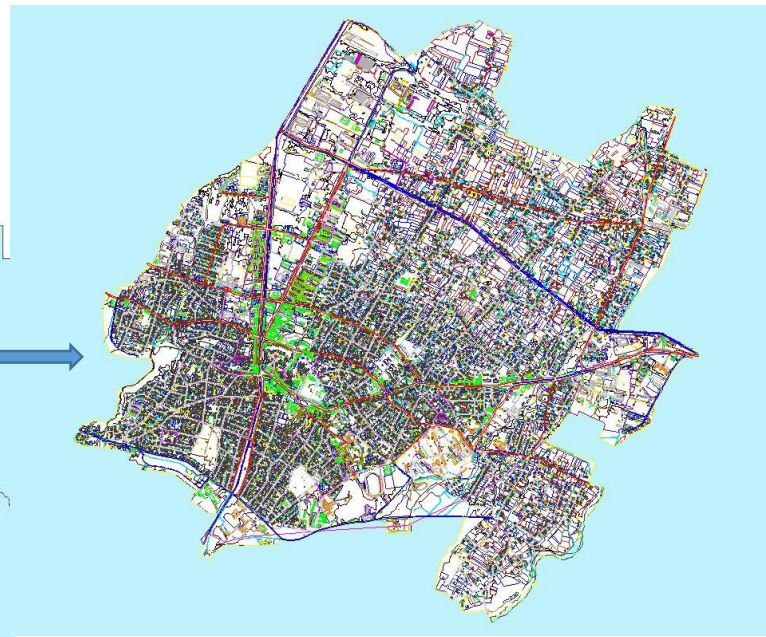
Maps for Sustainable Development in Georgia 2018-ongoing







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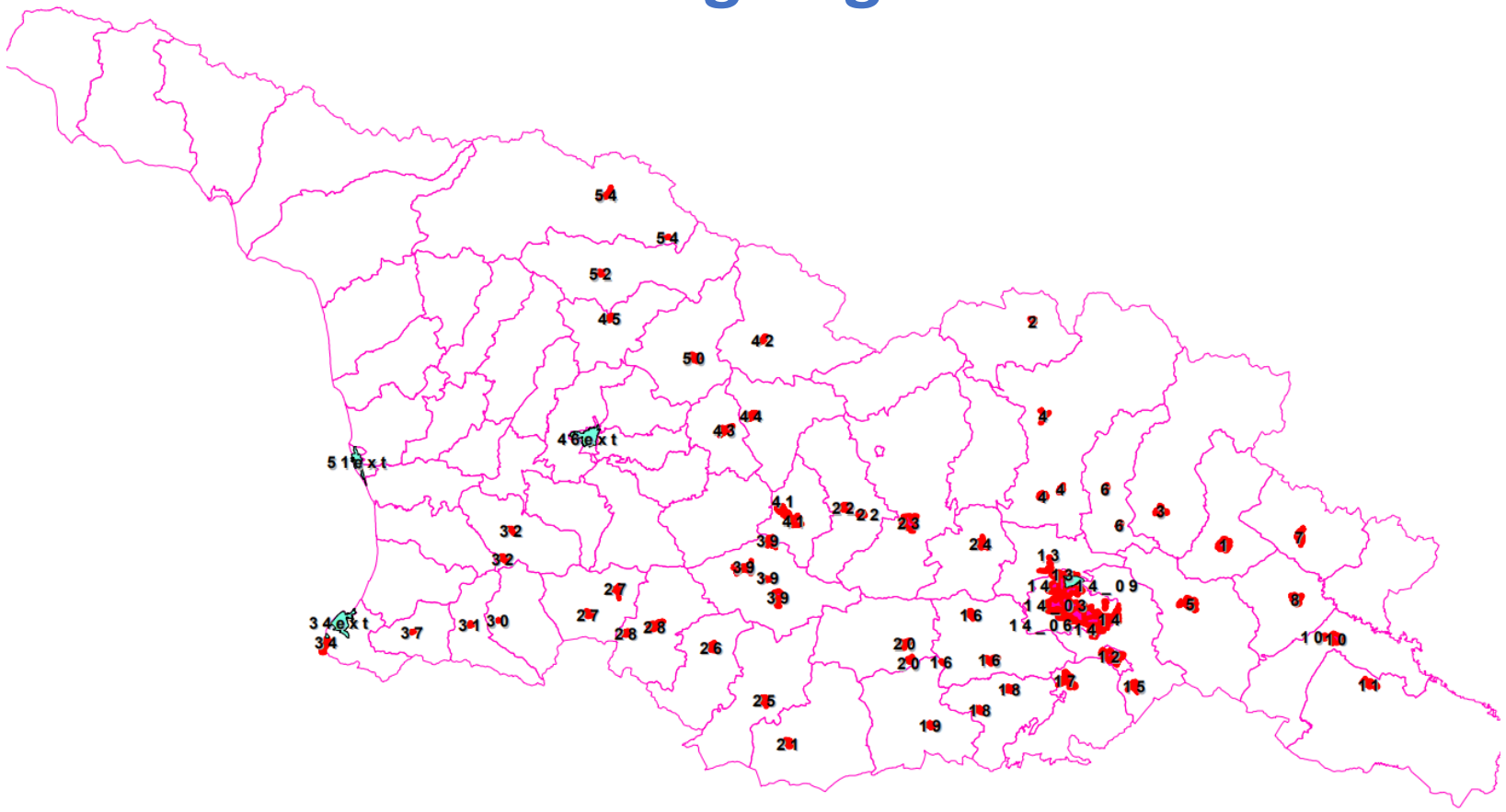
Kartverket

Maps for Sustainable Development in Georgia 2018-ongoing



A – standard project area 645.8 sq.km left 121.52

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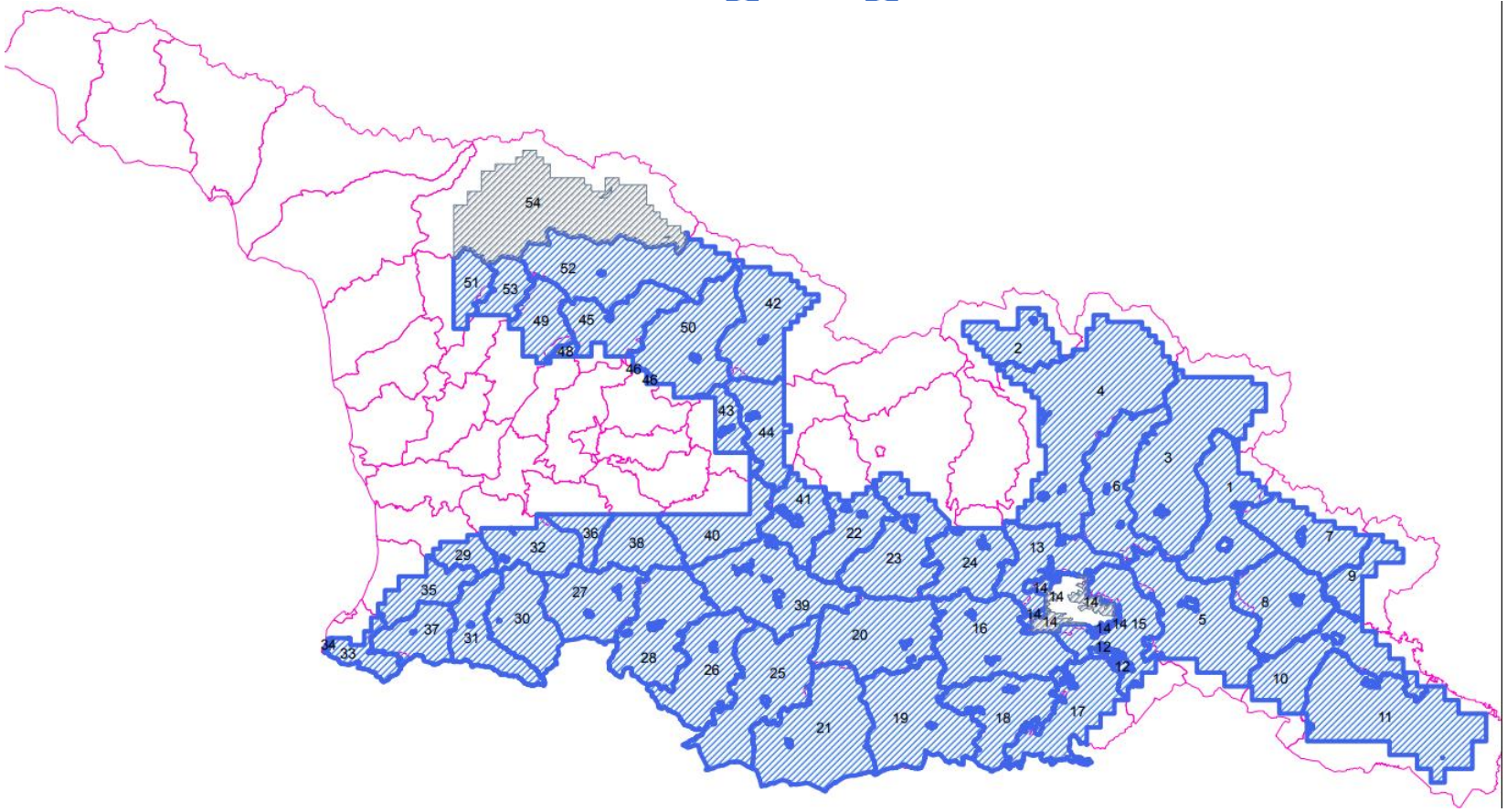
Kartverket

Maps for Sustainable Development in Georgia 2018-ongoing



B – standard project area 40253.4 sq.km Left 2053.22

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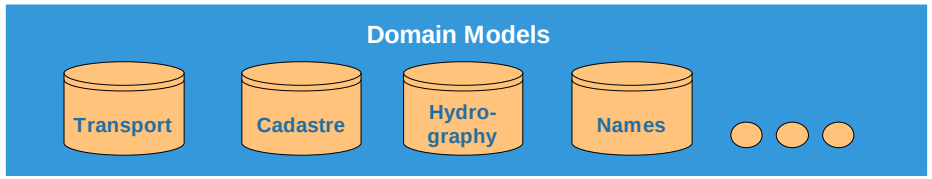
Technical Specification for Creation Spatial Data



- Standardisation on conceptual Level
- UML Schema and Definitions
- INSPIRE defined 34 Themes in 3 Annexes with priority

Buildings and Constructions

Hydrography

Nature

Transport

Utilities

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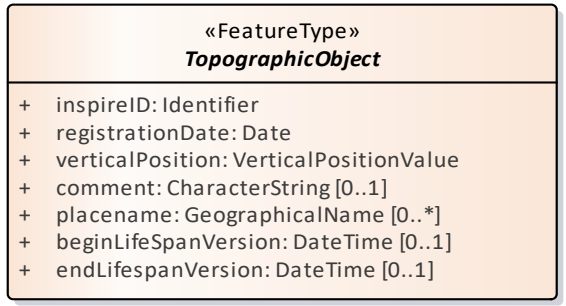
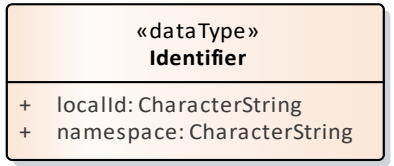
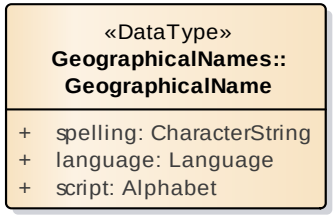
Basic Concepts

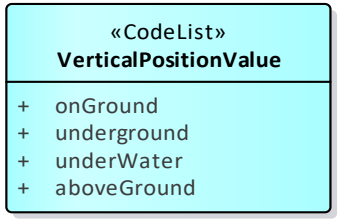
Common

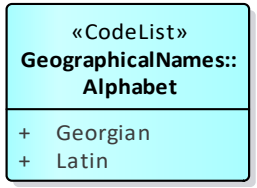
Common information to be registered for all features

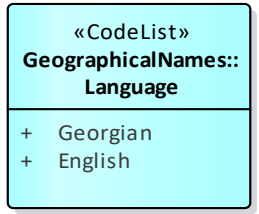






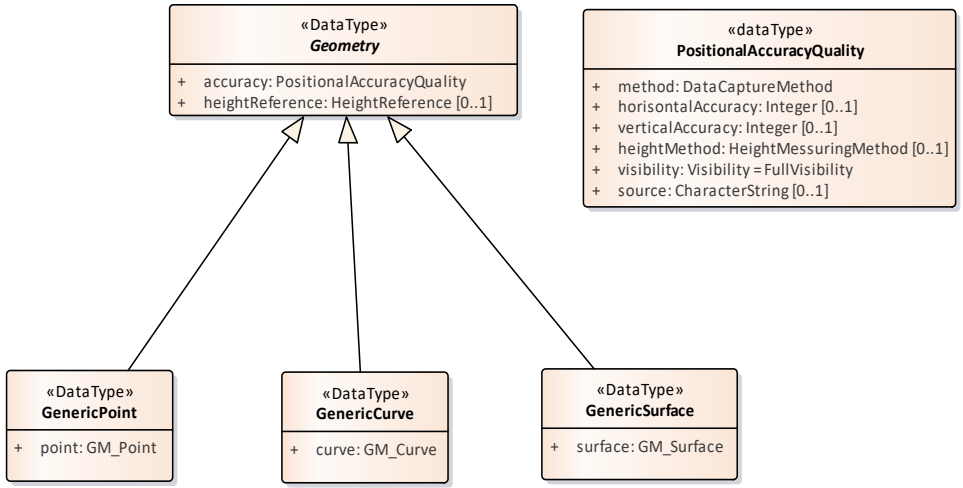


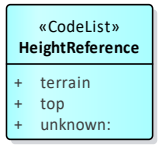


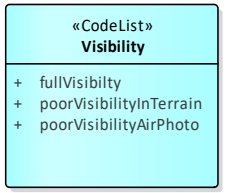


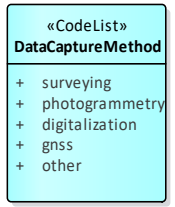
Geometry

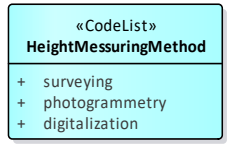
GenericPoint, GenericCurve, GeneringSurface











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Quality Requirements

Completeness

✓Commission

✓Omission

Delivery from the Photogrammetry

Thematic accuracy

○ Classification correctness

Logical consistency

❖Conceptual consistency

❖Format consistency

❖Topological consistency

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xmlns:app="http://skjema.geonorge.no/BasemapSpecification/NaturePhotogrammetry/1.0"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://skjema.geonorge.no/BasemapSpecification/NaturePhotogrammetry/1.0
BasemapSpecification/NaturePhotogrammetry/1.0/NaturePhotogrammetry.xsd">
  <gml:featureMembers>
    ..... feature instances from Photogrammetry
  </gml:featureMembers>
</gml:FeatureCollection>
```

GML datasets compliant to the UML models

Positional accuracy

➢Absolute or external accuracy

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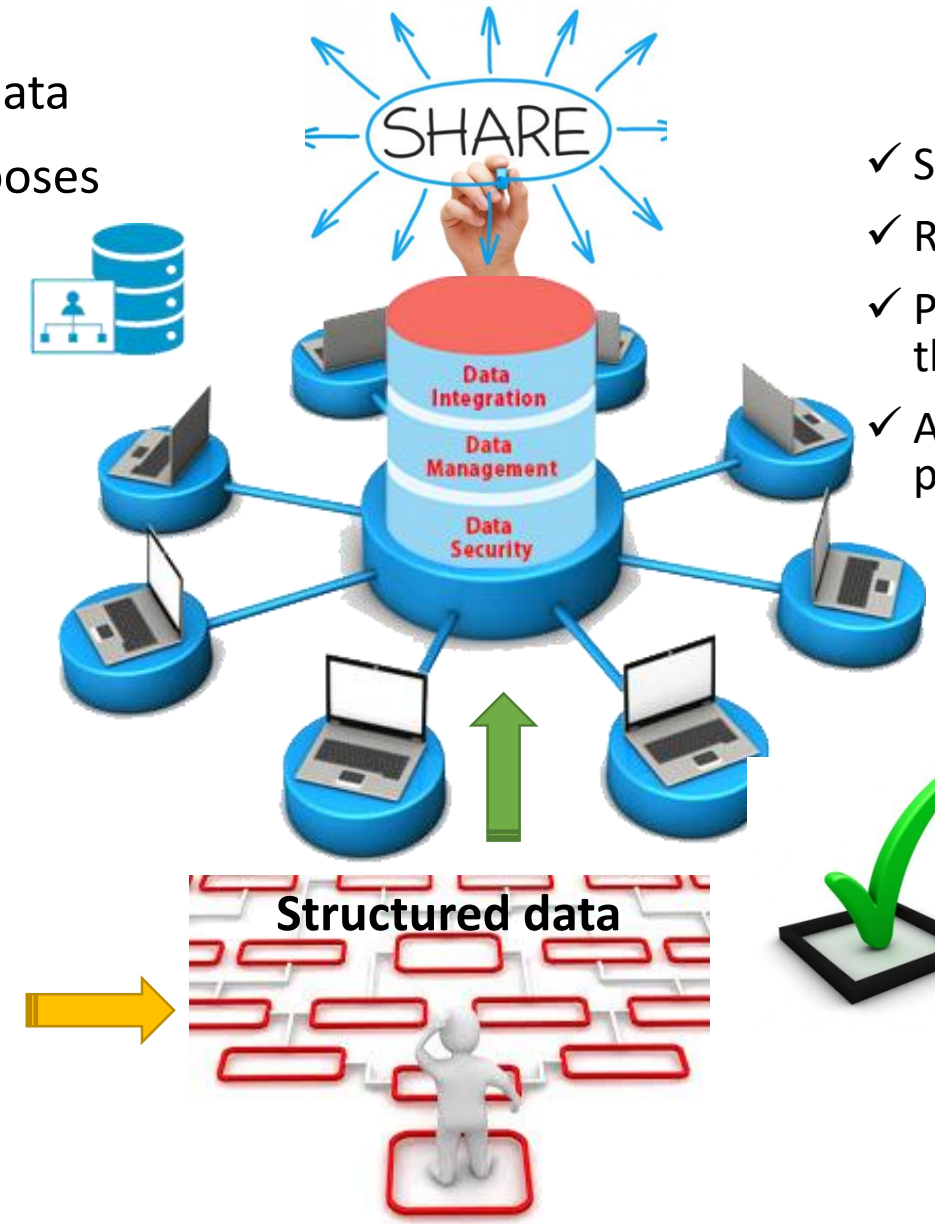
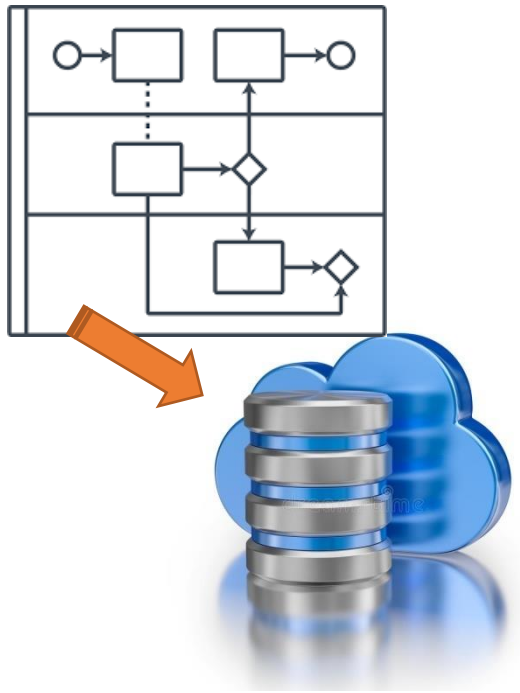
- Correct and structured data
- Basic data different purposes
- Homogenous data



- ✓ Standardization of databases for multiple products
- ✓ Real World Oriented Models
- ✓ Product Specifications for scale ranges, and thematic products
- ✓ Acquisition and Presentation rules related to each product

Data Base Model



Thank You For Your Attention

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✉ info@napr.gov.ge
www.napr.gov.ge

Use of Geospatial Data by Local Public Authorities in Moldova

Alexandru Morcov, Congress of Local Authorities, Moldova

Alexandru works for the Congress of Local Authorities in Moldova (CALM) and is a surveyor by background, so is in a very good position to coordinate efforts to leverage geospatial information in local authorities.

The use of geospatial data in paper form was quite comprehensive in Soviet times but stagnated for a long period after the collapse of the Soviet Union. Efforts to re-establish capability at a local level started in 2007 with the first Norwegian government funded project to create orthophoto mapping.

Another key development was the completion of the geoportal, which allowed local authorities to access geospatial data online.

Subsequently with the help of Norway and USAID, several applications have been developed covering different user cases including public transport tracking and fault reporting.

A call centre is now in place to answer questions from the public concerning these applications and software provided to enable local authorities to keep data up to date.

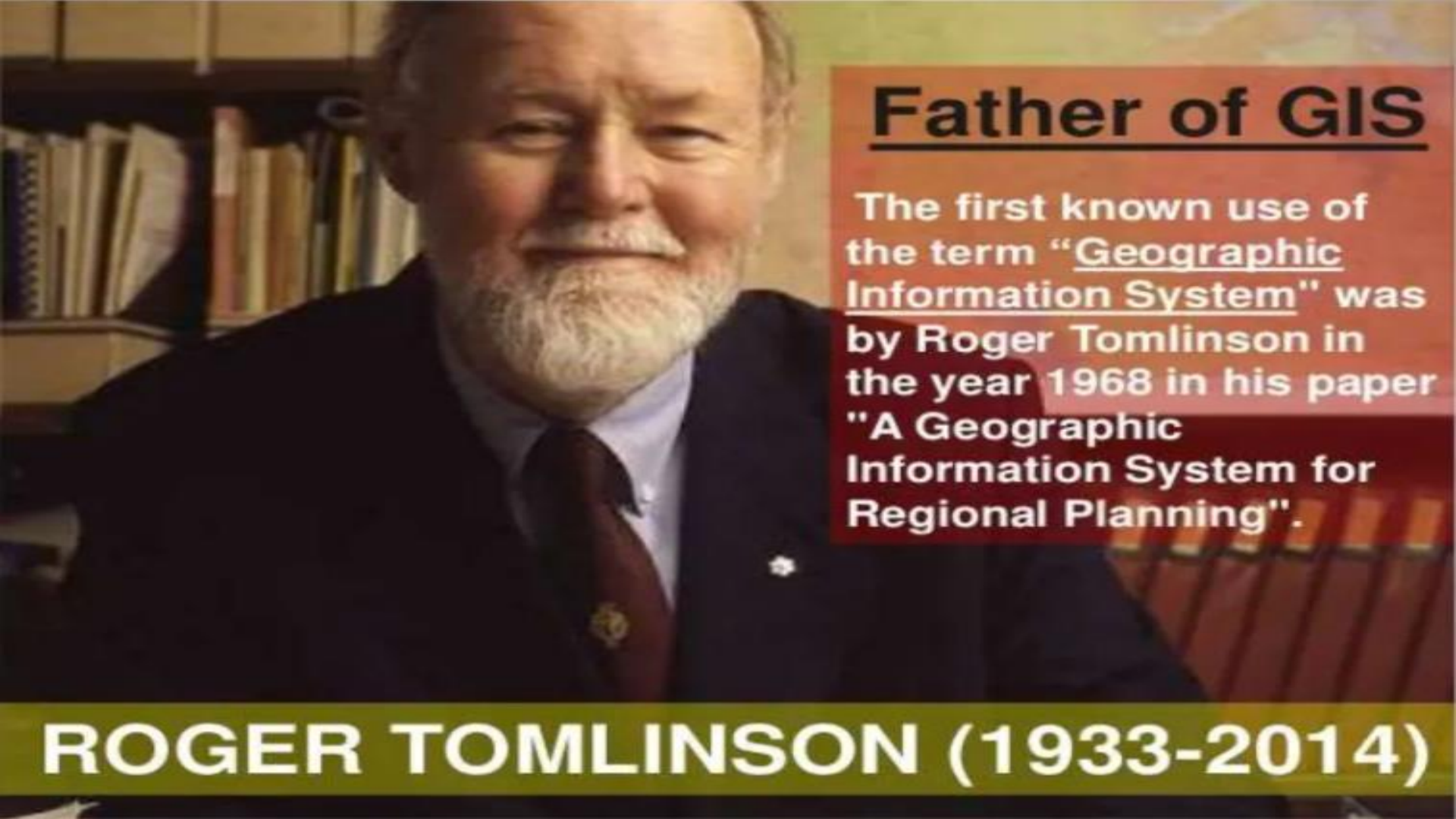
CALM has commissioned a training centre for upskilling local authority staff, with GIS as one of the first offerings. Hiring good people however remains a key problem.

CALM is looking with Government at the possibility of establishing shared services for geospatial data management, by which smaller authorities can delegate their power to undertake certain operations to other bodies.

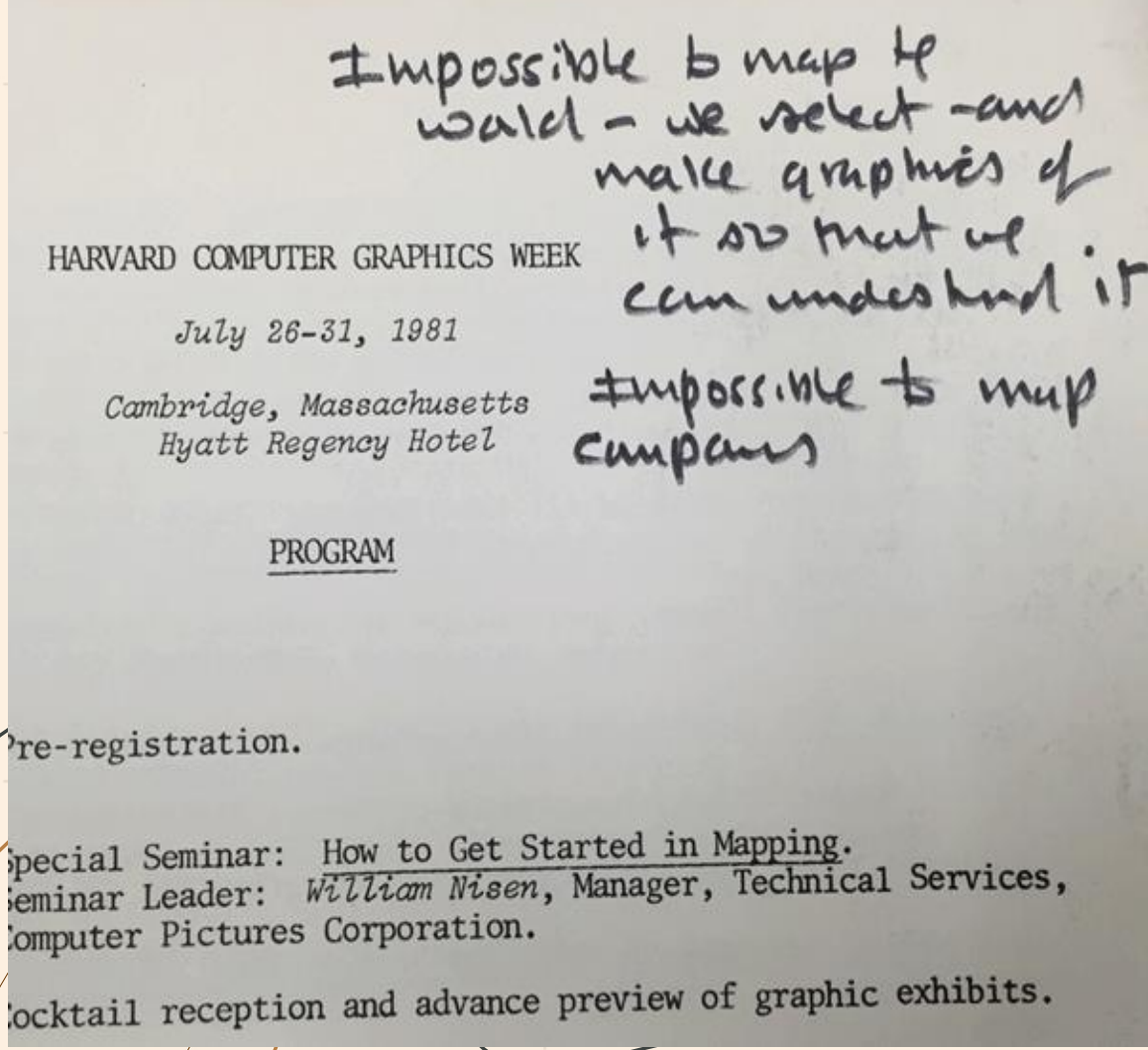
Further, legislative change may be recommended to oblige private surveyors to share information captured as part of their work with municipalities.

GIS in LPAs:
Past, present and future

Republic of Moldova
2021


Father of GIS
The first known use of the term "Geographic Information System" was by Roger Tomlinson in the year 1968 in his paper "A Geographic Information System for Regional Planning".
ROGER TOMLINSON (1933-2014)

“Impossible to map the world–we select and make graphics so that we can understand it” ~ **Roger Tomlinson**, note on an agenda, 1981.



Impossible to map the world - we select - and make graphics of it so that we can understand it

HARVARD COMPUTER GRAPHICS WEEK

July 26-31, 1981

Cambridge, Massachusetts
Hyatt Regency Hotel

Impossible to map compass

PROGRAM

Pre-registration.

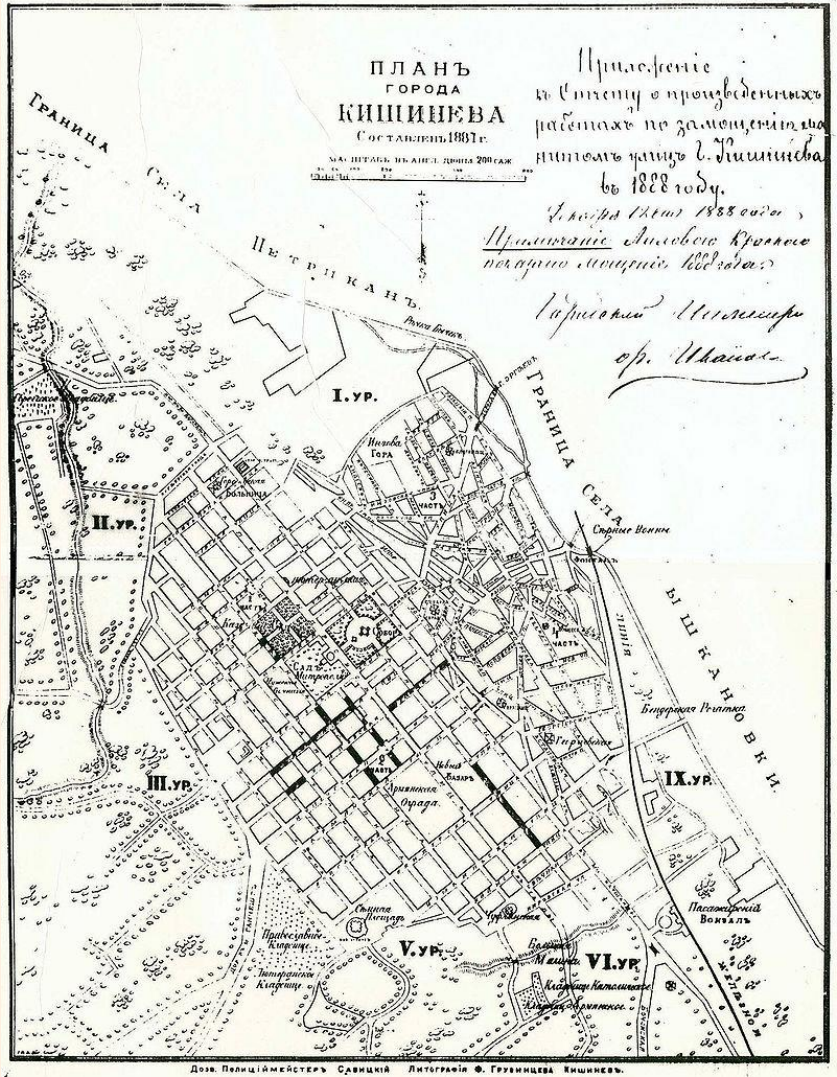
Special Seminar: How to Get Started in Mapping.
Seminar Leader: *William Nisen*, Manager, Technical Services, Computer Pictures Corporation.

Cocktail reception and advance preview of graphic exhibits.

01

PAST

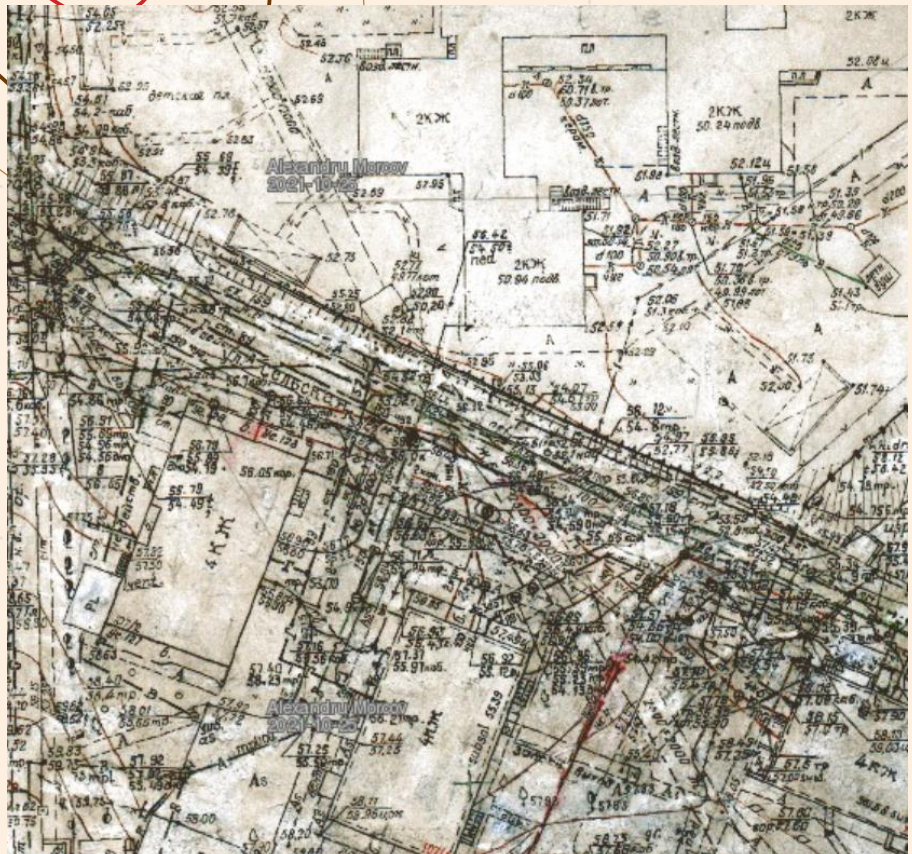
Evolution of the use of cartographic materials and local mapping

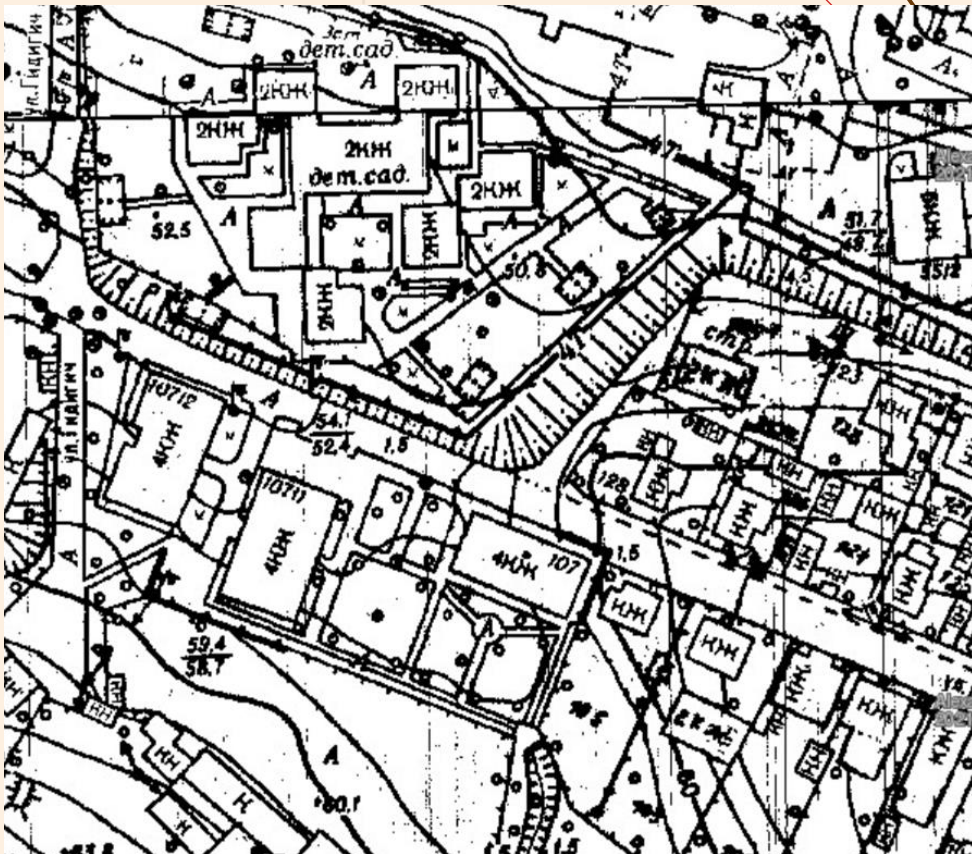


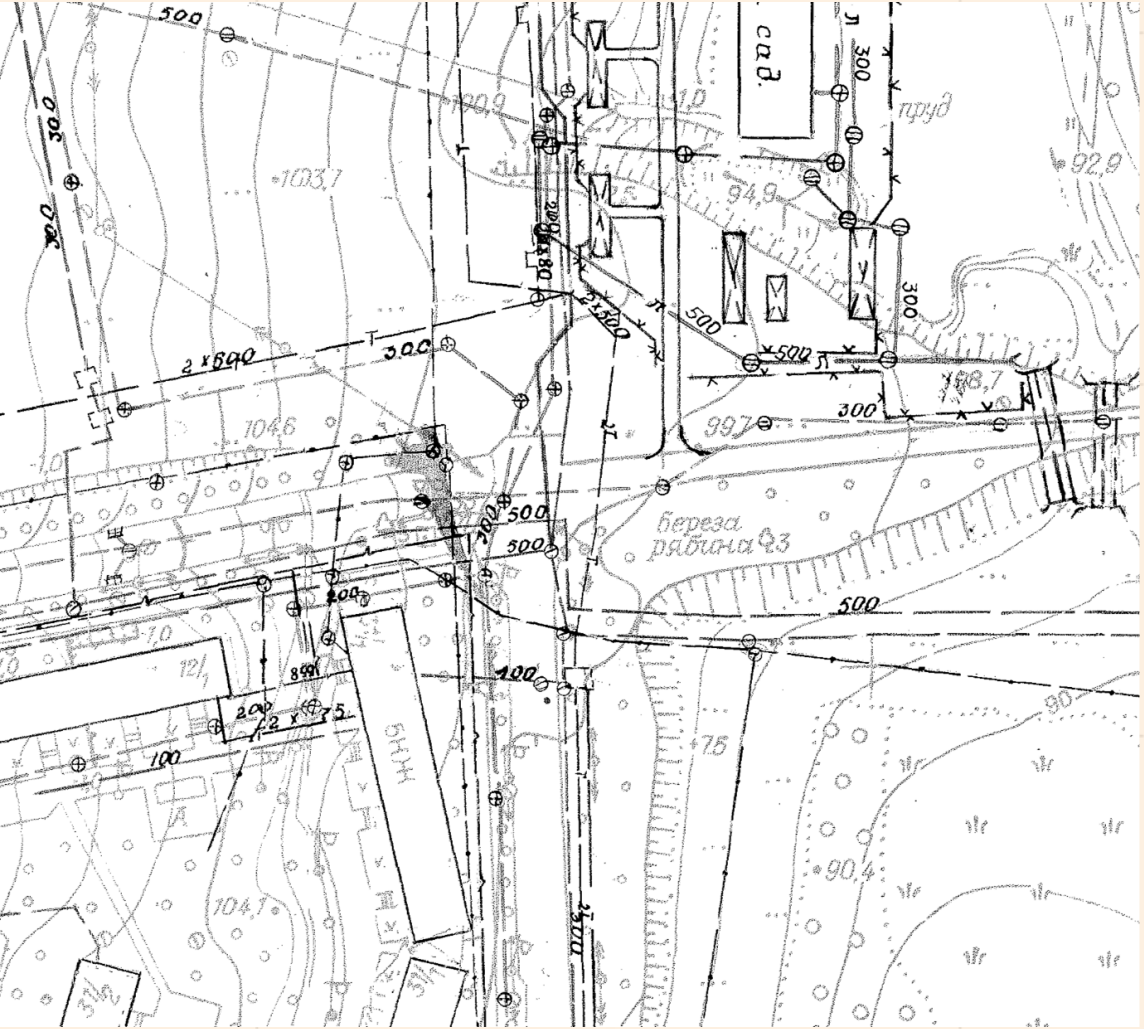
LOCAL MAPPING OF OBJECTS AND PROCESSES

had a comparatively good evolution during the Soviet period

Topographical plans scale 1:500, 1:1000, 1:2000







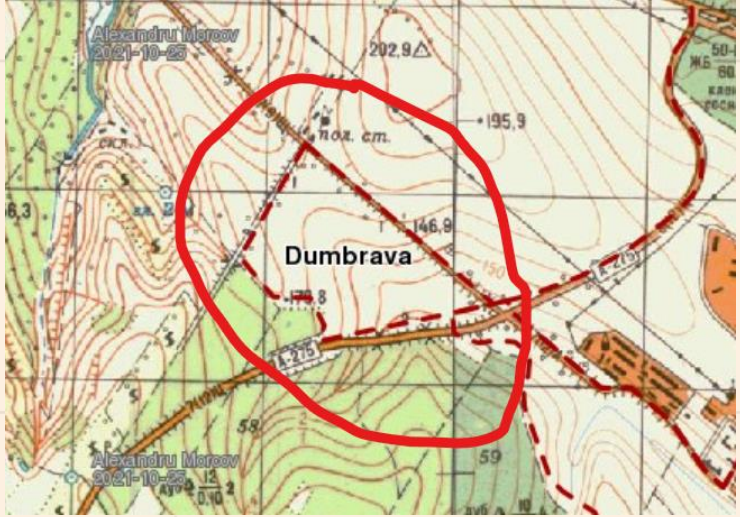
GIS for public utilities infrastructure

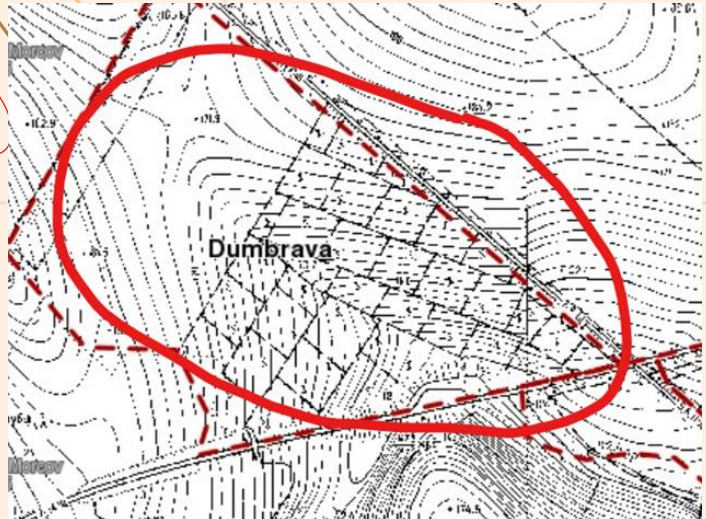
Most of the cities had a specialized GIS service, to keep register and continuously update the infrastructure objects

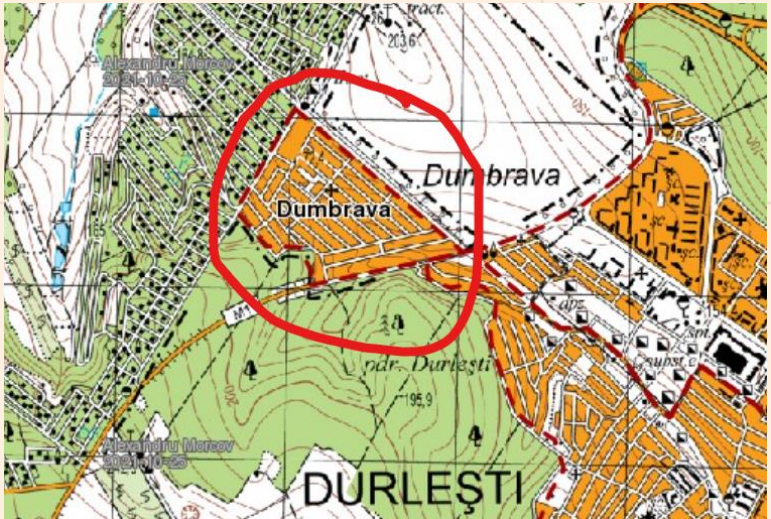
Local mapping

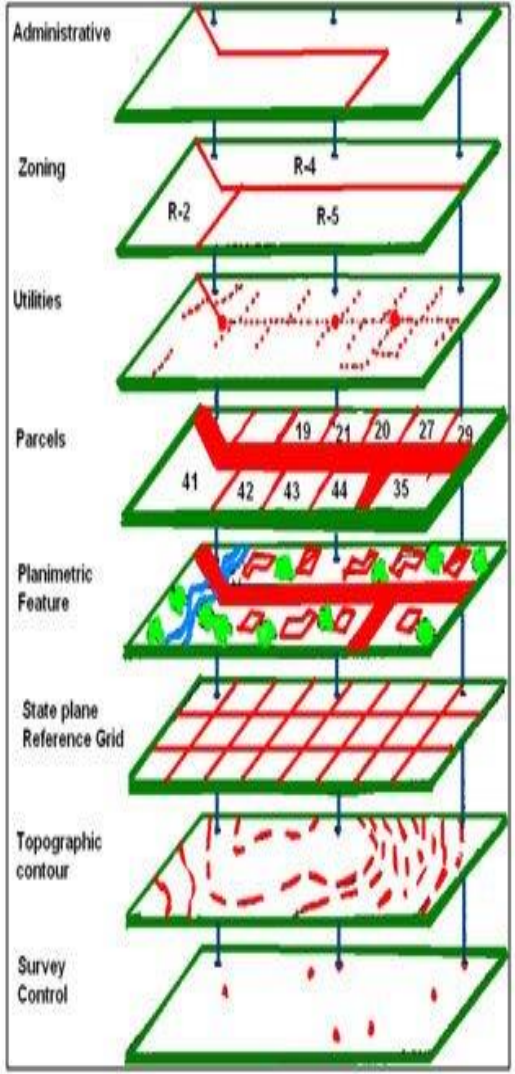
during transit period

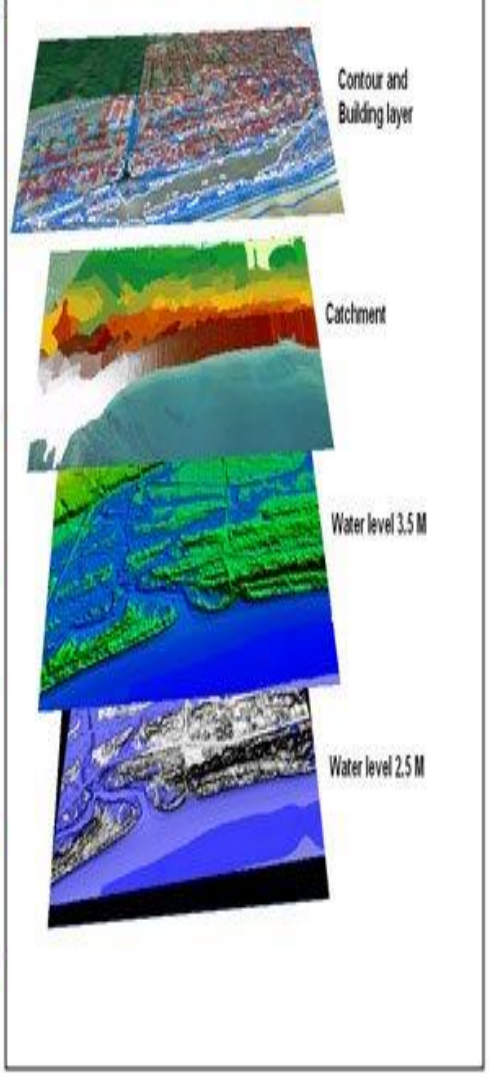
Dumbrava


Dumbrava


Dumbrava


Dumbrava
Dumbrava
DURLEŞTI





02

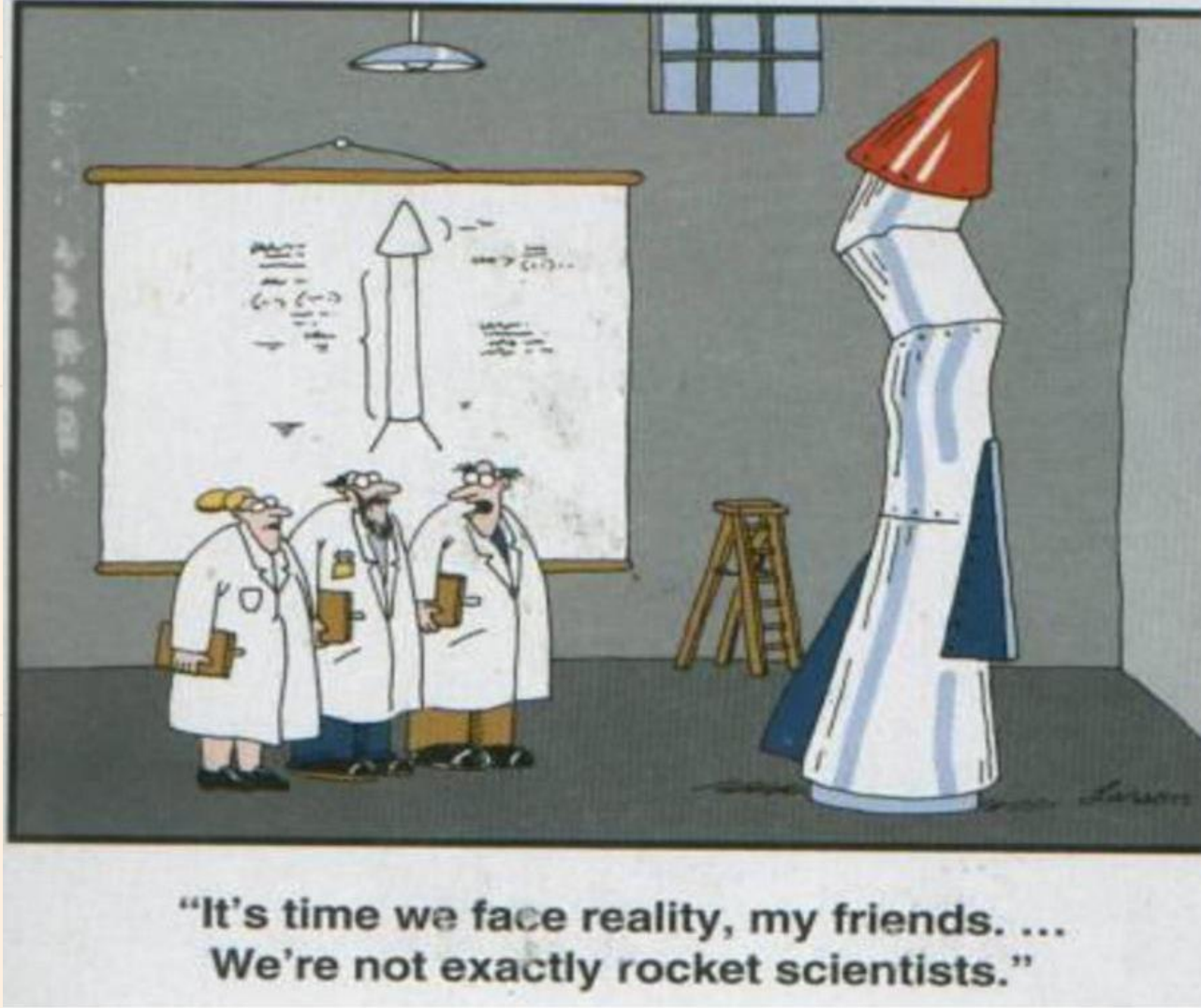
PRESENT

Use and production of spatial data at local level

Reduced institutional capacity on a local level

……

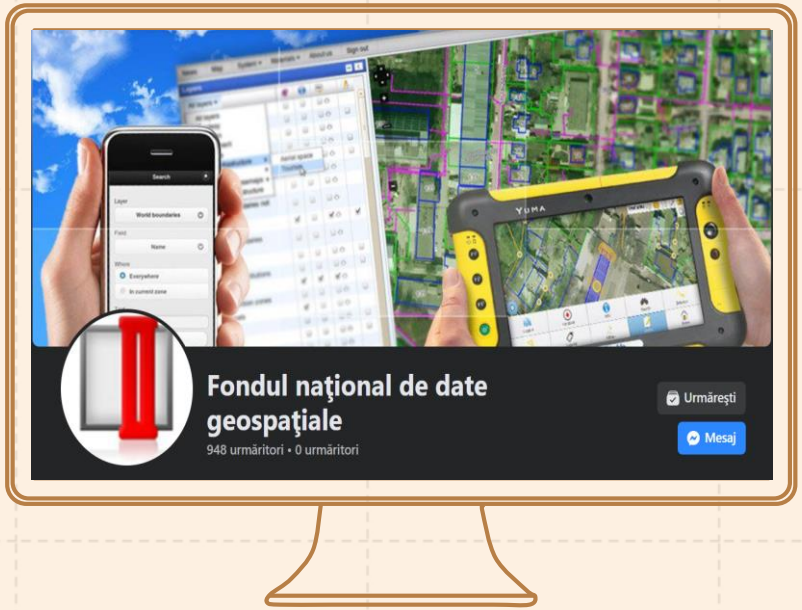
Not only Local…



Kartverket

”Start point”

Spatial data use by LPAs



03

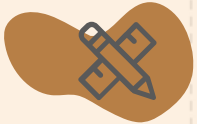
BENEFITS vs. CHALLENGES

Local GIS app lanced

Land-use planning

Permit tracking

Parcel/tax mapping



Engineering design

Road and utility maintenance

Event (crime, fires, accidents)

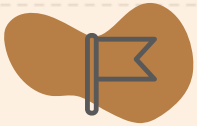
Reporting

Emergency management

Infrastructure assessment and development

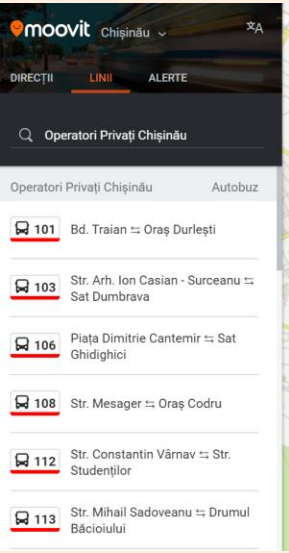
Environment

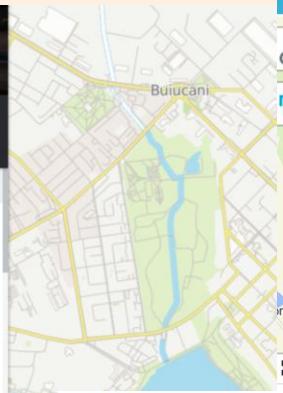
Green asset management

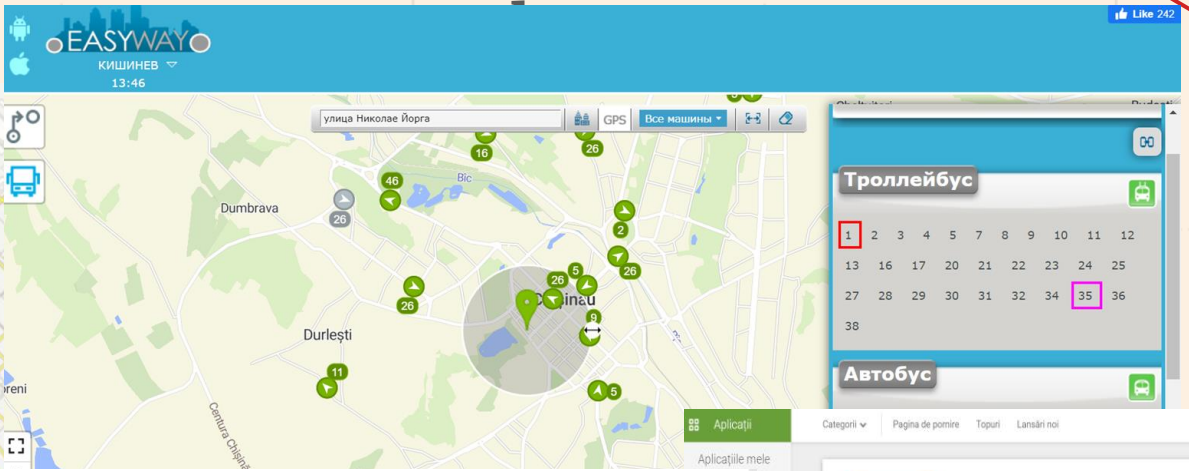


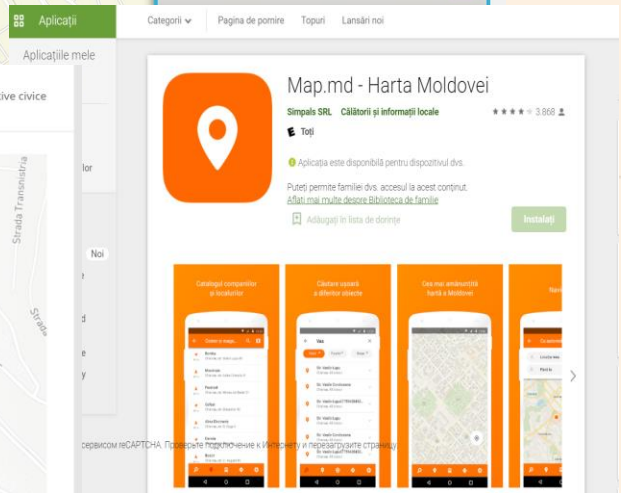
Property management

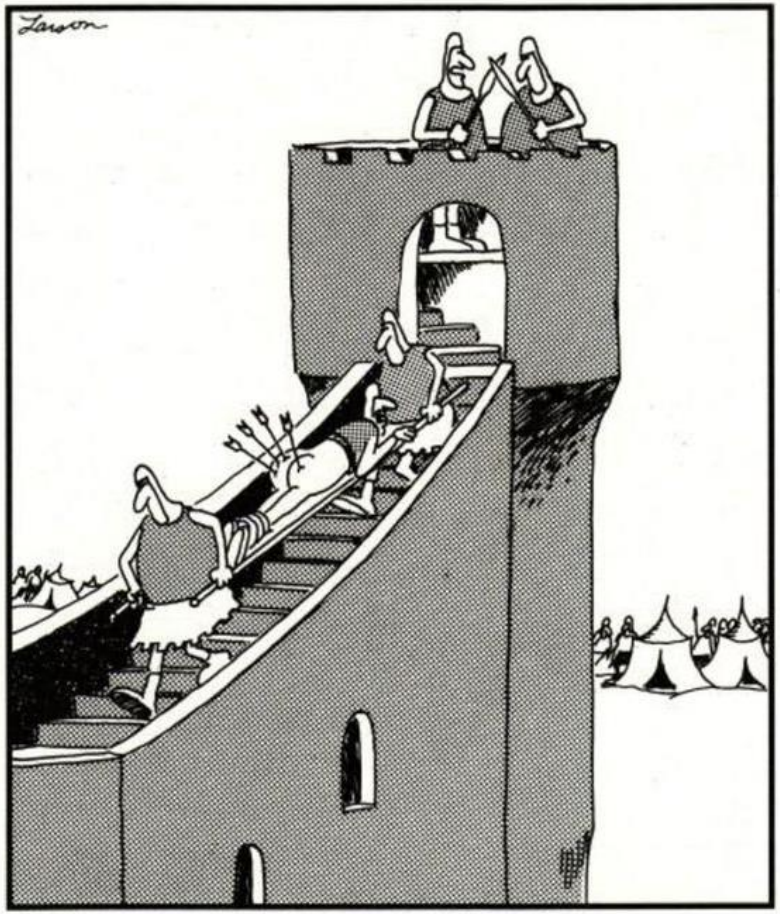
Private app complement LPA







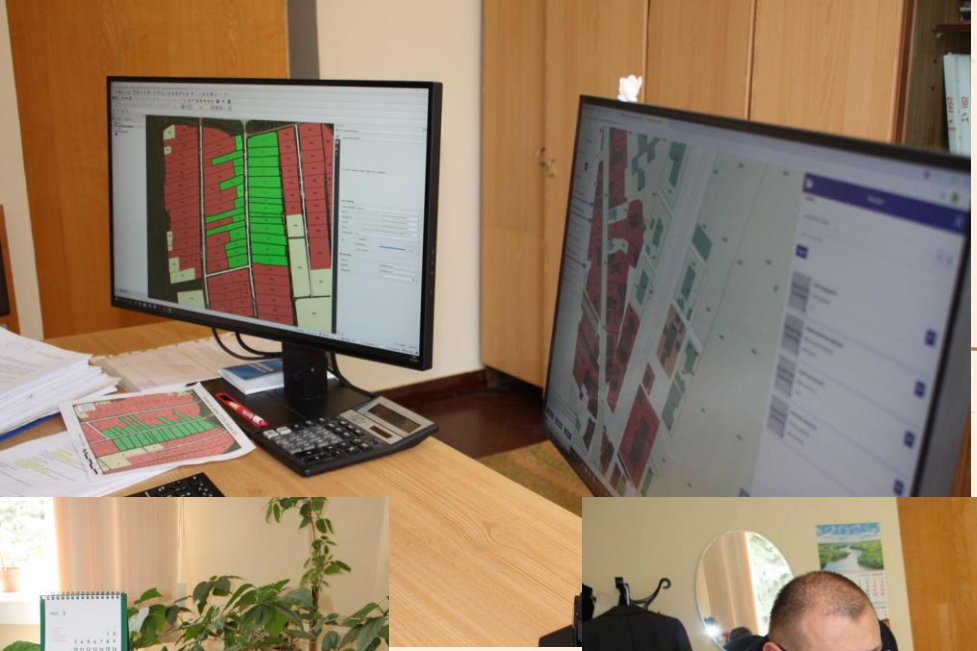


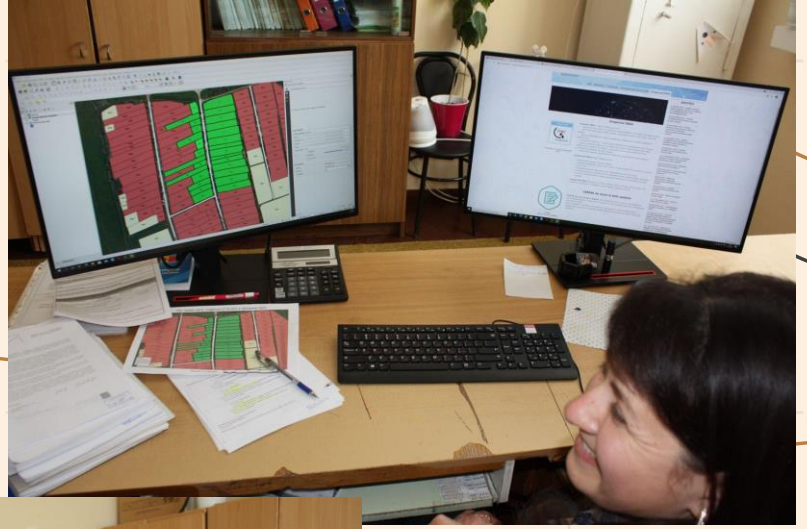


"So then I says to Borg, 'You know, as long as we're under seige, one of us oughta moon these Saxon dogs.'"

What "system" and procedures do we have and what do we need to have?!

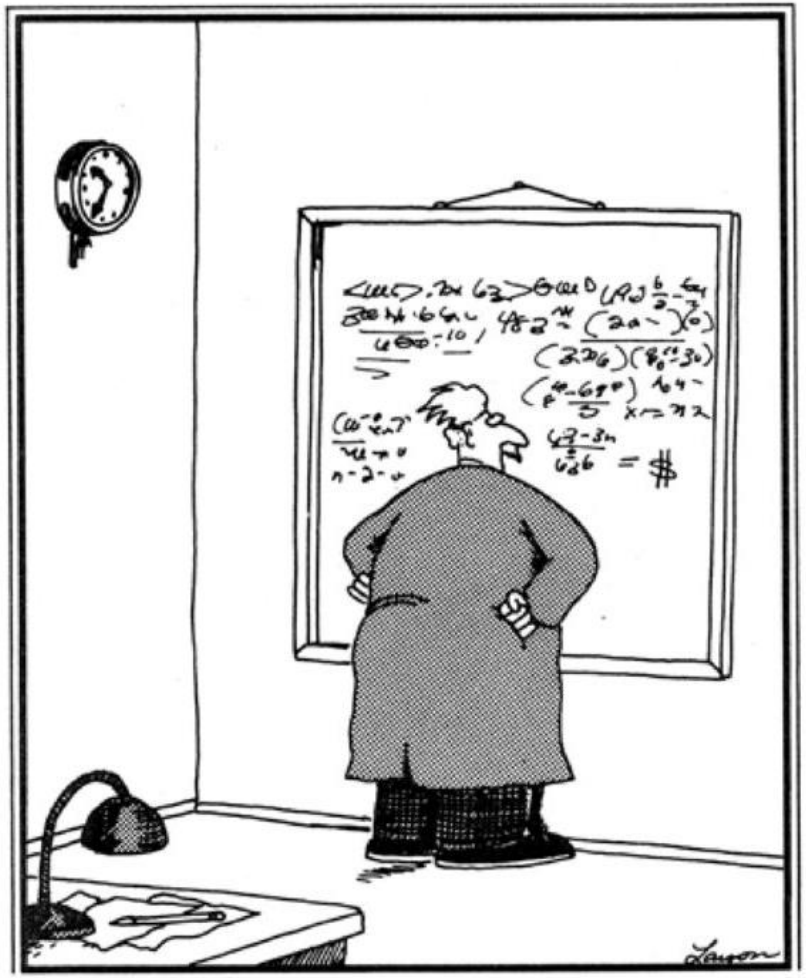
Cooperation





04

IN THE NEAR FUTURE



Einstein discovers that time is actually money.

So much to do, so little time

Training center

E-learning platform

E-service with call center

THANKS!

Do you have any questions?
morcov.alexandru@gmail.com
+373 79 588 388
calm.md

Narrative: Use of Geospatial Data by Local Public Authorities in Moldova

By Alexandru Morcov

It is always difficult for me to identify the right direction for the start of a presentation. I think that for the topic I am going to talk about it is best to remember the father of GIS: Roger Tomlinson. The first known use of the term "Geographic Information System" was by Roger Tomlinson in the year 1968 in his paper "A Geographic Information System for Regional Planning". Even from the name of his paper, it is clear that the idea of the term was inspired by the needs of regional planning.

And of course, his approach to mapmaking written on an agenda for Harvard's Computer Graphics Week, held in July 1981, "It is impossible to map the world - we select and make graphics so that we can understand it."

Local mapping of objects and processes had a comparatively good evolution during the Soviet period. The system and processes were established, well organised and by the end of the 80s had achieved a good coverage of the territory of the localities in Moldova. The system of recording and mapping objects and processes at the local level at that time can be qualified as a local "GIS" kept in paper format.

Mainly cities, where the density of utility infrastructure was quite high, had a specialized GIS service and teams of surveyors, for continuous recording and mapping of infrastructure objects. These records were well documented and structured, and were kept in hard copies on paper glued to aluminum boards in order to avoid them to be worn-out or damaged.

During transition period after the Soviet Union collapse, can be identified as a period of stagnation for local and GIS mapping, or even degradation. Largely, local mapping has being done as schematic representation of objects and processes, point by point without systematic approach or joint reference system. The lack of up-to-date maps at central level for a long period has decreased the accuracy of the authorities' planning decision-making process.

Characterizing the present situation: Administrative reforms in the absence of vision and consistency of public policies have decapitated public administration, especially in the field of mapping and GIS.

The assistance provided by the development partners of the Republic of Moldova has played an important role in the development of the spatial data infrastructure.

A crucial role in this context was played by the support provided by the Kingdom of Norway through the Norwegian Mapping Authority - Kartverket. The first orthophoto plan made available by Statens Kartverk in 2007 was the starting point for several geospatial analyses and visions in the country.

Launch of geoportal.md portal - was one of key elements in the use of available maps by LPAs.

Determining the benefits relative to expenditures correlated with the general perception of the importance and impact of GIS in public administration is the main challenge for the country.

Many routine operations of local government are tied to a location and rely on the use of geographic information to accomplish their goals. We conducted a comprehensive analysis of the overall systemic needs of LPAs on GIS and identified several solutions.

The trilateral institutional cooperation established between CALM, ALRC and Kartverket together with the work with the direct beneficiaries of the LPAs is an example to follow for the future. 150 municipalities have been equipping with high-performance technology for working with spatial data in real time. It will together with the training of LPA staff, boost the use of GIS systems in the local operational process.

This is due to generous support from the Kingdom of Norway.