PROCEEDINGS AND PRESENTATIONS

27 OCTOBER 2021

OPENING SESSION

Geospatial Information for Digital Transformation
Johnny Welle, Director General, Kartverket, Norway

Norwegian Support to Capacity Development of Land Sector Abroad
Dr. John Mikal Kvistad, Ambassador to Central Asia, Ministry of Foreign Affairs, Norway

Enabling Digital Government through Geospatial Data and Location Intelligence: What needs to be done with information management in accession countries
Léa Bodossian, Secretary General and Executive Director, Eurogeographics

A Future Vision for National Mapping and Cadastre Authorities
Dr. Robin McLaren, Know Edge, United Kingdom

Key Registers in the Netherlands
Haico van der Vegt, Kadaster, The Netherlands

INTEGRATED GEOSPATIAL INFORMATION FRAMEWORK: LAND CASE STUDIES

Keynote: Bridging the Digital Divide
Gregory Scott, United Nations Statistics Division

Keynote: World Bank Methodology for IGIF Implementation
Kathrine Kelm, World Bank

The Georgian Case: IGIF for Strengthening NSD
Nino Bakhia, National Agency of Public Registry, Georgia

Kyrgyzstan: A Model for Sustainable Base Mapping
Simon Wills, ConsultingWhere, United Kingdom

Republic of Moldova: NSDI National Action Plan
Pavel Ivancenco, Agency for Land Relations and Cadastre

IGIF Implementation in Ukraine: Challenges, Results and Perspectives
Dmytro Makarenko, Research Institute for Geodesy and Cartography, Ukraine

Opening Session

Geospatial Information for Digital Transformation

Johnny Welle, Director General, Kartverket, Norway

Dear Participants!

The world is experiencing a fourth industrial revolution often referred to as the Information age. It is built upon the internet and requires a comprehensive infrastructure of information to drive it. We usually relate the term infrastructure to physical objects. Everybody recognize that the road network is part of the fundamental infrastructure each country needs to support economic growth, allowing goods to flow between different locations. Although less tangible in respect that it cannot be so easily seen, information is also an increasingly fundamental infrastructure to what is often referred to as evidence-based decision-making.

One of the primary components of a National Information Infrastructure (NII) is the location of a nation's assets, including land, natural resources, and the built environment. Such information can add most value to the economy through open and transparent data sharing.

This is not easy to achieve and requires implementation of the long-term best practice in management of multiple issues of governance, technology, and people, to build what is referred to as a Spatial Data Infrastructure (SDI). The term has historically focused on the collection of data and the implementation of technologies but in August 2020, the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) adopted the Integrated Geospatial Information Framework (IGIF) to update and widen this concept.

Norwegian Mapping Authority has been at the forefront of assisting developing countries in the implementation of this new framework. Later today, we will hear presentations from the United Nations and World Bank on how this is being progressed globally and from local experts in specific countries in Eastern Europe and Central Asia.

Peter Drucker, the world-renowned management guru, first coined the phrase "Unless we measure it, we can't manage it". Essentially, what we do, as an industry is we measure the world - humanity's most fundamental asset. However, we go further than just measurement, we also provide the tools to analyse key components of decision-making – answering the question "where?" and increasingly to also explain "why?" and predict "what?" will happen next. Our work is therefore a crucial component of the ongoing Digital Transformation.

Johnny Welle
Director General
Kartverket, Norway

Johnny Welle has a long career in development and management of digital transformation in the public and private industry.

He is from the district of Sunnmøre in the Coastal zone of Norway and he likes to see opportunities and create solutions through knowledge, data sharing and new partnerships.

The geospatial industry brings to the table a set of increasingly sophisticated set of data and tools, from Artificial Intelligence to increasingly high-resolution satellite imagery, offering the potential to reduce the cost of producing actionable information.

However, we need to do more - money is scarce and particularly aid budgets worldwide are being squeezed in the wake of the COVID pandemic. Therefore, developing countries cannot build sustainable business models based on external support alone.

In Norway, we have long and successful tradition of both data and cost sharing through a cooperation known as Norway Digital, by which over 400 different organisations share the cost of maintaining the national geospatial infrastructure, contributing according to the value to their organisations. Other innovative funding solutions lie in public private partnerships, characterized by investment risk and reward being shared between partners.

So, a second theme of our conference is sustainability, and tomorrow we will focus on the societal benefits of geospatial information - how we measure those benefits and build clear messages to present to our senior decision makers in government and business.

Finally, in our third day we will be looking into the “crystal ball” to identify the key trends and future technological advances that will be key to digital transformation. These will include considering new markets for geospatial information, such as finance and consumer applications. But also, its pivotal role in decision-making in relation to the challenge of climate change and achieving the United Nations Sustainable Development Goals.

There has never been a more exciting time to be involved in the geospatial industry and we hope this conference will help to inspire you all to contribute on the journey.

Enjoy the conference!

Opening Session

Norwegian Support to Capacity Development of Land Sector Abroad

Dr. John Mikal Kvistad, Ambassador to Central Asia, Ministry of Foreign Affairs, Norway

Dear Everyone!

In 2006, The Norwegian Ministry of Foreign Affairs started funding aid projects abroad related to land administration, mapping and sea navigation with emphasis on combating poverty through capacity building. It is now just great to take stock of what has been accomplished.

The main purpose has been improved governance on central, regional and local levels, sustainable land use, secure land markets and safe navigation at sea. The effects on society are improved governance and enhanced public services to private and public sectors. In practice, this means improved and more transparent access to up-to-date electronic maps and registers for a wide range of usage in public and private sectors. The main products are digital geographic information, accessible to all on the Internet.

Dr. John Mikal Kvistad
Ambassador to Central Asia, Ministry of Foreign Affairs, Norway

Dr. John Mikal Kvistad is a Norwegian diplomat and he has been associated with the Norwegian Ministry of Foreign Affairs since 1994.

Securing property rights and efficient land registration constitutes a cornerstone in any modern economy. It provides confidence to individuals and businesses to invest in land, allow private companies to borrow capital to expand job opportunities, and enable governments to collect property taxes, which are necessary to finance provision of infrastructure and services to all citizens.

Without land tenure systems that work, economies risk missing the foundation for sustainable growth, threatening the livelihoods of the poor and vulnerable the most. It is simply not possible to end poverty and boost shared prosperity without making serious progress on land and property rights. That is precisely why the work that the Norwegian Mapping Authority and all their partners do is fully supported by us in the Ministry of Foreign Affairs.

I will now say a few words about your accomplishments at country level:

- After the collapse of the Soviet Union, there was no nationwide updating of maps in the Kyrgyz Republic. Finally, in 2019 a new and long-awaited aerial imagery was accomplished with Norwegian support. A new digital terrain model will be published. Moreover, Kyrgyzstan is very active with the implementation of the SDGs. New geospatial data from the project will support the country's engagement in the UN's Agenda 2030.

- A new modern mapping authority in Albania with a functioning geoportal, providing public access to topographic maps, is now in place. Hence, Albania can fulfill their national hydrographic obligations in accordance with the UN Convention on Safety of Life at Sea, after training and receiving a fully equipped vessel for sea mapping.

- There are now Digital Archive Systems fully rolled-out for the Mapping Authorities in both entities of Bosnia-Herzegovina. A densified and upgraded national positioning system is operational in both entities of the country.

- All cadastral maps are entered into the central database in Kosovo. Furthermore, an updated address register with signs for road names and house numbers are in place.

- The central Address Register system is ready for rollout in Montenegro, ensuring a unique address for all citizens and businesses, supporting future census, political elections and the development of social-economic prosperity. A modern data infrastructure for data management and data distribution has been implemented, enabling effective map production at the state Real Estate Administration.

- You have established a Digital Terrain and Surface Model covering 2/3 of territory of North Macedonia, which is very valuable for spatial planning, crisis management, and map analysis related to flood exposed areas.

- You have procured software and the development of a strategy for strengthening information security capacities of the Geodetic Authority in Serbia.

- We are happy to see that the production of up-to-date 1:50 000 scale maps in a seamless database are available in a public geoportal in Ukraine. A satellite-based positioning system with services is operational, and an Integrated Geospatial Information Framework action plan is in place.

- In Georgia, you are working towards forming a basemap for the National Spatial Data Infrastructure to support national reporting on the implementation of the UN Sustainable Development Goals. This is also urgently needed for completion of the state programme on land privatization and registration. The project will establish a mechanism for sharing geodata with users at central and local governmental levels, the private sector and the general public.

- The Norwegian Mapping Authority has been active in Moldova since 2006 and has successfully implemented four projects delivering two generations of orthophotos and digital terrain model. A new IT system for property registration and cadastre has been developed. You have improved technical and professional capacities at the Agency for Land Relations and Cadastre. Furthermore, a new basemap for the whole of Moldova has been produced. No wonder that the World Bank has made very positive remarks on your impressive work in Moldova.

Finally, I would very much like to point out that it is very positive that the Norwegian Mapping Authority has agreed to cooperate with the World Bank on the implementation of Integrated Geospatial Information Framework in Georgia, Moldova, Kyrgyzstan and Ukraine. The excellent cooperation between the Norwegian Mapping Authority and their partners has inspired the World Bank. This will certainly mean a lot for other countries and regions around the world.

Summing up, I can only applaud your strong efforts and everything that you have accomplished. It is truly impressive. So, I offer you our sincere congratulations and warm greetings from our Foreign Minister!

Thank you!

Enabling Digital Government through Geospatial Data and Location Intelligence: What needs to be done with information management in accession countries

Léa Bodossian

Secretary General and Executive Director,

Eurogeographics

Léa Bodossian, Secretary General and Executive Director, Eurogeographics

Léa has a passion for geography, political sciences and European affairs. She has held a number of high-level representations, communication and management positions within the European Commission and in an EU Agency.

By training, Léa is a spatial planner and a researcher with a specialisation in economic development nearby airports. She holds Masters Degrees in Spatial planning, Political Science and European Affairs. Léa was appointed Secretary General and Executive Director of EuroGeographics in 2020.

EuroGeographics (EG) is an association of National Mapping and Cadastral Agencies (NMCA) spending EUR 1.5 billion annually and employing 66,000 people. Its role focuses on knowledge exchange, representation and data aggregation, she said, "we will be judged by the impact we have". Generically EG aims to support the EU in creation of policies and to meet the statistical needs monitoring policy implementation and surveillance.

NMCAs needed to align with three big priorities - **the European Green Deal, creating an economy that works for people and a Europe fit for the digital age.**

She picked out Northern Macedonia, Armenia and Ukraine were those making strides to meet EU accession requirements. Her advice, grounded in what she had seen in her previous role in the aviation industry was to focus on collaboration, collaboration and collaboration.

Location intelligence, digital governement, information management in accession countries

Léa Bodossian – SGED-EuroGeographics

CONNECTING YOU TO MAPS, GEOSPATIAL AND LAND INFORMATION FOR EUROPE

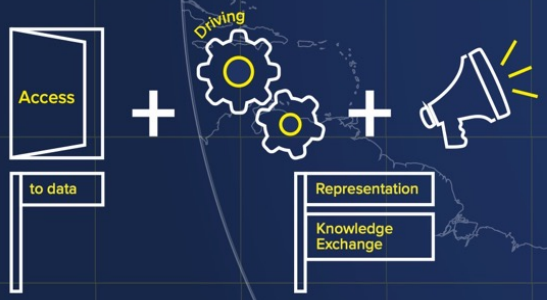
eurogeographics

#MAPSFOREUROPE

60+ members **46 countries**

from the whole of geographical Europe

What our members do



Our activities

Well-established network for sharing knowledge and expertise

Helping to protect people and the planet by providing critical data for reporting and monitoring the UN Sustainable Development Goals (SDGs)

Members invest **€1.5B** each year in providing official national geospatial data

Relied on by European and international institutions, government, businesses and citizens

66,000 people and over are employed by EuroGeographics members

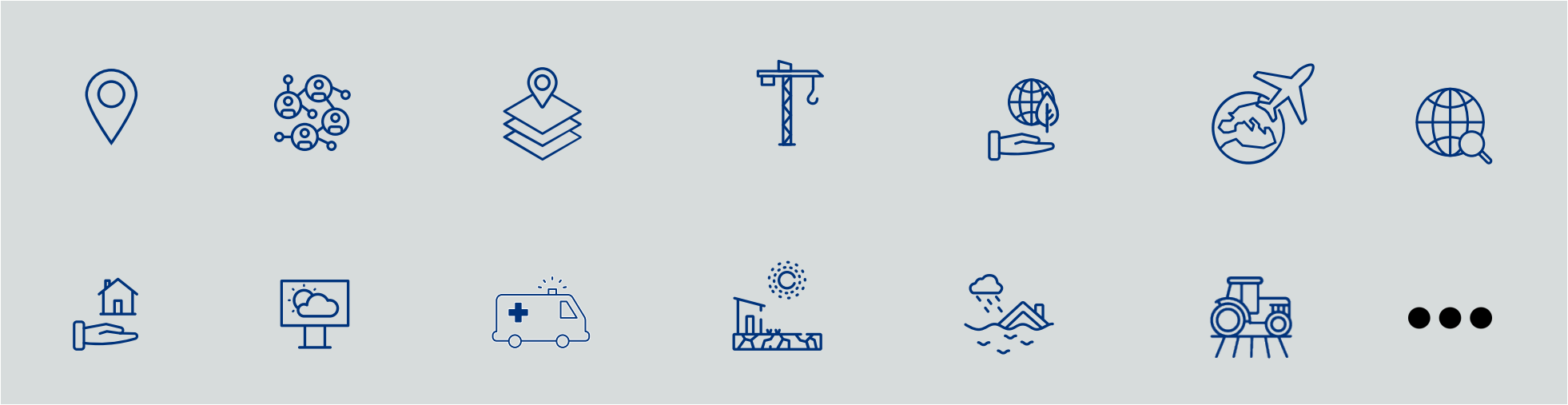
What do we do ?

Knowledge exchange

Representation

Data

“As NMCAs, we will be judged on the impact that we have”



What are policy makers using geospatial data for?

4 types of use

Creation of policies

Statistical needs

Monitoring

Surveillance

What are policy makers using geospatial data for?

- Monitoring energy networks
- Monitoring environmentally sensitive areas
- Developing smart cities
- Optimising trajectories
- Controlling evolution of pests
- Fostering renewable energy
- Monitoring crops & harvest
- Optimising transport networks
- Developing smart transport
- Border surveillance
- Disaster Management
- Controlling evolution of diseases
- Evolution of soil
- …

How is Europe transforming ?

The priorities of the European Commission (2020-2025)

- A European Green Deal
- An economy that works for the people
- A Europe fit for the digital age
- A New push for European Democracy
- A stronger Europe in the world
- Promoting our European way of life

How are we –NMCAs- contributing to this transformation?

A European Green Deal

An economy that works for the people

A Europe fit for the digital age

A New push for European Democracy

A stronger Europe in the world

Promoting our European way of life

IMPACT / INVOLVMENT OF OUR MEMBERS:

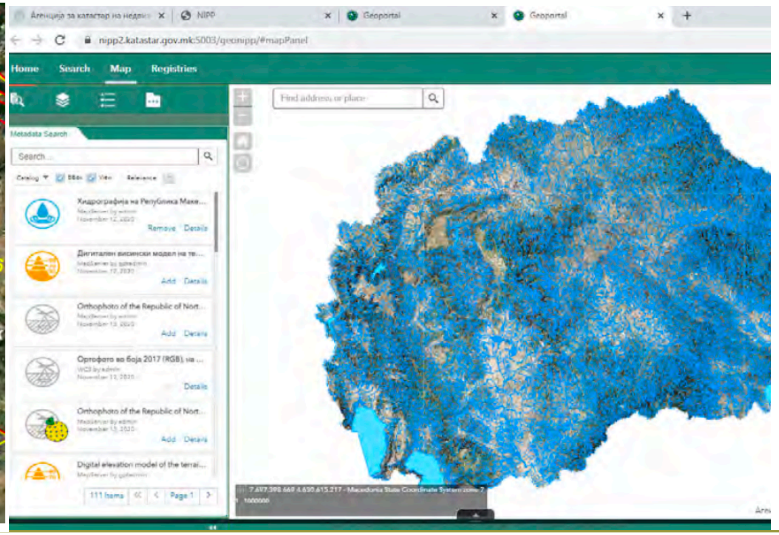
- Digital government
- Open data
- Trans European Networks (road, energy, digital)
- Smart cities
- Greening energy

How do we support our members in this ?

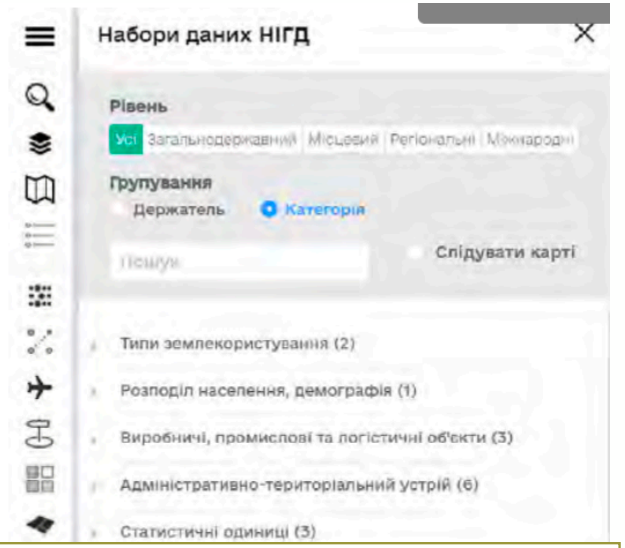
Knowledge exchange	Representation	Data
Webinars, workshops, Knowledge Exchange Network, publications…	Global : UNGGIM European Union	Coordination of production of pan-European Datasets Open Maps for Europe / EEA …

Our members are already engaged in that path

ARMENIA



NORTH MACEDONIA



UKRAINE

Discussions have already started

Thank you

A Future Vision for National Mapping and Cadastre Authorities

Dr. Robin McLaren, Know Edge, United Kingdom

Dr. Robin McLaren is currently a director of Know Edge and is a prominent consultant in land administration. He has been at the forefront of the GIS revolution and is recognised as an expert in Spatial Data Infrastructures and Land Policy. Robin has an honorary doctorate from the University of Glasgow for contributions to geomatics and land administration and is an Honorary Fellow at the School of Geosciences, University of Edinburgh.

Robin looked first at the drivers for change in NMCAs, Google, Apple and others were competing "head on" for their markets, their core value proposition as the only provider of national mapping was being undermined and they were not "stepping up" to the challenge of developing new business models. Others in Government such as Statistics and Space agencies had much higher profile and he could see the NMA function being consumed into them in many countries. In Hungary, the NMA he had helped to set up in the 1990s no longer existed.

Options for survival included moving from "collectors of data to collators" - becoming specialist system integrators. Other options were to position themselves to take a wider role on digital transformation through coordinating the development of key registers, offering value added services such data dissemination and quality accreditation and, where there was currently a void, to coordinate earth observation work. In the land administration sphere he saw embracing fit for purpose as essential, current practices were too expensive and Governments would find alternatives if they resisted fundamental cultural change. He described their situation with a quote "change is not a threat but an opportunity, survival is not a goal, but transformative success is." In discussion he described the greatest challenge to change as lack of human capacity and an inability to present compelling arguments for investment to policy makers.

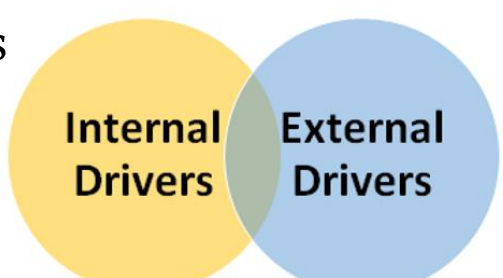
A FUTURE VISION FOR NATIONAL MAPPING AND CADASTRE AUTHORITIES

Dr Robin McLaren

Know Edge Ltd, Scotland

DRIVERS FOR CHANGE

- Competition from global corporations and emerging earth observation capabilities.
- Talented staff not challenged enough and in danger of leaving as some NMCA businesses have reached a steady state and focus is just about maintenance and improving efficiency.
- NMCA not perceived to contribute enough value add to the economy and losing funding.
- NMCA not maintaining coverage of rapidly expanding urban areas and not delivering needs of Digital Twins.
- Increasing trends to outsource Land Registration and Cadastre services through Public Private Partnerships (PPPs).
- Fit-For-Purpose approach to Land Administration gaining momentum and growing in acceptance across the land sector, providing tenure security for all rather than elite.
- NMCA not stepping up to form new partnerships and lead solutions to mitigate global issues, such as climate change, pandemics and city resilience.



GLOBAL CHANGES TO NMCA'S

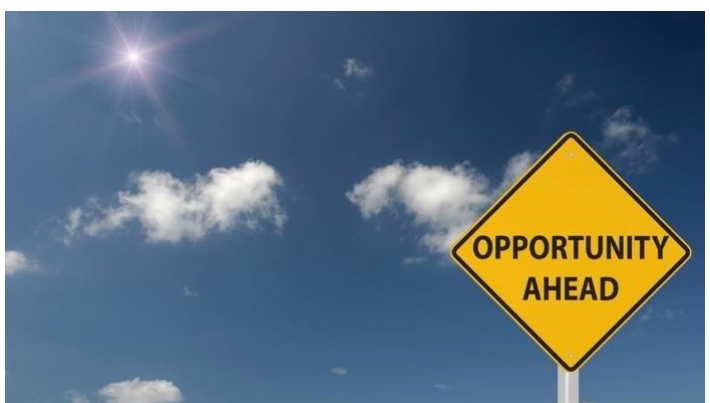
- Institutional reform through consolidation of agencies:
  - NMA + Statistical Agency (INEGI Mexico).
  - NMA + Valuation + Land Registration (Northern Ireland).
- Rising prominence of Statistical Agencies (UN-GGIM under UN Statistical Division). Their response to COVID-19 has enhanced their profiles (Namibia).
- Service privatisation (New South Wales leases Land Title Registry for A$2.6B).
- Disappearance through fragmentation of NMCA responsibilities (Hungary).
- Change in NMA remit from data collector to data collator (Norway).
- National / Donor Funding being ploughed into innovation hubs (Sierra Leone).
- Earth Observation sector growing in prominence (S. Africa).
- City mapping more autonomous (India).
- Users turn to Google, OpenStreetMap …….

Source: https://outcomes.business/

OPPORTUNITIES FOR CHANGE

Potential options (or combinations) for the future and survival:

1. Leadership in Information Management.
2. Data Integrator and Manager - Service Provision.
3. Value Added Services - Market Creator.
4. New Partnership with EO Ecosystem.
5. Change approach to Land Administration.



Source: https://www.istockphoto.com/photos/opportunity

1. LEADERSHIP IN INFORMATION MANAGEMENT

- Build on the reputation of being an exemplar in robust data custodianship through managing large, complex datasets.
- Develop a role in the wider coordination of information across Government.
- Create a new corporate profile and be more politically visible – an integral part of digital transformation.
- Opportunity to take a major role in establishing and managing Key Registers (property, citizens, businesses) to support digital transformation.
- In Lithuania the NMCA was selected as the custodian of many non-geospatial registers in the country as the organisation had built a reputation of being a robust, safe, and trusted custodian of government registers.
- Solution to retain good staff, especially ICT, through new challenges.

Source: https://www.dreamstime.com

1. LEADERSHIP IN INFORMATION MANAGEMENT - KEY REGISTERS

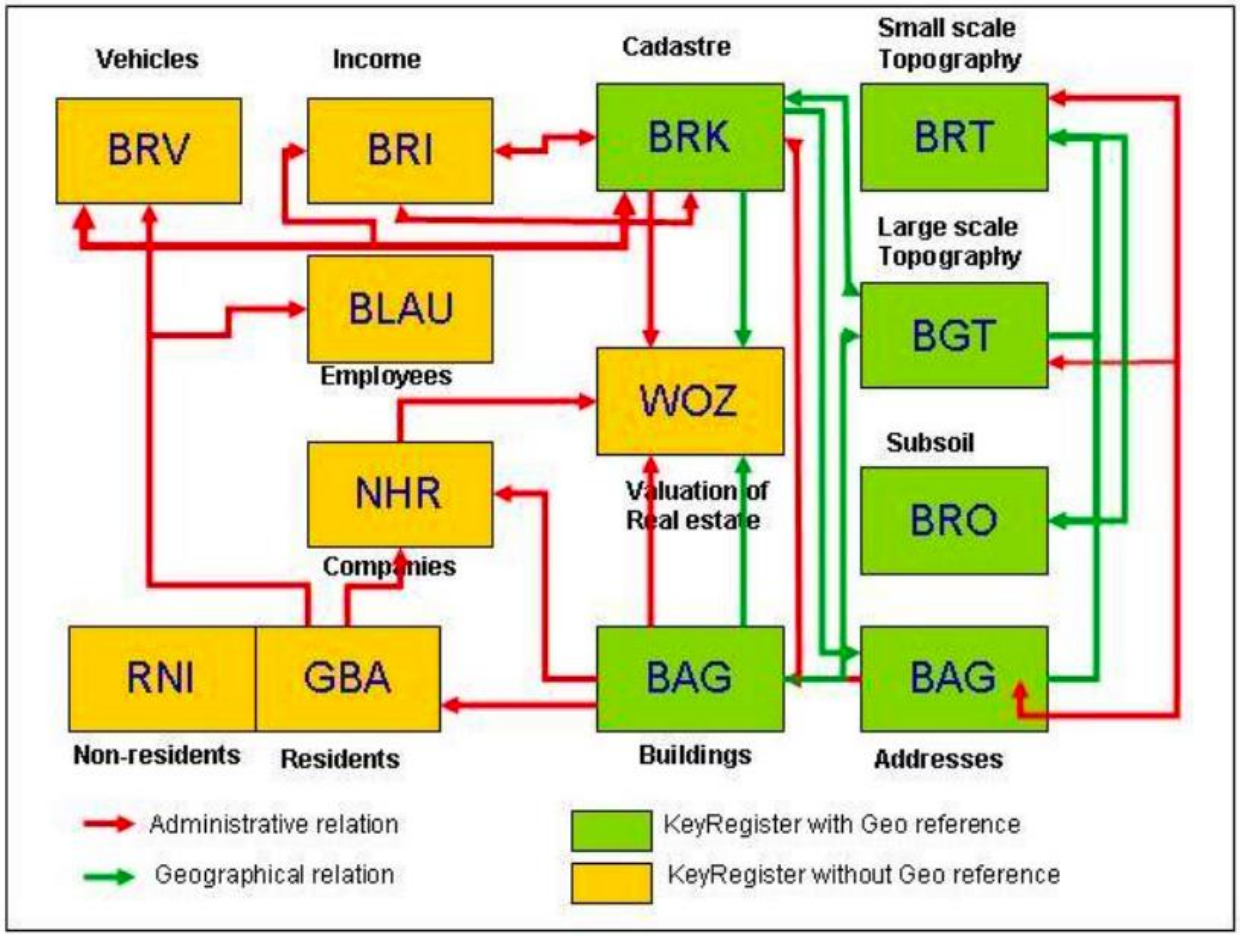
- A digital society needs the consistent, joined up evidence base to underpin all decisions around land and property.
- Access to authoritative and dynamically updated information about people, businesses, and land and property in a country including, location, address, ownership, use and value in Key Registers, is essential to support transformational government.
- Allows citizens and businesses to efficiently access public services at all levels.
- Key Registers underpin integrated e-services within Denmark, The Netherlands, Lithuania and New Zealand

Source: https://www.hyland.com/en/insights/trending-topics/digital-transformation

1. LEADERSHIP IN INFORMATION MANAGEMENT – KEY REGISTERS

Key Registers in The Netherlands

Haico van der Vegt,
Kadaster,
The Netherlands
10:40 Wednesday



Source: http://icaci.org/files/documents/ICC_proceedings/ICC2011/Oral%20Presentations%20PDF/B3-Standards

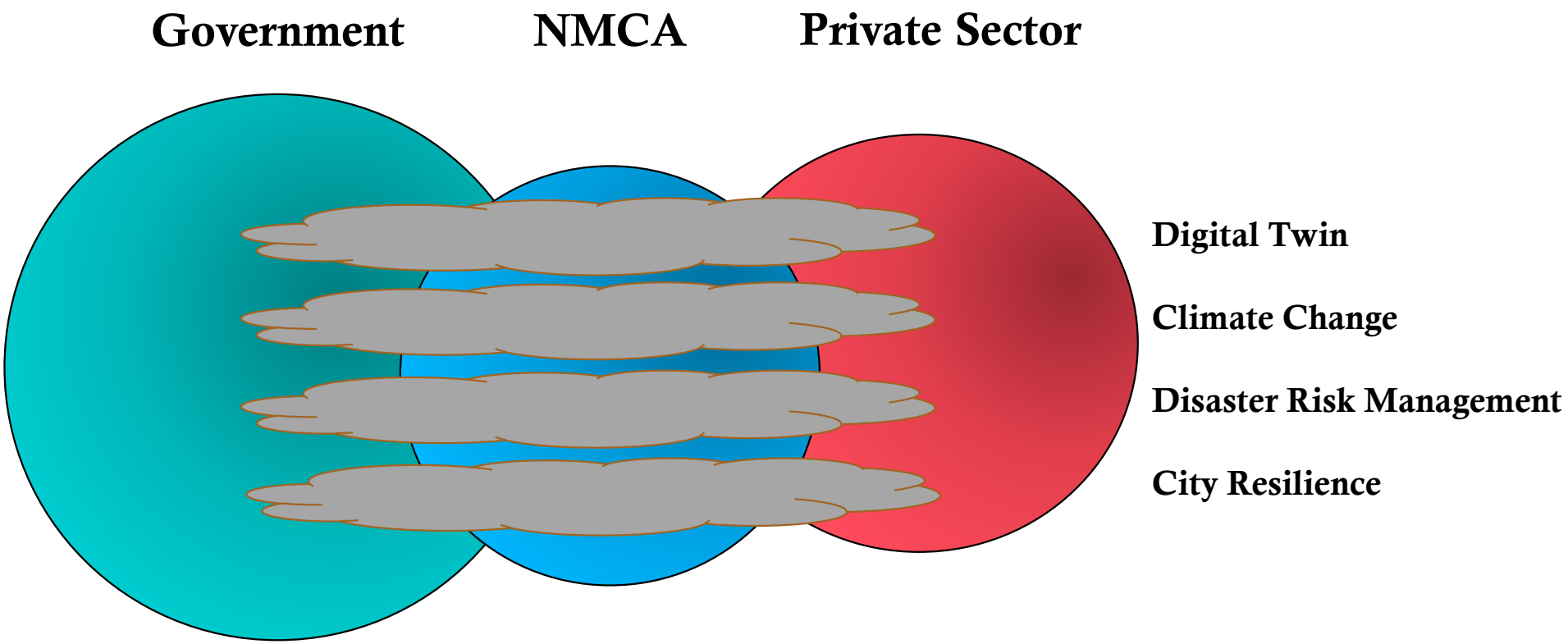
2. DATA INTEGRATOR AND MANAGER - SERVICE PROVISION

- Change focus from creator of data to collator, integrator (including QA) and management of data for specific sectors:
  - Data for autonomous vehicles.
  - Data for Digital Twins.
  - City Resilience.
  - Climate change mitigation.
  - SDG compliance monitoring.
  - Disaster Risk Management.

Source: https://www.cybernoor.com/solutions/application-integrations/

- This could also include facilitation in sectors through capacity development and development of an ecosystem of sector specific tools and services with a new set of partners.

2. DATA INTEGRATOR AND MANAGER - SERVICE PROVISION

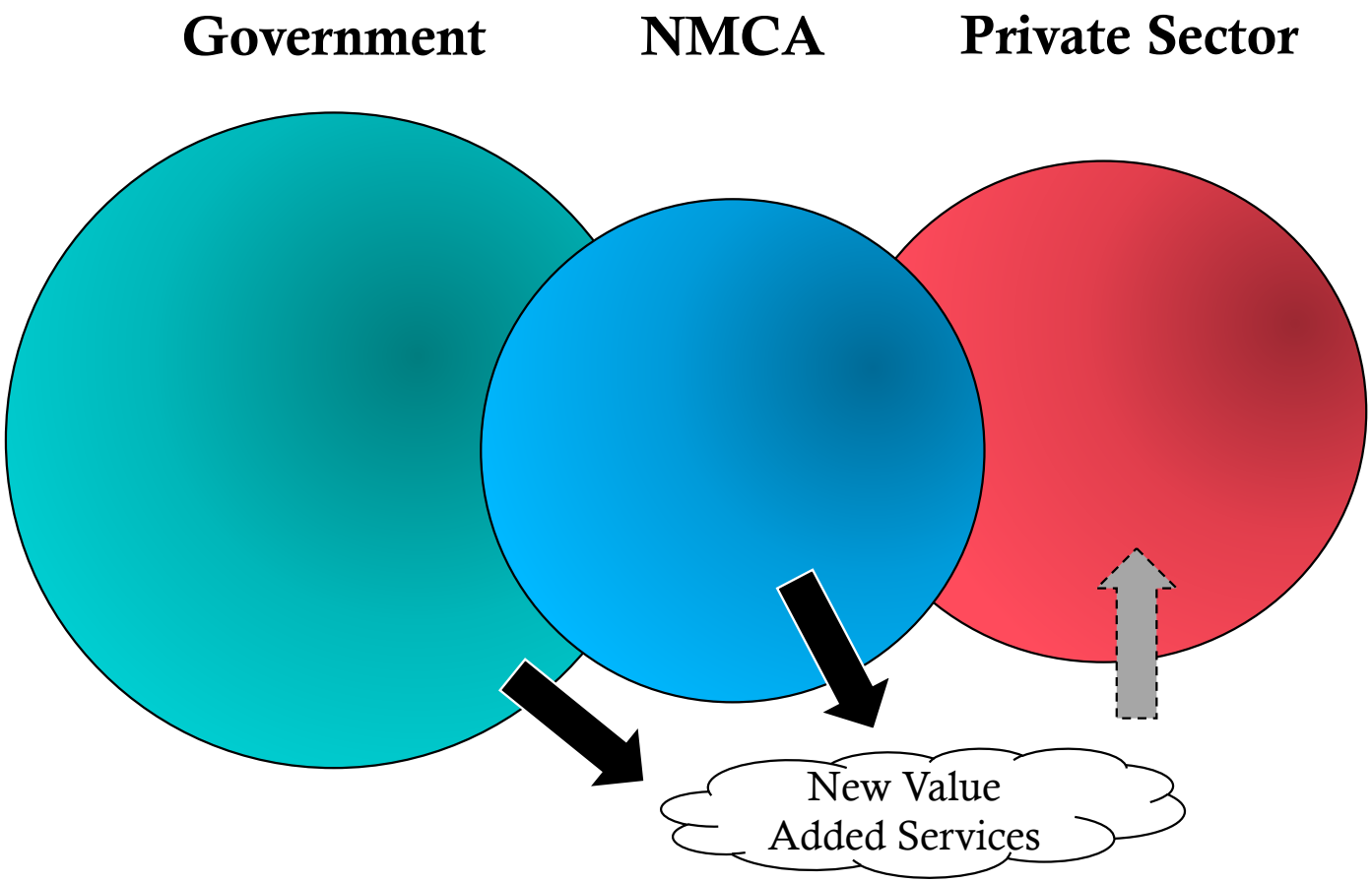


3. VALUE ADDED SERVICES - MARKET CREATOR

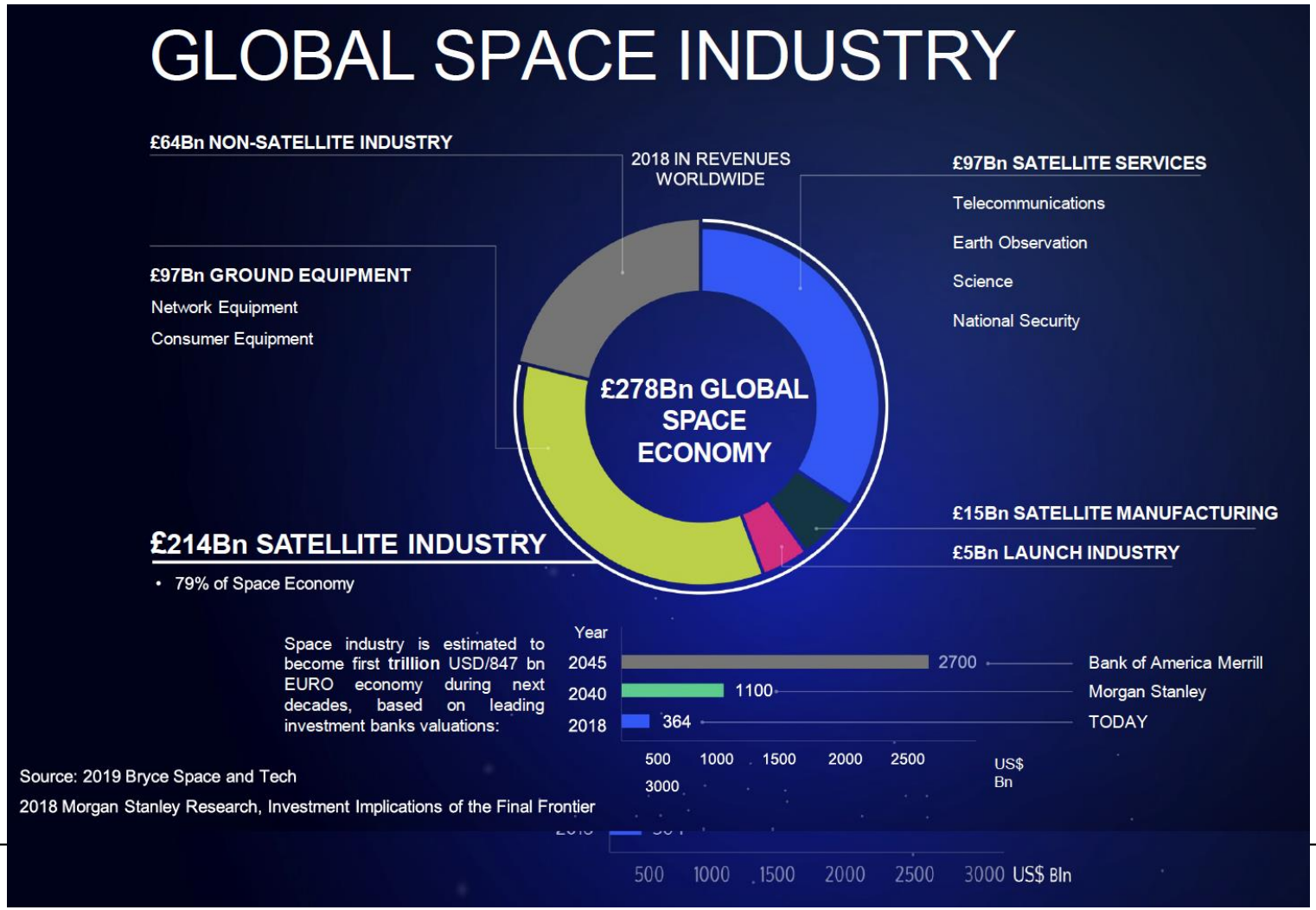
- NMCA could adopt a more proactive approach to innovation and to create and develop new embryonic markets of strategic importance where there is no intent by the private sector.
- When the markets start to mature NMCA would then have a transitional withdraw to leave the markets for the private sector or create a partnership with the private sector to expand the markets.
- The concept is one of the NMCA being a pump primer of new markets.

Source: https://www.clipartkey.com/

3. VALUE ADDED SERVICES - MARKET CREATOR



4. NEW PARTNERSHIP WITH EO ECOSYSTEM



4. NEW PARTNERSHIP WITH EO ECOSYSTEM

- Form new partnerships with the EO ecosystem to harness and exploit the new capabilities emerging from the EO sector.
- This is where the action and the money are.
- EO cluster in Edinburgh rapidly expanding through government support.

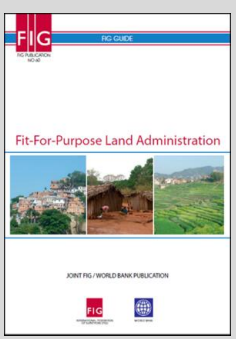
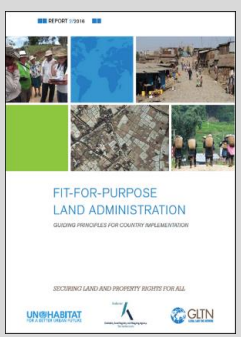
The satellite company PLANET financed the growth of the company through corn futures.

FinTech are major users of EO - performance of Walmart can be judged by number of cars in their car parks extracted from imagery.

Geospatial in the Financial Sector, Christophe Christiaen, Friday 12:20

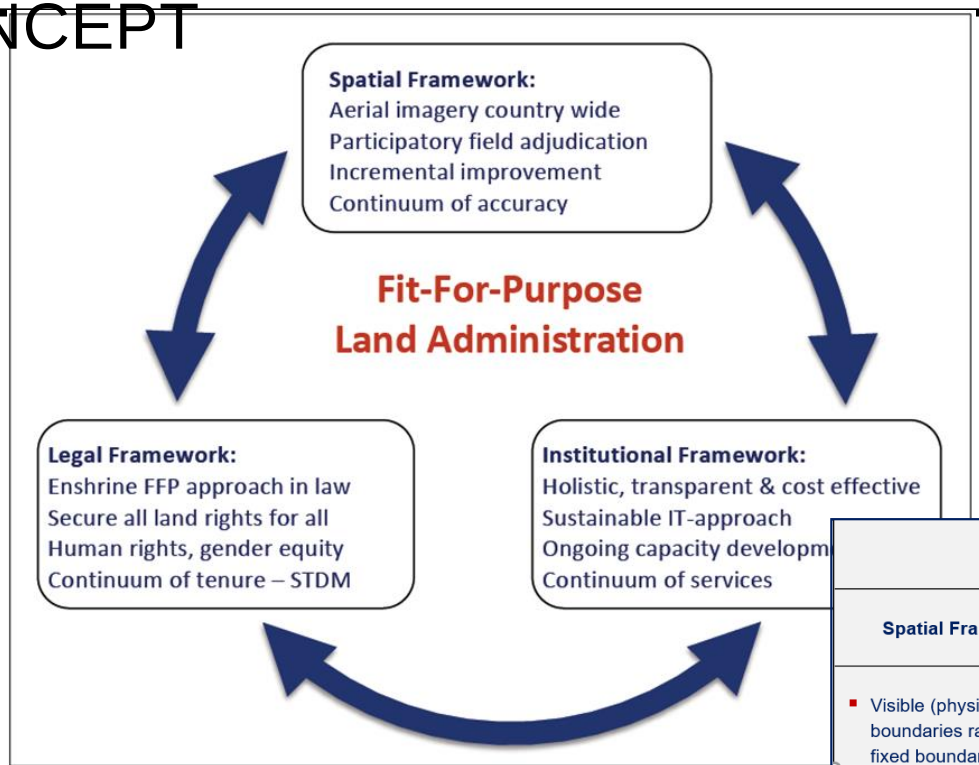
5. CHANGE APPROACH TO LAND ADMINISTRATION - FFPLA

- The FFPLA approach is not new as such … what is new is the development of a FFPLA concept with guiding principles for country implementation.

1990s	Land registration projects in Eastern Europe, China and Vietnam
2010s	Rwanda, Ethiopia
2014 – 2016	 FIG & WB  GLTN Spatial-, Legal-, and Institutional Frameworks Guiding principles for Country Implementation
2016 – 2021	Ongoing projects in about 25 countries throughout the world
2021	Land Journal Special Issue: FFPLA - providing Secure Land Rights at Scale

FFPLA, Gavin Adlington, Thursday 12:25

5. CHANGE APPROACH TO LAND ADMINISTRATION - FFPLA 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

New land Special Issue on FFPLA – Providing Secure Land Rights at Scale

Guest Editors: Stig Enemark, Robin McLaren, Christiaan Lemmen

14 articles from invited authors providing experience of:

FFP conceptual innovations (Vol 1)

- Assessing procedures of maintenance
- Assessing adjudication and quality assurance for legal and geospatial data
- Applying innovative geospatial tools to FFPLA;
- Using decentralization as a strategy for scaling FFPLA;
- Assessing the role of FFPLA for violent conflict settings;
- Applying the FFP approach to wider land management functions
- Applying the FFP approach to urban resilience, climate change and Covid-19
- Exploring the role and opportunities of the private financial sector and public private partnerships within FFPLA

12 articles from invited authors providing experience of:

FFP country implementation (Vol 2)

- Assessing the impacts of applying the FFPLA approach in China and Vietnam
- Analyzing the strategy for implementing a FFPLA approach in Indonesia, Nepal, Uganda and Mozambique
- Analyzing the cases of piloting FFPLA tools for land recordation in Ghana, Kenya, Uganda, Zambia and Namibia;
- Analyzing the impact of applying the FFPLA approach to South Africa;
- Using a FFP approach for upscaling of land administration in Benin;
- Applying the FFPLA approach in response to post disasters Caribbean
- Assessing FFPLA applications in Colombia and Ecuador.

Available on-line free of costs: www.mdpi.com/journal/land/special_issues/FFPLA

5. CHANGE APPROACH TO LAND ADMINISTRATION - CROWDSOURCING

Cleansing Records on the Web with Customer Feedback

- Obtain feedback from citizens and communities on the quality of existing land registration and cadastral records.
- Good examples are Ukraine, Croatia, Bulgaria and Serbia.

Source: http://uzhgorod.in/en/news/2014/iyul/f

5. CHANGE APPROACH TO LAND ADMINISTRATION - CROWDSOURCING

Ukraine Experience

Source: Rumyana Tonchovska (UN-FAO)

INNOVATION WORK

CROWDSOURCING FOR IMPROVED DATA QUALITY AND COMPLETENES

FAST DATA QUALITY IMPROVEMENT - Examples from Ukraine

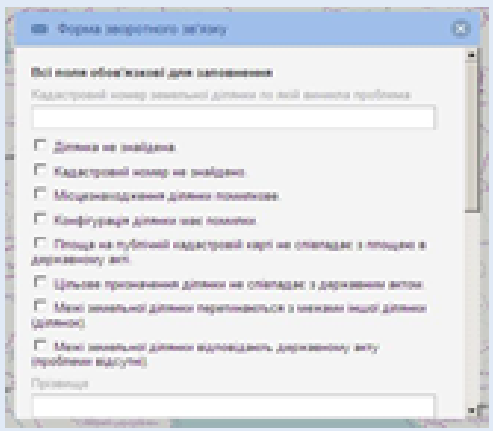
- ***Crowd sourcing*** *- online service for reporting errors*

During the first month:
11 000 errors reported
8 000 corrected.

- **16.8 mil ownership documents (35 mil pages)** scanned, indexed, data entered, verified, uploaded to a secure DB in 5 months.

- ***Created Unified Cadastre Map*** *– 1 460 local coordinate systems transformed in unified system in 2013. Many errors identified and in process of correction*

- ***Automatic tools for error identification, classification and correction created and piloted***



In Kiev:
Out of 88 reported errors,
56 were found to be similar.

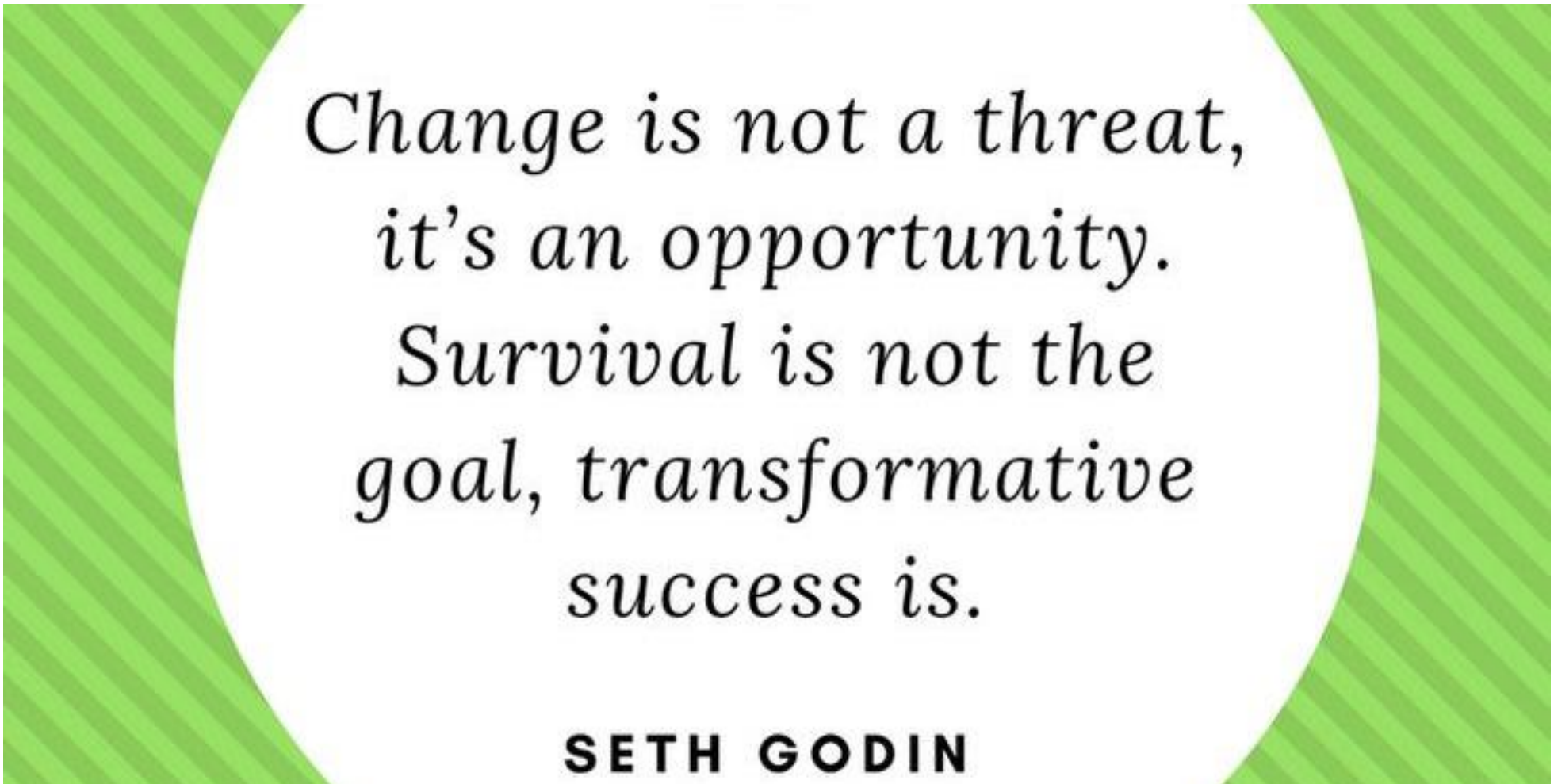
The correction of 56 errors led to automatic correction of more than 2000 errors

Exciting opportunities have emerged for potentially shaping the future of NMCAs, but what corporate and cultural changes do NMCAs have to implement to be able to exploit these opportunities?

REALISING THE OPPORTUNITIES

- Geospatial just one component of developing solutions to support the global agenda - need to integrate a wide variety of data sources, including regional.
- Developing new value added services will involve working with new stakeholders.
- New partners and business models needed to address these emerging market opportunities?
- Need to change how NMCA engages with partners to be strategic marketing led.
- Emerging technology can now support the integration of currently fragmented land interventions to deliver holistic solutions (e.g. tenure, valuation, resilience).
- This transition will require a cultural change to encourage innovation across all levels of the NMCA.

Source: https://projectriskcoach.com/how-to-cash-in-on-project-opportunities/


Change is not a threat,
it's an opportunity.
Survival is not the
goal, transformative
success is.
SETH GODIN

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A Future Vision for National Mapping and Cadastre Authorities

Robin McLaren

Slide 1: Introduction
It is a pleasure to be part of this excellent international conference and I would like to thank the Norwegian government for inviting me to present today. My topic should be of interest to most of you, as I will be looking at the future of National Mapping and Cadastral Authorities.

I first provided advice to a National Mapping Agency in 1978 when the Ordnance Survey of Great Britain asked my software company to investigate how to transform their cartographic database into a database real world objects. Since then I have provided strategic advice to many governments around the world on the direction of travel of their National Mapping and Cadastral Authorities. I will just call them agencies for the rest of the presentation. As we will see today, a journey of constant transformation is the name of the game for survival.

Slide 2: Drivers for Change
The context within which these agencies operate is highly dynamic and that pace of change is accelerating. But what is driving this change? Clearly, Google, Apple and other global corporations are competing head on with these agencies and satellite imagery and AI are opening up new innovative and fast approaches to capturing geospatial data. I am also hearing that staff, especially IT staff, are getting bored with the often-steady state of operations within agencies and seeking challenges elsewhere. The existing value propositions are being diluted and this is leading to a loss of funding for the agencies from government. Agencies are not maintaining coverage of rapidly expanding urban areas and not delivering Digital Twins to help manage cities more effectively.

In Australia and Canada, there are strong trends to outsource Land Registration and Cadastral services through Public Private Partnerships (PPPs). Who is now going to lead the development of wider Land Information Services? The Fit-For-Purpose approach to Land Administration is increasingly being adopted across the land sector and significant changes to existing services will have to be made. Agencies are not stepping up to form new partnerships and support solutions to mitigate global issues, such as climate change, pandemics and city resilience.

Slide 3: Global Changes to NMCAs
So what is the impact of these changes worldwide?
Agencies are consolidating in Mexico and Northern Ireland, for example.
Statistical agencies are rising in prominence.
Land registration services are being outsourced using public private partnerships.
The agency in Hungary has completely disappeared through decentralisation.
In some countries, the underlying remit of the agency is changing from data collector to data collator.

There are some indications that donor funding is being channelled into innovation hubs rather than to these agencies. The earth observation sector is growing in prominence in countries like South Africa. In countries with rapid urban expansion, the mapping responsibilities are being decentralised from national agencies to cities. This is happing in India. And of course, users are increasingly turning to alternative sources like Google and OpenStreetMap.

Slide 4: Opportunities for Change - Intro

These are serious and threatening impacts. So, I would now like to walk you through some options for the future that may help you transform and persist. The first option I would like to explore is to develop a wider role in the coordination of information across government.

Slide 5: Leadership in Information Management

Many agencies have created strong reputations by being custodians of large complex data sets and can build on this experience to develop a much wider role in the coordination of information across government to support digital transformation. This will allow the agencies to develop a new corporate profile and be much more politically visible and meaningful. One of the best opportunities to support digital transformation is to adopt a major role in establishing and managing Key Registers for government. These are authoritative registers about people, businesses and land and property. In

Lithuania, the agency was selected to manage some of the Key Registers but because the agency had built such a good reputation of being a robust, safe, and trusted custodian of government registers, they were also appointed as the custodian of many non-geospatial registers, such as health. One of the side benefits of this approach is the retention of good staff, especially ICT staff, who usually stay to enjoy the new challenges.

Slide 6: Leadership in Information Management - Key Registers

These key registers are essential for digital transformation in government and allow citizens and businesses to effectively access public services at all levels. The registers provide information about location, address, ownership, use and value for land and property, for example. Some of the best examples of key registers can be found in Denmark, Lithuania, New Zealand and The Netherlands.

Slide 7: Leadership in Information Management - Key Registers

The next speaker, Haico from Kadaster will describe the implementation of key registers in The Netherlands.

Slide 8: Data Integrator and Manager - Service Provision

New challenges have emerged to find solutions for our urban and global problems, such as city resilience, disaster risk management and autonomous vehicles, and of course climate change. COP-26 starts in Glasgow in Scotland next week. Solutions to these problems are multi-disciplinary and require the integration of a wide variety of geospatial and other data, including sources from the public and private sectors. So, agencies could change their focus from being the creators of data and step up to be the collator, integrator, and manager of these complex data sets to support insights, knowledge and solutions.

Slide 9: Data Integrator and Manager - Service Provision (Diagram)

Rather than just focus on data, more value add could be provided to these sectors through a new set of partners to build capacity and create of an ecosystem of sector specific tools and services.

Slide 10: Value Added Services - Market Creator

Rather than the agency just creating geospatial data, this next option considers the agency developing value added services using geospatial data. This option may require a change in government policy to allow the agency to enter the value added services market that is traditionally held by the private sector. Rather than the agency competing head on with the private sector, the agency could be a pump primer for new, embryonic markets where there is no intent by the private sector. A great example is in Switzerland where swisstopo and partners created a decision support tool for household investments in solar panels. You would not even know that geospatial data was driving this application.

Slide 11: Value Added Services - Market Creator (Diagram)

Once the targeted market starts to mature then the agency would either withdraw to leave the market to the private sector or create a partnership with the private sector to expand the market. This approach certainly helps to build trust between the agency and the private sector.

Slide 12: New Partnership with EO Ecosystem (Diagram)

The space industry is estimated to be a trillion dollar economy in the next decade. Earth Observation is where a lot of the action and the money is currently focused.

Slide 13: New Partnership with EO Ecosystem

Agencies need to be part of this action and form new partnerships with the Earth Observation ecosystem to harness and exploit the new capabilities emerging in this sector. In my hometown of Edinburgh, the government is supporting an Earth Observation cluster that is gaining momentum and is being very successful. Earth Observations are opening up exciting new markets for geospatial and a

good example is in FinTech. Christophe will be talking about Geospatial in the Financial Sector on Friday at 12:20

Slide 14: Change Approach to Land Administration - FFPLA

The last transformational change I'd like to talk about today is to adopt the fit for purpose land administration approach. This approach was conceptualised about five years ago by the World Bank and GLTN. It is

- **Inclusive** to cover all types of tenure.
- **Participatory** involving communities.
- **Affordable** to establish and operate.
- **Attainable** within a short time.
- And **upgradable** overtime.

Slide 15: Change Approach to Land Administration – FFPLA Concept

To adopt this approach the agency will have to make changes to their spatial, legal and institutional frameworks. For example, parcel boundaries can be defined using orthophotos rather than traditional surveying techniques. Rwanda is probably the best example of implementing this approach. The entire country was registered in five years for a cost of less than six U.S. dollars a parcel. Gavin Adlington will present more detail about this approach on Thursday at 2:25.

Slide 16: New Land Journal Special Edition

A special edition of the Land Journal has just been published and this features 26 articles about the concept and implementation of the approach.

Slide 17: Change Approach to Land Administration - Crowdsourcing

The quality of land registration and cadastral records can be improved through crowdsourcing by citizens. Some great examples can be found in Croatia, Bulgaria, Serbia and Ukraine.

Slide 18: Change Approach to Land Administration - Crowdsourcing

This slide provides more detail about this successful approach adopted by Ukraine. You can browse this later.

Slide 19: Exciting Opportunities…..

These are exciting opportunities, but agencies cannot just switch them on. There is a requirement to implement corporate and cultural changes within the agencies to be able to exploit these opportunities.

Slide 20: Realising the Opportunities

So, what are the most important changes you will need to make? A new diverse set of often complex data source need to be collated and managed. A brand new set of stakeholders will have to be engaged to create new, value added services and the engagement must be much more strategic marketing led. New innovative business models will also need to be created for these emerging market opportunities. Implementation processes will have to be rethought as emerging technologies can now support more holistic solutions. For example, combining tenure, valuation and resilience projects into an integrated programme. And finally, this transition will require a cultural change across the agency to encourage innovation across all levels.

Slide 21: Quote

I like this quote from Seth Godin, "*Change is not a threat, it is an opportunity. Survival is not the goal, transformative success is.*" So, my take away message to you today is to take advantage of these opportunities to transform your organisation, be ambitious and start to deliver significant benefits to society, the economy and the environment that politicians clearly recognise and appreciate. Otherwise, the wind of time may blow you away. Thank you.

Key Registers in the Netherlands

Haico van der Vegt, Kadaster, The Netherlands

Haico works as a regional manager at Kadaster International, the international branch of the Cadastre, Land Registry and Mapping Agency of the Netherlands. He is responsible for the development cooperation in Asia, Arab States and Europe. As a spatial data infrastructure expert, he is involved in many national and international SDI implementation projects.

Haico focused on one of Robin's themes, the value of geospatial in integrating national registers. He explained the concept of the authentic register as a single source of the truth, and the power of being able to synchronize a set of registers so citizens only had to notify Government of changes, such as moving house. The register was an essential part of Government machinery, in the digital age underpinning planning decisions of all types. He explained that creating key registers was not a quick process it has taken 20 years to reach the current state where 10 registers were effectively acting as a single system of systems. The system had a common architecture, and many components were reused in all registers. The benefits were many including higher quality data, reduced duplication and improved fraud detection (gaining tax concessions by claiming to live in three places at once was no longer possible).

Haico then explained the principles that underpinned all of registers, which importantly included a common finance model, mandated use by all public authorities, documented quality standards and active involvement of all stakeholders from the financing customer (Ministry of Internal Affairs) to citizens. Some of the key lessons learned were that it could not be "bolted on", many business processes needed to be adjusted, it is ma make to try to do everything at once but except that the infrastructure only has to be "good enough" and the money saved is more important than the cost. There is a lot more detail on this important opportunity in Haico's presentation.

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Key Registers in the Netherlands

Haico van der Vegt | 27 October 2021

kadaster

What is a key register?

"A register officially designated by the government with data that all government agencies are obliged to use when carrying out public law tasks"

- Single registration of authentic = trustworthy data
- Mandatory re-use of the data by all governmental bodies
- Known responsibility and liability
- Citizens do not have to supply data over and over again
- Known quality and source of data

Plus:

- Service oriented architecture for government data
- Generic components

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Core components of a key register

1. Regulation and established by Law
2. Obligation to report errors or other irregularities
3. Mandatory use by public bodies
4. Liability
5. Finances
6. Content well defined (public catalogue)
7. Procedures and standards for data distribution
8. Accessibility
9. Quality Assurance
10. Obliged users' involvement
11. Relations between key registers
12. Governance and responsibilities

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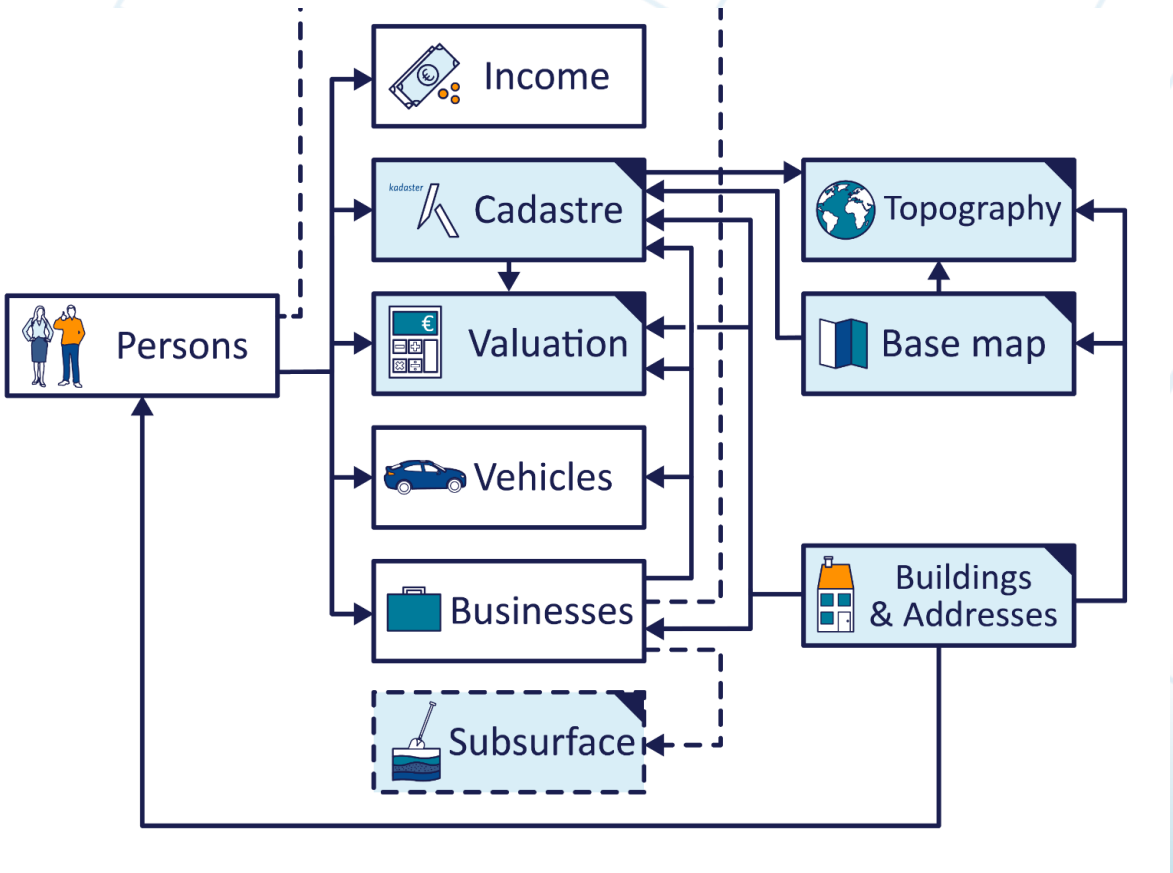
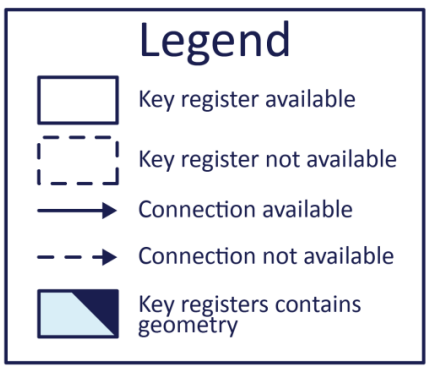
System of Key Registers…why?

The System of Basic Registrations forms the basis for:

- a government that does not ask for the known way;
- a government that is customer-oriented;
- a government that does not allow itself to be fooled;
- a government that knows what it is talking about;
- a government that has its affairs in order and does not cost more than necessary

How does the system look like?





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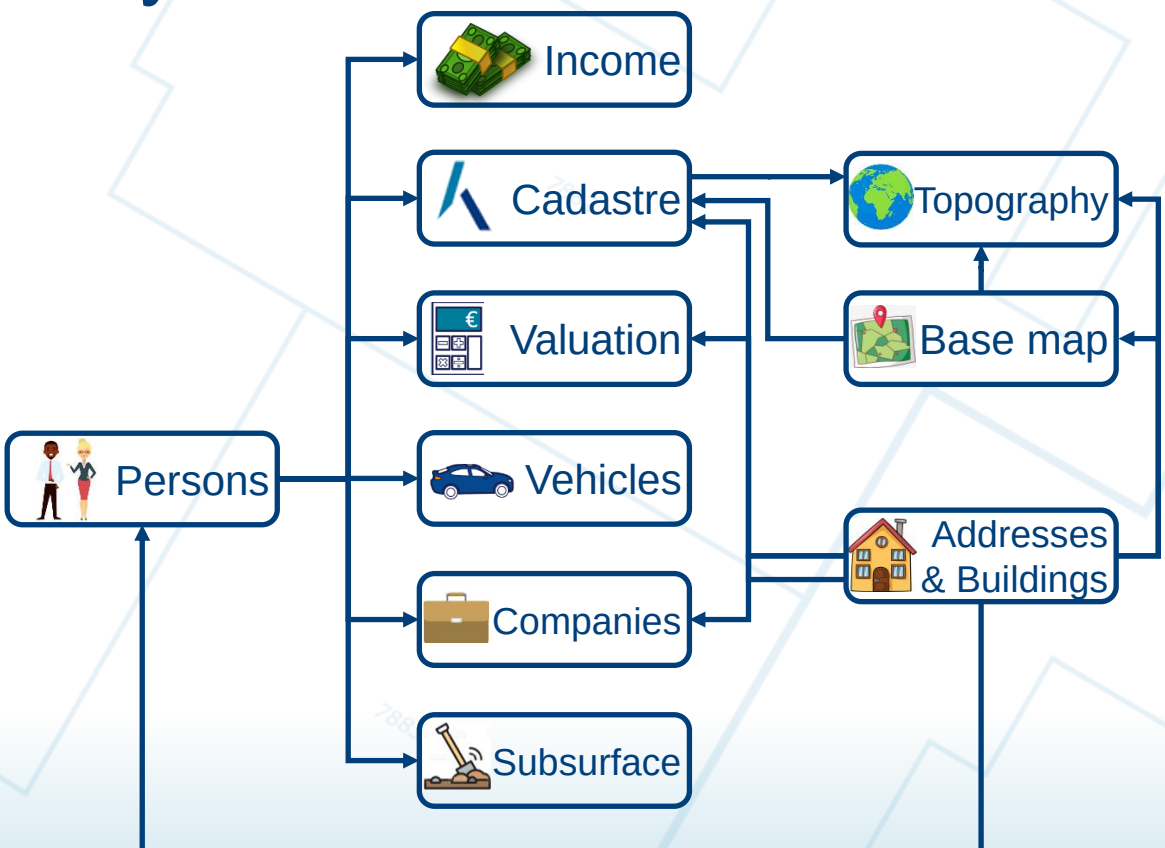
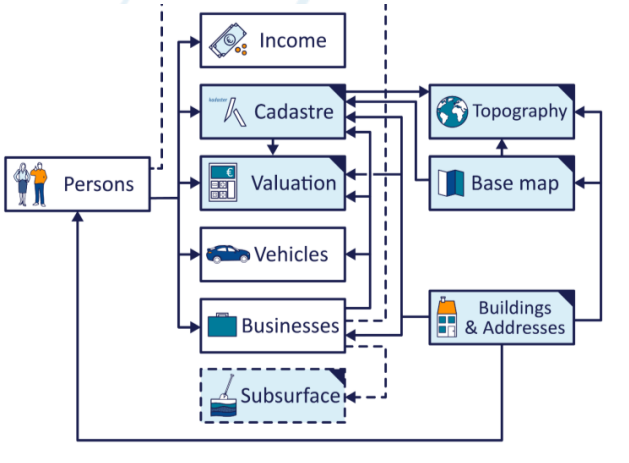
Quality





Governance

- Ministry of the Interior coordinating body
- National Program:
  - Legislation
  - National Execution Program (iNUP)
  - National Reference Architecture (NORA)
  - Shared services:
    - shared identification/authentication/authorisation (IAA)
    - shared data exchange (*Diginetwerk*)
    - information nodes
    - shared delivery service (*Digilevering*)
    - shared service to report errors (*Digimelding*)
  - Data catalogue and meta-data register

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Different roles


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Keynote: Bridging the Digital Divide

Gregory Scott, United Nations Statistics Division

Gregory Scott
Inter-Regional Advisor
Global Geospatial Information Management
United Nations Statistic Division

Greg Scott joined the United Nations Statistics Division in 2012 with the specific task of establishing the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) and growing its relevance and status with Member States and related International Organizations involved in national, regional and global geospatial information management. In his role as Secretariat, Greg provides strategic policy advice and leadership, and guides the development, coordination and implementation of the substantive content for the Committee of Experts.

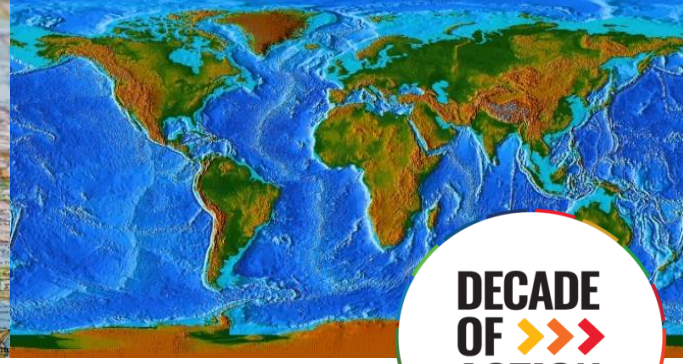
Greg opened the debate by stressing that geospatial information is a critical component of both national infrastructures and the knowledge economy; a blueprint of what happens where and the means to integrate a wide variety of government services. He set out the case for the IGIF, linking it to a range of global development agendas and stressing the importance of data in delivery of the sustainable development goals, the changing expectations of citizens and to digital transformation. Geospatial information has emerged as a major contributor to economic transformation in many countries, including e-government, e-services and e-commerce.

Greg recognised that many nations risked being left behind by the growing digital divide, but offered that the IGIF provided a reference guide for developing and strengthening national arrangements in geospatial information management and therefore assists countries in bridging the geospatial digital divide.

In particular, he highlighted the opportunities to developing nations provided by IGIF pathway 5, the innovation pathway, coupled with effective governance (IGIF pathway 1) and improved communication (pathway 9).

He stressed that NSDIs were one infrastructure that could benefit from IGIF but many nations were now looking beyond NSDIs and the framework supported all geospatial infrastructures.

Finally, he listed 37 countries that were already using the IGIF in developing national strategies and action plans. All UN GGIM IGIF resources are openly available online at https://ggim.un.org/IGIF/



DECADE OF ACTION

Geospatial Information for Digital Transformation: Current Initiatives and Future Opportunities

27-29 October 2021

The IGIF: Bridging the Digital Divide

Greg Scott, UN-GGIM Secretariat
Environmental Statistics and Geospatial Information Branch
United Nations Statistics Division
Department of Economic and Social Affairs
United Nations, New York

Kartverket

Context: Why is the IGIF needed?

Global Development Agendas

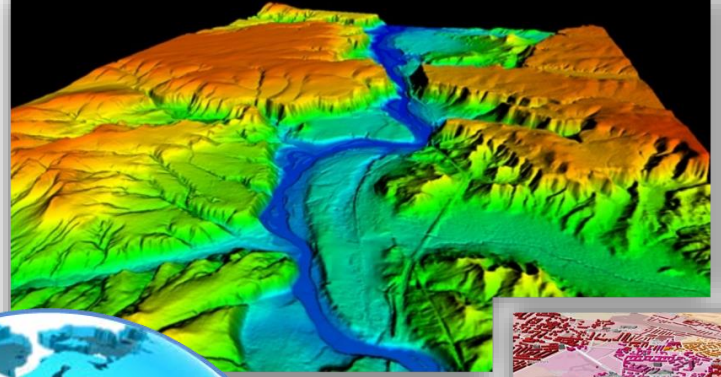
- 2030 Agenda for Sustainable Development
- Sendai Framework for Disaster Risk Reduction 2015-2030
- Paris Agreement on Climate Change
- SAMOA Pathway for SIDS
- Addis Ababa Action Agenda
- HABITAT III New Urban Agenda
- Our Ocean, Our Future: Call for Action

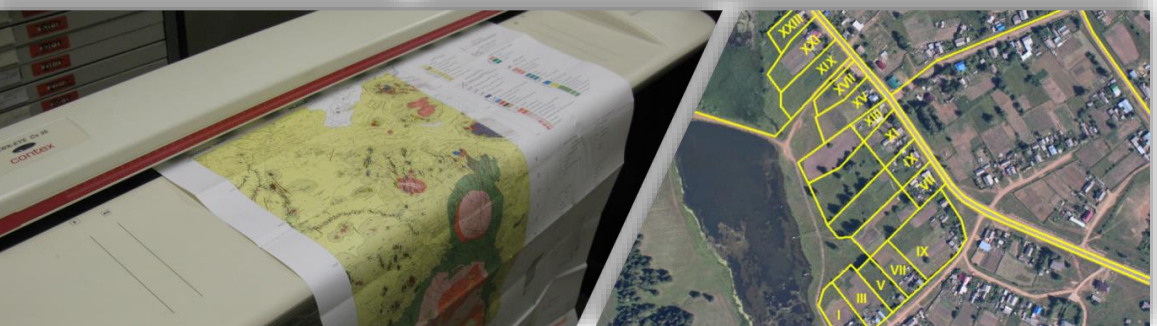
The transformative nature of the 2030 Agenda requires new and innovative data sources and integration approaches to implement the SDGs and to 'leave no one behind'.

The SDGs are highly dependent on geospatial information and enabling technologies as the primary data and tools for relating people to their location, place and environment, and to measure 'where' progress is, or is not, being made, especially at local levels.

“Within the past generation, hundreds of millions of people have emerged from extreme poverty, and access to education has greatly increased for both boys and girls. Further, the spread of information and communications technology and global inter-connectedness has great potential to accelerate human progress, to bridge the digital divide, to develop knowledge societies, and scientific and technological innovation”

2030 Agenda for Sustainable Development



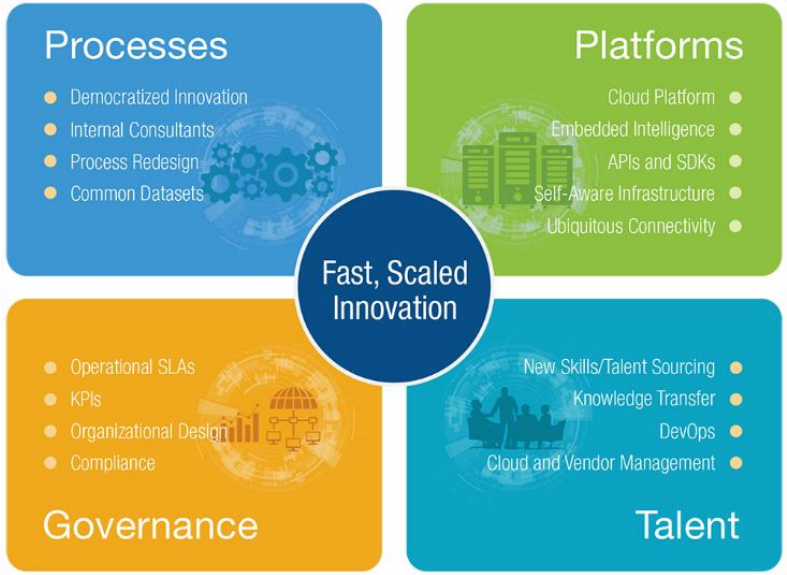


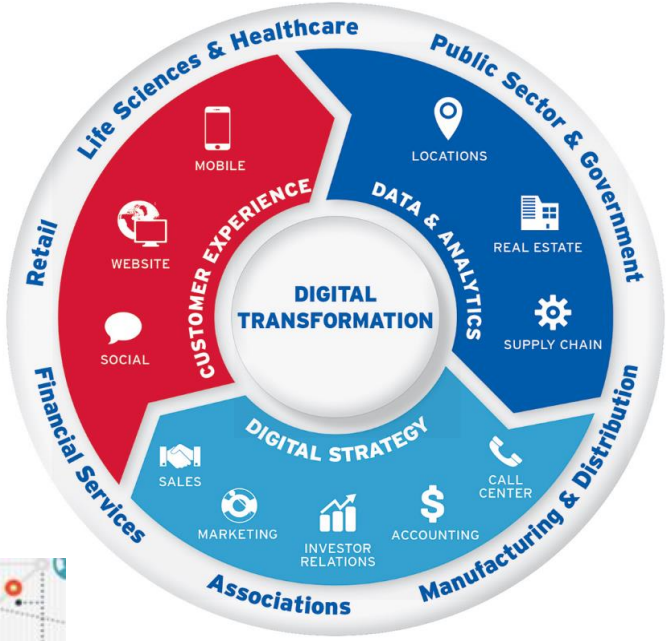
Bridging the Geospatial Digital Divide

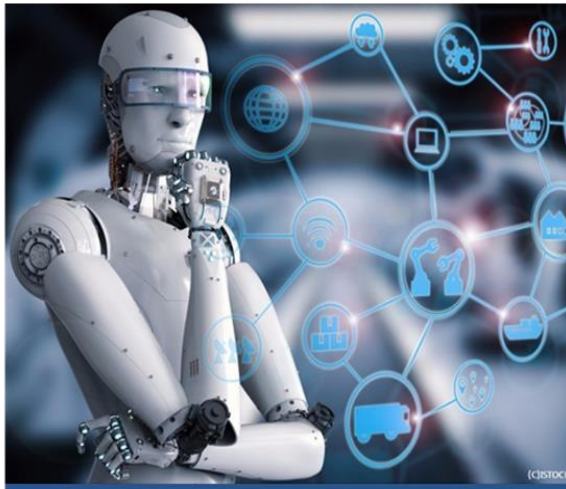
ng and exploiting the new data needs, nation systems, analytics and associated abling technologies and tools to support the implementation of the SDGs is going to take strategic policy leadership and transformational change – a digital transformation that is able to bridge the ‘geospatial digital divide’ which continues to inhibit development progress for developing countries.

Greg Scott, November 2016

Disruptive nature of digital transformation





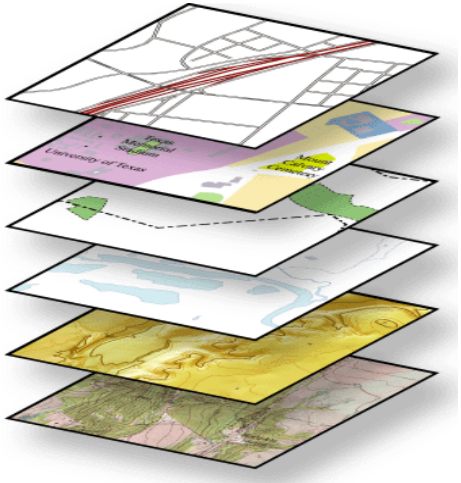


The disruptive nature of digital transformation, technology, innovation, and their exponential impacts, means that society's expectations on how, and at what level of detail, we record what is happening where and when are changing at a rapid pace.

Changing community expectations

Citizen connectivity is increasing, with geospatial information playing a greater part. This leads to growing demand for quality geospatial information, and greater citizen expectations for digital government services.

Context: Why is the IGIF needed?



Geospatial information is a critical component of the national infrastructure and knowledge economy; a blueprint of what happens where, and the means to integrate a wide variety of government services.

Geospatial information has emerged as a major contributor to economic transformation in many countries, including e-government, e-service and e-commerce.

Yet there is still a considerable lack of awareness and understanding of the vital and integrative role of geospatial information and related enabling architectures, such as National Spatial Data Infrastructures (NSDIs), in contributing to national development.

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

The Sustainable Development Goals Report 2019

"It is abundantly clear that a much deeper, faster and more ambitious response is needed to unleash the social and economic transformation needed to achieve our 2030 goals. From our advances, we know what works. This report therefore highlights areas that can drive progress across all 17 SDGs: financing; resilience; sustainable and inclusive economies; more effective institutions; local action; better use of data; and harnessing science, technology and innovation with a greater focus on ***digital transformation****. In everything we do, we must diligently ensure that policy choices leave no one behind, and that national efforts are supported by effective international cooperation, grounded in a commitment to diplomacy and crisis prevention"*

António Guterres
Secretary-General, United Nations

Seventh Session of UN-GGIM, August 2017

“develop an overarching Geospatial Framework……”

“prepare and implement country level Action Plans…..”

ROADMAP FOR COLLABORATION

BETWEEN

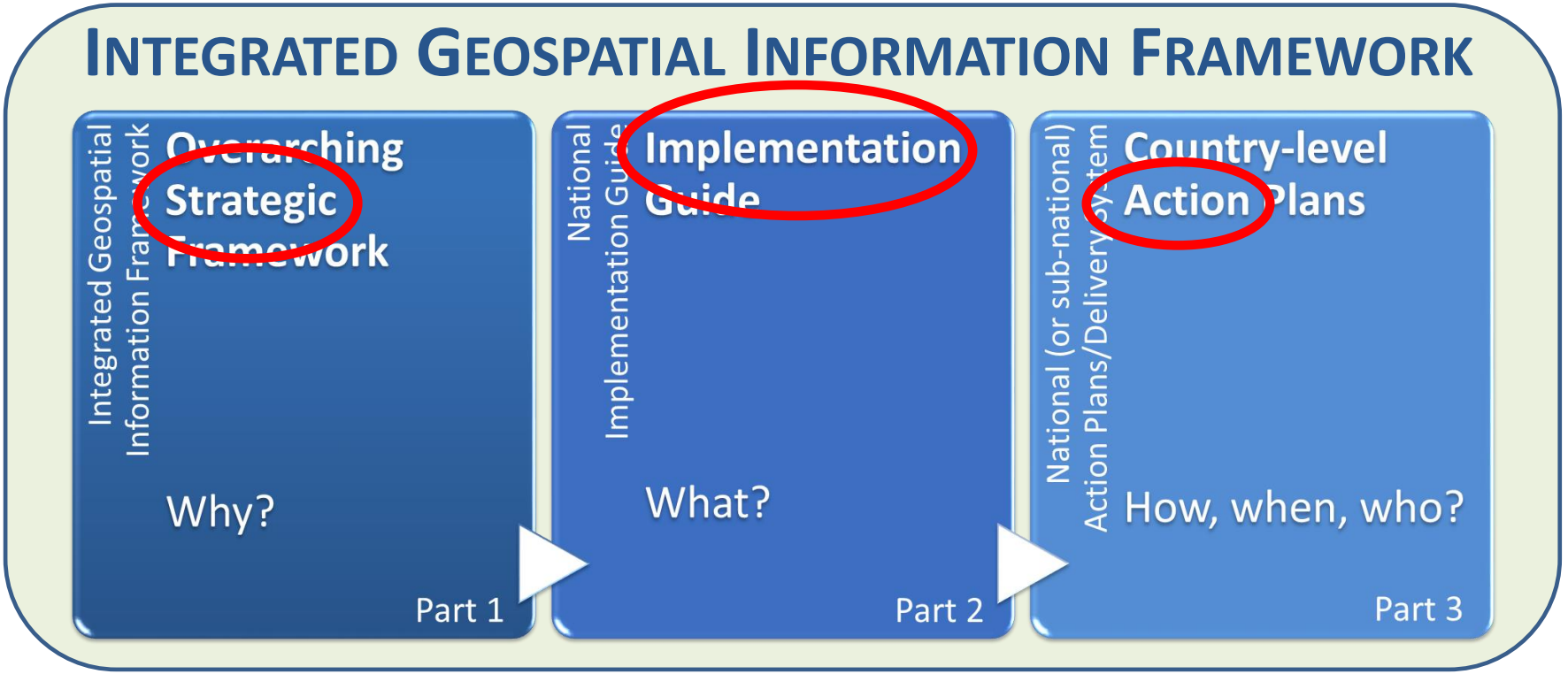
WORLD BANK’S GLOBAL PRACTICE ON SOCIAL, URBAN AND RURAL DEVELOPMENT, AND RESILIENCE

AND

UNITED NATIONS STATISTICS DIVISION

TO ASSIST COUNTRIES TO BRIDGE GEOSPATIAL DIGITAL DIVIDE

Integrated Geospatial Information Framework



The IGIF is a multi-dimensional Framework that is aimed at strengthening national geospatial information management in countries, developing countries in particular. It comprises an overarching **Strategy** – from local to global, **Implementation** guidance, and **Action** plans at the country level. The IGIF explains the Why, What, How, When and Who of a nation's geospatial information program.

http://ggim.un.org/IGIF/

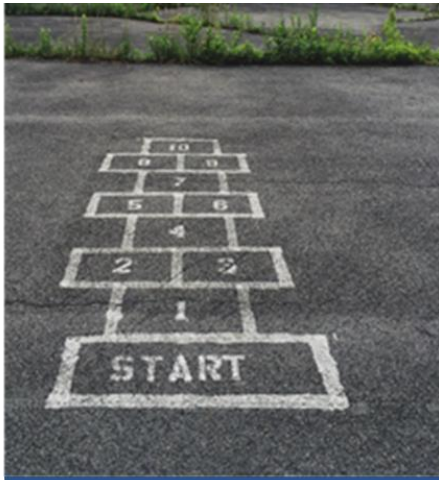
Integrated Geospatial Information Framework (IGIF)

Part 1: Overarching Strategic Framework

Adopted by UN-GGIM at its Eighth Session in August 2018

IGIF: Overarching Strategic Framework

- Forward-looking (aspirational) and built on national needs and circumstances.
- Provides the overarching strategic messages and integrated national framework, focusing on policy perspectives and elements of geospatial information.
- Demonstrates the case for change, '**why**' geospatial information management is a critical element of national social and economic development, and '**why**' it needs to be strengthened.
- **Vision** and **Mission** statements communicate the overarching aim of the IGIF.
- The Framework achieves this via **Strategic Drivers**, **7 Underpinning Principles**, **8 Goals, 9 Strategic Pathways** and defined **Benefits** that lead to a national approach that accounts for national circumstances, priorities and perspectives.
- As a 'strategic' introduction to the IGIF, the intended audience of the **Overarching Strategic Framework** includes national leaders, political leaders, organizational managers, the business community and academia.



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

IGIF: Case for Change

Data management policies, practices, and integration and analytical capabilities are currently limited in many countries.

- This is particularly a significant challenge for developing countries.

Geospatial information has been typically collected in organisational silos - resulting in data duplication, and the use of different data standards, formats and classifications.

- This has made data harmonisation, maintenance and integration problematic.

The intent of the Framework:
To provide an inclusive and engaging mechanism to bring collaboration, coordination and cohesion across a country, (government institutions & private sector) for the purposes of developing, strengthening and integrating arrangements in national geospatial information management.

VISION

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

MISSION

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

STRATEGIC DRIVERS

National Development Agenda ● National Strategic Priorities ● National Transformation Programme ● Community Expectations ● Multilateral trade agreements ● Transforming our World: 2030 Agenda for Sustainable Development ● New Urban Agenda ● Sendai Framework for Disaster Risk Reduction 2015–2030 ● Addis Ababa Action Agenda ● Small Island Developing States Accelerated Modalities of Action (SAMOA Pathway) ● United Nations Framework Convention on Climate Change (Paris Agreement) ● United Nations Ocean Conference: Call for Action

UNDERPINNING PRINCIPLES

Strategic Enablement	Transparent and Accountable	Reliable, Accessible and Easily Used	Collaboration and Cooperation	Integrative Solution	Sustainable and Valued	Leadership and Commitment

GOALS

Effective Geospatial Information Management	Increased Capacity, Capability and Knowledge Transfer	Integrated Geospatial Information Systems and Services	Economic Return on Investment
Sustainable Education and Training Programs	International Cooperation and Partnerships Leveraged	Enhanced National Engagement and Communication	Enriched Societal Value and Benefits

The Framework is an enabler for coordinating, developing, strengthening and promoting the effective sharing of geospatial information for policy formulation, decision-making and innovation.

IGIF: Vision and Mission

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

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

Vision

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

Mission

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

The motivation: National to Global **Strategic Drivers**

IGIF: Strategic Drivers

Addis Ababa Action Agenda	Multilateral trade agreements	Transforming our World: 2030 Agenda for Sustainable Development	INSPIRE
National Strategic Priorities	United Nations Ocean Conference: Call for Action	National Development Agendas	Sendai Framework for Disaster Risk Reduction 2015–2030
New Urban Agenda	Small Island Developing States Accelerated Modalities of Action (SAMOA Pathway)	United Nations Framework Convention on Climate Change (Paris Agreement)	National Transformation Programmes
National Transformation Programmes			

Global development agendas are a major driver for maintaining quality geospatial data to better inform policy and demonstrate national progress globally.

IGIF: Strategic Drivers

- Digital Transformation - Moving countries towards e-economies, e-service and e-commerce to improve citizen services
- Build capacity for using geospatial technology
- Enhance informed government decision-making processes
- Facilitate private sector development
- Take practical actions to achieve a digital transformation
- Being able to bridge the geospatial digital divide

IGIF: 7 Underpinning Principles

PRINCIPLE 1: Strategic Enablement
Implementation of the IGIF requires political and financial support

PRINCIPLE 2: Transparent and Accountable
All citizens have access to geospatial information and resources

PRINCIPLE 3: Reliable, Accessible and Easily Used
Geospatial information is reliable, and made accessible and usable

PRINCIPLE 4: Collaboration and Cooperation
Strengthens information sharing, reduces duplication of effort, and provides clarity on roles and responsibilities

PRINCIPLE 5: Integrative Solution
Considers how people, organizations, systems, and policy and legal structures work together

PRINCIPLE 6: Sustainable and Valued
National efficiencies and productivity are increased and sustainable in the long term

PRINCIPLE 7: Leadership and Commitment
Implementation of the IGIF requires strong leadership and commitment at the highest level

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

IGIF: 8 GOALS

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

IGIF: 9 Strategic Pathways

Geospatial information has immense social and economic value. Citizens, communities, business sectors, governments, and many other stakeholders benefit every day.

STRATEGIC PATHWAYS

Governance

- **Governance and Institutions**
  - Governance model
  - Leadership
  - Value proposition
  - Institutional arrangements
- **Policy and Legal**
  - Legislation
  - Policies, norms and guides
  - Data protection, licensing and sharing
  - Governance and accountability
- **Financial**
  - Business model
  - Opportunities
  - Investment
  - Benefits realization

Technology

- **Data**
  - Data themes
  - Custodianship, acquisition and management
  - Data supply chains
  - Data curation and delivery
- **Innovation**
  - Technological advances
  - Process improvement
  - Innovation and creativity
  - Bridging the geospatial digital divide
- **Standards**
  - Standards governance and policy
  - Technology and data interoperability
  - Compliance testing and certification
  - Community of Practice

People

- **Partnerships**
  - Cross-sector and interdisciplinary cooperation
  - Private sector and academia collaboration
  - International collaboration
  - Community participation
- **Capacity and Education**
  - Awareness
  - Formal education
  - Professional training
  - Entrepreneurship
- **Communication and Engagement**
  - Stakeholder and user engagement
  - Strategic messaging and engagement
  - Communication strategy, plans and methods
  - Monitoring and evaluation

BENEFITS

Knowledge | Decisions | Development | Society | Economy | Environment | Users | Citizens | Access | Technology | Applications | Value

Anchored by 9 Strategic Pathways, the IGIF is a mechanism for articulating and demonstrating national leadership in geospatial information, and the capacity to take positive steps. The Strategic Pathways 'implement' the IGIF through actions.

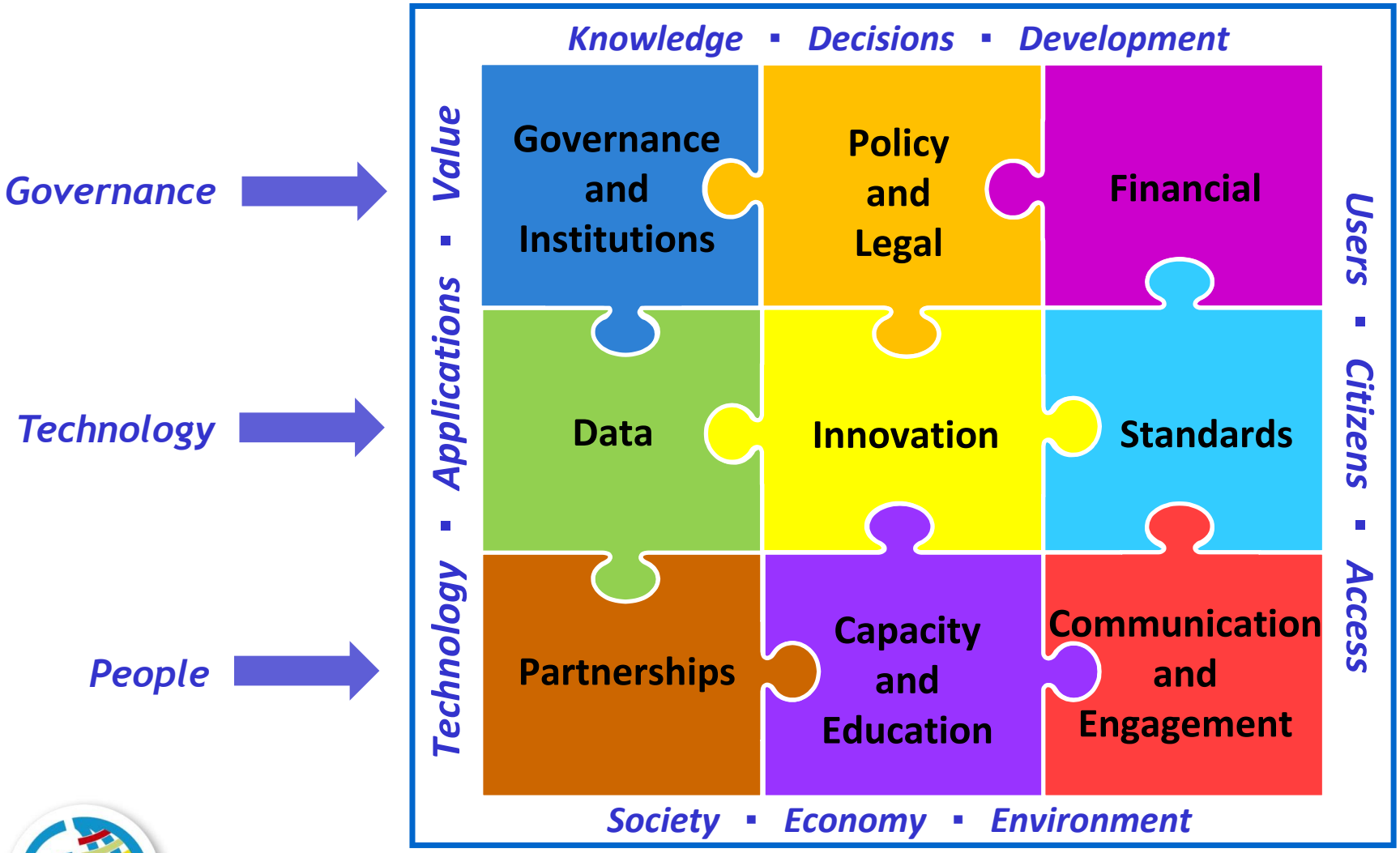
IGIF: BENEFITS

BENEFITS (SOCIETAL)	**Knowledge | Decisions | Action | Development | Society | Economy | Environment** **Government | Users | Citizens | Access | Technology | Applications | Value | Engagement**
BENEFITS (THEMATIC)	**Water | Energy | Tourism | Health | Education | Infrastructure | Security | Population** **Defence | Industry | Transport | Disasters | Urbanisation | Food Supply | Planning**

The ultimate benefits, including the considerable economic benefits, of integrating and strengthening national geospatial information management is that it is a strategic enabler for all levels of government and the broader community.

It improves planning for economic growth and delivery of better services.

It supports the delivery of the SDGs, such as poverty alleviation, socially inclusive development, protection of the environment, disaster response times, regional cooperation and transparency in governance.

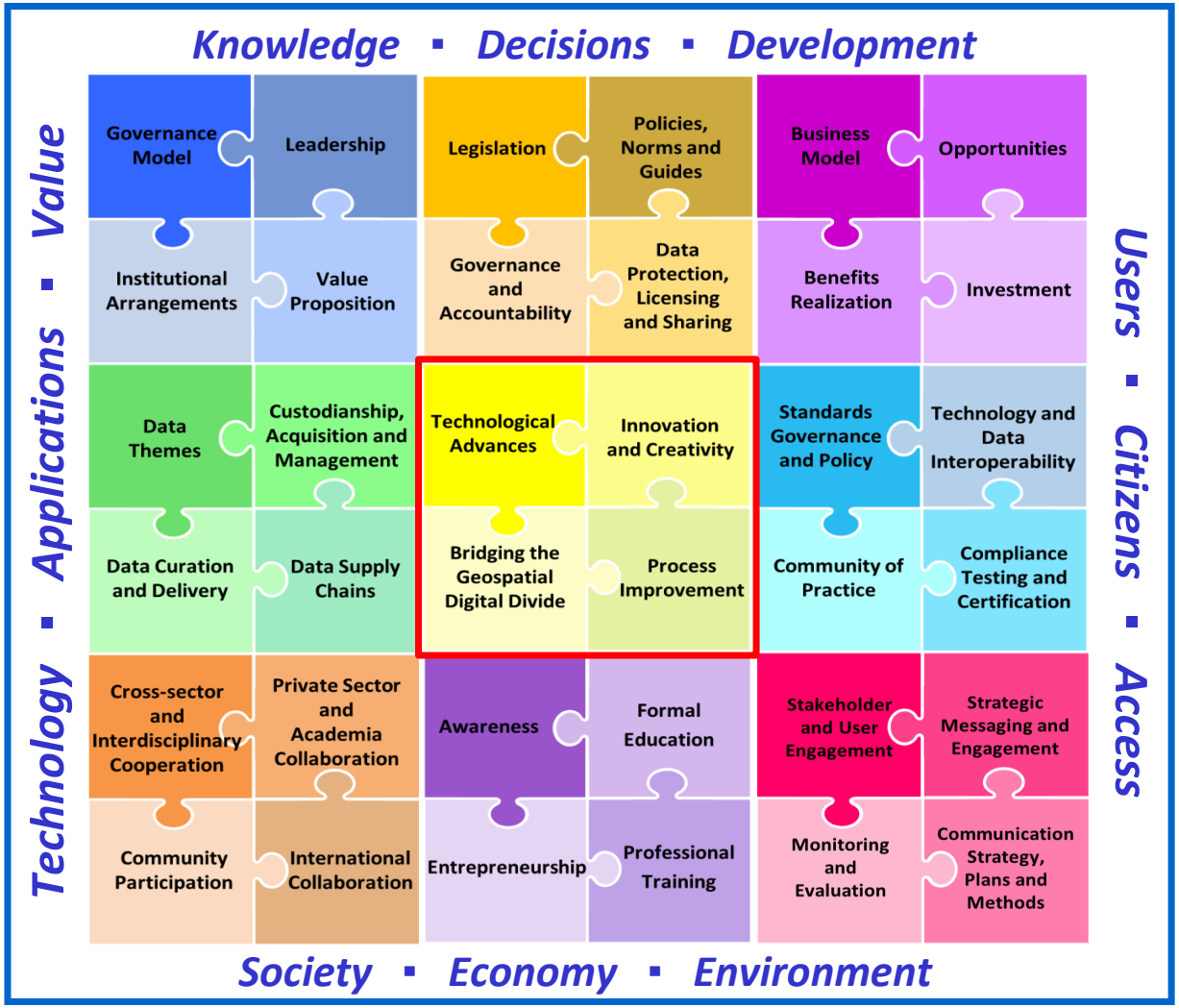


9 Strategic Pathways solve the IGIF puzzle

Governance

Technology

People



9 Strategic Pathways solve the IGIF puzzle …with 36 Key Elements

Integrated Geospatial Information Framework (IGIF)

Part 2: Implementation Guide

Adopted by UN-GGIM at its Tenth Session in September 2020

IGIF: Implementation Guide - Foundations

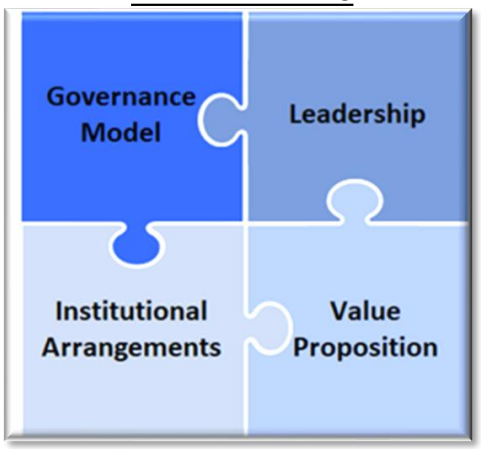
- Explains '**what**' specific guidance and options can be taken by countries in implementing the IGIF. It captures strategic to operational needs with guiding principles; while not being detailed and prescriptive – Country-level Action Plans do that.
- Provides guidance for countries to establish 'nationally' integrated geospatial information frameworks in such a way that transformational change is enabled, visible and sustainable.
- Every country is at different levels of maturity in their geospatial development journey, so the guidance is comprehensive yet general enough to be applicable to all countries, and sufficiently flexible so that each country can develop their own plan of actions to meet their national priorities and circumstances.

IGIF: Implementation Guide

STRATEGIC PATHWAY 1

Governance and Institutions

4 KEY ELEMENTS



1. Abstract
2. Summary
3. Introduction
4. Context and Rationale
5. Approach
6. **Elements**
7. **Guiding Principles**
8. **Actions**
9. Deliverables
10. **Outcomes**
11. Resources

"Tools" and "Interrelated Actions" are identified throughout the Chapter

Elements of Governance and Institutions	Governance Model	Leadership	Value Proposition	Institutional Arrangements

Guiding Principles			
	Facilitate Strategic Outlook Credibility Participatory	Open and Transparent Accountability Guidance Clarity	Project Management Oversight Communication and Evaluation Legal Interoperability

Key Actions for Strengthening Geospatial Information Management			
	Forming the Leadership Governing Body Geospatial Coordination Unit(s) Specialist Working Groups	**Defining Value** Strategic Alignment Study Value Proposition Statement	**Creating a Plan of Action** Country-level Action Plan
	Establishing Accountability Governance Model	**Setting Direction** Geospatial Information Management Strategy Change Strategy	**Tracking Success** Monitoring and Evaluation Success Indicators

Tools to Assist in Completing the Actions			
	Steering Committee Charter Example Strategic Alignment Template	Guidance for Vision, Mission and Goal Statements Country-level Action Plan Template	Monitoring and Evaluation Template Success Indicators Example

Interrelated Actions			
	Policy Framework (SP2) ICT Capacity Review (SP5) ICT Needs Assessment and Gap Analysis (SP5)	ICT Needs Assessment and Gap Analysis (SP5) Stakeholder Engagement Strategy (SP9) Legal and Policy Review (SP2)	Data Inventory and Gap Analysis (SP4) Socio-Economic Value Assessment (SP3)

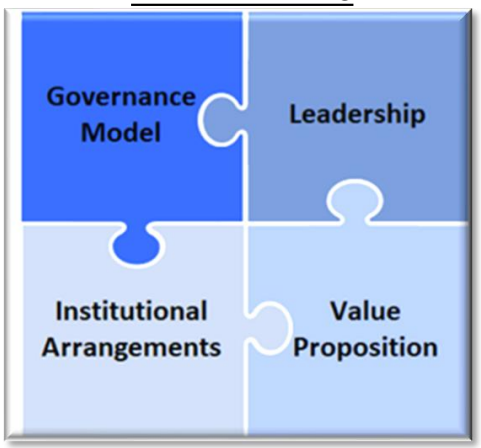
Outcomes			
	Strengthened Leadership, Institutional Mandates and Political Buy-in	Efficient Planning and Coordination Geospatial Information is Valued	Cooperative Data Sharing

IGIF: Implementation Guide

STRATEGIC PATHWAY 1

Governance and Institutions

4 KEY ELEMENTS



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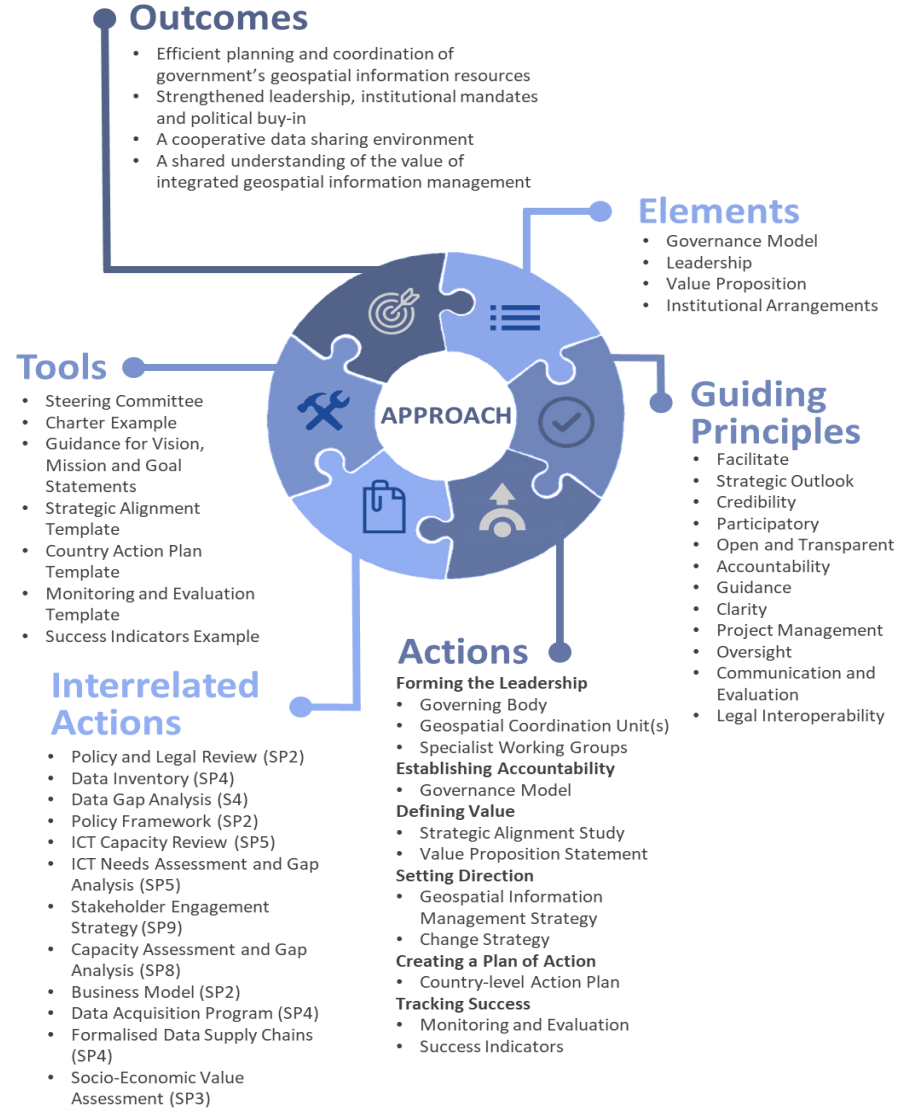
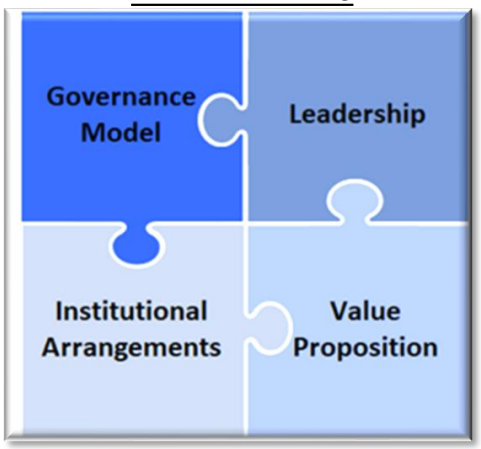


IGIF: Implementation Guide

STRATEGIC PATHWAY 1

Governance and Institutions

4 KEY ELEMENTS



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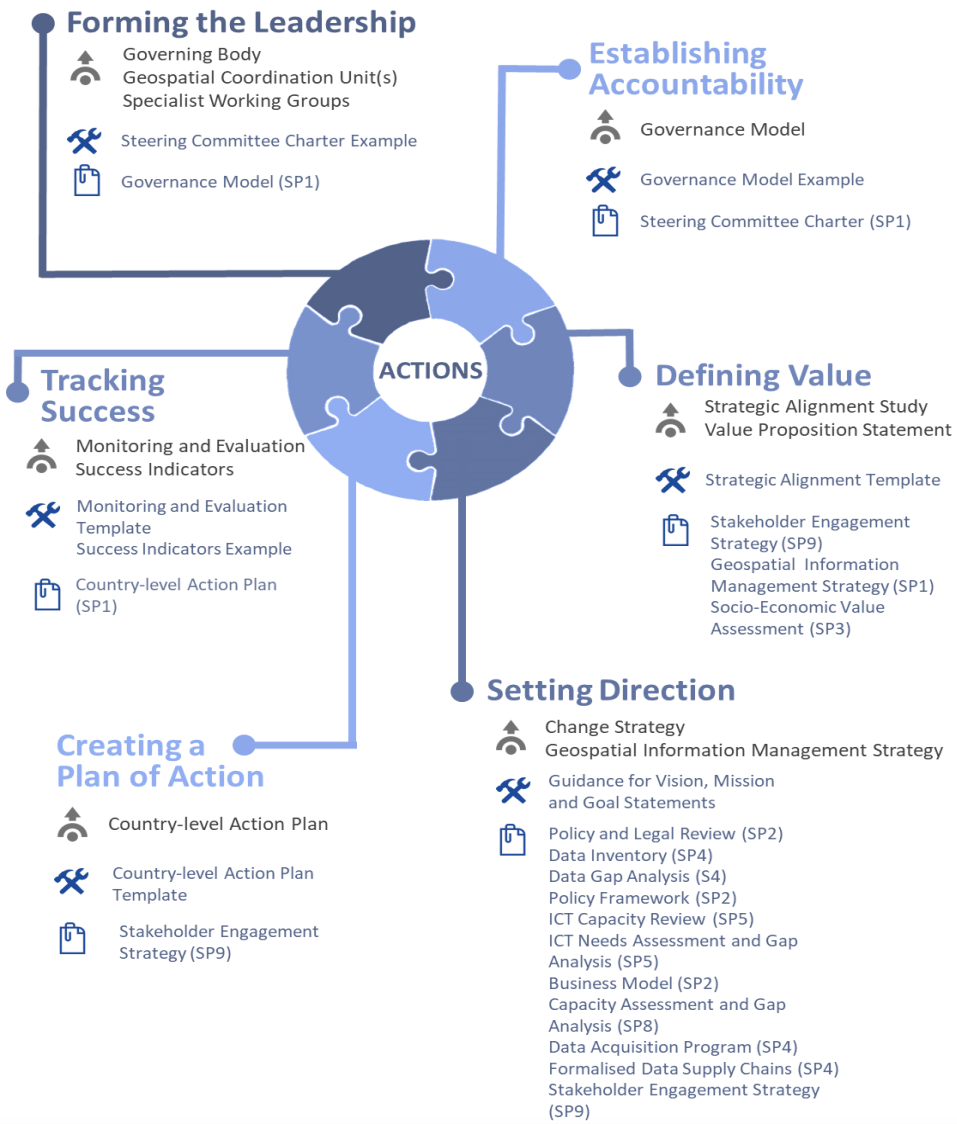

IGIF: Solving the Puzzle

Solving the Puzzle

Understanding the IGIF Implementation Guide

*This introductory chapter, **Solving the Puzzle**, describes how to understand and use the IGIF: Part 2 Implementation Guide. The Implementation Guide expands on each of the nine strategic pathways of the Integrated Geospatial Information Framework (IGIF), with details of each pathway provided in separate, uniformly structured chapters. The Implementation Guide pathways provide the 'what' – the specific guidance and options to be taken by countries in implementing the IGIF. It captures strategic to operational needs with guiding principles, actions, deliverables, outcomes and resources. The aim is to provide guidance for governments to establish integrated geospatial information frameworks in countries in such a way that transformational change is enabled, visible and sustainable.*

Executive Summary

Geospatial information is a critical component of the national infrastructure and knowledge economy – a blueprint of what happens where, and the means to integrate and leverage a wide variety of government services. It provides the integrative platform and 'glue' for all digital data that has, or can have, a location dimension to it. All countries and all sectors need geospatial information and enabling technologies for making decisions on national policy, strategic priorities and sustainable development.

However, many countries continue to face a series of impediments that exacerbate their ability and 'opportunity' to participate fully in transformational change with geospatial information capabilities. Yet, this change is essential to support national development, economic prosperity, and through that, a global and thriving information economy. Many countries still need to bridge the geospatial digital divide. Bridging this divide requires building capacity for people, establishing governance, and implementing data, technology and processes to sustain national geospatial information capabilities. This is achieved through the implementation of an integrated geospatial information framework aligned to national strategies and arrangements so that it can be anchored into national development priorities.

The IGIF comprises three parts as separate, but connected, documents: Part 1 is an Overarching Strategic Framework; Part 2 is an Implementation Guide; and Part 3 is a Country-level Action Plan. The three parts comprise a comprehensive IGIF that is intended to serve a country's needs in finding sustainable solutions for social, economic and environmental development, to influence inclusive and transformative societal change for all citizens according to national priorities and circumstances, and to leave no one behind.

With a focus on the ability for geospatial information to be integrated with any other meaningful data to solve societal and environmental problems, the IGIF acts as a catalyst for economic growth and

opportunity, and stimulates improved understanding and decision-making for national development priorities and the Sustainable Development Goals (SDGs). The Implementation Guide communicates to the user 'what' is needed to establish, implement, strengthen, improve, and maintain a national geospatial information management system and capability.

Importantly, the IGIF is not an infrastructure. It is a standalone 'framework', independent of Spatial Data Infrastructures (SDIs), National Spatial Data Infrastructures (NSDIs) and any other infrastructures. However, the IGIF fundamentally recognizes, builds upon, and augments previous investments and substantial achievements in planning and implementing SDIs and NSDIs.

The IGIF is a framework of concepts that not only provides additional structure, reasoning, and evidence as to why NSDI's are important, but also provides the guidance, options and actions to plan for, develop, and implement an integrated national geospatial information management program, aligned to national strategic priorities and circumstances within a country.

With the data revolution, and now with digital transformation disrupting traditional methods of data delivery and dissemination, users have typically not understood or appreciated the value and need for integrated geospatial information as a way to expand and improve the usefulness of their data. Such data has, as its common element, location information. Once the location (for example coordinates or a geocode) is included, trends, relationships, geographic comparisons, predictive analytics and other important connections become evident, especially when mapped and visualized.

While the concept and relevance of the IGIF, as an integrative framework, appears to be new it is anchored by and builds substantially upon an existing body of work produced by UN-GGIM through its Subcommittee, Expert Groups and Working Groups, and Thematic Networks. These works have served as sources of information for each strategic pathway in the Implementation Guide. This will continue to be the case.

1. Introduction

The IGIF aims to translate high-level, strategic geospatial information concepts into practical implementation guidance and action for use by Member States. The three parts of the IGIF have been developed with the knowledge that it will be a 'living document', maintained in the years ahead to continue to evolve, be further refined, and will respond to a changing data and technology paradigm as a valuable resource for Member States.

What is the relationship between the Implementation Guide and the other two parts of the Framework?

Part 1 of the IGIF, the Overarching Strategic Framework, is the strategic policy guide for Member States to reference when developing and strengthening their national and sub-national geospatial information management systems and capabilities (Figure 1). It presents a forward-looking and aspirational geospatial framework built on national needs and circumstances. As an introduction to the IGIF, the intended audience includes groups such as national leaders, political leaders, organizational managers, the business

IGIF: Solving the Puzzle

Geospatial information is a critical component of the national infrastructure and knowledge economy – a blueprint of what happens where, and the means to integrate and leverage a wide variety of government services. It provides the integrative platform and 'glue' for all digital data that has, or can have, a location dimension to it. All countries and all sectors need geospatial information and enabling technologies for making decisions on national policy, strategic priorities and sustainable development.

However, many countries continue to face a series of impediments that exacerbate their ability and 'opportunity' to participate fully in transformational change with geospatial information capabilities. Yet, this change is essential to support national development, economic prosperity, and through that, a global and thriving information economy. Many countries still need to bridge the geospatial digital divide. Bridging this divide requires building capacity for people, establishing governance, and implementing data, technology and processes to sustain national geospatial information capabilities. This is achieved through the implementation of an integrated geospatial information framework aligned to national strategies and arrangements so that it can be anchored into national development priorities.

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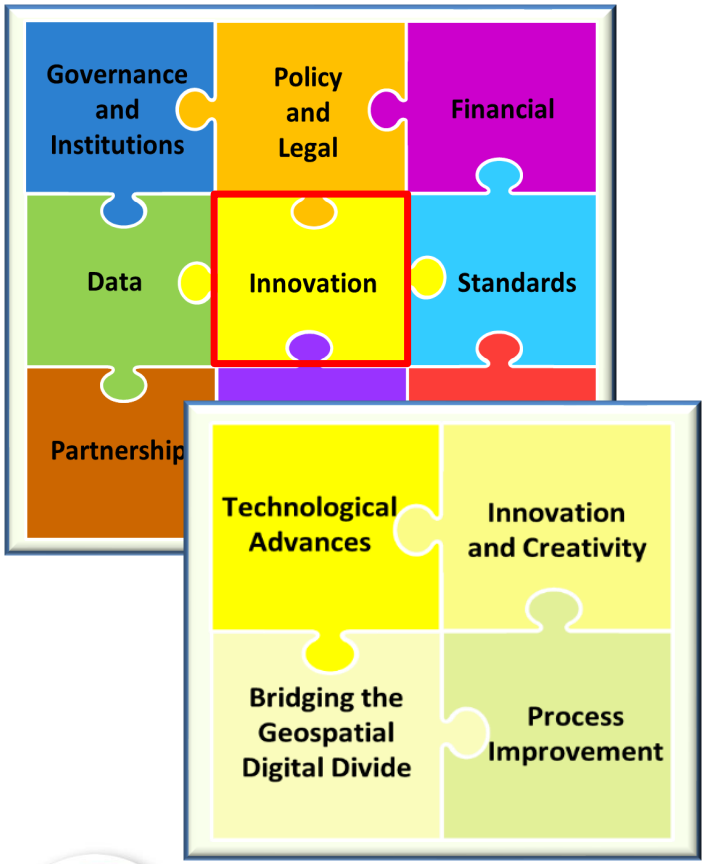
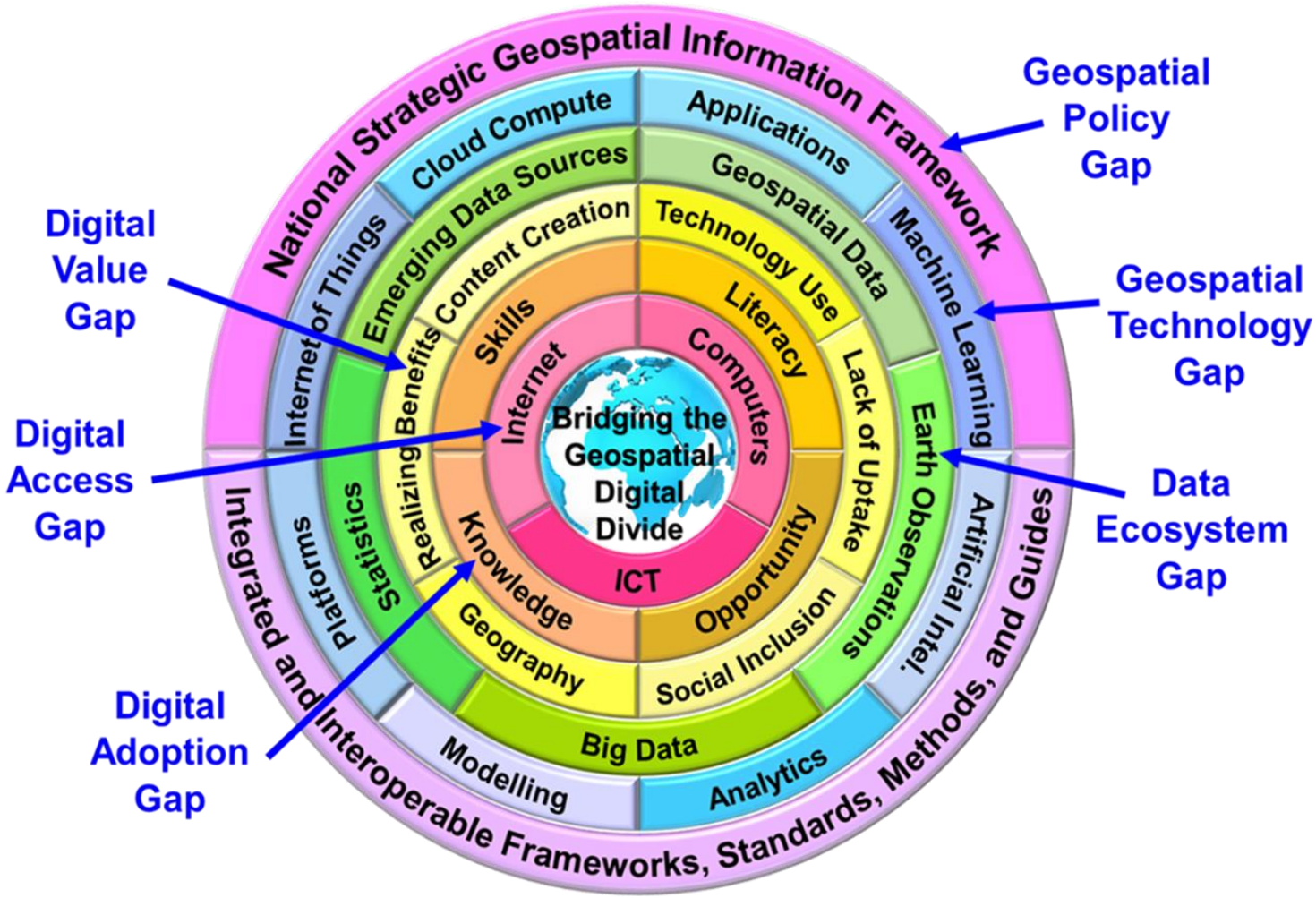
IGIF: Strategic Pathway 5 - Innovation





INTEGRATED GEOSPATIAL INFORMATION FRAMEWORK (IGIF)
PART 3: COUNTRY-LEVEL ACTION PLANS

IGIF: Country-level Action Plan (CAP)

- The Country-level Action Plan (CAP) is specific to, and completed by, each country. The CAP provides the process to build an IGIF for a nation, beginning with specific plans that align with national priorities and circumstances. CAP templates are available for countries to use and detail '**how**' the guiding principles, options, and actions specified in the Implementation Guide will be carried out, '**when**' and by '**whom**'.
- Each CAP explains where each country is at in terms of their capabilities and capacity, and reflects decisions made to advance and/or enhance national geospatial arrangements within that country, what their aspirations are, and where they want to be after planning for their IGIF.
- The CAP contains the processes, templates and tools that are available and necessary to first develop a national action plan, and then operationalize the IGIF through its subsequent implementation, and aligned with national priorities.
- Using the Implementation Guide and available tools, CAPs are now being actively developed and implemented by countries, and with support from multiple donors and stakeholders, including the United Nations, World Bank, FAO and several countries, including Norway.

National (or sub-national) Action Plans/Delivery System

Country-level Action Plans

How, when, who?

Part 3

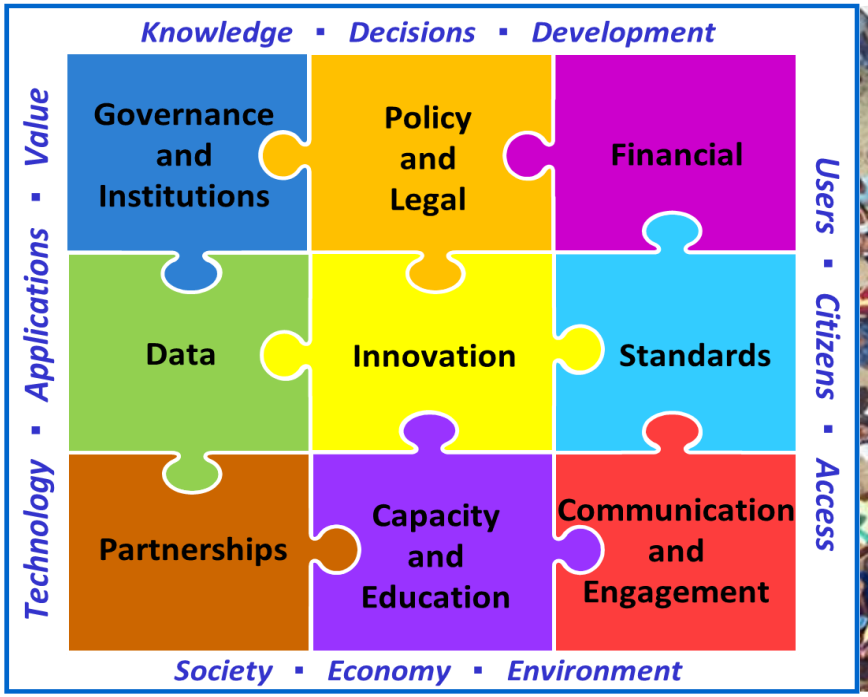
Each Country-level Action Plan is unique, reflecting decisions made to advance and/or enhance national geospatial information arrangements, and where a country wants to be after planning for their IGIF.

IGIF: COUNTRY-LEVEL ACTION PLAN (CAP)

Completed Pilots	IGIF Implementation in Progress/Planned (funding support)		
Albania (WB Palestine (WB) Guyana (FAO) Municipal Level: Tirana, Albania (WB)	Burkina Faso (UNSD) Cambodia (WB) Colombia (WB) Dominican Republic Egypt (WB) Ethiopia (UNSD) Fiji (UNSD) Georgia (Norway) Germany Ghana (WB) Ireland	Italy Kyrgyz Republic (Norway Lesotho Liberia (WB/Sweden) Moldova (Norway/WB) Mongolia (UNSD/WB) Nepal (UNSD) Netherlands Nicaragua (WB) Philippines (WB) Russia	Saudi Arabia Senegal (WB) Seychelles (WB) Serbia (WB-FAO) Sierra Leone (WB) Sweden Tonga (UNSD) UAE Ukraine (Norway) United Kingdom Vietnam (WB)

Note on Methodology:
UNSD supports countries remotely through UN tools and on-line engagement.
FAO, Norway and Sweden are using World Bank tools and provide in-country support.

SUMMARY



Strengthening geospatial information management will assist countries in bridging the geospatial digital divide, secure socio-economic prosperity, and leave no one behind.

A Framework for the World, the **Integrated Geospatial Information Framework (IGIF)** is a reference guide for developing and strengthening national arrangements in geospatial information management and assisting countries in bridging the geospatial digital divide.

Keynote: World Bank Methodology for IGIF Implementation

Kathrine Kelm, World Bank

Kathrine Kelm

Senior land administration specialist
World Bank

Kathrine is a senior land administration specialist at the World Bank, currently covering the East Asia Pacific region.

Kathrine is a land lawyer and is leading the global geospatial project, focusing on supporting IGIF country level implementation to enhance technical support, capacity strengthening, and financing for geospatial information and infrastructure.

IGIF action plans are only the start of the future geospatial information development journey and project funding for delivery, including for maintained authoritative data, requires national funding or the support of institutions like the World Bank.

The World Bank, who collaborated with the UN in developing the IGIF, was represented by Katherine Kelm who has become the driving force for IGIF within the Bank.

She explained how World Bank funding is allocated - working through country partnership frameworks, which are a good start point to determine whether World Bank loans are a suitable option.

She explained that geospatial enhancements would rarely justify projects on their own, but that national agencies should work with their governments to link IGIF action plan initiatives with larger projects, such as Mongolia's digital transformation project.

She noted the courses offered by the Bank's Open Learning Campus and introduced a series of IGIF tools the Bank has developed to support nations all of which are in use in the Kartverket partner projects. These include one to support socio-economic impact assessments to help with business cases.

Leaders from each of the four partner countries supported by Kartverket then provided national insights into the role IGIF was playing in their development.

WORLD BANK METHODOLOGY FOR IGIF IMPLEMENTATION

GEOSPATIAL INFORMATION FOR DIGITAL TRANSFORMATION: CURRENT INITIATIVES AND FUTURE OPPORTUNITIES

ONLINE CONFERENCE 27-29 OCTOBER 2021

WORLD BANK GROUP

Kathrine Kelm
Senior Land Administration Specialist
Land and Geospatial Team
Urban, Disaster Risk Management, Resilience and Land Global Practice

The World Bank Group

Introduction to the World Bank Group

WORLD BANK GROUP

The World Bank Group: Five Institutions

WORLD BANK GROUP

International Bank for Reconstruction and Development (IBRD) — 1944

International Development Association (IDA) — 1960

→ THE WORLD BANK IBRD • IDA | WORLD BANK GROUP

Finance to Government

IFC International Finance Corporation WORLD BANK GROUP — 1956 — *Private Sector* → planet. — US$ 20 million

ICSID INTERNATIONAL CENTRE FOR SETTLEMENT OF INVESTMENT DISPUTES — 1966 — *Dispute settlement/arbitration*

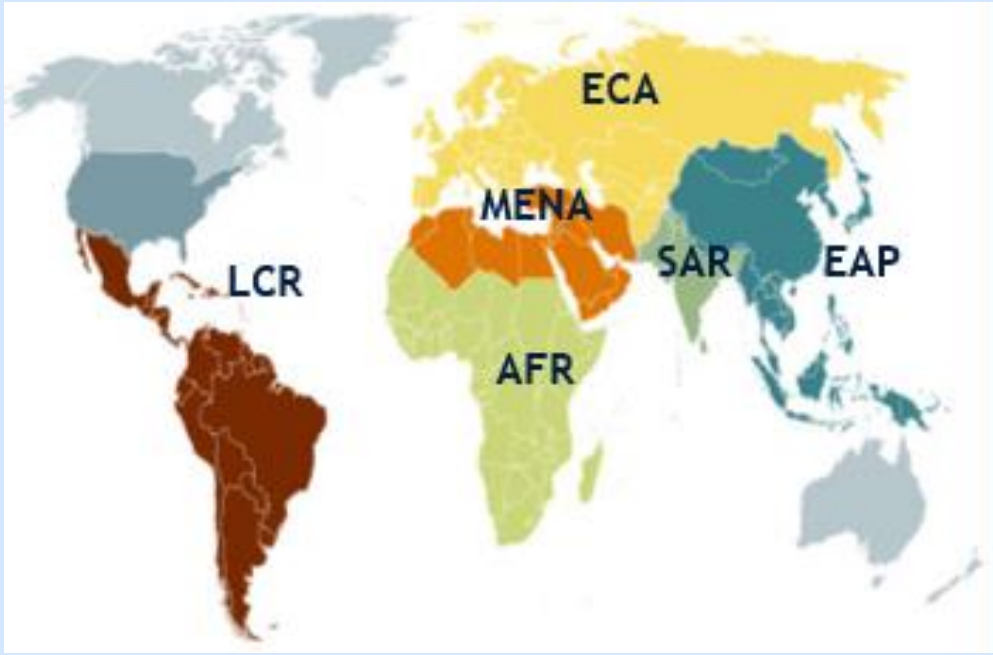
MIGA Multilateral Investment Guarantee Agency WORLD BANK GROUP — 1988 — *Guarantee Agency*

How the World Bank is organized

Financing is allocated through the Ministry of Finance

Six Regions: Regional VP and Directors

- AFRICA
- EAST ASIA PACIFIC
- EUROPE AND CENTRAL ASIA (ECA)
- MIDDLE EAST & NORTH AFRICA
- LATIN AMERICA AND CARRIBEAN
- SOUTH ASIA



Operations:

- 100+ country offices
- Sustainable Development Group

Urban, Disaster Risk Management, Resilience and Land Global Practice Portfolio US$ 40+ billion

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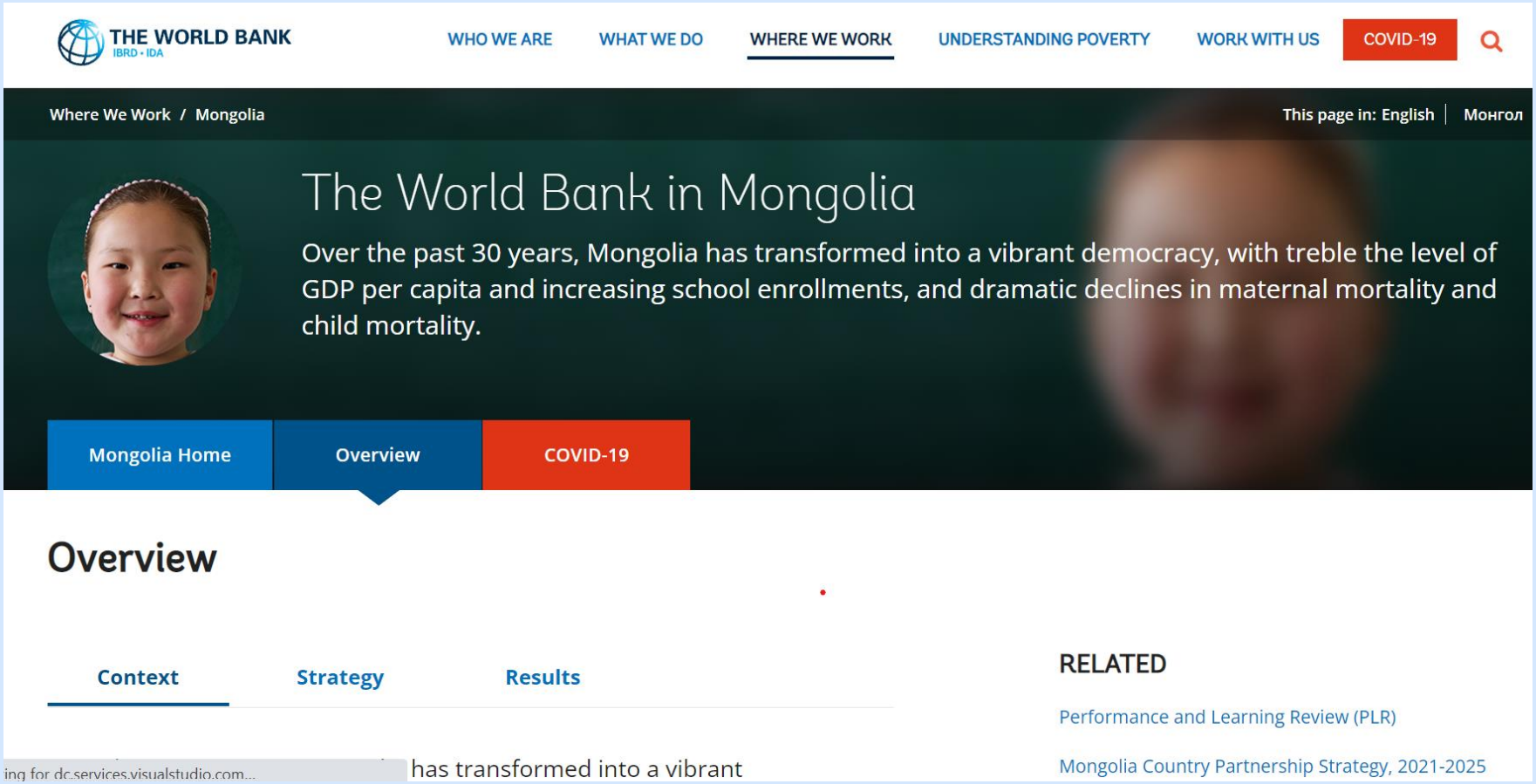
Country Partnership Strategy/Framework: defines investment priorities



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Country Partnership Framework: role of geospatial information management

Document of
The World Bank Group

FOR OFFICIAL USE ONLY

Report No. 132141-MN

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

INTERNATIONAL DEVELOPMENT ASSOCIATION

INTERNATIONAL FINANCE CORPORATION

MULTILATERAL INVESTMENT GUARANTEE AGENCY

COUNTRY PARTNERSHIP FRAMEWORK

FOR

MONGOLIA

FOR THE PERIOD FY21-FY25

63. The Bank will also support the growth of Mongolia's digital economy…… **the ambitious goal of completing the eMongolia initiative in seven years. The new government has further prioritized the digital agenda. The pipeline Digital Transformation project....to build Mongolia's digital and ICT industry for economic diversification and resilience.**

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The World Bank Group

Work with Countries: Financing Geospatial Information and Infrastructure

WORLD BANK GROUP

Spatial Data **Infrastructure**: Investment Challenges

Transport

Energy

Well established business lines exist for traditional infrastructure

Data require a new infrastructure: National Information Infrastructure and Spatial Data Infrastructure (SDI)

Significant financing is needed for SDIs globally

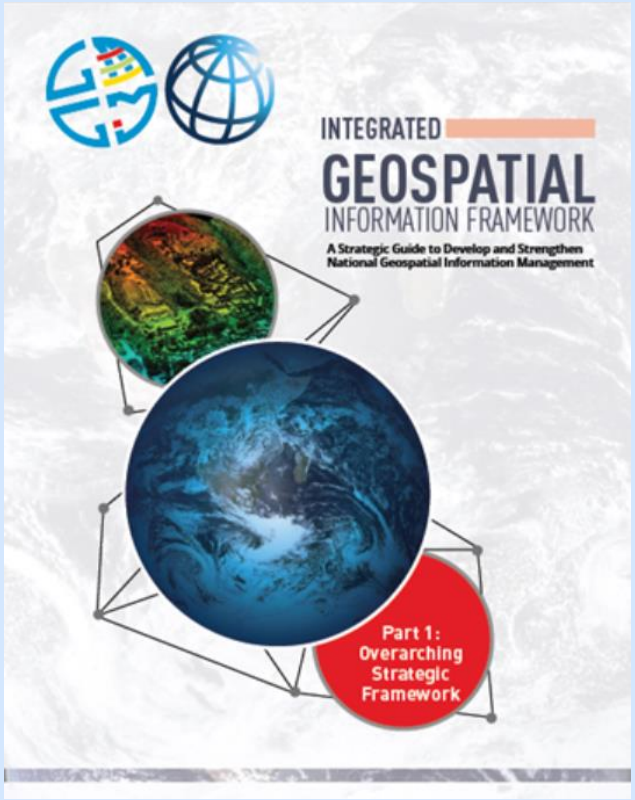
Clients note that convincing decision makers to invest in SDI and geospatial information management is a challenge

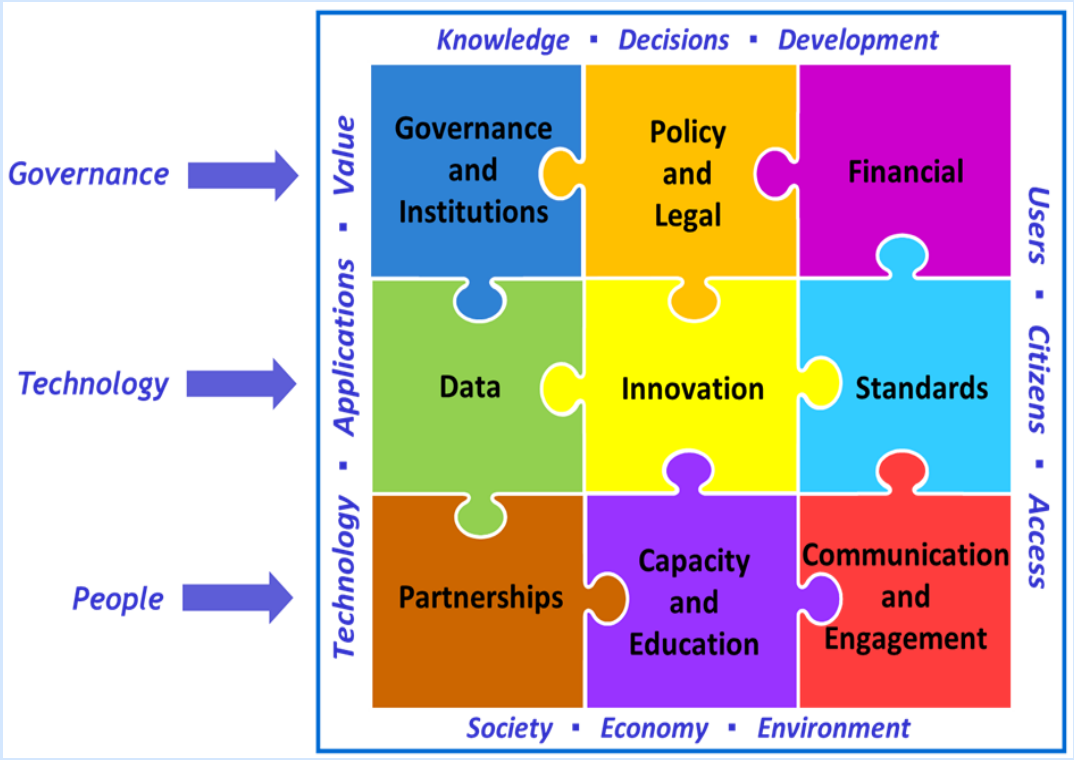
More evidence is needed to justify financing

WORLD BANK GROUP

Integrated Geospatial Information Framework (IGIF)

The IGIF was adopted by member states in August 2018. It provides a holistic view of geospatial information management through 9 Strategic Pathways.





http://ggim.un.org/meetings/GGIM-committee/8th-Session/documents/

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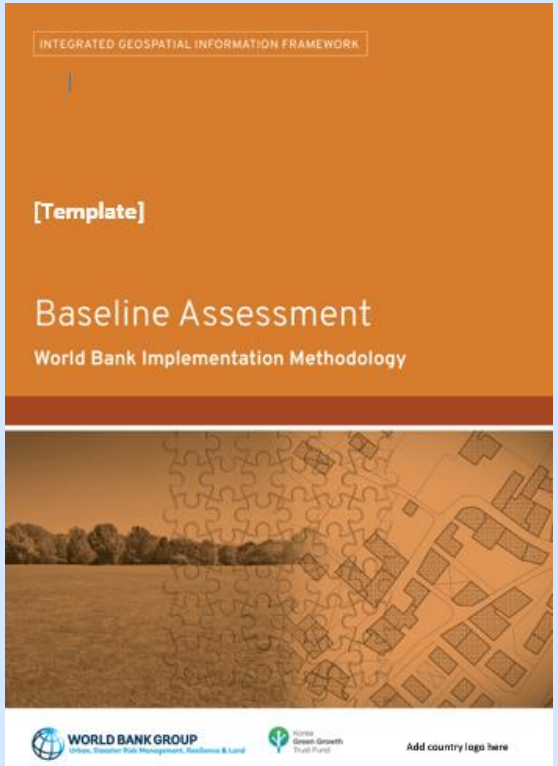
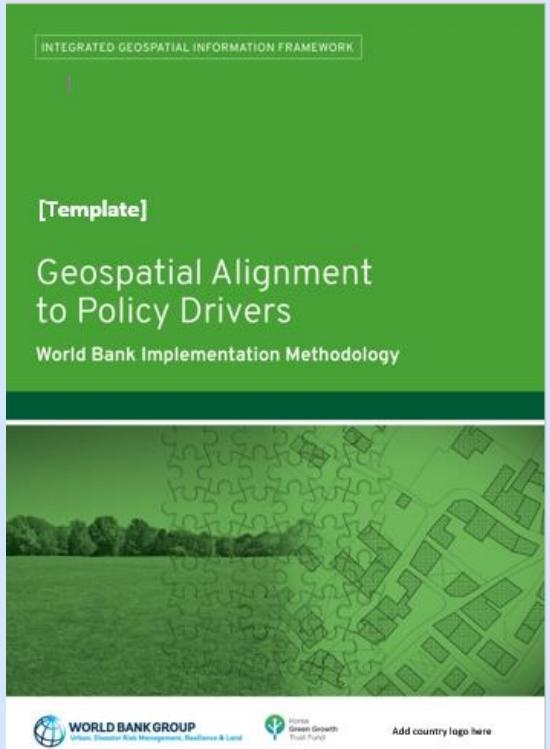
IGIF Country Level Implementation: Templates and Tools

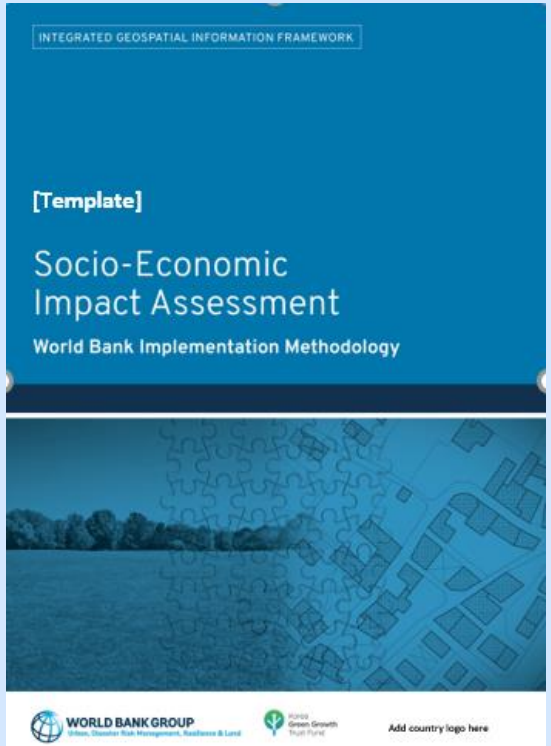
New Release: Open and Available on the World Bank Open Learning Campus website

Diagnostic/Baseline Assessment

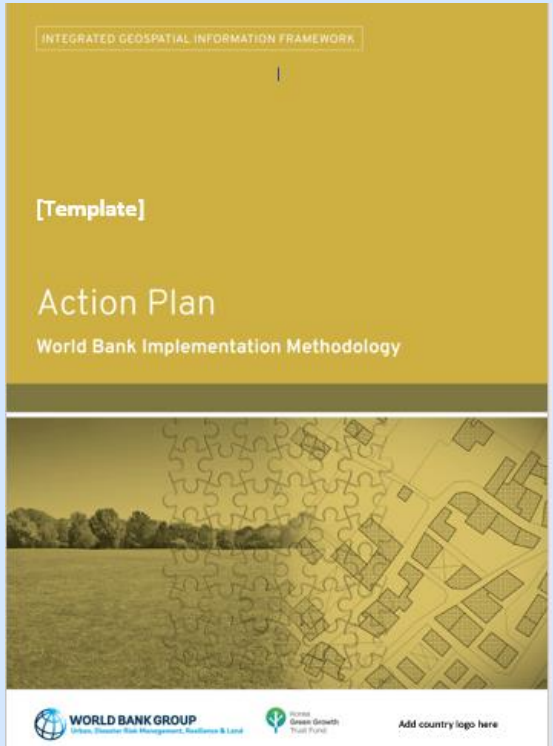


Business case
-Alignment to Policy/ Business Drivers
-Socio-Economic Impact Assessment

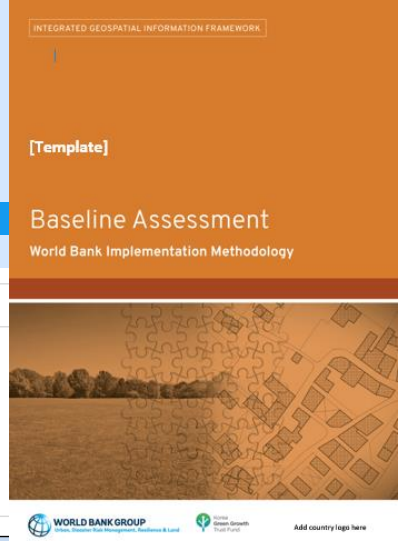




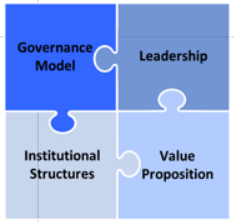
Action/Investment Plan



1. Diagnostic: National Report and Baseline Assessment

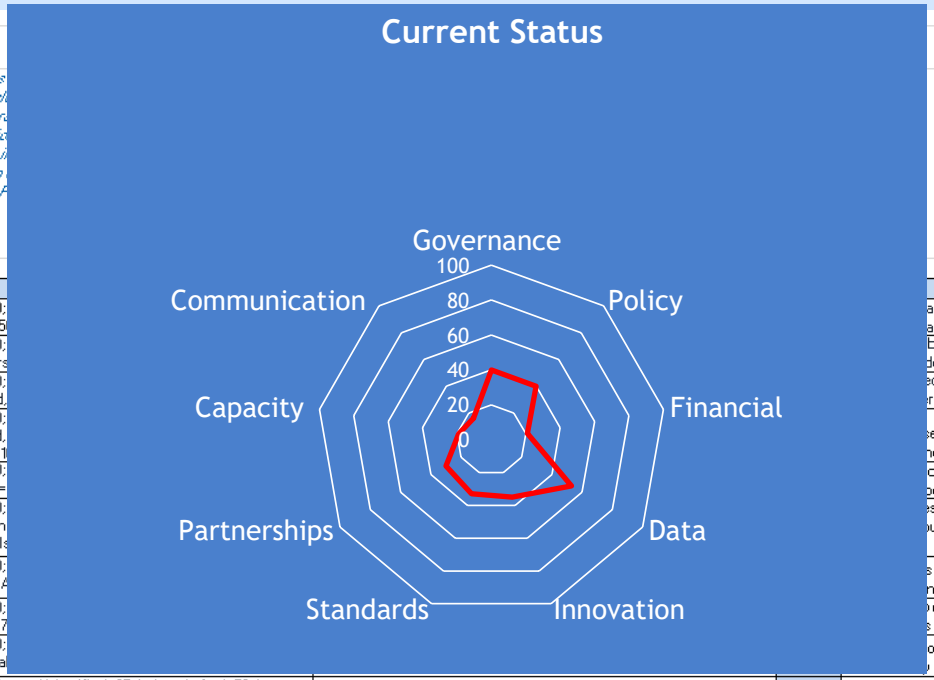


STRATEGIC PATHWAY 1



Governance and

This strategic pathway establishes
institutional arrangements and a cl
multi-disciplinary and multi-sector
an Integrated Geospatial Informatio
political endorsement, strengthen i
data sharing environment through
Integrated Geospatial Information F
to achieve the vision



	Indicator				Guidance
1.1	Is there a NSDI "champion" in Government?	None=0; exists=5			arly identifiable individual(s) actively promoting SDI, angible outcomes towards the development and
1.2	Is there a NSDI Coordinating body?	None=0; and pers			be cross sector, and across levels of Government. Could designated or de facto.
1.3	Is the NSDI Coordinating body represented at senior / top level in government?	None=0; Defined,			eone from the co-ordinating body representing it at the top rnment .e.g. a cabinet level minister?
1.4	Is the coordinating body supported by an active secretariat?	None=0; defined, Active=1			ecretariat been defined, mandated, and is actively he NSDI governance structure?
1.5	Are there clear Terms of Reference (ToR) for the Coordinating Body?	None=0; drafted=			dinating Body been given clear ToR? ...and are they being ort to describe this.
1.6	Does the coordinating body actively reach out to all levels of government (including local government) and other stakeholders (private sector, NGOs, volunteering sector)?	None=0; (ToR) in All level			s how inclusive the SDI is - how far it integrates across and us levels of government, and other sectors.
1.7	Are there Working Groups supporting SDI development? e.g. technical, standards, legal, service development)?	None=0; up=75; A			s are important, to provide technical input to support policy ntation.
1.8	Is there a user group / forum available for consultation and providing user feedback / requests?	None=0; Exists=7			/ forum is a channel for feeding user feedback and s to the SDI governance agencies.
1.9	Does the national "champion" actively interact with the global and regional geospatial community?	None=0; Regiona			o which the "champion" interacts with the wider to exchange information.
1.10	Are there linkages between the coodinating body and those developing the e-Government agenda?	None=0; need identified=25; being drafted=50; In place=75; Being used=100		0	This is important for assessing how joined up the intitutions are in terms of co-ordinating policy development
				0	

Indicator **Scoring Guide** **Notes from Interview** **Score** **Guidance**

Basis for Stakeholder Meeting: introduce IGIF, validate baseline results and initiate/enhance coordination

Food and Agriculture Organization of the United Nations

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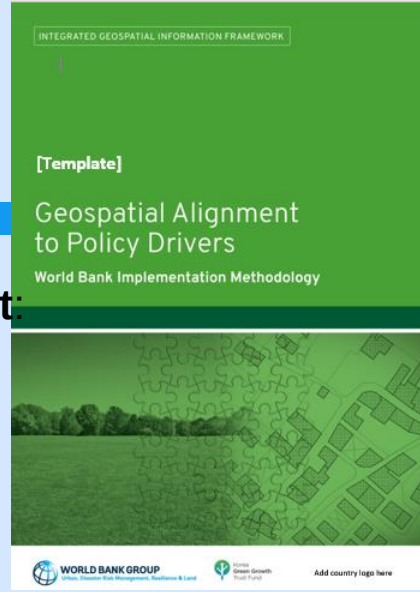
2. Strategic Alignment to Policy and Business Drivers



More than 60 specific use cases were identified in the **Mongolia Geospatial Alignment Report**:

- **eGovernance:** leverages digitalization opportunities to make the state more efficient and reduce burden on citizens
- **Health:** supports epidemiological studies, social research and health care, and managing the outbreaks of disease
- **Mining:** supports the largest sector of the economy by facilitating export activities and the growth of raw materials processed in-country through exploration.
- **Land Administration:** enables integrated state land management, valuation/taxation and land use planning.
- **National/Sectoral Development Planning:** holistic approach balancing economic diversification and social needs
- **Transport:** supports road network planning and intelligent transport systems
- **Disaster and Emergency Management:** improves planning and response to all types of incidents
- **Agriculture:** matches the need to improve food security whilst avoiding over-exploitation of the fragile ecosystem.
- **Environment and Tourism:** supports the protection of the environment and is used to attract more visitors.

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3. Socio-Economic Impact and Benefits: Sectors, Use Cases, Actions

SECTORS

Transport
Land
Environment
Law
Disaster Management
Energy
Health
Community Services
Mining
Water
Security
Government Administration
Agriculture
Tourism
Urban Planning

USE CASES

Event Management
Mining Cadastre
Environmental Permitting
Emergency Response COP
Crop Production
Rangeland Monitoring
Transport Modelling
Traffic Operations
Intelligent Transport Network
Freehold Land Cadastre
Eco-tourism
Crime Mapping
Farm to Table
Agricultural Land Registry
Road Safety
State Land Cadastre
Business Registration
Energy Sourcing
Location-based Services
eGovernment
Street Works
Census
Livestock Management
National Development Plan
Valuation
SmartCities
Community Services
Parking
Ride-sharing Apps
Earthquake Monitoring
Retail Apps
Real Estate Apps
Disease Monitoring

ACTIONS/INVESTMEMTS

Positioning
e.g. GNSS Network

Imagery Acquisition
e.g. Satellite Imagery

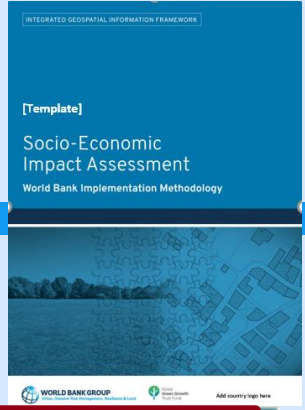
Data Capture
e.g. State Land Cadastre

Data Integration
e.g. Street Address

Data Sharing Geoportal/Policy

Business Intelligence
e.g. AI and Machine-learning Applications

3. Socio-Economic Impact and Benefits: Mongolia example

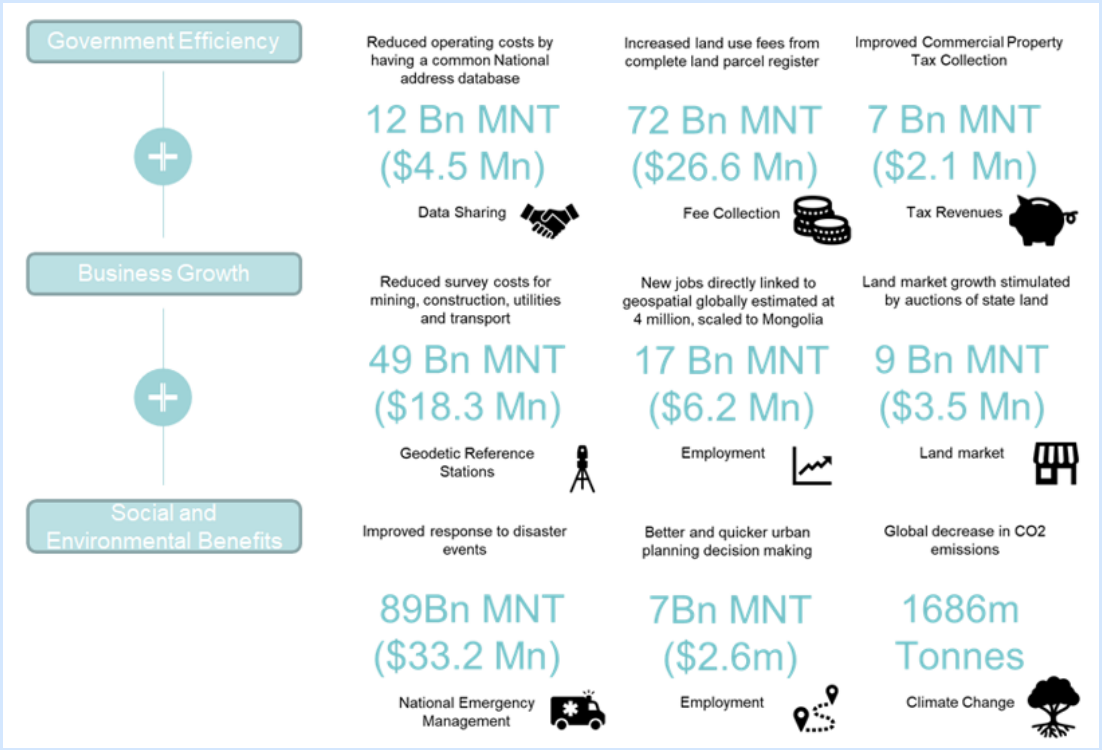


Across Public and Private Sectors

Ref	Impact	Evidence	Methodology	Benefit Recipients	Net Discounted Value of Benefits	
					Billion MNT	US$ Million
1	National geospatial data sharing (addresses)	ALAMGC cost estimates and current data duplication	Multiplier effect of information sharing	Govt	12.0	4.5
2	Reduced Loss and Damage during Disasters	Substantial Case Study Expert predictions of reduced costs for future Forest Fires, weather and other natural disasters	Reasoned extrapolation from case study, statistics and expert opinion	Indirect	71.5	26.6
3	Faster emergency response in case of building fires, leading to savings in damage	Statistics supplied by NEMA. Global Geospatial Value studies	Reasoned estimation of potential savings, backed by expert opinion.	Indirect	14.5	5.4
4	Increased land use fees and taxes	Current revenues Volumes where premium rates apply	Estimation of proportions of land where premium rates of fees or taxes apply	Revenue	71.5	26.6
5	Increased collection of Property Tax	WB Study in Ulaanbaatar	Predictions of increased revenues for City Council	Revenue	7.1	2.6
6	Land Market Growth	Current real estate market size, Comparable study in Bulgaria	Local market analysis, validated by recent comparative study	Indirect	9.3	3.5
7	Urban Planning efficiencies from 3D City Model	In-depth EuroSDR study for Republic of Ireland	Benefits Transfer, validated by local expert opinion	Govt	6.9	2.6

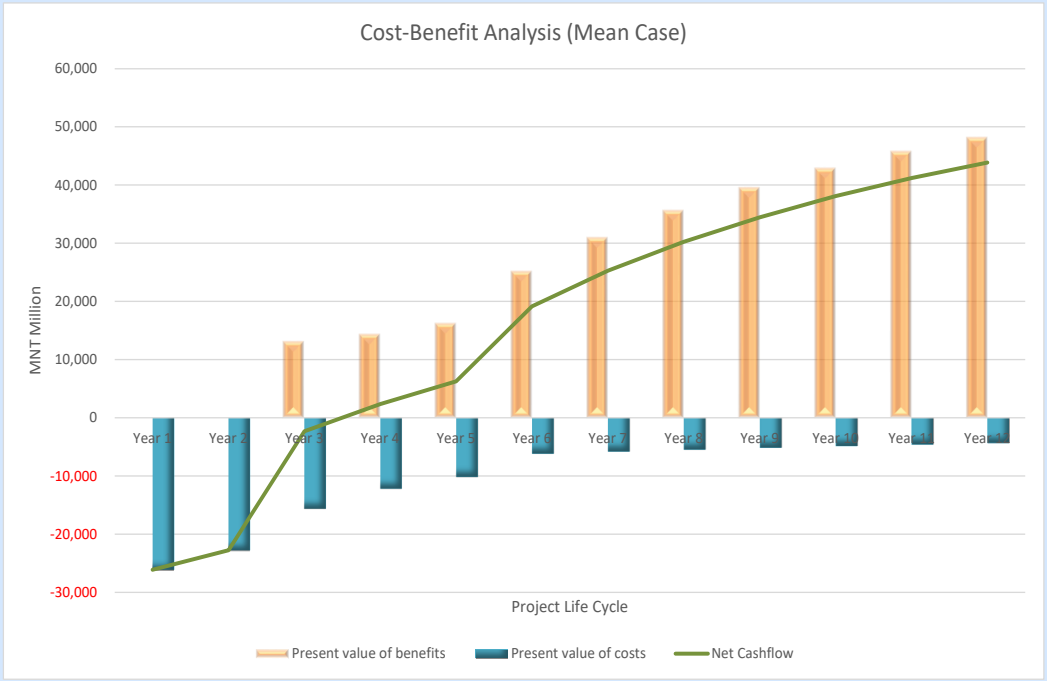
3. Socio-Economic Impact Assessment: Financing Justification

Benefit to Cost Ratio: 2.5: 1
Return on Investment: 250%
Net Present Value: US$ 66,1 million

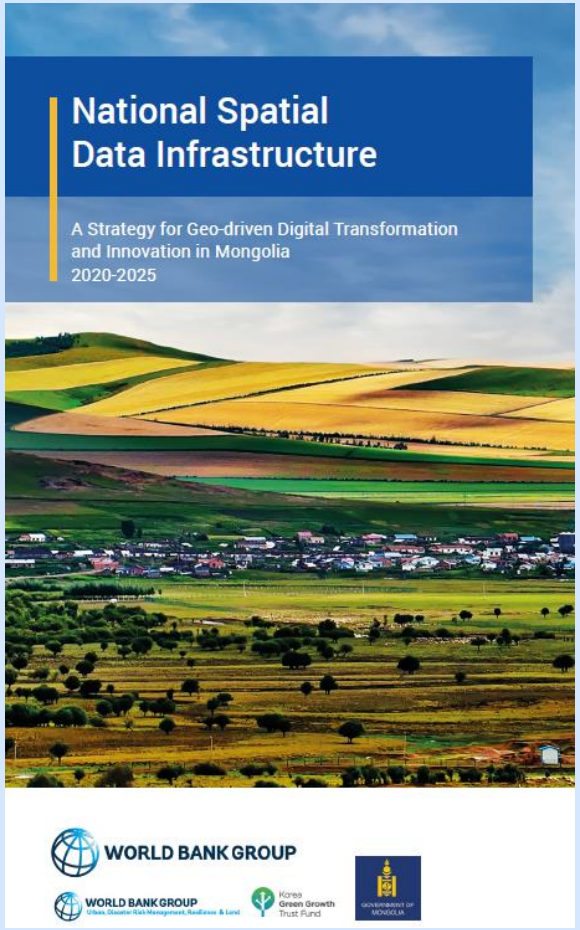


World Bank Infrastructure Project Model:

- **Project Life Cycle:**
  5 years development
  7 years operation
- **Discount Rate: 6%**



4. IGIF Action/Investment Plan: Mongolia Example



Vision: Geo-driven eGovernment and innovation that empowers efficient and effective use of geospatial information towards national sustainable development and economic growth.

Potential financing through the new WB- financed Digital Development Project: Delivery 2022

IGIF Implementation Guide

4. Action Plan Priority Investments Linked to Existing Financing

Example from Colombia IGIF Action Plan

Prioritize Activities in Existing Projects

Task Type					Financial			Time Frame				
Ref		IGIF Pathway	Priority	Description	Total Investment (US$)	Capital or Recurrent	Funding Source	Year 1	Year 2	Year 3	Year 4	Year 5
		Financial										
3.1	Create an NSDI Business Model		Med		35,000	C	WB					
4.1	Create inventory of existing data	Data	High	See also overlap with 6.3	30,000	C	WB					
4.2	Train and Guide data owners to complete metadata		High		50,000	C	Gov					
4.3	Define fundamental dataset & custodians		High	Consultancy advised	50,000	C	Gov					
4.4	Invest in data themes, prioritised to demand		High	Depending on theme and demand								
	Cadastral Parcels - MPC		High	MPC Subcomponent 3.2	19,500,00	C	WB					
	Functional Areas		High	Consultancy advised	500,000	C and R						
	BaseMap		High	Consultancy advised	500,000	C and R						
	Address Database		Med	Consultancy advised	500,000	C and R						
	Security / Safety		High	Consultancy advised	50,000	C and R						
4.5	Create digital archive of historical data and imagery		Low	Could be a PPP	500,000	C and R						
		Innovation										
5.1	Ensure real time GNSS corrections are available		High	System testing	20,000	C						
5.2	Evaluate imagery for updated topographic base maps		High		20,000	C						
5.3	Develop a Geospatial Centre of Excellence (CoE)		Med	Assumes Head, 2 x trainers	250,000	C and R						
5.4	Assess Geospatial Innovation start-up scheme		Med		20,000	C						
5.5	Improve access to key registers	Demonstrator	Med		50,000	C						

New IGIF Projects and Partnerships using World Bank Methodology

Norwegian Government:

4 projects in Eastern Europe & Central Asia

Links to WB projects/financing in:

- Georgia and Moldova

Exploring links for financing in:

- Ukraine and Kyrgyzstan

Kartverket

FAO of the UN:

- Guyana

Food and Agriculture Organization of the United Nations

German Government

- National Working Group
- Federal States (Lower Saxony)
- North African Countries (with Italy)

Federal Agency for Cartography and Geodesy

BKG
Wir geben Orientierung.

World Bank Projects

- Albania
- Cambodia
- Colombia
- Egypt
- Liberia (with Sweden)
- Moldova (with Norway)
- Mongolia
- Nicaragua
- Philippines
- Senegal
- Seychelles
- Serbia (with FAO)
- Vietnam

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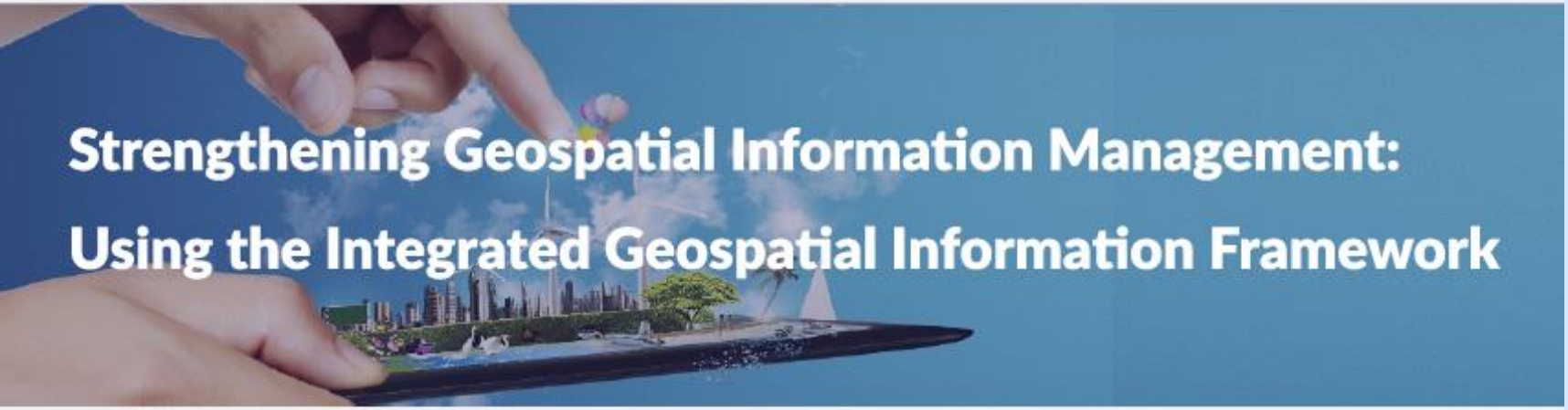
Ministry of Economy and Finance



Strengthening Geospatial Information Management: Using the Integrated Geospatial Information Framework

Self-Paced Online Course

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https://olc.worldbank.org/

MODULES

Module 1: The Value of Geospatial Information

Module 2: Introducing the Framework

Module 3: Solving the Puzzle: Understanding the Implementation Guide

Module 4: Creating a Country-level Action Plan

Module 5: The Socio-economic Benefits Assessment (Coming Soon)

Thank you!

kkelm@worldbank.org

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https://olc.worldbank.org/

https://d3gzc8yfvw5zzm.cloudfront.net/Geospatial/Template/index.html

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The Georgian Case: IGIF for Strengthening NSDI

Nino Bakhia, National Agency of Public Registry, Georgia

Nino Bakhia is Head of Addressing Service at the National Agency of Public Registry under the Ministry of Justice of Georgia since 2018. She received her Master's degree in Land Management from Stockholm Royal Institute of Technology in 2007. Since 2007, she has been working in various departments of the National Agency of Public Registry, representing one of the core spatial data producing authorities of Georgia.

On behalf of the National Agency of Public Services Nino expressed her gratitude to the Norwegian government and Kartverket for many-year support to land sector in Georgia providing core data sets, enhancing professional and technical capacity and implementation of the IGIF.

She discussed the 2013 government resolution that set up a state commission to develop the Georgian NSDI and the challenges of delivering against it. She talked through the use of the World Bank IGIF tools to identify current strengths and weaknesses in the provision of good geospatial information and alignments to government policy all of which informed an action plan.

She noted the development of over 70 use cases and a socio-economic benefits impact assessment. The action plan is set out with each initiative clearly linked to an IGIF strategic pathway. Nino voiced a common challenge in many nations in that there was no budget for NSDI and thus a reliance on donor organisations to date. She also stressed how the process of developing the documents had led to positive re-engagement with stakeholders across government and the private sector.

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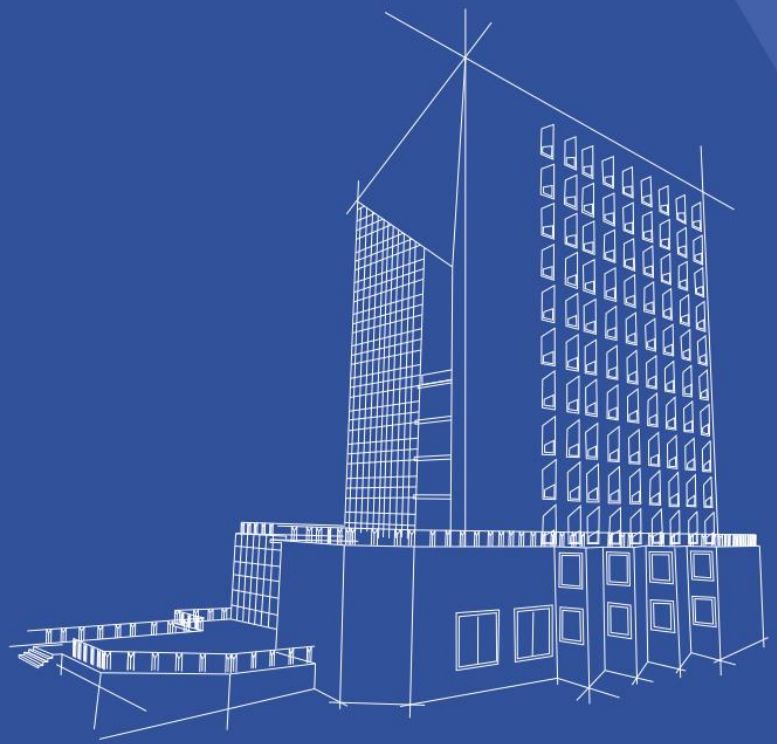
Georgian Case: IGIF for Strengthening NSDI



Nino Bakhia
Head of Addressing Unit
National Agency of Public Registry
Ministry of Justice of Georgia

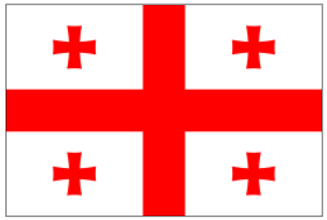
27.10.2021

Georgia - Brief information

Total area: 69,700 km^2

Official Language: Georgian

Population: 3.7 million



Capital city: Tbilisi

Per Capita Income: US$ 4,700

Aspiration: European and Euro-Atlantic integration

National Agency of Public Registry

NAPR - Founded in 2004

Geospatial data related Responsibilities:

- Geodesy and Cartography
- Cadastre and Land Registration
- Assigning Addresses to Real Estate
- Coordinating creation and development of NSDI

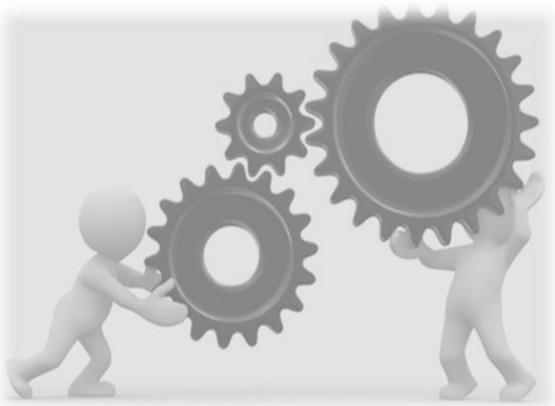
Products and Services:

- Land Registration
- Land Information
- Topographic Maps
- Orthophotos
- Satellite Imagery
- Addresses
- etc.

Georgia became a full member of EuroGeographics in 2010

First Steps for Creation of NSDI in Georgia

2013 - Georgian Government Resolution #262 on setting up a State Commission for establishment and development of National Spatial Data Infrastructure.



2015-2018

- A Draft Law on Spatial Data Infrastructure, Metadata Regulation, National profile of Metadata and Draft of National profile of Data Product Specification;
- Draft NSDI Strategy and Action Plan;
- A Detailed Communication Strategy and Action Plan; and an Education Strategy;
- A Data Framework - Government Resolution 'On the Categorization of Geodata';
- A Geoportal v1.0.

Norwegian Support – IGIF

2019 – DT Country Assessment

February 2021 – IGIF Implementation

ConsultingWhere
Maximising the value of location information

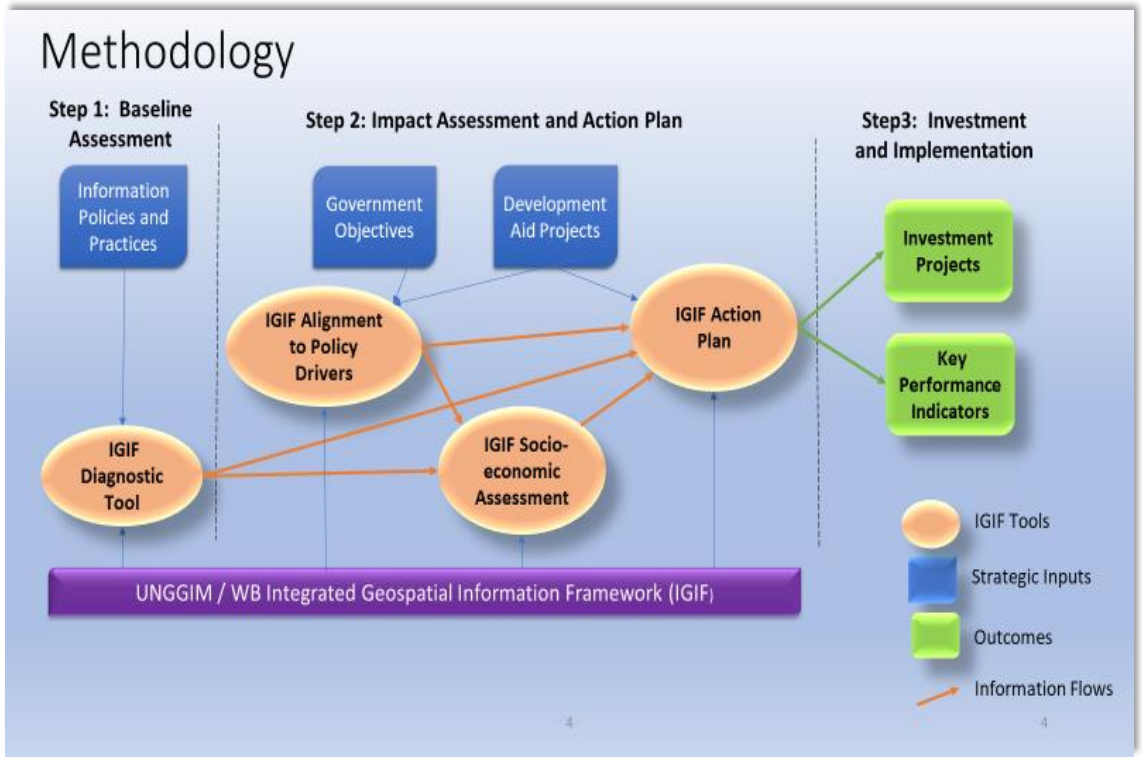
Norwegian Ministry of Foreign Affairs

Kartverket

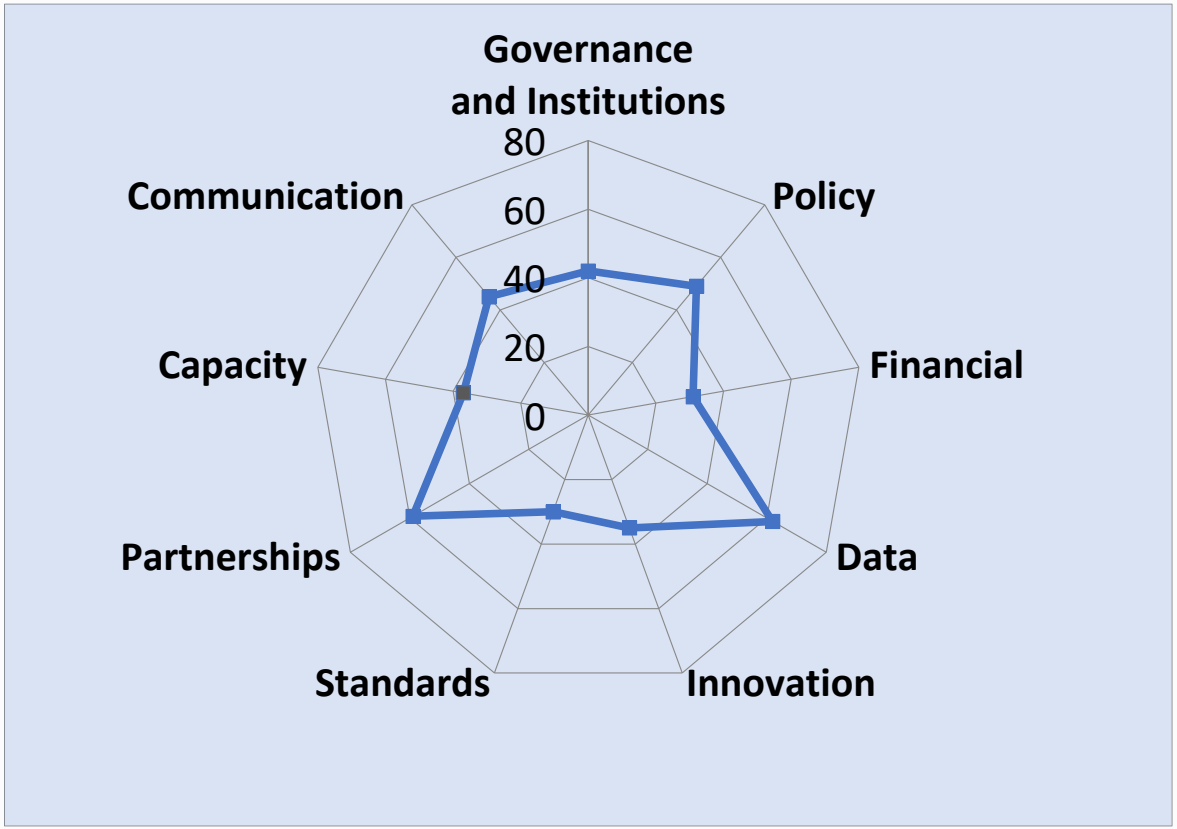
Norwegian Support – IGIF

Four Steps

1. Conduct a baseline assessment of current NSDI
2. Investigate government strategic needs and priorities and describes the important use cases
3. Analyze cost and benefits of strengthening geospatial information management
4. Develop a road map to strengthen capacity and capability



Results of Baseline Assessment

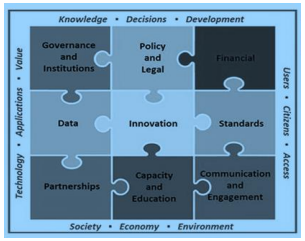


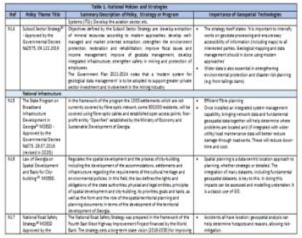
Overall score: 43.3

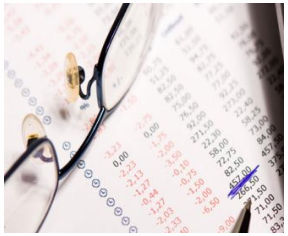
Governance and Institutions (Score = 42)
Policy and Legal (Score = 49)
Financial (Score = 31)
Data (Score = 62)
Innovation (Score = 35)
Standards (Score = 30)
Partnerships (Score = 59)
Capacity and Education (Score = 37)
Communication and Engagement (Score = 45)

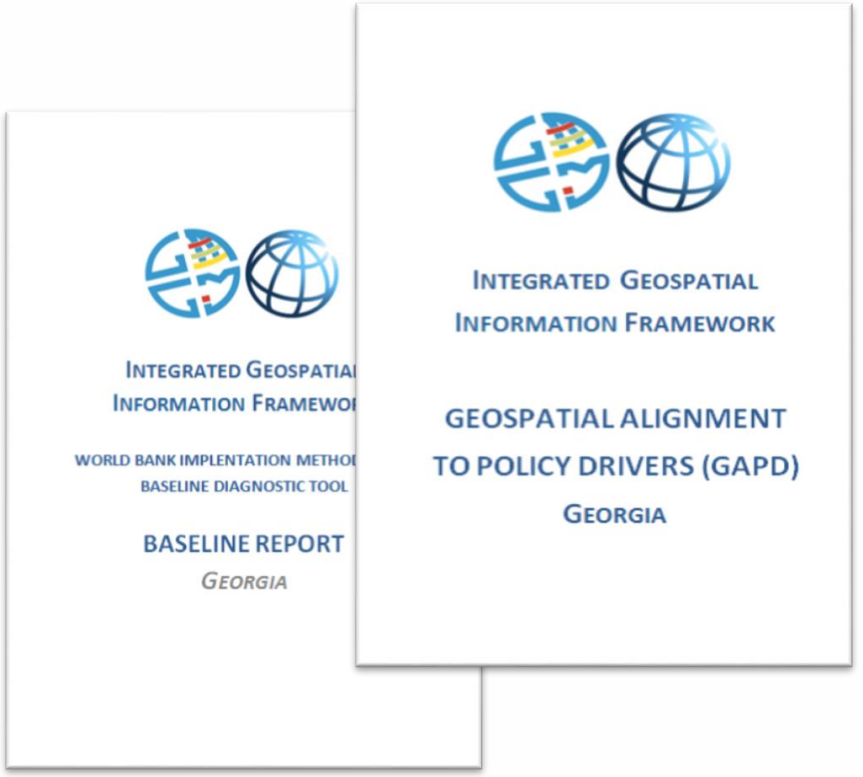
Deliverables from Assessment Methodology & Tools

- ***Baseline Report***
- ***Geospatial Alignment to Policy Drivers***
- ***Socio-Economic Impact Analysis***
- ***National SDI Action and Investment Plan***



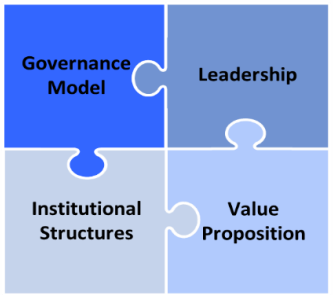






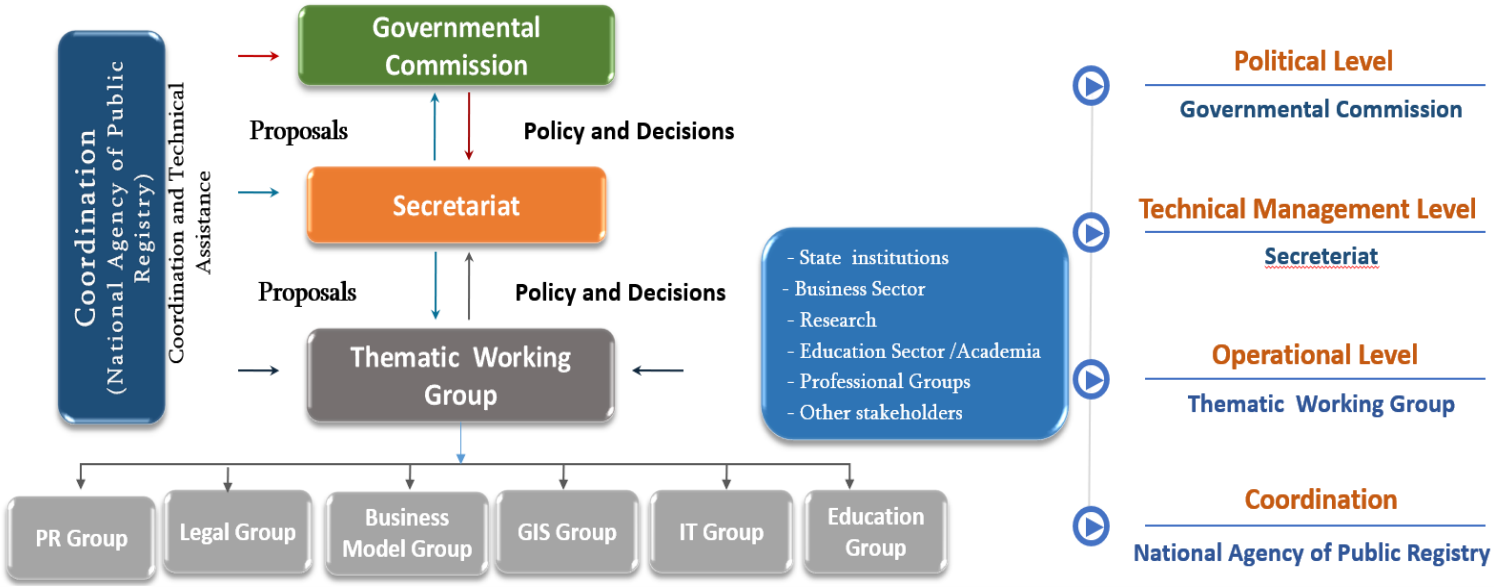
Strategic Pathway Highlights

Governance and Institutions



NSDI Governance Model

Decree of Government of Georgia No 262, October 9, 2013
(Amended by Decree of Government of Georgia No 101, March 09, 2015)



Strengths

Clear NSDI mandate
Active coordination
NSDI achievements
Strategic culture
Growing support for NSDI

Weaknesses

NSDI governance inactivity
Lack of leadership
Lack of momentum
Siloed operations
Overlapping agency mandates

Strategic Pathway Highlights

Policy and Legal

Implication of **INSPIRE directive** on the future policy and legal framework for Georgia

According to the Charter, NAPR function is: "to coordinate and monitor the creation, maintenance and development of NSDI and to integrate it in the European Spatial Data Infrastructure."

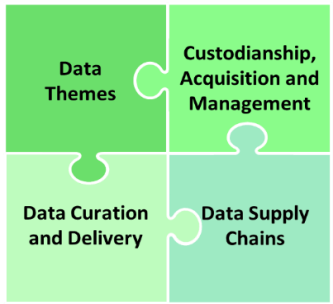
According to Decree No 262: one of the goals of the Commission are "to develop relevant proposals for measures to be taken in the field of NSDI creation and development pursuant to European Parliament Directive 7 2007/2 / EC of 14 March 2007 on the establishment of a spatial information infrastructure in

Strategic Pathway Highlights

Financial

No separate budget specifically for NSDI implementation

NSDI projects mostly funded by donor organizations



Data

Strategic Pathway Highlights

Innovation

Georgia's Innovation and Technology Agency (GITA)

Lack of incentives for innovation using geodata

Need for academic and private sectors in geodata related research programmes

Need for Bridging the Divide

Standards

Resolution No 262, requires the Government Commission to comply with European standards, in anticipation of the integration of spatial data with INSPIRE.

Partnerships

Cross-sector and interdisciplinary cooperation, coordination and collaboration with all levels of government, the geospatial industry, private sector, academia, and the international community.

Strategic Pathway Highlights

Capacity and Education

'Education Strategy for the Development of NSDI

(i) higher education institutions - research and educational programs in the field of GIS that meet Western European standards;

(ii) professional training services meet the requirements of professionals to support the implementation and ongoing management of the NSDI;

(iii) collaboration among higher and vocational education institutions and the public sector to attract young professionals.

Communication and Engagement

The importance of engagement and communication is recognized in Resolution No 262 and through the establishment of the NSDI PR Working Group.

Recommendations

- Reestablish the GC, Secretariat and Working Groups
- Include an End User Group within the NSDI Governance Model
- clear strategic direction for NSDI activities to align with government strategic needs and priorities
- Review draft NSDI Policies and legal documents, seek stakeholder support and endorsement by Parliament/Government
- assessment of NSDI benefits and articulate a return on investment for executive audience
- Adopt standards to ensure geospatial data exchange interoperability
- professional development training and seek endorsement for the Education Strategy to be implemented

National Policies/Strategies & Geospatial Data

- National Disaster Risk Reduction Strategy of Georgia 2017-2020
- Decentralization Strategy 2020-2025
- The Third National Environment Action Programme of Georgia 2017-2021
- Agriculture and Rural Development Strategy 2021-2027
- Government Program 2021-2024 Toward Building a European State
- Regional Development Program of Georgia 2018-2021

NATIONAL AGENCY OF PUBLIC REGISTRY

Vision 2030 Sustainable Development Goals

The linkage between the UN GGIM Global Fundamental Geospatial Data Themes and the Vision 2030 SDG

Data Theme / Sustainable Development Goal (SDG)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	No poverty	Zero hunger	Good health	Quality education	Gender equality	Clean water & sanitation	Affordable clean energy	Decent work and economic growth	Industry, innovation & infrastructure	Reduced inequalities	Sustainable cities & communities	Responsible consumption & production	Climate action	Life below water	Life on land	Peace, justice & strong institutions	Partnerships for the goals
Addresses				X		X	X		X		X						
Buildings & Settlements	X		X	X		X	X		X		X	X	X				
Elevation & Depth	X	X	X			X	X				X		X	X	X		
Functional Areas	X	X	X	X	X	X	X	X	X	X	X			X			X
Geographical Names	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geology & Soils		X	X			X	X	X	X		X	X	X	X	X		
Land Cover/Land Use	X	X	X		X	X	X	X	X		X	X	X	X	X		
Land Parcels	X	X						X	X	X	X					X	
Orthoimagery		X				X			X		X			X	X		
Physical Infrastructure			X	X		X	X		X		X						
Population Distribution	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Transport Networks		X	X					X	X		X						
Water		X	X			X	X		X		X	X	X	X	X		
Global Geodetic Reference Framework		X				X	X	X	X	X	X	X	X	X	X	X	

Working on the draft for Development strategy of the Ministry of Justice of Georgia

- Registration of Land Parcels/Cadastre
- Addresses

2 405 405
info@napr.gov.ge

Examples of geospatial use cases

Good Governance – why do we need to invest?

- Evidence-based Local Decision Making
- Support to National Development Planning
- Disaster Management
- Supporting digital start-ups and SMEs use geospatial data
- Feasibility Studies and design for New Road and Rail schemes
- Water Supply Planning
- Tourist Development

IGIF to strengthen NSDI

Mid-term positive results:

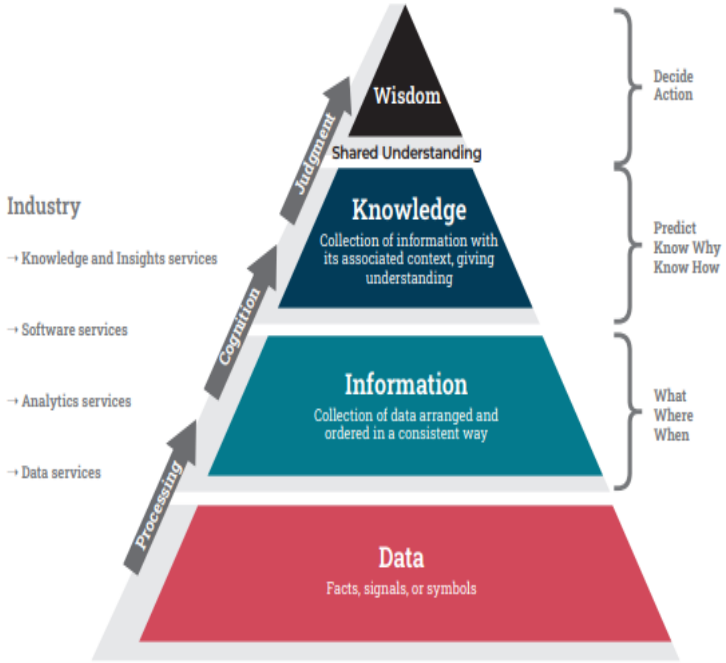
- Reactivated communication between NSDI actors – exchange of updated information concerning the fulfilled, ongoing and planned projects;
- Renovated works on draft of NSDI law (According to the defined plan draft should be ready to pass the legal procedures in Spring 2022);
- Development of Geoportal - back into the Agenda;
- Renewed Vision and Mission Statements for NSDI Strategy 2020-2022.

Vision: Make is as easy as possible for people to find, understand and use geospatial data for planning and good decision-making for the socio-economic development of society.

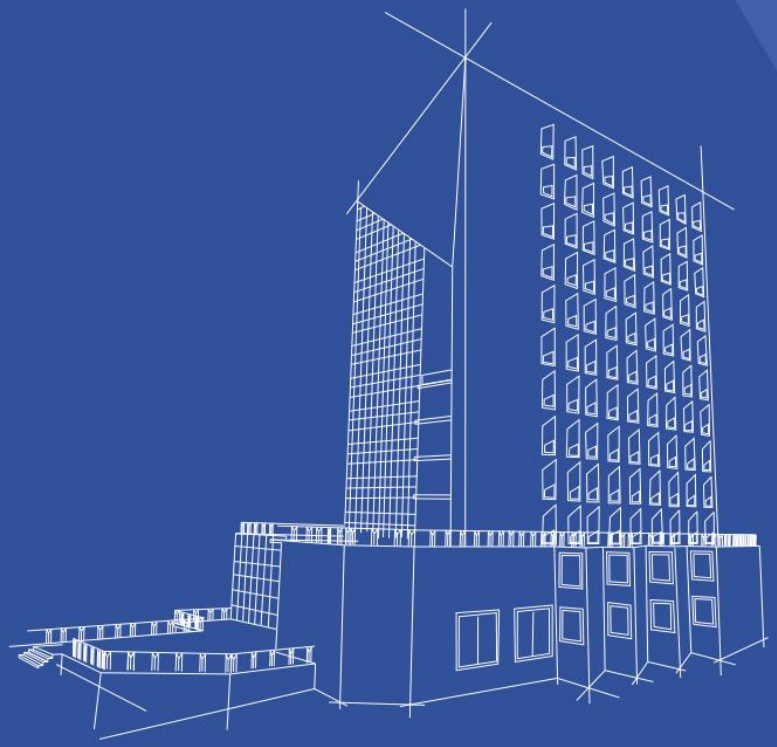
Mission: State agencies to work cooperatively to implement a national spatial data infrastructure to provide all organizations, businesses and citizens with streamlined access to geographic and thematic data through standardized data, interoperable technologies and services, and best practice data management.

Main Challenges

- Reestablish the GC, Secretariat and Working Groups;
- Define the champion;
- Prioritize the issue (worth enough to invest) - Convince the government that development of NSDI and geospatial information has a crucial importance to achieve the goals defined by strategies and policies; sustainable development of the country.
- Prepare the final versions of NSDI related acts and seek the endorsement of them by the Parliament/Government.
- Find resources to develop and launch the Geoportal;
- Assist creation of new culture of management - Evidence-based Decision Making,
- …



NATIONAL AGENCY OF PUBLIC REGISTRY



Thank you for your Attention!

2 405 405
info@napr.gov.ge
www.napr.gov.ge

Kyrgyzstan: A Model for Sustainable Base Mapping

Simon Wills, ConsultingWhere, United Kingdom

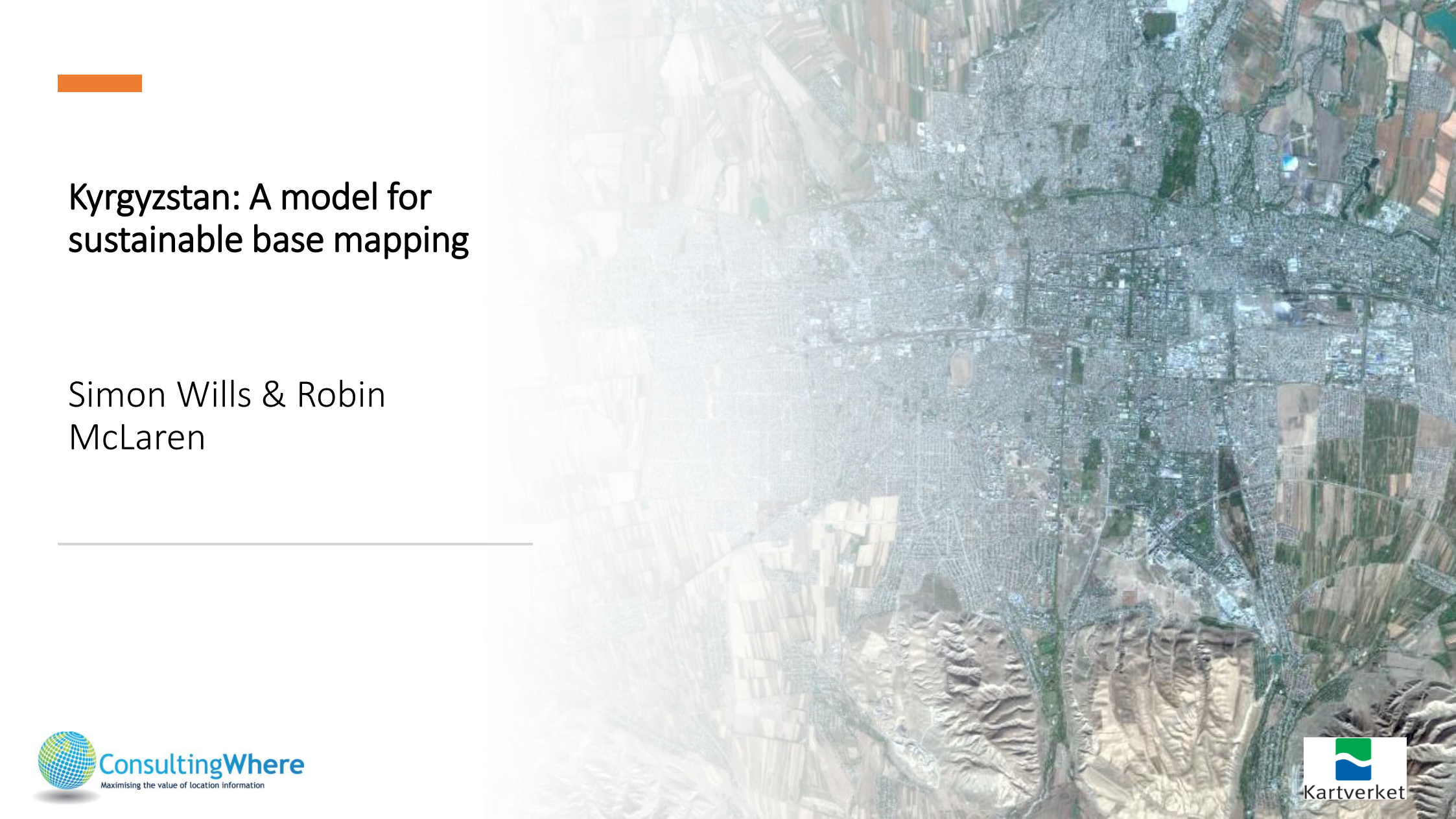
Simon Wills has over twenty-five years of experience in the development and use of information systems, specialising in the management of location-enabled applications and statistical modelling of spatial data. He is a geologist by background and worked in Botswana in the field of remote sensing for many years undertaking both managerial and senior consultancy work for the local distributor of Esri and ERDAS software. Now working with ConsultingWhere, he was part of the team assessing the socio-economic benefits of strengthening geospatial infrastructure in Mongolia and is now leading the consultancy team advising on the implementation of IGIF in Kyrgyzstan.

Simon presented a model for sustainable base mapping in Kyrgyzstan. In particular, he examined two use cases that aligned with government priorities. Fit-for-purpose land registration using Orthoimagery would cost around quarter the price of traditional survey methods and thus also help to increase security of tenure. However, this change would need political commitment and adaptation of the legislation and regulatory framework.

The second use case focused on disaster risk management and in particular the capital city Bishkek given creeping development towards a geological fault line. Benefits of the latter case were difficult to quantify, but nationally the benefits of the use of geospatial data and technologies to prepare and react to the current level of natural disasters was estimated at US$ 2.7m annually.

Kyrgyzstan: A model for sustainable base mapping

Simon Wills & Robin McLaren



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Introduction

- Initially to summarize the current state of geospatial and the development of NSDI in Kyrgyzstan
- Funded by the Norwegian Mapping Authority as part of a joint project with Statistics Norway
- Local partner is the State Agency for Land Resources
- Used World Bank IGIF toolkit for baseline assessment
- Sustainability of geospatial investment: base mapping

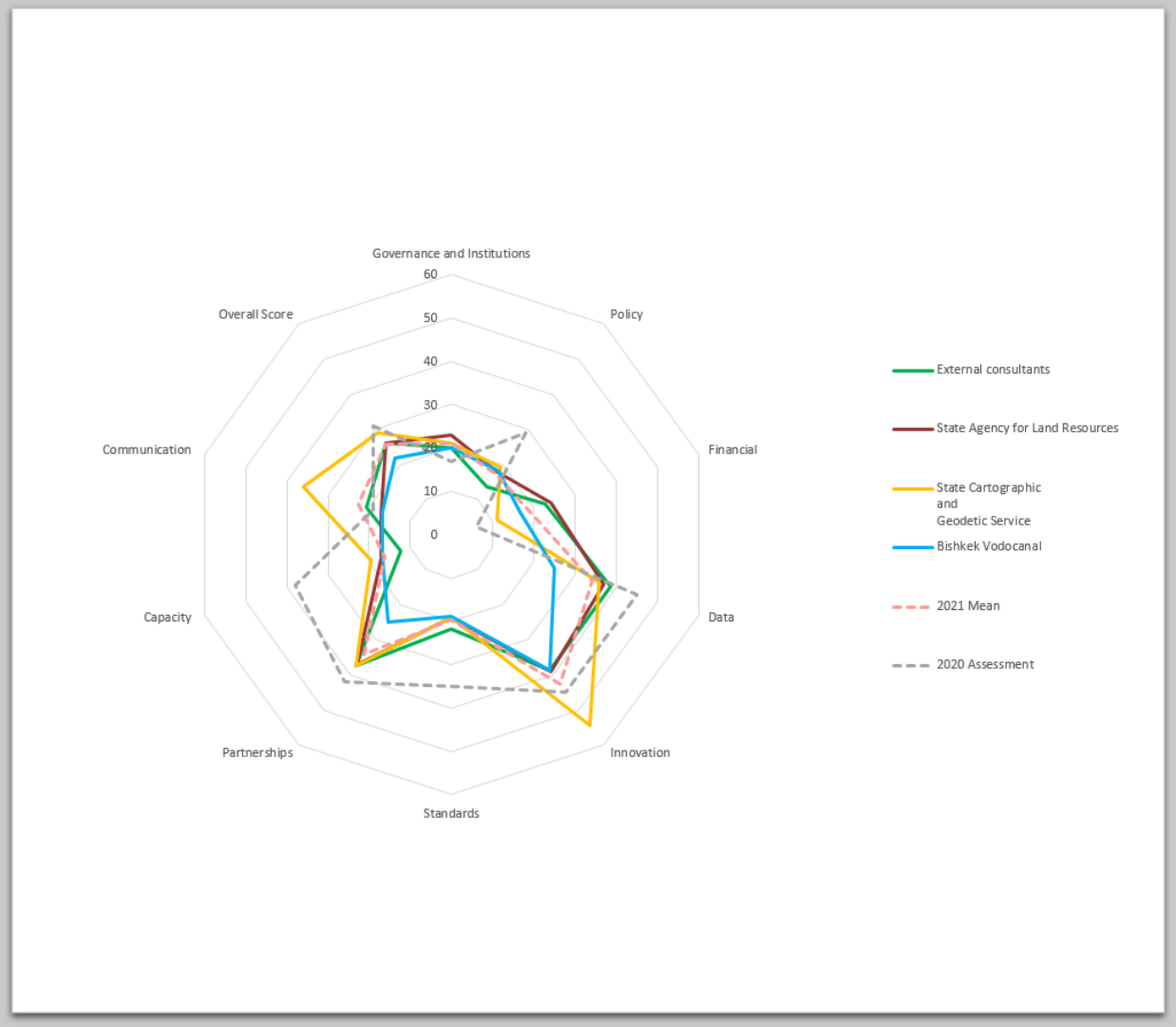
Strengths & weaknesses

Strengths

- Governance & cooperation
- Digital transformation
- International donor support
- Capacity development

Weaknesses

- Lack of visibility and awareness
- No geospatial champion
- Over-reliance on donor funding
- No sustainable business model
- Data sharing and open data
- Effectiveness of NSDI group
- Fragmented geospatial data and services



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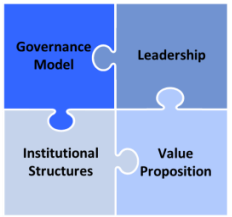
Pathway highlights



Strengths: NSDI working group, draft action plan & Digital Kyrgyzstan
Weaknesses: No geospatial champion, no value proposition, no formal NSDI strategy or plan

Strengths: Donor funding
Weaknesses: lack of use cases & benefits studies, insufficient government funding, lack of coherent policy on data access & charging

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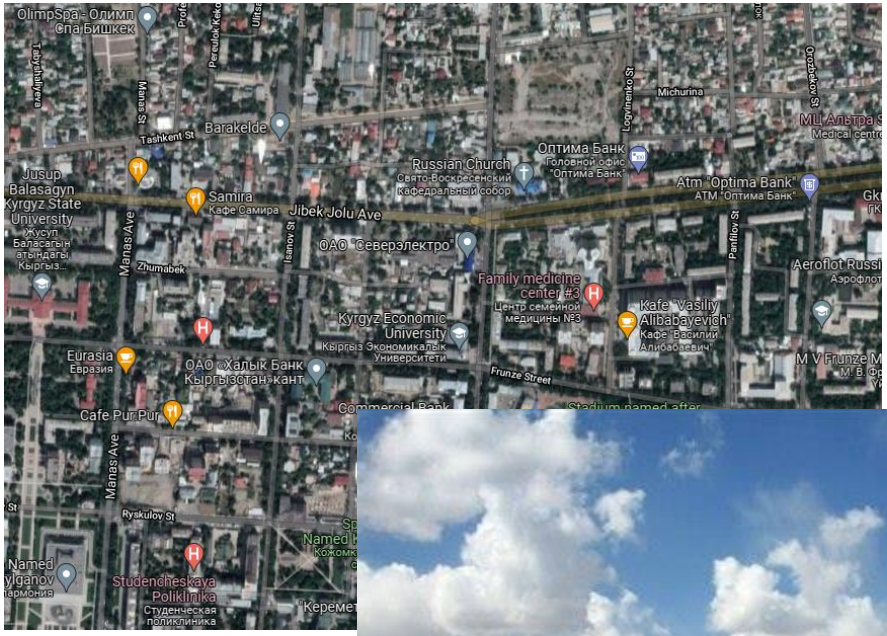
Proposed Actions

Develop a small number of **geospatial use cases** that are aligned with government policies to raise awareness and to obtain a budget for a socio-economic impact assessment

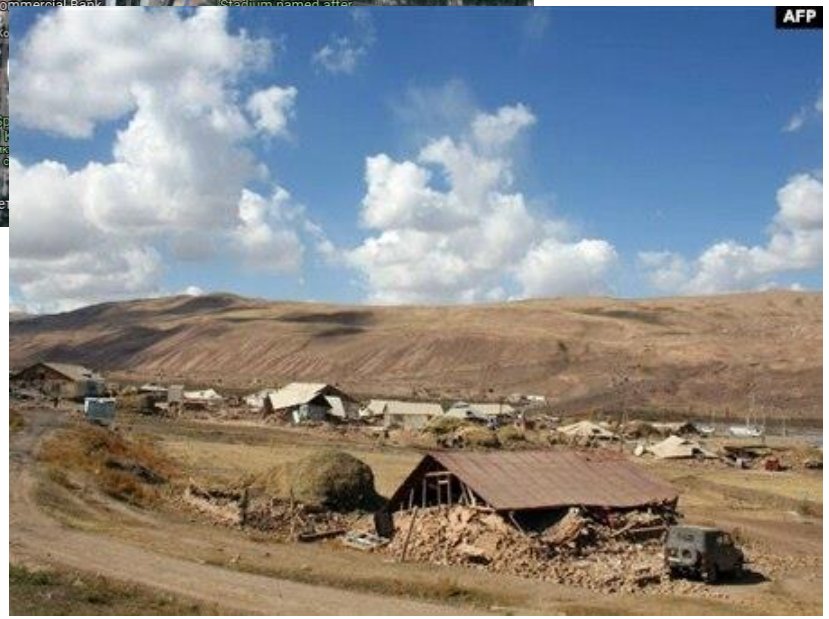
Develop an outline value proposition, supported by a **socio-economic impact assessment and business model** leading to the formation of an approved NSDI strategy

Use cases

- 2018 Norwegian National Mapping Authority orthophoto project
  - 20cm & 10cm capture
  - Investment in storage, distribution infrastructure, digital photogrammetric stations & training
- Assess the value of this data to Kyrgyzstan and the potential to capture again in the future
- Focus on tangible economic benefits to the country and the sustainability of such mapping



Land Registration & Cadastre



Disaster and risk management – earthquake hazards

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Use case: Land Registration & Cadastre Orthophoto

https://www.turkishairlines.com/en-int/flights/flights-to-bishkek/

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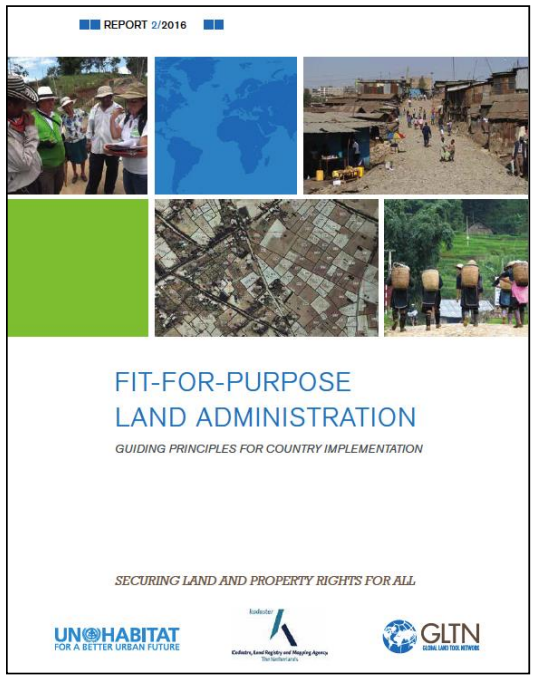
Kartverket

Fit-For-Purpose Land Administration



https://gltn.net/download/fit-for-purpose-land-administration-guiding-principles-for-country-implementation/

land

Special Issue "Fit-for-Purpose Land Administration-Providing Secure Land Rights at Scale". 2021
https://www.mdpi.com/journal/land/special_issues/FFPLA

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

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Registration statistics within area covered by digital orthophotos sponsored by the Norwegian Government

Category of Registration	Plots/ Buildings/Facilities	First Registration	Quality Improvement
Bishkek Area			
Registered	154,900	0	92,900
Non-registered (Formal)	42,000	42,000	0
Non-registered (Informal)	21,500	21,500	0
Wider Orthophoto Footprint Area			
Registered	1,493,500	0	896,100
Non-registered (Formal)	149,350	149,350	0
Non-registered (Informal)	74,675	74,675	0
TOTAL	**1,935,925**	**287,525**	**989,000**

Benefits of Adopting the FFPLA Approach

	Traditional Approach US$ 53 per parcel / building	FFP Approach US$ 13.5 per parcel / building	Financial Saving
287,525 first registration properties	US$ 15 million	US$ 3.8 million	**US$ 11.2 million**
989,000 properties for quality improvement	US$ 52 million	US$ 13 million	**US$ 39 million**

New registrations 2021 to 2035

Annual savings of between USD 185,000 to USD 250,000

UN ESCAP estimates urban population growth in Bishkek running at 2.15% pa. from 2020 to 2035 (https://www.unescap.org/sites/default/files/Summary%20report_Urbanization%20and%20resource%20trends%20in%20Kyrgyzstan.pdf)

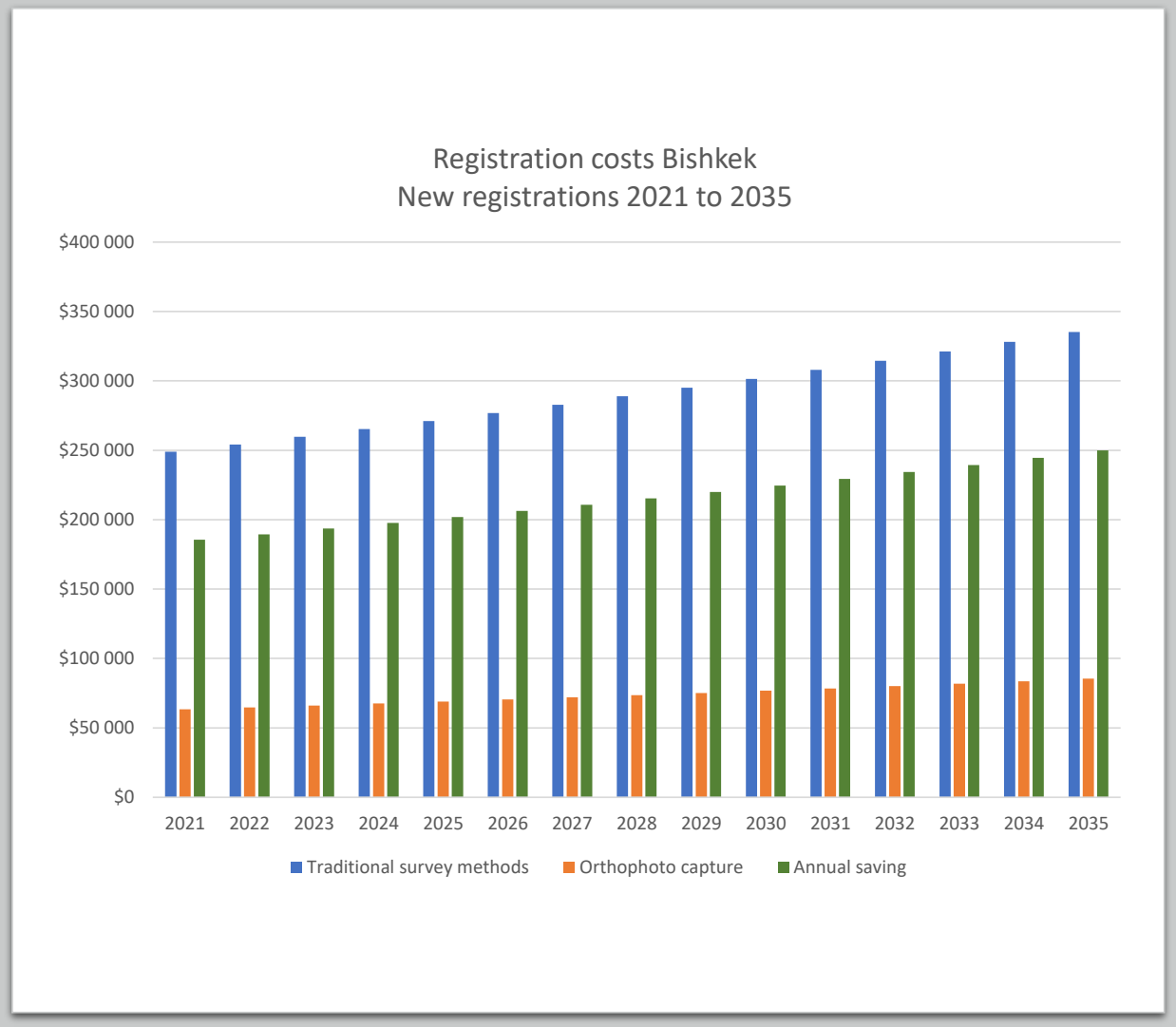
Potential of 4,600 to 6,300 new registrations required annually – 82,000 in total over the 15 years.

Registration cost using traditional survey: USD 4.3 million

Registration cost using orthophotos: USD 1.1 million

Does not consider inflation.

Costs exclude orthophoto data capture – reflect SALR internal costs only.



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Other Benefits

- 200 court cases at a total cost of USD 800,000 related to land disputes
- **Experience in other countries suggests up to 40% saving on these: USD 320,000 pa**
- With increased security of tenure being achieved across the country and trust established in the land records managed by government, the mortgage providers will provide more loans for property owners due to the reduction in risk. This is turn will lead to increased economic development and will encourage a much more vibrant land market to be developed in Kyrgyzstan.

Prerequisites to Achieve the Benefits

- **Legal and regulatory framework** – the current legal and regulatory framework guiding the registration of properties in Kyrgyzstan imposes strict technical procedures and corresponding accuracy requirements. These will have to be modified to provide the flexibility needed by the FFP approach.
- **Engagement strategy** – the successful adoption of the FFP approach will involve the commitment of a range of stakeholders and this will involve a significant cultural change, especially for the surveying community. An awareness campaign for citizens will be essential for them to understand the reasons for change and the benefits.
- **Political backing** – the FFP approach will only be successfully adopted and implemented if there is strong political commitment. Political support needs to be established and nurtured to then convince the range of other stakeholders involved.

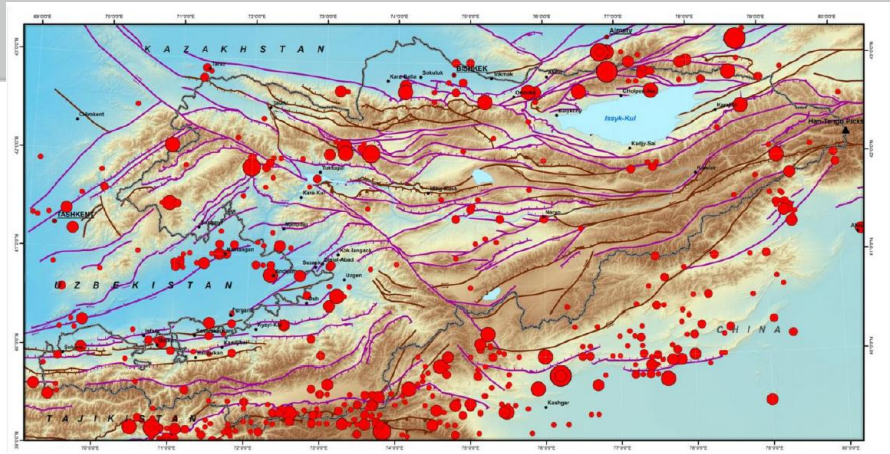
Use case: Disaster and risk management

The geography, tectonic regime and topography Kyrgyzstan make it highly prone to natural hazards.

Due to the mountainous terrain, most of the country is subject to significant landslide hazard.

Mudflows and floods occur frequently and cause significant damage.

Earthquakes made up 18% of the disasters in the country (1988 – 2007, World Bank) but accounted for the largest proportion of economic loss at 73%



Atlas of Earthquakes in Kyrgyzstan. Central-Asian Institute for Applied Geosciences and United Nations International Strategy for Disaster Reduction , 2009

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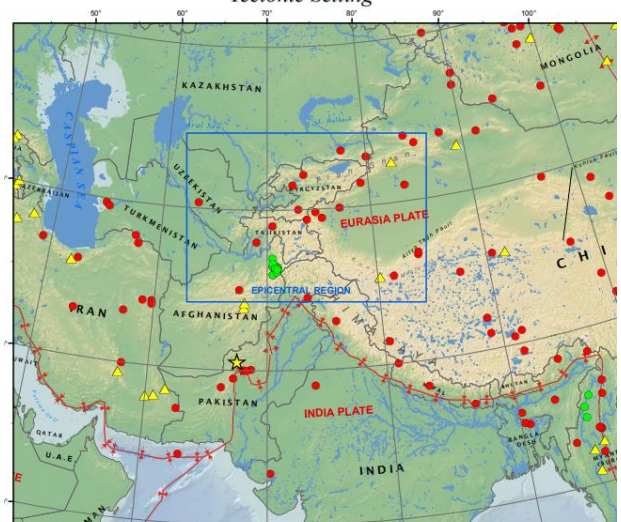
Earthquakes in Kyrgyzstan

Date and time	Latitude	Longitude	Mpv	K	Intensity in the focus	Depth
2021-09-19 08:40:15	**39.47**	**72.82**	**3.2**	**eight**	**3**	**13**
2021-09-18 21:23:45	39.46	73.26	3.4	8.2	3	ten
2021-09-17 04:07:34	42.97	78.52	3.2	7.8	about 3	35
2021-09-16 12:31:10	42.19	76.55	3.6	8.4	3	twenty

Institute of Seismology: 19th September 2021

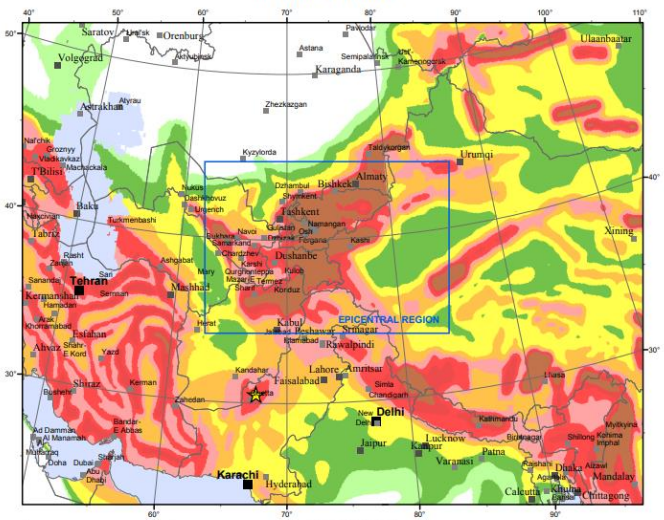
Tectonic Setting



RELATIVE PLATE MOTIONS

The red vectors represent the motion of the India Plate relative to the Eurasia Plate in the region. The motion of the Inda Plate is generally 40 - 50 mm/yr northward with respect to the Eurasia Plate.

Seismic Hazard



Seismic hazard is expressed as peak ground acceleration (PGA) on firm rock, in meters/sec², expected to be exceeded in a 50-yr period with a probability of 10 percent.

Use case: Disaster and risk management

Important component in responding to natural disasters

Planning to determine potential magnitude and impact of disasters

Risk reduction

- Identification of vulnerable areas to earthquake damage and retrofitting of buildings and infrastructure to better withstand shocks. Current World Bank project
- Identification of flood risks, landslip risks

Resource allocation in both the response and recovery phases of disaster management

Economic value: cost and loss reduction due to better decisions facilitated using geospatial information

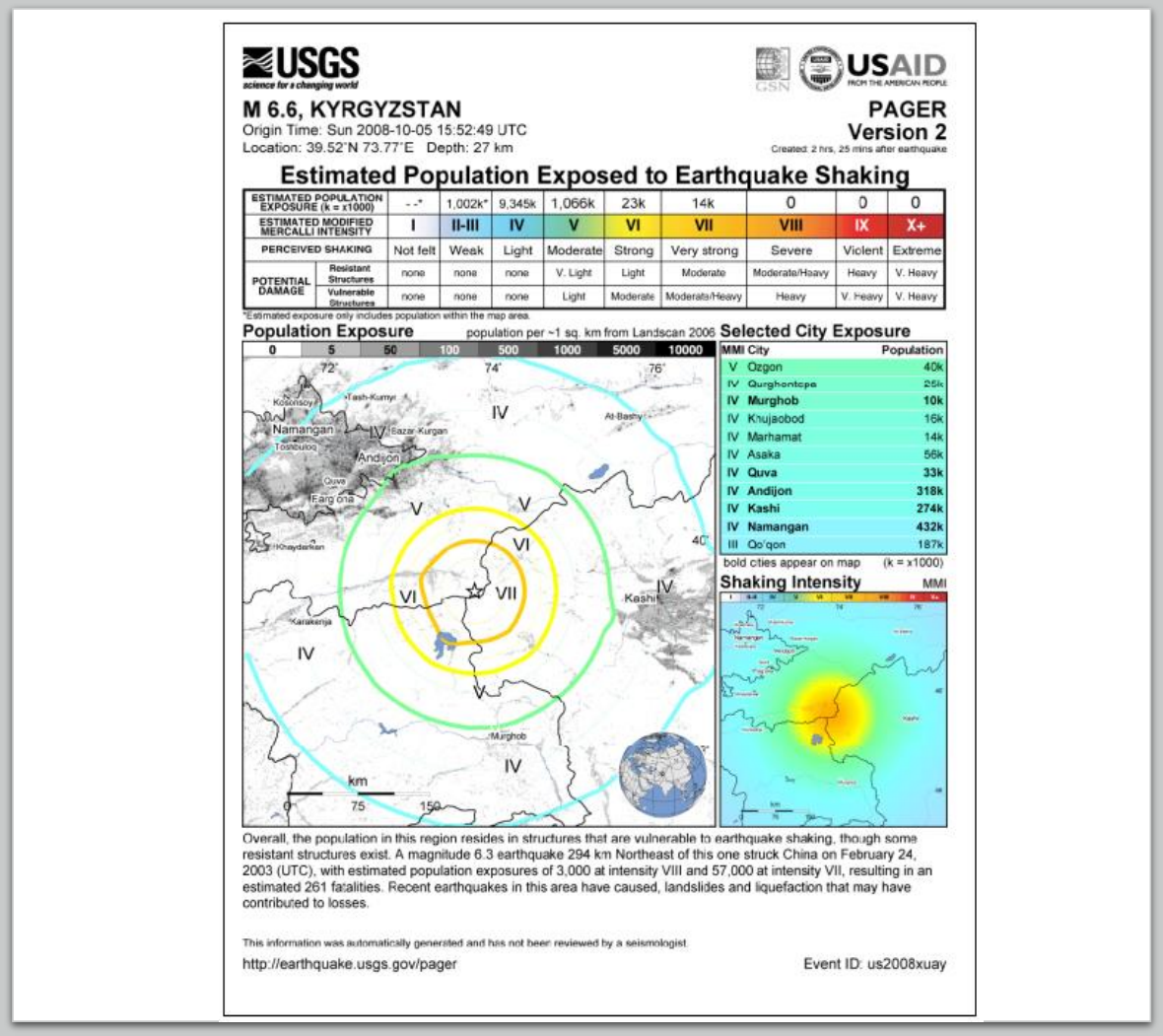
Cost avoidance method: evaluation of the cost and losses that could have been avoided had an information product been available to use in decision making

UN study estimates that up to 50% of loss (direct loss and economic loss) **may** be mitigated with better planning and the use of geospatial

Other studies suggest there is a maximum possible reduction in losses irrespective of planning and data e.g., for floods this is estimated to be 35%

Quantifying the losses

Date and Region	Magnitude	Consequences
15 May 1992 Burgandi-Nookat region	6.6	4 killed, 50,000 people affected, losses of 31 million USD
9 January 1997, Ak-Tala district	7.0	1,230 people affected, losses of 2 million USD
19 August 1997, Jalal-Abad region	7.3	54 killed, 86,000 affected, losses of 130million USD
26 December 2006, Isakeevo-Kochkorka region	5.8	12,050 people affected
5 October 2008, Alai and Chonalai districts, village of Nura	6.6	In the village of Nura: 74 killed, 850 people affected, losses of 8 to 10 million USD



USGS science for a changing world

GSN USAID FROM THE AMERICAN PEOPLE

M 6.6, KYRGYZSTAN

Origin Time: Sun 2008-10-05 15:52:49 UTC

Location: 39.52°N 73.77°E Depth: 27 km

PAGER
Version 2

Created: 2 hrs, 25 mins after earthquake

Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)		--*	1,002k*	9,345k	1,066k	23k	14k	0	0	0
ESTIMATED MODIFIED MERCALLI INTENSITY		I	II-III	IV	V	VI	VII	VIII	IX	X+
PERCEIVED SHAKING		Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	Resistant Structures	none	none	none	V. Light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy
	Vulnerable Structures	none	none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy	V. Heavy

*Estimated exposure only includes population within the map area.

Population Exposure population per ~1 sq. km from Landscan 2006

Selected City Exposure

MMI	City	Population
V	Ozgon	40k
IV	Qurghontepa	25k
IV	**Murghob**	**10k**
IV	Khujaobod	16k
IV	Marhamat	14k
IV	Asaka	56k
IV	**Quva**	**33k**
IV	**Andijon**	**318k**
IV	**Kashi**	**274k**
IV	**Namangan**	**432k**
III	Qo'qon	187k

bold cities appear on map (k = x1000)

Shaking Intensity MMI

Overall, the population in this region resides in structures that are vulnerable to earthquake shaking, though some resistant structures exist. A magnitude 6.3 earthquake 294 km Northeast of this one struck China on February 24, 2003 (UTC), with estimated population exposures of 3,000 at intensity VIII and 57,000 at intensity VII, resulting in an estimated 261 fatalities. Recent earthquakes in this area have caused, landslides and liquefaction that may have contributed to losses.

This information was automatically generated and has not been reviewed by a seismologist.

http://earthquake.usgs.gov/pager Event ID: us2008xuay

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Quantifying the losses

Estimates of losses

United Nations International Strategy for Disaster Reduction

Earthquakes USD 8 million pa (2010)

Global Facility for disaster reduction and recovery

Natural disasters USD 30 to 35 million pa

Global Earthquake Model

Earthquake average annual losses up to USD 70 million

Ministry of Emergency Situations

All disasters USD 46 million 2016 to 2020

Natural disasters USD 21 million 2016 to 2020

2014 estimate of annual direct damage from emergency situations in the range USD 30 to 35 million

UNDP

Direct damage due to natural disasters 2015 to 2017 USD$21 million pa

World Bank

Economic damage can reach 1.5% of GDP – c. USD 100 million pa

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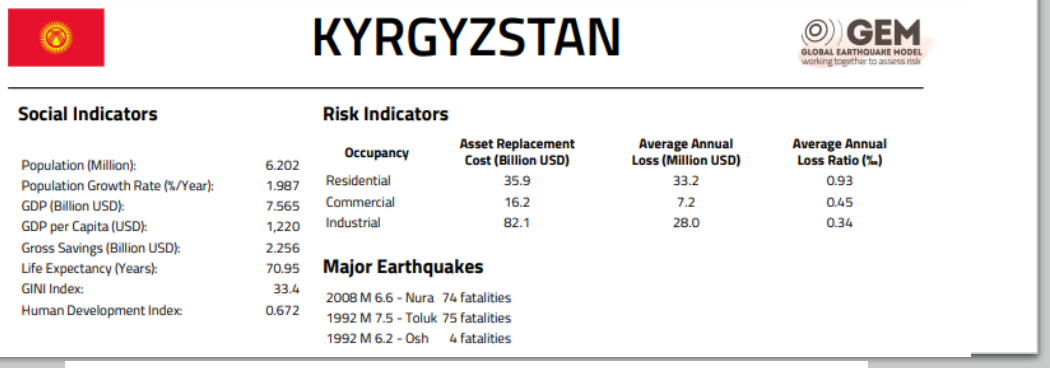
Disasters in Kyrgyzstan 2016 to 2020. Ministry of Emergency Situations

Category	Material damage (USD)	Percentage of damage	Casualties
Fires (man made)	24,590,000	53.3	15
Mud	8,660,000	18.8	7
Flood	2,550,000	5.5	0
Plane crashes	2,250,000	4.9	39
Frost	2,070,000	4.5	0
Hail	1,890,000	4.1	0
Earthquake	1,500,000	3.3	0
Landslide	980,000	2.1	35
Storm	750,000	1.6	1
Snowfall	400,000	0.9	0
Major accidents	140,000	0.3	148
Avalanche	130,000	0.3	19
Military incidents and Sots. conflicts	90,000	0.2	2
Rockfall	80,000	0.2	3
Flood	20,000	0.0	0
Blizzard	20,000	0.0	0
Large fires (natural)	10,000	0.0	0
Infectious disease	10,000	0.0	1357
Total	46,140,000	100	1626



KYRGYZSTAN

GEM GLOBAL EARTHQUAKE MODEL working together to assess risk

Social Indicators

Population (Million):	6.202
Population Growth Rate (%/Year):	1.987
GDP (Billion USD):	7.565
GDP per Capita (USD):	1,220
Gross Savings (Billion USD):	2.256
Life Expectancy (Years):	70.95
GINI Index:	33.4
Human Development Index:	0.672

Risk Indicators

Occupancy	Asset Replacement Cost (Billion USD)	Average Annual Loss (Million USD)	Average Annual Loss Ratio (‰)
Residential	35.9	33.2	0.93
Commercial	16.2	7.2	0.45
Industrial	82.1	28.0	0.34

Major Earthquakes

2008 M 6.6 - Nura 74 fatalities
1992 M 7.5 - Toluk 75 fatalities
1992 M 6.2 - Osh 4 fatalities

Global Earthquake Model
https://downloads.openquake.org/countryprofiles/KGZ.pdf

Quantifying the benefits

Description	Lower bound	Mean case	Upper bound	Comments
Economic loss due to natural disasters (USD). Direct damage only.	21,000,000	45,500,000	70,000,000	Lower bound: UNDP Upper bound: Global earthquake model
Estimated percentage savings.	10%	20%	40%	Upper bound: Ministry of Emergency Situations
Attributable to NSDI data.	20%	30%	40%	The second-best alternative would be to use alternative sources of data such as google maps and other open source data
Realizable savings USD pa.	420,000	2,730,000	11,200,000	

Figures for losses are direct damage only.

Do not include World Bank estimates of economic loss of up to 1.5% of GDP.

Benefits only, no costs included.

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Kartverket

Seismic modelling in Bishkek

Potential earthquakes on faults nearest to Bishkek could cause substantial damage

- City growth to the south has expanded the city towards the Issyk Ata fault
- Mw 7.5 earthquake on the Issyk Ata fault could potentially cause 5,300 to 10,500 totally damaged buildings, 14,400 to 18,400 damaged buildings and up to 3,900 fatalities
- Area has a history of large (>7Mw) earthquakes
- 1885 Mw 6.5 earthquake 50km SW of Bishkek
- Modelling of seismic risk involves high-resolution DEM's
- Currently satellite derived
- Higher resolution DEM allows more local variation in both the urban fabric and local topography to be considered in models
- Potential economic losses from this modelling is in the billions of USD for worst case scenarios

Amey et al., (in press), Improving urban seismic risk estimates for Bishkek, Kyrgyzstan, incorporating recent geological knowledge of hazards

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Quantifying the costs

Air survey orthophotos and DEM – based on NMA 2018

20 cm resolution c. USD 20 per km^2
10 cm resolution c. USD 145 per km^2
1 – 2 m elevation
Bishkek (formal city boundary, 171 km^2) @ 10cm c. USD 25,000
Bishkek including informal settlements @ 10cm c. USD 27,500

Alternatives
UAV – c. USD 400 per km^2 (UK figures)
Lower fixed costs than air survey
Useful for small areas (World bank estimates that < 10 km2 UAV has cost advantage over satellite and aircraft)

Satellite - Pléiades international pricing
Minimum order size 100km2, USD 65 per km^2
50cm orthos, 10m elevation
USD 11,115 for Bishkek

Use free satellite data for change detection to pinpoint areas that need survey.

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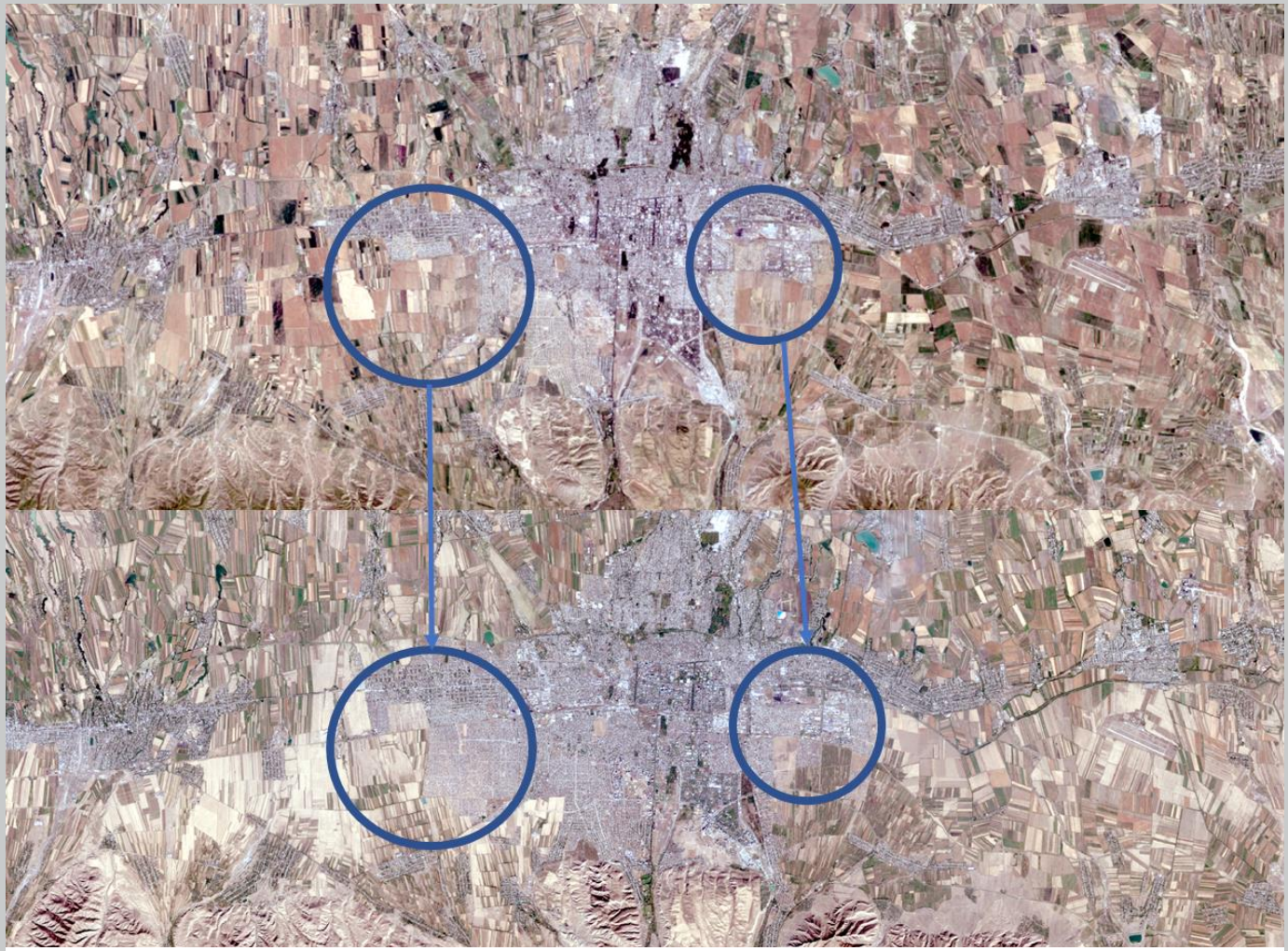

Landsat Data: upper image 12th August 2016, lower image 13th October 2021

Acknowledgements

Norwegian Mapping Authority

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Elena Busch, Norwegian Mapping Authority

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Alexei Ushakov, Yulia Bystrova, Professor Akylbek Chymrov, Azamat Karypov, Professor Luis Ángel Ruiz Fernández, Narynbek Isabekov, Sabyr Chukumbaev, Dr Alexander Zubovich, Merder Totonov, Rimma Chynybaeva, Adam Tashtemirov

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Republic of Moldova: NSDI National Action Plan

Pavel Ivancenco, Agency for Land Relations and Cadastre

Pavel Ivancenco has been working at the Agency for Land Relations and Cadastre of Moldova since 2015. I took part in the development of the Law on National Spatial Data Infrastructure for Moldova and governmental decisions on its implementation.
Pavel is responsible for administration of national SDI geoportal, validation and publishing metadata and geospatial data themes. He has been closely involved in the implementation of the Integrated Geospatial Information Framework in Moldova, supported by Kartverket and ConsultingWhere.

Pavel described Moldova's development of a NSDI country action plan. As with Georgia, and thanks to Norwegian support, the baseline assessment showed good data holdings but development is necessary elsewhere. The geospatial alignment with policy drivers' assessment identified land administration, disaster risk management, agriculture, local government and emergency services as key drivers to justify resources. Pavel also offered an insight into the country action plan, which includes initiatives to complete national basemap coverage, roll out a national geocoded street address database and upskilling across government agencies

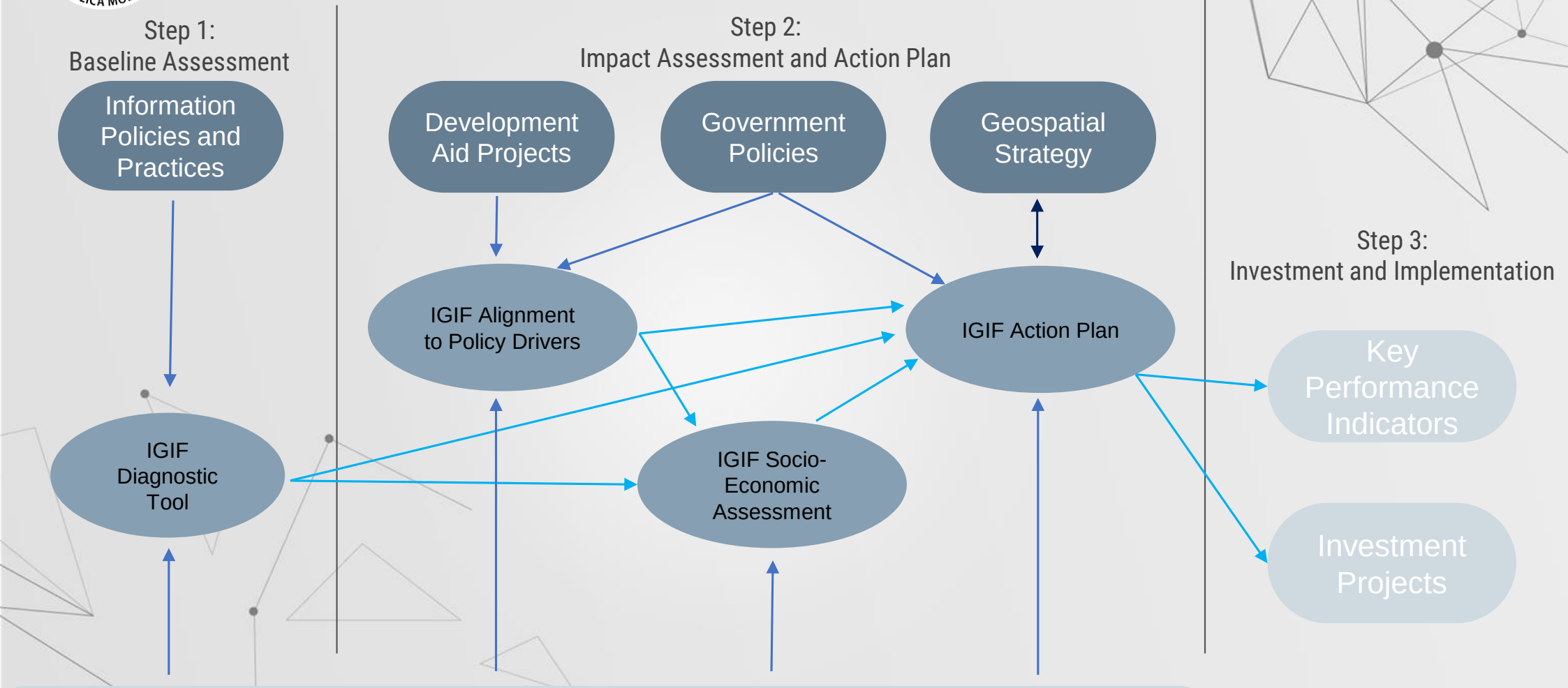
Kartverket

Moldova : Norwegian support for Development of Country Action Plan

Geospatial Information for Digital Transformation, 27-29 October 2021

Pavel Ivancenco
pavel.ivancenco@arfc.gov.md

IGIF WORLD BANK METHODOLOGY

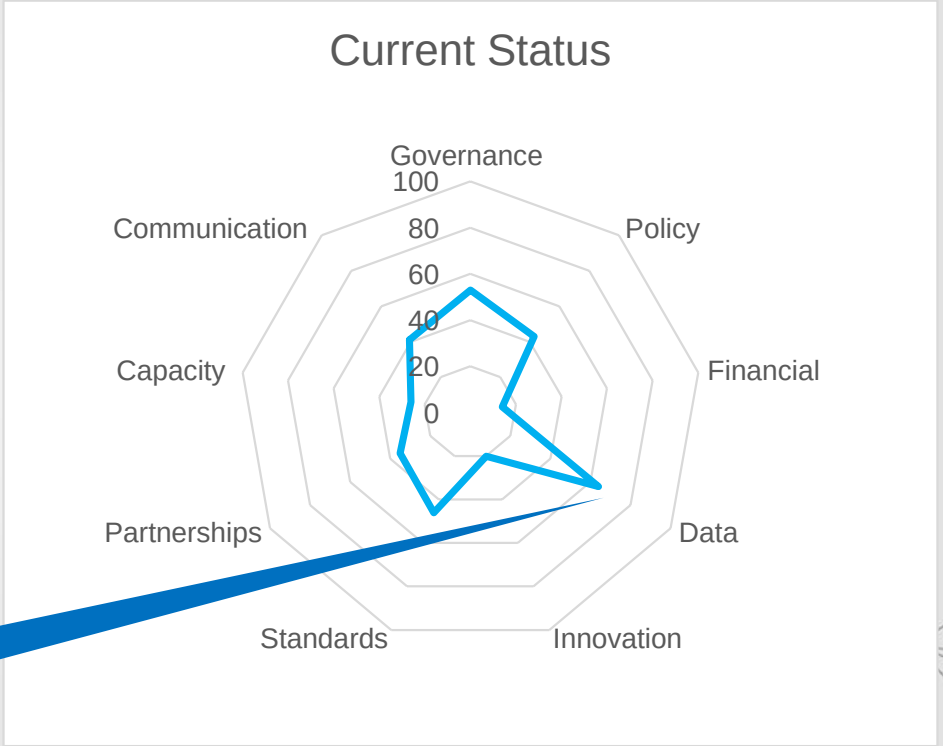


UNGGIM / WB Integrated Geospatial Information Framework (IGIF)

Moldova: IGIF Baseline Assessment 2021

Results of using the Diagnostic Tool

	Current Status
Governance	53
Policy	43
Financial	14
Data	64
Innovation	20
Standards	46
Partnerships	35
Capacity	26
Communication	41
Overall Score	38

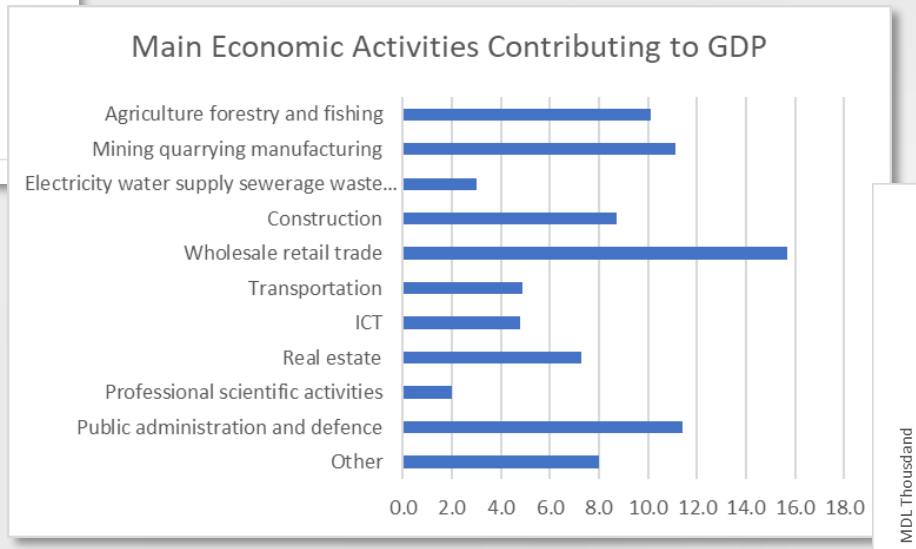


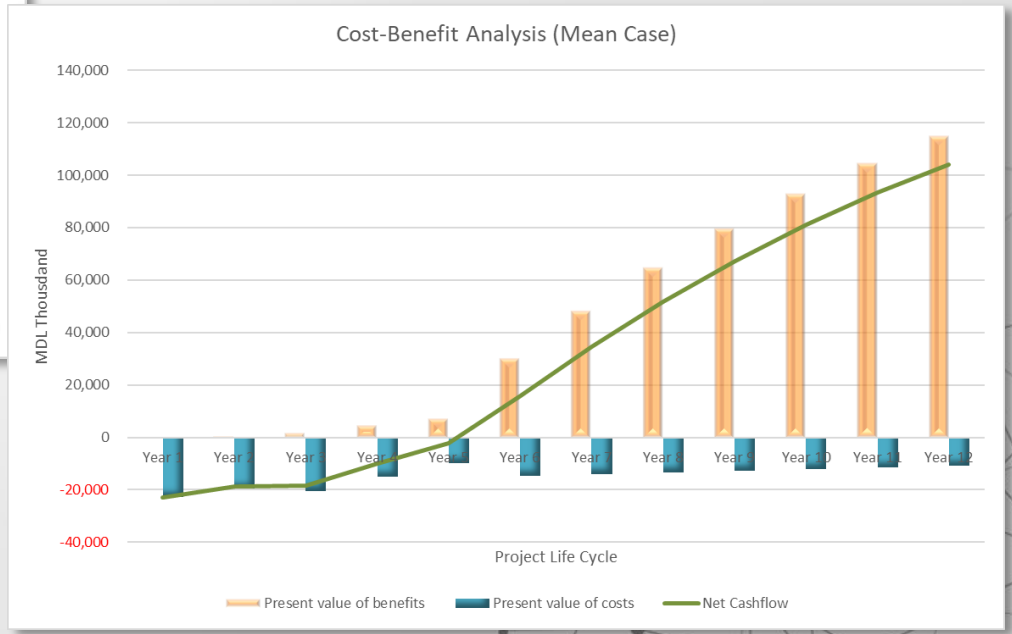
Good score on data benefiting from Norwegian support

Moldova: Geospatial Alignment to Policy Drivers - 2021

1. Economic and Urban Planning
2. Land Management and Administration
3. e-Government
4. Transport
5. Disaster Risk Management and Emergency Services
6. Agriculture, Forestry and Fishing
7. Health and Social Care
8. Natural Resources
9. Water and Hydrology
10. Energy
11. Environment and Tourism
12. Local Government
13. Commercial
14. Multi-sector e.g. data sharing

Socio-Economic Benefits Analysis and Use Case





Country Action Plan

Draft Recommendations for 5-year period of investment

Country Action Plan

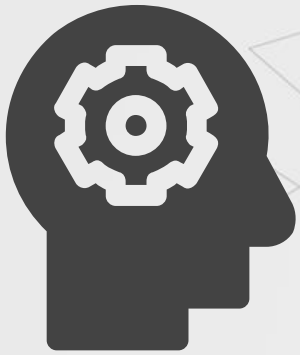
Enhancing Human Capacity in partnership with schools and Universities

Upskilling Government Agencies – through enhanced management training and external support

Growing the geospatial ecosystem – by including more commercial stakeholders in the NSDI project

Raising the profile of NSDI – by developing a coherent communications strategy

Improved Data Sharing - agreeing and implementing protocols to reduce wasteful duplication of effort



Country Action Plan

Orthophotos, DTM and basemap - develop plan of completion of coverage and continuous revision to ensure sustainability

Complete Cadastre – high priority as basis for implementing mass valuation and reforming taxation system

Develop scalable geoportal – to support wider range of users in future

Roll-out National Geocoded Street Address Database

Create Digital Twins for four city center areas including Chisinau

Establish National Earth Observation Centre of Excellence

Country Action Plan

Digitization of missing NSDI datasets

Quality improvements to existing data

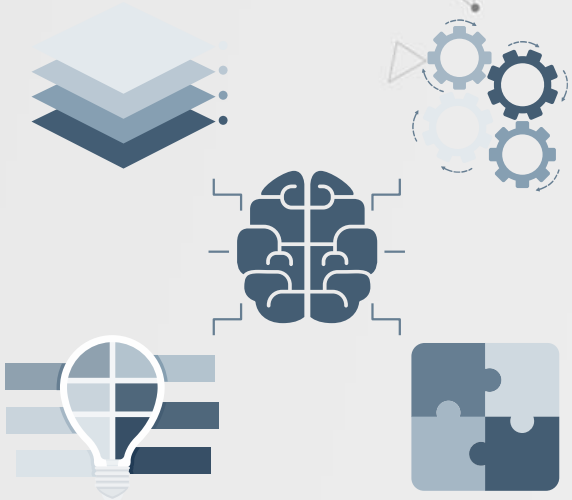
Maintain National CORS network

Support Emergency response system – by equipping extra vehicles across police, ambulance and fire with geospatially enabled apps

Greater geostatistical integration – to enhance delivery of the next census and the small area analysis

Sponsoring innovation by making geospatial data available to start-ups

Underpinning these investments with a long-term business model



Thank you for attention!

Pavel Ivancenco
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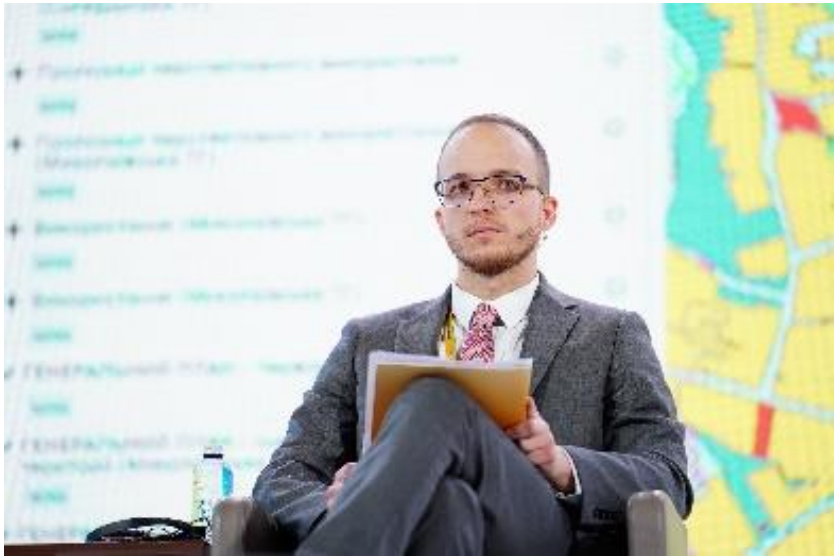
IGIF Implementation in Ukraine: Challenges, Results and Perspectives

Dmytro Makarenko, Research Institute for Geodesy and Cartography, Ukraine



Dmytro Makarenko is an international relations specialist with over 10 - year experience in various governmental positions in Ukraine.

During 2014 – 2020, he was working at the State Service of Ukraine for Geodesy, Cartography and Cadastre. In 2020, Dmytro joined a team of NSDI developers at Research Institute of Geodesy and Cartography, to support ongoing geospatial process in the country. In this capacity, he is engaged in the Norwegian funded project in Ukraine supporting implementation of the IGIF in Ukraine.

Lastly, Dmytro Makarenko discussed the challenges, results and perspectives of IGIF implementation in Ukraine. He described 18 years of history in trying to get the NSDI implemented and the two IGIF baseline assessments completed in Ukraine in 2019 and 2021, both giving different results particularly in the data pathway.

He described the key findings from the baseline assessment in the light of significant NSDI progress over the last 2 years but raised concerns over sustainability. He stressed the need to simplify the topic and to have clear examples of cross sector benefits.

Most importantly, he argued that a champion is essential if an action plan is actually going to be implemented. Reflecting on the NSDI history in Ukraine, Dmytro also offered that sustained communications and evidence of progress were fundamental in keeping NSDI moving forward.

IGIF IMPLEMENTATION IN UKRAINE CHALLENGES, RESULTS AND PERSPECTIVES

Dmytro Makarenko
Scientific & Research Institute of Geodesy and Cartography
IGIF Consultant at Norway ”Maps for good land governance Project”
NSDI Advisor at USAID Agro Program

PLAN OF THE PRESENTATION

1. Ukrainian NSDI context: why the progress was slow so far?
2. The first IGIF assessment of Ukraine: comparing two approaches
3. IGIF score: which is the strongest and weakest from the community and stakeholders
4. Challenges and and key findings from the baseline report
5. The 2-years leapfrog in NSDI development – what does it mean for Ukraine?
6. Vision of the geodata holders: interview results
7. Current action plans, suggestions and recommendations

UKRAINIAN NSDI CONTEXT: WHY THE PROGRESS WAS SLOW

18 years NSDI initiatives development

The first fundamental concepts on NSDI had been developed even before the INSPIRE directive was adopted

4 attempts of draft law adoption

“Nothing personal”. Mostly due to political instability on the highest level

Low awareness

about NSDI topic on the high political level

”Social” initiatives clearly were more sensitive to the potential electorate

No political drivers

to take the NSDI initiative on the top priority

Absence of the political will for the Land Reform finalization. The initiation of the decentralization reform in 2015

THE FIRST IGIF ASSESSMENT OF UKRAINE

INTEGRATED GEOSPATIAL INFORMATION FRAMEWORK

A STRATEGIC GUIDE TO DEVELOP AND STRENGTHEN NATIONAL GEOSPATIAL INFORMATION MANAGEMENT

At 8th UN-GGIM meeting in **August 2018** part 1 of IGIF **"Overarching Strategic Framework"** was adopted

Well received by the Ukrainian geospatial community, but with no clear vision, knowledge and expectation of the final goal

2019 – the first, trial or "internal" IGIF assessment done, but with limited stakeholders (StateGeoCadastre, State Enterprises and several most active NSDI SubGroup members)

The most frequent objections:

"Why do we need that IGIF methodology?"

"We have everything (strategy, draft law, etc) in place"

"Who will do that?"

"Let's put the score higher"

"Why you are trying to blame me?"

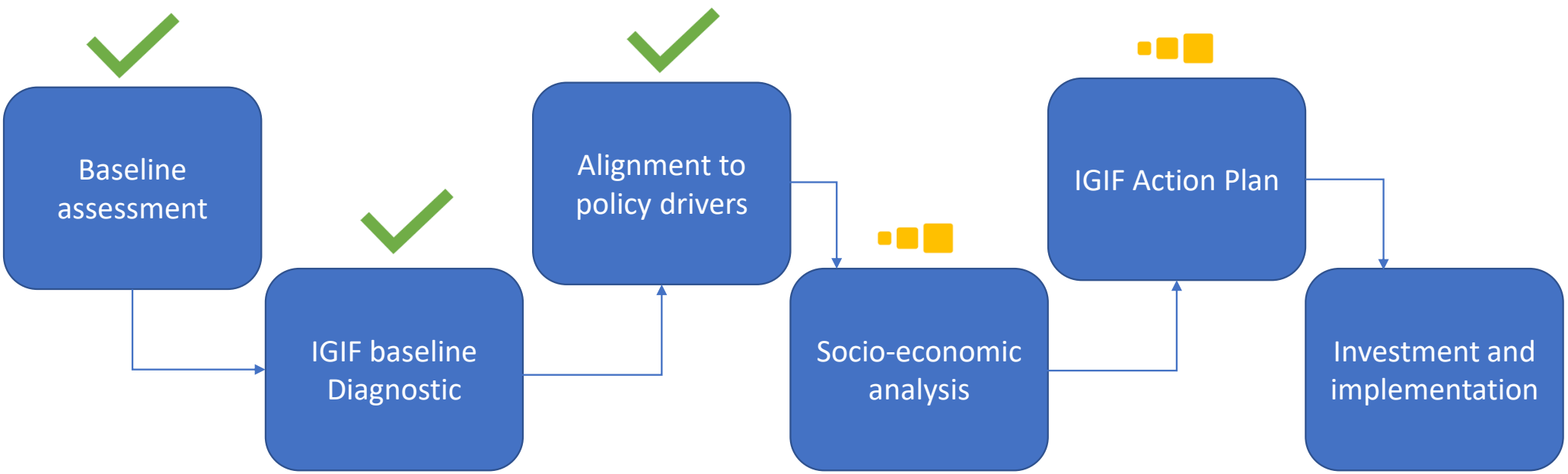
Why should I care if that is not in place?

THE SECOND IGIF ASSESSMENT OF UKRAINE

- Is supported within the Norwegian “Maps for good land governance project” during the 2021 year (Feb-Dec)
- Is being completed according to the WB methodology

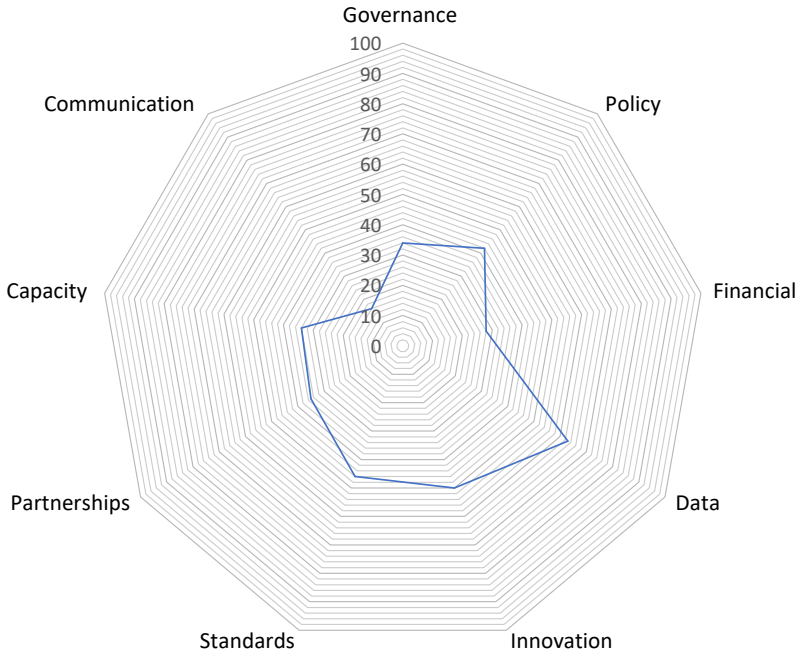
Kartverket

NORWEGIAN MINISTRY OF FOREIGN AFFAIRS



IGIF Results 2019

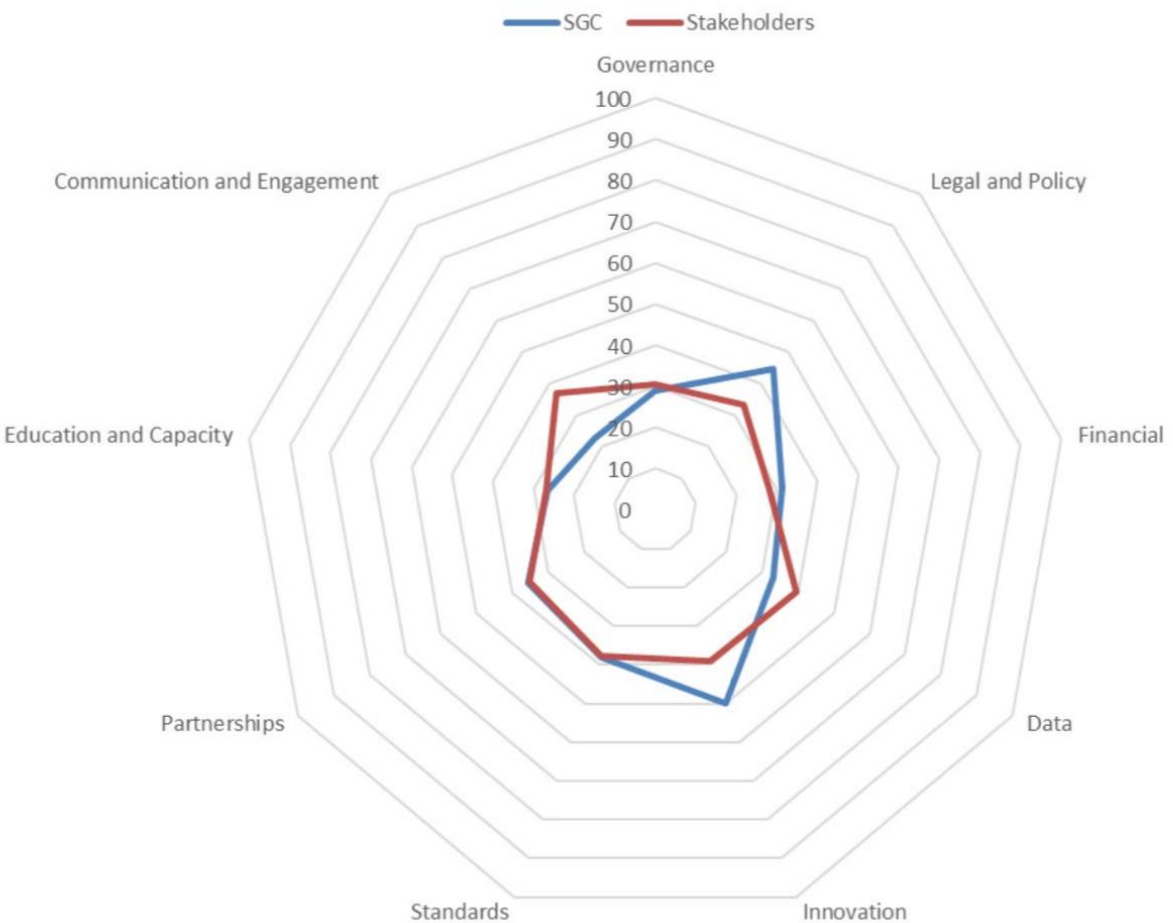
Total score 39



IGIF Results 2021

Total score 35

IGIF SCORE: THE ASSESSMENT FROM THE STAKEHOLDERS



Assessment from the stakeholders is different – it indicates that **they are lacking the comprehensive information about what NSDI is and what is the key goal of NSDI**

Communication was scored more, most likely, due to the vision on behalf of the organization of the stakeholders

IGIF SCORE: THE STRONGEST AND THE WEAKEST PATHWAYS

Innovations

Digitalization if one of the key national priorities

Standards

Developed but hardly accessible and understandable

Policy and legal

Almost all necessary legal acts are in force

VS.

Communication

Data holders are moving independently, without having information about the final goal

Capacity

Lack of patience to push the process and keep it live

Governance

Working groups should exist and be productive

KEY FINDINGS FROM THE IGIF ASSESSMENT

Governance and Institutions

+ Huge high level support from the high level officials
- No coordination unit for project management of implementation

Policy and Legal

+ Adoption of main legal documents – the Law and NSDI Order
- Overlapping mandates between some authorities

Financial

+ There is an announced readiness to secure and allocate the funds
- Still no significant national-wide work hasn't been financed

Data

+ Well-developed by all stakeholders
- "Departmental" approach with no sharing

Innovation

+ Strong support and focus on e-solution from the government
- Overall digitalization is not have a clear connection to the NSDI

KEY FINDINGS FROM THE IGIF ASSESSMENT

Standards

+ The value and importance of standards is well recognized
- Poor understanding of the technical standard language

Partnership

+ The cooperation between state and academic sector is productive and also supported by international assistance
- There is a room for improvement in relationship between state and private sectors

Capacity and education

+ High level of education and vision for the life-long programs
- Lack of support for the professional development by government agencies

Communication and engagement

+ Open dialogue with high-level officials about the NSDI
- Lack of communication strategy

Національна інфраструктура геопросторових даних

TWO-YEARS LEAPFROG FROM UKRAINE

https://nsdi.gov.ua/

708 data sets are available at the pilot project geoportal

111 data sets are available for downloading in vector form

657 data sets are available for reviewing

28 national level

35 regional level

644 local level

KEY MESSAGES FROM THE INTERVIEWS

«Duplicating the data on central and municipal level»

«Paper form data restrain the development of NSDI»

«Hardware and capacity challenges»

«Strong necessity of a single address registry and topographic map 10k»

KEY MESSAGES FROM THE INTERVIEWS

«Data exchange is not effective and sufficient enough»

«Development of cadasters on local level is a train for development the NSDI at the moment»

«No system of monitoring of the fundamental data»

«Need a proper access to the Public cadastral map»

CHALLENGE

1st meeting of NSDI Council

SUSTAINABILITY IS ONE OF MAIN CHALLENGES TO KEEP THE PROCESS OF NSDI DEVELOPMENT STABLE

2nd meeting of NSDI Council

CONCLUSIONS AND RECOMMENDATIONS

- **Significant progress of Ukraine for the past two years demonstrated that NSDI topic is on the top agenda**
- **It is still needed to “simplify” the topic and give certain and clear examples of the benefits for each sector**
- **Even when having the best action plan ever – the most important thing is to have an active “promoter”**
- **Without sustained communication and evidence of progress you will start again from the beginning each time**

THANK YOU FOR ATTENTION!

ANY QUESTIONS?

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