Agenţia Relaţii Funciare şi Cadastru a Republicii Moldova

INTEGRATED GEOSPATIAL INFORMATION FRAMEWORK

MOLDOVA

Geospatial Alignment to Policy Drivers

Kartverket

consultingwhere
Maximising the value of location information

AGENTIA RELAȚII FUNCIARE ȘI CADASTRU
REPUBLICA MOLDOVA

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ABBREVIATIONS

ALRC	Agency for Land Relations and Cadastre of Moldova
CORS	Continually Operating Reference System
GAPD	Geospatial Alignment to Policy Drivers
GDP	Gross Domestic Product
GIS	Geographical Information System
GNSS	Global Navigation Satellite System
IGIF	Integrated Geospatial Information Framework
INSPIRE	Infrastructure for Spatial Information in Europe
NSDI	National Spatial Data Infrastructure
SDG	Sustainable Development Goal(s)
SDI	Spatial Data Infrastructure
ToR	Terms of Reference
UN-GGIM	United Nations Global Geoinformation Information Management
WB	World Bank

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PREFACE

The world is experiencing a fourth industrial revolution built upon the internet and a comprehensive data infrastructure of fundamental datasets1. The term infrastructure is used here in the same sense as the road network is part of the fundamental infrastructure required to support transportation.

To help achieve this transition, many countries are building national data infrastructures. For instance, the Netherlands has been at the forefront of recognizing that integrating authoritative key data registers, such as buildings, addresses and ownership, into a coherent data infrastructure will, not only make Government more cost-effective, but will also make the interaction for citizens and businesses with Government quicker and more efficient2 and allow the private sector to derive benefits from new services.

One of the primary components of a data infrastructure is the location of a nation's assets, including land, natural resources, and the built environment to allow these assets to be managed more effectively in the context of development planning and climate change mitigation, for example. This is because "everything happens somewhere" and without knowledge of location (geospatial position3), decision making on many matters of national importance is significantly impaired.

The term Spatial Data Infrastructure (SDI) has historically focused on the collection of data and the implementation of technologies. The IGIF provides guidance on how to extend the scope of SDI to cover the governance, policy, financial, capacity and engagement processes necessary to collect, maintain, integrate, and share geospatial information, through all levels of government and society.

In August 2020, the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) adopted the Integrated Geospatial Information Framework (IGIF), which provides the strategic guidance that enables sub-national or national-specific Action Plans to be prepared and implemented to strengthen integrated information management.

The IGIF aims to assist countries (including city and regional governments) to move towards e-economies, e-services, and e-commerce. Delivering socio-economic value by improving services to citizens, enhancing evidence-based government decision making processes, creating new job opportunities, facilitating private sector economic growth, and taking practical actions to achieve a digital transformation. Through these means, IGIF will help to bridge the geospatial digital divide between developed and developing countries and to support the 2030 Agenda for Sustainable Development.

IGIF Structure

The IGIF comprises of three (3) parts as separate, but connected, documents:

- **Part 1:** Overarching Strategic Framework presents a forward-looking Framework built on national needs and circumstances, focusing on policy, perspectives, and elements of geospatial information. It sets the context of 'why' geospatial information management is a critical element of national social, economic, and environmental development.

[1] United Nations GGIM Fundamental Geospatial Data Themes: https://ggim.un.org/documents/E-C20-2018-7-Add_1-Global-fundamental-geospatial-data-themes.pdf

[2] https://business.gov.nl/regulation/addresses-and-buildings-key-geo-register/

[3] These terms are used in different geographies and contexts and are regarded here as interchangeable.

- **Part 2:** Implementation Guide is the detailed document that provides the 'what', the specific guidance and actions to be taken in implementing the Framework. The aim is to provide guidance for governments to establish 'nationally' integrated geospatial information frameworks in such a way that transformational, albeit staged, change is enabled, visible and sustainable.
- **Part 3:** Country-level Action Plans will provide templates and guides to operationalize the Framework in a national and sub-national context. Providing the 'how, when and who' approach, this document will assist countries to prepare and implement their own country-level Action Plans taking into consideration national circumstances and priorities.

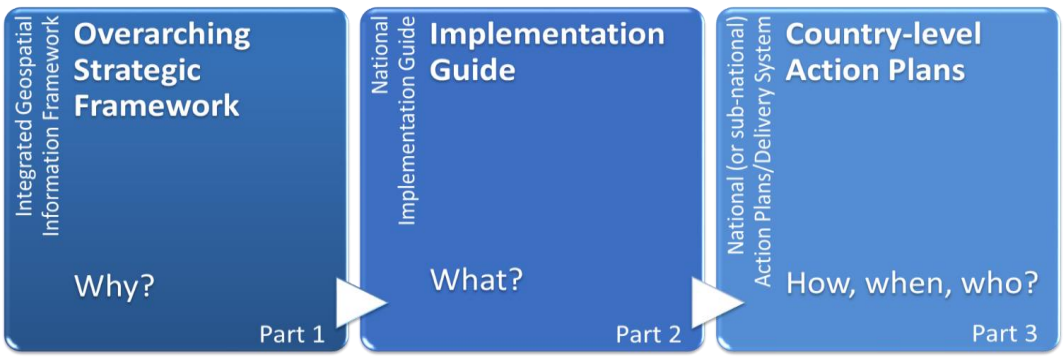

Figure 1: The 3-component documents of the Integrated Geospatial Information Framework

World Bank IGIF Implementation Methodology

The World Bank Group has established an IGIF Implementation Methodology and corresponding analytical toolkit to support the use of the IGIF and incrementally create SDIs customized to specific countries and priorities. The graphic below illustrates the sequence and relationship of these analytical tools used to arrive at the implementation of the SDI. The symbology shows the analytical tools (in orange), key inputs (in blue), the IGIF in purple, outcomes (in green) and uses arrows to different types of information flows.

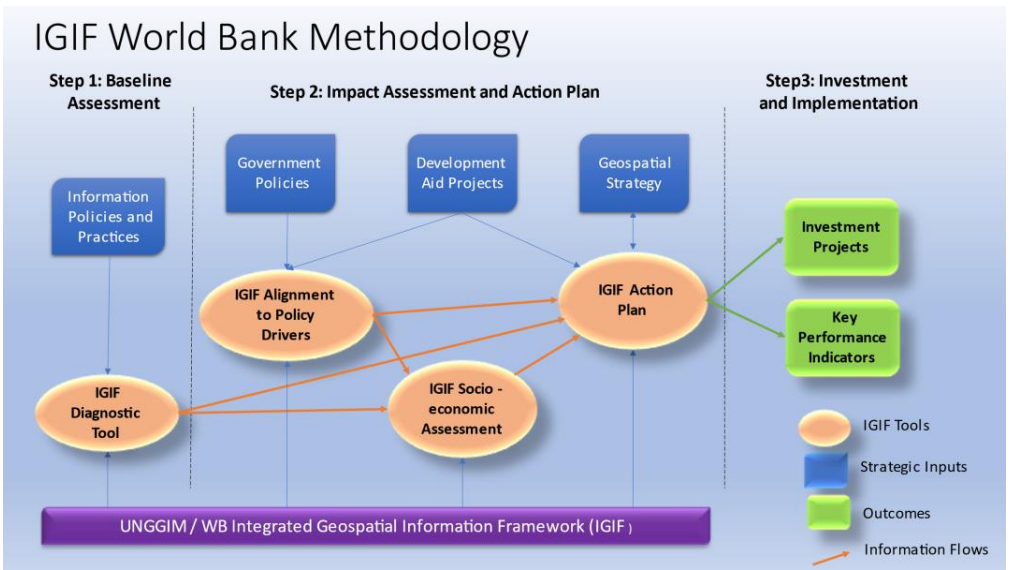

Figure 2: World Bank IGIF Implementation Methodology

In summary, this methodology has been applied as follows:

Step 1: Baseline Assessment

A single integrated tool is used for this purpose:

Analytical Tool 1 – IGIF Baseline Diagnostic Tool (DT): this provides an assessment of the "as is" position of geospatial information management in the country, structured around the nine IGIF pathways, including governance, policy, financial, human capacity, and technical perspectives. The output forms a baseline for the next steps.

Step 2: Impact Assessment and Action Plan

Three tools are used to build a prioritized, cost-justified roadmap for strengthening integrated geospatial information management:

Analytical Tool 2.1 – IGIF Alignment to Government Policy Drivers: this tool is used to align the Government's strategic objectives and international commitments to specific spatial use cases (applications) and then prioritizes them based on how well they support and accelerate achieving these strategic objectives.

Analytical Tool 2.2 – IGIF Socio-Economic Impact Assessment: this tool delivers an assessment of the socio-economic business case for investment in an SDI from both qualitative and quantitative perspectives. It is informed by the outputs from the previous two tools outlined above.

Analytical Tool 2.3 – IGIF Action Plan: this tool builds on the previous deliverables to create or update a high-level geospatial strategy and a corresponding costed plan roadmap for SDI enhancements, presented as a series of interdependent policy interventions and implementation projects.

Step 3: Investment and Implementation

Once the Action Plan has been approved in terms of scope, investment plan and priorities, then work will commence to identify sources of government and international funding. Individual actions may also need to be specified in greater detail to support implementation planning and the definition of Key Performance Indicators (KPIs) to monitor and evaluate implementation.

These steps must be delivered within a recognized project management methodology that provides proper governance and incorporates transparency and accountability for all tasks and outcomes.

CONTENTS

1. CONTEXT

Purpose

The purpose of this Geospatial Alignment to Policy Drivers (GAPD) Report is to provide a summary of:

(i) key reference policy documents that have, or will, influence the implementation of the National SDI

(ii) a summary of key use cases that will make use of the SDI, and

(iii) a schedule of the key stakeholders whose support for the implementation of the SDI will be a prerequisite for the success of the project.

The report provides a means of aligning the Governments policy objectives and international commitments to specific use cases based on the use and application of geospatial data which is a goal of the implementation of a National SDI. The GAPD report is an intermediate deliverable and will contribute to the IGIF Socio-economic Impact Assessment and the development of the IGIF Action Plan

Audience

The primary audience for this report is the stakeholder group who contributed to the assessment of the current state of the SDI and who will contribute to its implementation.

Why this report is being written?

As described in the Introduction, the Integrated Geospatial Information Framework (IGIF) is a United Nations (UN) endorsed Framework developed to support the development of national infrastructures for geospatial information management in developing countries. The framework aims to assist countries to move towards e-economies, e-service, e-commerce, and other services to improve services to citizens in support of the implementation of national strategic priorities together with the 2030 agenda for sustainable development.

Since 2006 the Norwegian Mapping Authority has been working with the government of Moldova through its cooperation partner the Agency for Land Relations and Cadastre (ALRC). ALRC is the coordinating authority for the National SDI and is responsible for implementing policy. This current engagement has been initiated by Kartverket. Through engagement with ALRC the objective is to provide support to Moldova with the implementation of its IGIF.

Terminology

There are many terms within the scope of legislation and governance that vary between different jurisdictions. Unless otherwise stated, the following definitions are adopted:

Policy - a set of principles of what to do in defined situations that has been agreed by the Government or organisation

Strategy - a plan of action designed to achieve a long-term or overall aim

Instrument – a formal or legal written document

Program – an endorsed Government Program for the implementation of one or more policies through a series of one or more plans. It may or may not include costs, responsibilities, and budgets. It is not unusual for a Program to express or amend strategy or even to lay out policy

Brief Country Description

The Republic of Moldova is a land-locked country in Eastern Europe situated between Romania (to the West) and Ukraine (to the East). The country has a total area of approximately 34 thousand square km with a population of approximately 3.5 million[4]. Although the urban population is less than half of the total population, Moldova enjoys an extremely high literacy rate, the most recent estimate being 99.4% of the population.

Moldova became independent in 1991 and, since 2009, the country has been governed by a series of pro-European ruling coalitions. The government is a parliamentary republic, and the Executive comprises a Head of State (President), a Head of Government (currently the Acting Prime Minister), and a Cabinet. The administration of the country is via three municipalities (first level administrative areas), 32 rayons5 (second level administrative areas), and 2 autonomous regions.

The economy relies heavily on the agricultural sector but has some natural resources including lignite, phosphorites, gypsum, and limestone. With few natural energy resources, Moldova imports almost all of its energy supplies from Russia and Ukraine and has an objective of connecting with the European power grid by 2022. Stronger integration with Europe is a stated goal of the government and this has resulted in some market-oriented progress. Moldova has experienced economic growth since 2017, largely driven by increased consumption, increased revenue from agricultural exports, and improved tax collection[6].

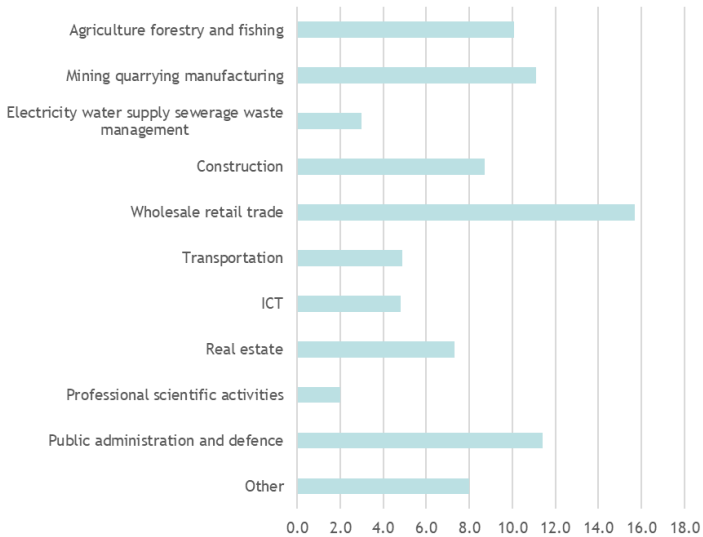

Figure 2: Main economic activities in GDP terms[7]:

During 2014, Moldova signed an Association Agreement (AA) and a Free Trade Agreement (DCFTA[8]) with the European Union (EU) connecting Moldovan products to this market. The EU AA/DCFTA has contributed to significant growth in Moldova's exports to the EU and in recent years, the EU purchased over 65% of Moldova's exports[9].

[4] https://www.cia.gov/the-world-factbook/static/9aab5d68865c8b061952a3dc63ac3a69/MD-summary.pdf
[5] translated as referring to districts or departments
[6] https://www.cia.gov/the-world-factbook/countries/moldova/#economy
[7] Anuarul Statistic al Republicii Moldova, 2020 https://statistica.gov.md/pageview.php?l=en&id=2193&idc=263
[8] Deep and Comprehensive Free Trade Agreement
[9] http://eubam.org/wp-content/uploads/2017/10/Pisar_1-2.pdf

One outcome of the DCFTA was the redrafting of the Country's Customs legislation and procedures in line with EU standards and to align with the EU's Union Customs Code. This has reduced business costs, boosted competitiveness, and has raised Moldova's ranking in the World Bank's Ease of Doing Business index and, although this has deteriorated marginally over the past 18 months (47 to 48) the DCFTA has resulted in a significant improvement to the 'doing business' indicators and reflects a regulatory environment that has become conducive to business operation together with stronger protections of property rights[10].

EU integration prospects have been driving the governments' policy reform agenda since 2009 and these developing links with the EU have been a significant contributing factor in the progress of the various policies supporting the development of the geospatial landscape in Moldova and has been one of the drivers behind the development of its National SDI.

Recent, current, and proposed SDI-related activity

The use and application of geospatial information is not a recent activity to Moldova. A driver for much of this was the need for land reform following independence. To facilitate this a government entity, the Agency for Land Relations and Cadastre (ALRC) was established in 1994. The primary role of ALRC is the development and promotion of state policy and strategy in the field of land administration with responsibilities including, land registration, cadastre, geodesy, topographic mapping, thematic mapping, aerial photography, imagery, and the implementation of the National SDI[11].

In 1997 – 2006, much progress was reported with the land privatisation process with support from the WB and other donors. The stated development goal of this support was to achieve economic growth supported by the functioning land market and the assistance from Norway has contributed to improvement of public services providing open access to geospatial data on the Internet.

In terms of support towards the implementation of a National SDI Moldova has benefited from strong relationships with a number of strategic partners including assistance from the World Bank, which has supported integration with the EU INSPIRE Geoportal, capacity building, the development of standards.

Assistance from the Norwegian Government, through the Norwegian Mapping Authority, which has had a strong relationship with ALRC since 2006, provided support for the implementation of various geospatial projects, including:

- Ortho-imagery and Digital Terrain Modell;
- The development of a GNSS Positioning Service (MoldPOS);
- The development of a property information system (MoldLIS);
- Production of a digital topographic basemap – a first up-to-date map since 1980s, as well as
- Current direct support to the implementation of the National SDI.

Assistance through EU Twinning project for the development of NSDI, which has provided support for improvements with spatial data services based on EU standards, guidance on updates to the National SDI legal framework, developing standardised network services for sharing of spatial data, and capacity

[10] https://tradingeconomics.com/moldova/ease-of-doing-business#:~:text=Ease%20of%20Doing%20Business%20in%20Moldova%20is%20expected%20to%20reach,according%20to%20our%20econometric%20models.
[11] http://www.arfc.gov.md/

building associated with the National SDI. For details on this and other donor activities associated with this, (see Ovdii & Busch, 2020) [12]

In parallel with the activities outlined in this section a parallel activity by a team representing EU ENI 2020 (referred to as Twinning project MD 16 ENI OT 01 19) has been undertaking a series of missions with ALRC with the objective of identifying improvements to Spatial Data Services in Moldova based on EU standards.

Structure

Section 2 of the report provides a brief description of the GAPD analysis. Section 3 provides summaries of a number of key policy documents and the relevance of these within the context of the National SDI and the use of geospatial information. Section 4 provides a summary of key use cases, i.e. potential business processes for which the SDI could potentially be used and provide value. Section 5 provides a schedule of the key stakeholders, and section 6 outlines conclusions and next steps. A key reference document for this report is the Baseline Assessment Report reference 'Moldova IGIF Baseline Assessment Report. The GAPD report will contribute to the Socio-economic Impact Assessment and the Action Plan.

[12] Ovdii M, Busch E, Implementation of the Integrated Geospatial Information Framework in Moldova; 2020 World Bank Conference on Land and Poverty, The World Bank, Washington, 2020;

2. PURPOSE

Overview

The report outlines a series of policy areas (themes) that the Action Plan needs to be able to support. This is not intended to be a complete catalogue of potential use cases that could be influenced by the implementation of the National SDI.

The report also identifies the spatial use cases that, from discussions with the ALRC and other stakeholders, together with experience gained on similar engagements, provide an assessment of areas, which may provide the most likely socio-economic impact.

The report also lists the major stakeholders and their contribution and influence on the likely success of the NSDI initiative.

The GAPD report contributes directly into both the socio-economic benefits analysis and the IGIF Action Plan for Moldova.

Organization

The analysis has been built up in three parts:

Part 1: Reference document review: this stage assembles Government policy and associated strategic statements, International commitments, and other reference materials from relevant planned or on-going development projects. It identifies a number of key policy areas where the National SDI is likely to have a positive impact on implementation of policies or international commitments. Relevant to the selection of policy themes are:

a) achievability within the timeframe for implementation and,

b) alignment with sponsor's business entry point(s), such as efficient land administration and land registration, rural and urban development, and improvements in agricultural methods.

The IGIF refers to the applicability in some cases of a "topic-focused approach" for reasons of simplicity and the ability to rapidly demonstrate results[13].

Part 2: Geospatial use cases: the use cases are described to identify how each would advance the relevant thematic policy areas identified in Part 1.

Part 3: Characteristics of the key stakeholders: this includes the likely influence of these organizations on the development of the NSDI.

[13] IGIF Part 2 (Page 9): http://ggim.un.org/meetings/GGIM-committee/8th-Session/documents/Part%202-IGIF-Implementation-Guide-Consultation-Draft%2014Jun2018.pdf

3. REFERENCE DOCUMENT REVIEW

The table below provides a summary of a number of Government policies and International commitments, which may be relevant to the implementation of the National SDI and considered in the preparation of this report. The aspiration of the Government is continued closer integration with Europe with membership of the EU being the key objective. The goal of EU integration seeks to develop the economy, provide improved education and social protection for citizens, an effective governance model, and a safe and healthy environment. For example, see Council of Europe Action Plan for Moldova 2021 – 2024[14] and the National Development Strategy 2030[15]. Many of the policies described are motivated and influenced by this desire for closer integration with Europe.

National Policies and Strategies

Table 1 presents the results of the review under the following headings:

Policy Theme/Title – the key policy areas to which the reference documents refer.

Summary description of Policy or Strategy – contains the title of the reference document, where the source data can be referenced (typically a url link), together with a brief description of the primary relevant policies.

Importance of Geospatial technologies – outlines how geospatial technologies can support implementation.

[14] https://cancelaria.gov.md/en/content/national-development-strategy-moldova-2030-parliament
[15] https://search.coe.int/cm/Pages/result_details.aspx?ObjectID=0900001680a029ad

Table 1: Reference Documents

Ref	Policy Theme Title	Summary Description of Policy or Strategy	Importance of Geospatial Technologies
RD1	**Public Administration; Environment;**	Moldova National Development Strategy 2030 The source document is available here... (in Romanian). The notes are taken from various summary documents including https://cancelaria.gov.md/en/content/national-development-strategy-moldova-2030-parliament The National Development Strategy 2030 is the main strategic planning document for Moldova. This represents the strategic reference document for all policy documents at national, regional, and local level. The strategy identifies long-term development priorities, focusing on improving the quality of citizens lives. It identifies 4 development 'pillars': (1) sustainable and inclusive economy, with the aim of improving access to infrastructure, public utilities and living conditions (safe water and sewerage), as well as increasing income from sustainable sources and mitigating economic inequalities (with specific references to the agricultural sector and increasing agricultural productivity (in the FAO summary to the agricultural sector); (2) human and social capital to provide for quality education and an inclusive social protection system; (3) making public institutions more efficient and providing effective governance; and (4) ensuring a safe and healthy environment.	*Geospatial information supports an integrated approach to decision-making for planning and development through visualization techniques and integration of geography and statistics.*
RD2	**Health; Education; Infrastructure;**	Council of Europe Action Plan for Moldova 2021 – 2024 https://search.coe.int/cm/Pages/result_details.aspx?ObjectID=0900001680a029ad The Council of Europe Action Plan for the Republic of Moldova 2021-2024 is a strategic programming instrument that aims to bring Moldova's legislation, institutions and practice further into line with European standards in the areas of human rights, the rule of law and democracy. The Action Plan takes into account the National Development Strategy 2030. The Action Plan aims to support Moldova in its efforts to implement the UN Sustainable Development Goals (SDG's)[16], specifically Goals 3 – health; 4 -	*Geospatial analysis can support the planning and development of health and education facilities, aligned with population densities and forecasts of population growth. Integrating cadastral data with land use and zoning data will provide more informed development planning (SDG's 3 and 4).*

[16] https://sdgs.un.org/goals

		education; 5 - gender equality; 10 - reduced inequalities; 11 - sustainable cities and communities; and 16 - strong institutions.	*Improved planning and design of urban areas and communities through the use of geospatial data (SDG 11)*
RD3	**Environment and Agriculture;**	Environmental Strategy for the Years 2014-2023 http://green.gov.md/pageview.php?l=en&idc=41&t=/Regulatory-framework (Romanian) Environmental Strategy (Green Government) http://green.gov.md/pageview.php?l=en&idc=41&t=/Regulatory-framework Elaboration of the environmental strategy has been dictated by the political drive for European integration. Environmental protection is a national priority as it directly concerns the conditions and health of the population as well as capacities for sustainable development, which implies maintaining the quality of the main components of the environment (air, water, soil, flora, and fauna). The strategy covers soil, air and water pollution, management of forests, improvements to agricultural practice, renewable energy (energy insecurity) and the impact on climate change. The strategy seeks to establish objectives for the protection of the environment, the implementation of which will lead to the sustainable development of the country.	*An effective NSDI (including the NSDI Law) will strongly facilitate the drive to achieve the set environmental strategic targets*
RD4	**Digital Economy**	Strategy for an Inclusive, Sustainable, and Digital Economy until 2030 (SEIDD 2030) https://mei.gov.md/en/content/national-development-strategy-moldova-2030 The National Development Strategy 2030 indicates the priority areas for the long-term sustainable development and represents the strategic reference document for all other policy documents. SEIDD 2030 provides policy options, targets, and indicators with a greater level of detail for the following 3 strategic objectives (1) increasing revenues from sustainable sources; (2) increased citizen access to infrastructure, public utilities, and improved living conditions; and (3) improving working conditions and reducing informal employment. SEIDD 2030 will comply with the established requirements regarding the content / structure of strategies, and will target the following areas of Government: economy, employment, innovation, regional development/urbanism, agriculture and rural development, energy efficiency, transport and infrastructure, consumer protection;	*An effective NSDI will support the areas targeted by the digital economy strategy including planning, urban development, rural transformation, transport and infrastructure, and energy efficiency using mapping, imagery, address records, land ownership records, and other public registers*
RD5	**Digital Transformation**	Modernization of Government Services https://www.egov.md/en/content/modernization-government-services	*At the national level, the integration of public registers will*

		Rationalization of public services and simplification of the institutional framework; Re-engineering and optimization of workflows, e services to citizens; Digitization and automation of workflows (including inter-institutional data exchange); More delivery channels, integrated, citizen-centred service delivery; Develop geospatial services on geographic names, addresses, and administrative boundaries. Further development of the geoportal platforms across Government agencies to provide and share geospatial information. Accelerating Digital Transformation in the Public Sector https://www.md.undp.org/content/moldova/en/home/projects/digital-moldova.html This project aims to improve access to public services through digital transformation of government processes and business model(s) and promote innovation. Objectives include supporting changes in the organizational and innovation culture in the public and private sectors to help achieve the Sustainable Development Agenda and national targets; contribute towards streamlining innovation through engaging with the ongoing and prospective projects; and supporting the digitalization of Moldova that will contribute to improved governance by increasing the efficiency and effectiveness of government processes, increasing transparency and public access to governmental information; and improving the innovative delivery of public services.	*be integrated into a unified system and coordinated with other policy documents. Geospatial information provides a means of consistent integration.* *The digital transformation policy explicitly promotes innovation which lends itself to the innovative use of geospatial techniques. The relevant geospatial services can best be delivered using SDI*
RD6	**Rural Development and Natural Resource Management;**	National Strategy for Agriculture and Rural Development (SNDAR) 2021-2030 https://www.ifad.org/en/web/operations/w/country/moldova See also http://news.gov.md/en/news/2021/02/19/21001287 IFAD strategic opportunities programme (COSOP 2019 - 2024) has two strategic objectives (1) improve the capacity of agricultural producers through investments in rural infrastructure, and (2) promote rural transformation through improved access to financial services and markets. IFAD supports the National Development Strategy 'Moldova 2030' and investments are aligned with the UN's SDG's and specifically will contribute to SDG 1 - no poverty;	*Geospatial information supports the decision-making for agricultural, forestry and rural development purposes using analytics tools and visualization techniques. Moreover, geospatial information also supports the integration of geography and statistics.*

		SDG 2 – zero hunger; SDG 5 – gender equality; SDG 6 – clean water and sanitation; and SDG 13 – climate action See also the strategic opportunities programme 2019 – 2024 https://webapps.ifad.org/members/eb/124/docs/EB-2018-124-R-22.pdf?attach=1 for information on increasing tax base with improved farming methods and rural development	
RD7	**Water Supply and Sanitation;**	Strategy for Water Supply and Sanitation 2014-2028 https://www.euwipluseast.eu/images/2020/11/PDF/MD_Gov-WSS-Strategy-AP_EN.pdf see also RESOLUTION NO. 442 of 1 July 2020 - Amendments to Government Resolution No. 199/2014 on Approval of the Water Supply and Sanitation Strategy (2014-2028) The Action Plan for 2020-2024 for the Water Supply and Sanitation Strategy for 2014-2030 includes the following objectives (1) improve the management of public water supply and sanitation services; (2) plan and develop public water supply and sanitation systems to expand access of the population to high-quality services; and (3) harmonize the national water supply and sanitation legislation with the Community standards and international commitments.	*Geospatial data will support investigations into existing water supplies; water (and wastewater) management; planning and development of water supply with forecast of population growth and urban development*
RD8	**Energy**	Energy Strategy of the Republic of Moldova to 2030 https://www.spcr.cz/files/Moldova_EnStrategy_draft_12_full_310512.pdf The UN SDG 7 has its main focus on the sustainable production and use of energy. This is reflected in National Development Strategy. The strategy identifies the goal of creating a competitive and efficient energy sector that will provide citizens and businesses with quality energy resources, respond to the dependency on imports of energy resources, and the impact of the energy sector impact on climate change. The Energy strategy of Moldova for up to 2030 is the main planning document. The Strategy has many goals including the aim to ensure the natural gas supply safety, by diversifying the supply routes and sources, of carrier types (conventional, non-conventional gas, LNG) and of storage facilities, together with strengthening Moldova's role of natural gas transmission corridor. It also looks to strengthen Moldova's role of power transmission corridor, by building new interconnectors, connected to the ENTSO-E[17]	*Use of geospatial data in planning, developing, and maintaining energy distribution and supply infrastructure and the development of intelligent energy networks. Using topographic and climate data identify suitable sources for renewable energy.*

[17] European Network of Transmission System Operators for Electricity (see *https://www.entsoe.eu/about/*)

		According to the Energy Strategy a national priority is to ensure an enhanced use of renewable sources. The Strategy also aims to improve energy efficiency through the introduction of the intelligent electricity networks and the development of environmentally friendly renewable energy sources.	
RD9	**Environment**	Adapting the 2030 Agenda on Sustainable Development to the Context of the Republic of Moldova https://statistica.gov.md/public/files/SDG/docs/Targets_ONU_EN.pdf Provides an assessment of the alignment of sustainable development goals to national policies A summary of the findings was that 11% of SDGs targets are aligned to the national policy papers, and do not require any adjustments to be taken over; 57% of SDG's are partially aligned to the national policy papers, only a few components of these targets are included, therefore, the relevant national strategies should be adjusted to better reflect the spirit and details of SDGs targets; 32% of SDG targets are not reflected in the national policy papers. Most of aligned targets relate to the "environment" sector, while most of misaligned ones relate to "governance and human rights" sector. For each SDG the paper provides a summary of priority policy areas, key responsible agencies, and relevant national policy documents. Of specific interest to the NSDI the paper identifies a number of goals including Goal 2 – sustainable agriculture; Goal 3 – health; Goal 6 – management of water; Goal 7 – energy; Goal 9 – infrastructure; Goal 11 – 'smart' cities; Goal 15 – forest management etc.	*Improved rural, forestry and agricultural methods can contribute to more sustainable agriculture, which would provide environmental benefits, for example through the use precision farming methods using geospatial data. Alongside economic considerations, precision farming also promises substantial environmental benefits and is actively promoted by the EC.*

International Commitments

International commitments will place certain obligations on the two parties, and, in terms of Moldova, these obligations may then by incorporated into policy documents prepared by the Government. For example, in technical terms and with specific reference to the implementation of a National SDI, the IGIF framework developed by the United Nations is a key reference; in commercial and economic terms the agreements with the EU (AA and DCFTA see section 1.5) are key influencers of Government policy; and in environmental and sustainable development terms the UN's Agenda for Sustainable Development heavily influences many of the key Government policies.

Table 2 International Commitments

Ref	Policy Theme Title	Summary Description of Policy or Strategy	Importance of Geospatial Technologies
IC1	**UN Global Geospatial Information Management**[18]	The Committee of Experts on Global Geospatial Information Management at its tenth session adopted the Implementation Guide of the Integrated Geospatial Information Framework (IGIF) as a means of strengthening national geospatial information management arrangements within and across Member States at the institutional level and supporting the implementation of the Sustainable Development Goals, especially in developing countries. In 2016, the Economic and Social Council (ECOSOC) adopted a draft resolution (E/2016/L.28) entitled "Strengthening institutional arrangements on geospatial information management". The resolution acknowledges that UN-GGIM is well placed to continue to contribute to the work of the United Nations, especially in the context of assisting Member States to implement the 2030 Agenda for Sustainable Development and the Paris Agreement on Climate Change.	The Integrated Geospatial Information Framework (IGIF) provides a basis and guide for developing, integrating, strengthening and maximizing geospatial information management and related resources
IC2	**Transforming our World: 2030 Agenda for Sustainable Development**[19]	This Agenda is described as a plan of action for the people, planet and prosperity. The agenda refers to 17 Sustainable Development Goals (and 169 targets). They seek to build on the Millennium Development Goals. They are integrated and seek to balance the three dimensions of sustainable development: economic, social, and environmental	Many of the SDG's will depend on geospatial data
IC3	**United Nations Framework**	The UN Framework Convention on Climate Change (UNFCC) commonly referred to as the Paris Agreement, deals with greenhouse-gas-emissions	A number of the IGIF fundamental data themes will contribute to monitoring

[18] https://ggim.un.org/IGIF/
[19] https://sdgs.un.org/goals

	Convention on Climate Change[20]	mitigation, adaptation, and finance, and it was signed in 2016. Under this agreement, each country must determine, plan, and regularly report on the contribution that it undertakes to mitigate global warming. To achieve this long-term temperature goal, countries aim to reach global peaking of greenhouse gas emissions as soon as possible to achieve a climate neutral world by mid-century	climate change and the impact of urban and rural development on the environment. These will include Buildings and Settlements, Land Cover and Land Use, Population Distribution, Transport Networks, Water.
IC4	**INSPIRE Directive 2007/2/EC**[21]	The INSPIRE (Infrastructure for Spatial Information in Europe) directive was approved by the European Council and Parliament in 2007. It aims to benefit European public authorities (and others) by making available geographic information, which is relevant, harmonised and of high quality that supports policies and activities impacting the environment. INSPIRE also requires the adoption of 'Implementing Rules' which set out how the system will operate.	The EU INSPIRE directive requires EU States to share 34 different spatial data themes through a network of 'services'
IC5	**Development of Pan-European Geospatial Datasets**[22]	The objectives of developing Pan-European Geospatial Datasets are to provide a consolidated and consistent overview of European Commission needs, set out crosscutting and domain specific requirements of the European Commission for EU wide geospatial information from Member States, support Sustainable Development and other EU policies and to seek support from Member States to obtain more and better-quality data.	The priority Geospatial Datasets for the European Commission's needs were identified as: Buildings (BU), Cadastral Parcels (CP), Addresses (AD), Administrative Units (AU), Statistical Units (SU), Transport Networks (TN), Land Parcel Information System (LPIS) Postal Codes (PC) [and Utility and Governmental Services US]
IC6	**EU-Moldova Association Agreement** [23]	The Association Agreement between the European Union Member States and Moldova was signed in June 2014 and has been in full effect since July 2016.Since the Agreement's provisional application since September 2014 Moldova has benefitted from a Deep and Comprehensive Free Trade Agreement (DCFTA) with the EU. This preferential trade system has allowed Moldova to benefit from reduced or eliminated tariffs for its goods, an increased services market and better investment conditions. One of the key objectives of the Association is to promote economic	This Agreement is supported by the Moldova 2030 Development Plan which includes promoting citizen access to infrastructure, public utilities, sustainable agriculture, and a healthy and safe environment, all of which is supported by a NSDI

[20] https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement
[21] https://inspire.ec.europa.eu/
[22] https://eurogeographics.org/wp-content/uploads/2018/05/20100128_EuroGeographics-Data-Policy_V1.1.pdf
[23] https://ec.europa.eu/trade/policy/countries-and-regions/countries/moldova/index_en.htm

		integration between the two Parties by increasing Moldova's participation in EU policies, programmes, and agencies.	
IC7	**United Nations 'The Future We Want'** [24]	The Future We Want is the declaration on sustainable development and a green economy adopted at the UN Conference on Sustainable Development in Rio in 2012. The Declaration includes broad sustainability objectives within themes of Poverty Eradication, Food Security and Sustainable Agriculture, Energy, Sustainable Transport, Sustainable Cities, Health and Population and Promoting Full and Productive Employment. It calls for the adoption of agreed Sustainable Development Goals. It also calls for a UN resolution strengthening and consolidating UNEP both financially and institutionally so that it can better disseminate environmental information and provide capacity building for countries. Elaboration of an Environmental Strategy has been dictated by the desire by Moldova for European integration, for national legislation alignment to the provisions of EU directives, and by promoting green economy as described in the 'Green Government' National Environmental Strategy	The Green Government strategy will have a dependence on a number of geospatial data themes including Land cover, Agriculture and Aquaculture facilities, Land use, Soils etc.
IC8	**Norwegian Mapping Authority: Maps for Sustainable Development MDA 19/0001**	The agreement describes the most recent collaboration between ALRC and the Norwegian Mapping Authority. Predicted outcomes include new nationwide digital mapping, which will support improved governance, economic growth, the implementation of the UN SDGs; improved land management and land use planning. This is one of many areas of collaboration between the two organisations. Norway has been supporting Moldova with various mapping and related projects since 2006.	The Mapping project is a key component to the development of the National SDI which is being implemented and will provide Moldova with a framework to meet the requirements of the EU INSPIRE Directive

[24] https://sustainabledevelopment.un.org/content/documents/733FutureWeWant.pdf

4. KEY GEOSPATIAL USE CASES FOR THEMATIC POLICY AREAS

The policy documents outline in section 3 Part 1 have been used to assess and inform the geospatial use cases which may be of relevance to the various policy objectives and strategies developed by the Government. The use cases are summarised in the table below with a more detailed description available in Appendix A. The use cases will inform the socio-economic impact assessment and will be further developed through the stakeholder interviews and analysis of relevant documents and reports.

The complete use case schedule (Appendix A) provides the following information, with a summary presented in the table below:

Ref (Reference) - links the use case back to the policy or strategy themes.

Geospatial Use Case Description – a short title for the use case.

Priority – in advance of the socio-economic impact assessment this is a high-level categorization, based on an initial understanding of the potential benefits. This may be revised following the stakeholder interviews.

Lead Agency – the government agency that would be expected to lead the development of the investment analysis and reasoning. Some initiatives may embrace more than one Agency. Appendix A will contain details of supporting Agencies where this information is available

Supporting Agencies – other organizations that would be expected to support this process.

Primary outcomes – outcomes in this context are the types of benefits that may reasonably be expected to be realized as a result of investing in implementation of the use case.

Outcome Categories – this is based on the WB scheme of classifying types of benefits.

Clarifying Description (if required) – gives more detail of the use case expressed in terms of its potential application.

Principle data types and sources - outlines the key data needed for the application to deliver useful results.

Duplicate data or systems – identifies known alternative types or sources of data required to implement the use case. This may represent where potential savings may be realized by rationalizing data capture and maintenance by creating a single master source.

Additional Information – consultant comments, references to case studies, and further information which may be useful to subsequent development of the use case under the socio-economic impact assessment and action plan.

Table 3: Geospatial Use Cases

Ref	Use Case Description	Qualitative or Quantitative	Priority	Lead Agency	Primary Outcomes
Economic and Urban Planning					
P1	**Support to the Moldova 2030 Development Strategy**	Qualitative	M	Ministry of Agriculture, Regional Development, and Environment	All investment programs are subject to scrutiny for fitness for purpose and align with and support the National Development Plans. GIS provides evidence to support priority assessment. However, the quality of the data they receive is variable and is not constantly updated. The NSDI program would provide better quality and more complete spatial data.
P2	**Improved Urban Planning**: through availability of enhance spatial data	Qualitative	M	Ministry of Agriculture, Regional Development, and Environment	Better and more efficient management of urban migration and rural development leading to improved decision making on public insfrastructure and service provision. In terms of 3D city models this can assist the assessment of the 'right to light' issue (Healthy environment pillar identified in the 2030 Development Strategy). Access to daylight and sunlight are critical considerations when planning building development. The situation is particularly complex in dense urban areas. 3D modelling can support improved development.
P3	**National Statistical Analysis**: Census planning, execution and analysis.	Qualitative	VH	National Bureau of Statistics	Population census and statistical analysis using geospatial analysis techniques; improved definition of enumeration districts based on population surveys and analysis linked to address location.
Land Management and Administration					
LR1	**Land Registration and Property Valuation**	Quantitative	VH	Public Services Agency	Completion of the Land Registration and Property Valuation project. The objective of this (second) WB project is to complete the registration of 95% of all unregistered properties (private and public) through a process of systematic registration. Target end date for this is 2024.

LR2	**Land Reform** - to reduce the number of land related disputes	Quantitative	L	Public Services Agency	The availability of complete cadastral surveys linked to ownership registration will reduce number of cases coming to court by providing greater certainty through improve evidence location.
LR3	**Increase in Land Fees and Property Taxation**	Quantitative	VH	Public Services Agency	Associated with LR1. Currently the absence of a complete register of land may result in an inefficient system and that tax revenues may be incomplete. Completing the land registration and property valuation project, together with data sharing with other agencies, will allow for more precise valuation and improved assessment of the tax due on a land parcel for all types of rights.
Surveying					
S1	**Enhanced Continuously Operating Reference Stations (CORS) Network**	Quantitaive	M	ALRC	Decreasing the costs of land surveying. Reduced staffing and time to coordinate control points.
e-Government					
G1	**Integrated National Registers**: The ability to use gesopatial information to synchronise administrative registers e.g. cadastre, identity cards, property register, address register	Qualitative	H	Public Services Agency + e-Gov Agency	Reduction in the time citizens have to spend to make administrative enquires and changes. Reduction in business costs seeking to reconcile addressing recrods Government efficiency from de-duplicating update processes. Joining-up key initiatives by joining-up key registers.
G2	**Online Digital Services** -	Qualitative	H	Public Services Agency +	Moving people to using online government services. Key systems exchange, integrated gateway for payment, single signoff

	available to citizens and businesses			e-Gov Agency	forauthetication, digital document exchange between government entities, cloud based geo information system, and citizen notification system.
G3	**NSDI part of National information infrastructure (NII).**	Qualitative	H	ALRC	NSDI data being recognised as an integral part of the NII will enable more informed decisions to be made across the public sector. These decisions may be as varied as cutting journey times by selecting better routes through to be able to optimising sites for new schools to locations of students.
Transport					
T1	**Transport Planning**: Pedestrian, rail, road - volume and optimization of integrated transport links for maximised efficiency.	Quantitative - mix of benefits transfer and primary evidence	M	Minsitry of Economy and Infrastructure (includes Ministry of Transport)	Objectives of the transport strategy: - creating an environment for the transport and logistics sector to facilitate the sustainable economic development (of Moldova); - ensuring a framework that allows each type of transport to contribute to the economic development (oriented towards the development of foreign trade); - ensuring the transparency of decisions on infrastructure investments and expenditures.
T2	**Street Works Management** - the ability to collate requests for digging up roads from utlilties and constructors to minimise disruption to traffic flows.	Qualitative - no strong evidence for benefits transfer	L	Congress of Local Authorities	Reduced traffic jams - savings in time for commuters, reduced costs for constructors - with forward planning they can lay multiple cables into a single trench.
T4	**Feasibility Studies** and design for New	Quantitative - evidence from other	L	Minsitry of Economy and Infrastructure	Costs of survey work associated with design can be reduced by use of existing basemap data. Also, when surveys are carried out the survey

	Road and Rail schemes	developing countries			data produced can be curated within NSDI to reduce cost of new mapping and made available to others doing subsequent development.
T6	**Transport Road Safety and Maintenance**: Traffic Enforcement.	Qualitative	L	Congress of Local Authorities (CALM)	Improve Safety by better design of road infrastructure and traffic calming measures, such as road humps.
Disaster Risk Management and Emergency Services					
ES1	**Disaster Management** - use of geospatial data to aid preparation, response and recovery.	Quantitative	H	General Inspectorate for Emergency Situations (part of Min of Internal Affairs)	The monetary benefits accruing from the more effective response to disasters are substantial, the social benefits also substantial. Geospatial data can also assist in disaster risk reduction in simulation studies. Maintain Atlas of Risks (see SP7.6).
ES3	**Faster Emergency Response**: Integrate address data with cadastre, household data, building footprints, address text datasets and address verification and validation services.	Quantitative - benefits transfer from Alpha Beta Study	L	General Inspectorate for Emergency Situations	Increased response speed by police, fire and ambulance directly related to decrease in deaths and serious injuries.

Agriculture, Forestry and Fishing					
Ag1	**Increased Crop Production/Sustainable Agriculture/Precision farming**	Quantitative	H	Min of Agriculture, Regional Development, and Environment	Increase crop yields and resilience to adverse climatic events. The use of geospatial data allows the sector to efficiently plan crop production that is more suited to local conditions. Having access to satellite data that can be refreshed on a regular basis gives the ability to monitor vegetation growth patterns and vegetation stress developing at an early stage.
Ag2	**Agricultural Land Management/Land Consolidation** - equitable allocation of subsidies	Quantitative	H	Min of Agriculture, Regional Development, and Environment	Government provides subsidies to farmers to help encourage production to address issues of food security. It is widely believed that these subsidies are not directed most efficiently and there is mis-allocation resulting from fraud and lack of data to support applications. Land consolidation (to resolve historic issues of land fragmentation) - see also LR1.
Ag4	**Forestry** - forest management (planning and harvesting); rural development; sustainable forest development;	Quantitaive	M	Moldsilva (see also Institute for Forest Research and Planning (ICAS) at icas.com.md	Improved development, promotion and implementation of forest policy, alignment with international trends of socio-economic sustainable development, rural development, rural employment, sustainable forestry, forests and wildlife protection; maintenance and conservation of biodiversity; contributing to forestry research and education. REDD+ serves as a framework through which developing countries are rewarded financially for reducing greenhouse gas emissions or increasing the removal of carbon dioxide from the atmosphere through practices on forest land.
Health and Social Care					
H1	**Mapping accessibility of primary health care facilities**	Qualitative	M	Ministry of Health, Labour, and Social Protection	Improves access to primary healthcare Model access to primary healthcare Reduce healthcare inequalities
H2	**Patient Pathways** – eg tracing COVID-19	Qualitative	M	Ministry of Health, Labour, and Social Protection	Virus tracker system allowing data of confirmed COVID-19 patients to be gathered and analyzed. System has helped speed up the contact tracing process and stem the spread of pandemic. See Moldova covid dashboard….

					https://gismoldova.maps.arcgis.com/apps/opsdashboard/index.html#/d274da857ed345efa66e1fbc959b021b
Natural Resources					
NR2	**Geological Mapping**	Quantitative	L	Agency for Geology and Mineral Resources	Move away from paper maps to digital mapping/digitise paper records (see SP4.13). Maintenance of the State Geological Register; see http://agrm.gov.md/en/despre-noi/functiile-si-sarcini-en for more information.... Digital field collection of geological data, the development of a national geologic data model and 3D geological data. A move to full 3D geological data in the future will also accrue benefits. 3D models have diversified the application and impact of National geological survey capability. Models have directly led to new groundwater abstractions (important given the risk of drought in Moldova) and flood management schemes, and are critical components of decision-making tools for regulating waste disposal (see EC WFD) and exploration.
Water and Hydrology					
WH1	**Improved Water/Hydrology management**	Qualitative	VH	Moldova Waters Agency	Key objective is the fulfilment of the requirements of the European Water Framework Directive (WFD). Primat outcome is clean water (see https://ec.europa.eu/environment/water/water-framework/info/intro_en.htm).
WH2	**Improved Water Asset management**	Quantitative	M	Ministry of Agriculture, Regional Development, and Environment	Understanding the locations of water supply pipes and sewerage systems is the starting point to improve many aspects of public health.The NSDI program will provide the opportunity to enhance the availability of current geospatial data enabling digitalization to be more accurate and converted more quickly, making it accessibale and cost-effective.
WH3	**Tracking Water loss and leak management** – reduced costs and monitoring of water usage	Quantitative	M	Moldova Waters Agency	Drought is an issue in Moldova. A fully digital network will enable engineers using geospatial analysis to locate where water pressure is lower than expected given usage, allowing them to find where water loss is occurring. Further, when leaks and consequent flood incidents happen engineers will be able to more rapidly determine how to isolate pipe sections and stop the flow.
WH4	**Payment of Bills** – increase of	Quantitaive	L	State Fiscal Service	Water utility agencies often have difficulty delivering bills and collecting revenue. As piped water networks are extended to individual properties,

	revenue by systematic identification of households/businesses and matching against register of payments				then a national street addressing system can be become essential for this purpose.
Energy					
EE1	**Renewable Energy** – reduced dependence on energy imports; site selection	Qualitative	H	Energy Efficiency Agency	Moldova's energy sector relies heavily on imports of electricity and gas. The country produces only about 20 percent of its annual electricity consumption from natural gas-fired combined heat and electricity power plants. Moldova is therefore very dependent on energy supplies from neighbouring countries. Investing in renewable energy would help reduce some of this dependency…... Improved site selection using multi-criteria analysis based on using a wide range of geospatial data.
Envionment and Tourism					
Env1	**Environmental Impact Assessment** - more cost-effective using SDI.	Qualitative	L	Ministry of Agriculture, Regional Development, and Environment	Manage environmental monitoring with up to date accurate geospatial data.
Env3	**Air Pollution-** visualisation and analysis of levels of pollution to sources	Qualitative	L	Ministry of Agriculture, Regional Development, and Environment	Moldova has poor air quality (see reference), improved analysis of sources can help to identify and influence the behaviours of polluters.
Local Government					
LG1	**Local Decision Making** - developing local government	Qualitative	M	Congress of Local Authorities of	Opportunity for enhanced development governance, management, planning, and provision of citizen services. Integrated development planning with neighbouring administrative areas. Geospatial representation of planning information will provide the opportunity for

	processes and authority by providing access to geospatial information to support local governance			Moldova (CALM)	community engagement and more informed decision-making including urban and rural planning and development.
Commercial					
Com 2	**Banking** – more informed decision making for online transactions	Quantitative	H	Public Services Agency	National scope; Register of Addresses as one of the core datasets; Reduced fraud Increased speed of Decisions Reduced costs
Cross-Cutting					
M1	**Open Data Policy**	Quantitative	H	ALRC	Reduced effort on creating and maintaining datasets and contribution to innovation of the country.
M2	**Addressing**	Quantitative	H	Public Services Agency	National register of Addresses Linking key registers Efficiency for Government Improved ease of business Supports citizen focused consumer apps, such as home delivery.
M4	**Satellite Imagery**	Quantitative	M	ALRC	National access to Earth Observation data. Increasing quality and quatity of imagery available via Data Cube initiatives. Includes high resolution, ESA Sentinel 2 data and Landsat. SDI provides an opportunity to ensure data is shared effectively with other government agencies
M5	**Digital Transformation**	Quantitative	H	E-Government Agency	Digitisation of mapping records
M6	**Modernisation of Public Services** - modernisation and improved public services	Quantitative	H	E-Government Agency	Modernise public services through re-engineering and digitization; increased efficiency by ensuring data exchange between public service providers; diversify access channels to public services (including locating Public Service Delivery centres).

M7	**Government 'Collaborative' Data Acquisition Program**	Quantitative	M	ALRC	Reduce the cost of data aquisition and avoid data duplication; Each year government agencies purchase or collect a wide range of data and geospatial information products, such as aerial photography, satellite imagery and topographic mapping surveys. A National Data Acquisition Program can reduce costs associated with the capture, storage and management of geospatial information by procuring data once and then used many times and by many agencies. This can reduce costs where data capture duplication is prevalent because greater value can be leveraged through economies of scale and consolidated spending.

5. STAKEHOLDER CHARACTERISTICS

The following section lists the stakeholders who have been invited to participate in the socio-economic impact assessment and who will also be involved in the future development of the National SDI. The table provides a summary of some of the key characteristics for each of the stakeholders including

Key Stakeholder – name of organization.

Abbreviation – the acronym for the relevant organization used elsewhere in the study.

Functions – a brief description of the stakeholder functions most relevant to the development and implementation of the SDI.

Centralized / Decentralized – these characteristics will help the team to assess the feasibility of certain strategic options, for example data sharing. This assessment by the project team is for instance if a distributed approach to data sharing may be impeded by low bandwidth or intermittent availability of suitable internet access.

Influence – an examination and assessment of the current level of capabilities, commitment, existing data assets and user needs. This will be useful in assessing the possible influence of the individual stakeholders in the future development of the SDI.

Table 4: Stakeholder Characteristics

Key Stakeholder	Abbreviation	Functions	Centralized / Decentralized	Influence
Agency for Land Relations and Cadastre https://www.arfc.gov.md/	ALRC	The functions of ALRC include Geodesy, National Mapping, Geoinformatics, Cadastre, Real Estate Valuation, and Land Reform programs including the implementation of the state policy in the field of land relations and their alignment to European standards; ALRC is the coordinating authority for the National SDI and is responsible for implementing associated government policy.	Centralized	ALRC is the coordinating authority for the National SDI and is responsible for implementing government policy
Public Services Agency http://www.asp.gov.md/	PSA	The functions of PSA include the management and administration of state registers and information systems including population, legal entities, vehicles, driver license, cadastre and registration of property rights and transactions, administrative units, and addresses.		PSA/Cadastral Department is responsible for the creation and maintenance of the real estate cadastre, execution of cadastral and real estate evaluation works, administration of the real estate cadastre central database, and registration of real estate and ownership rights. Cadastre Department is responsible for the Administrative units, Cadastral parcels, Buildings, Addresses A new solution for parcels, property rights and valuation (MoldLIS) was developed with the support from Norway. http://cadastru.md/ecadastru/

Ministry of Agriculture, Regional Development, and Environment https://www.madrm.gov.md/	MARDE	As the title suggests the functions of MARDE include Agriculture (subsidies, project support, policy, regulatory control); Regional Development (planning, rural development, international collaboration, urban revitalization), and Environment (policy and monitoring, water resource management, waste management, environmental impact assessments).	Centralized	MARDE is responsible for the implementation of the national strategy for agriculture and rural development. MARDE is a central public authority responsible for implementing government policy
Ministry of Economy and Infrastructure https://mei.gov.md/en	MEI	Functions include economic policy, economic forecasting and modelling, energy policy (including energy efficiency and the use of renewable energy resources), transport (including the development of transport strategy.	Centralized	Will have influence in regard to the socio-economic impact assessment and its potential influence on economic policy MEI is a central public authority responsible for implementing government policy.
E-Government Agency www.egov.md	e-Gov	The primary function of e-Gov is the implementation of the governments digital transformation strategy including the modernization of public services through their digitization, improving governance through data exchange between agencies and public service institutions (use of MConnect), and improved access channels to public services (through the use of government portals and, offline, through the provision of centres for the provision of public services, this in association with PSA)	Centralized	E-Gov will influence strategy for government portals and interoperability. Has limited capacity in GIS applications.
Congress of Local Authorities of Moldova https://www.calm.md/	CALM	The function of CALM is to represent all local authorities, providing a centre for information, training, expertise,	De-centralized	Influence of the individual LPA's in terms of promotion of recognized good practice; will

(representing individual Local Public Authorities (LPA's)s including the cities of Chisinau and Orghei)		experience, and provision of other services to support the local public authorities (LPA's)		influence the implementation of the SDI at the LPA level
Orghei City Hall https://Orghei.md/index.php?l=en	Orghei	The functions of Orghei cover all the aspects of local government administration including the provision of public services, urban regeneration, infrastructure maintenance. The economy is represented by three key sectors: industry, transportation, and other public services (telecommunications, electricity and thermal energy, water supply and sanitation, waste management)	Centralized	Orghei is prominent in the use and application of geospatial information and citizen engagement. This experience can help influence other LPA's regarding the potential benefits for SDI for local administrative purposes
Chisinau City Hall	Chisinau	The functions of Chisinau cover all the aspects of local government administration (see also CALM and Orghei)	Centralized	Chisinau as the capital city is also important in the use and application of geospatial information and citizen engagement. This experience can help to influence other LPA's regarding the potential benefits for SDI for local administrative purposes
General Inspectorate for Emergency Situations https://www.mai.gov.md/	GIES	GEIS is part of the Ministry of Internal Affairs, and its functions include all elements of emergency and disaster response (natural and manmade) including epidemics, weather phenomena (floods, droughts, storms, earthquakes) accidents and emergencies, transport accidents, emergency rescue, fire, hazardous waste, and civil protection. The scope of GIES ranges from single one-	Centralized (coordination function) with de-centralized/regional offices	User of the NSDI GEIS has a WMS-service for data related to Exceptional Accidents and Incidents. The service is used internally only at present

		off events through local, territorial, national, and transboundary		
National Bureau of Statistics https://statistica.gov.md/index.php?l=en	NBS	NBS is the central administrative authority with the function of managing and coordinating all statistical activities. The bureau is responsible for approving the statistical methods and statistical indicators used and for monitoring alignment with international standards, especially those of the EU.	Centralized	NBS influence covers the development, production, dissemination, and coordination of all official statistics. The use of National statistical data will be a key contributor to the SDI
Energy Efficiency Agency https://www.aee.md/ro	EEA	EEA (part of the Ministry of Economy and Infrastructure) has a primary function of implementing state policy in the field of energy efficiency, energy performance of buildings, capitalization of renewable energy sources, financing projects relating to energy efficiency and renewable energy sources	Centralized	Influential in the areas of environment and climate change
Military Topographic Service[25] https://www.army.md/	MoD	Part of the Ministry of Defence	Centralized	Influential for release of mapping and imagery data to business and citizens.
State Enterprise "Ingeocad" https://www.ingeocad.md/	INGEOCAD	Ingeocad is part of ALRC (one of 4 state enterprises within ALRC) which functions include Institute of Geodesy, Engineering Research and Cadastre (INGEOCAD) and is the leading state enterprise for geodetic, geological, topographic mapping and cartographic production. Ingeocad also provides engineering-geological and surveying/geodetic work for construction sites.	Centralized	Key agency for technical development of SDI, including national geoportal

[25] SEIA interview may not be possible for reasons of security

State Enterprise "The State Planning Institute for Land Management" https://ipot.md/en/about-us.html	IPOT	Institute for Land Management is part of ALRC (one of 4 state enterprises within ALRC) and has the primary function of regulating land ownership and monitoring of the land. Functions include land management services (including land consolidation projects; land monitoring, land inventory); cadastral services (including boundary/parcel demarcation, maintaining cadastral plans and records for property transactions); soil surveys; and surveying services (including large scale topographic surveys, engineering surveys for roads, railways, pipelines and other infrastructure.		Influential in the field providing public access to specific services/information, providing public access to information on land and property.
Ministry of Health, Labour, and Social Protection https://msmps.gov.md/en/	MoHLSP	The function of the MoHLSP is that of the central specialized agency responsible for the implementation of government policies in the fields of health, labour, equal opportunities, social protection, and demography.	Centralized (with local and regional offices)	The National Development Strategy (Moldova 2030) and the CoE Action Plan 2021-2024 both include specific references to SDG's which will fall under the remit of the MoHLP. MoHLSP will be influential in promoting these goals but has a limited capacity for GIS applications.
Ministry of Finance https://www.mf.gov.md/ro	MoF	The functions of the MoF includes budget development and approval, accounting and auditing of the public sector, management of the public finances, management of the public sector debt, and treasury functions such as forecasting and managing the state budget and the preparation and	Centralized	While not a direct user of any of the IGIF data themes MoF will be very influential in terms of contributing to, and promoting, the 'direct use values' which may be outputs from the SEIA analysis and

		publication of reports on the implementation and performance of the budget.		providing substance to the GDP impacts.
Moldsilva http://www.moldsilva.gov.md/?l=en	Moldsilva	The primary function of the Moldsilva agency is the central administration agency for state policy covering forestry (and hunting). The functions include the development, promotion and implementation of state policy in forestry and hunting, taking into account international trends of socio-economic sustainable development, rural development, rural employment, sustainable forestry, development, forests and wildlife protection, conservation of biodiversity, and forestry research and education.	De-centralized	Should be influential in the use of the SDI (and geospatial information) for the management of the state forests and wildlife management Good capabilities in GIS through ICAS.
State Enterprise "Forest Research and Development Institute" (see Moldsilva)	ICAS	ICAS functions include forest management (including disease monitoring), forest research, and forest design. ICAS is responsible for land cover and protected zones (forest fund and State-protected zones of the forest fund) datasets. ICAS is subordinate to Moldsilva.	Centralized	Influential and has good capabilities in GIS.
Agency for Geology and Mineral Resources http://agrm.gov.md/en/	AGRM	AGRM (part of the Ministry of Agriculture, Regional Development, and Environment) has, as its primary function, the use and protection of the subsoil; the management of mineral resources; regulation and management of mining and quarrying; monitoring of	Centralized	Influential in the area of Geology and Soils thematic data.

		groundwater quality, maintaining a record of mineral reserves (referred to as a cadastre of mineral deposits and reserves), geological exploration, geological research.		
S.E. State Road Administration https://www.asd.md/en/	SRA	Responsible for Roads data.	De-centralized	SPA has roads data in digital format and is willing to provide this data to the NSDI via ALRC.
SA Apa-Canal Chisinau https://www.acc.md/	ACC	Functions include Water Supply (domestic and industrial) including water capture, water treatment, water pumping, and managing the distribution networks; Public Sewerage including wastewater pumping and treatment; and public services for heating and hot water supply including thermal power plants, production of thermal energy, and electricity production.	De-centralized	Influential for utility mapping, asset management, and customer records.

6. CONCLUSIONS

The preparation of this GAPD report has primarily been a process of research and investigation, a desk exercise with limited direct involvement with the key stakeholders through workshops or equivalent. The exception to this has been the continued engagement with ALRC that has remained engaged throughout, provided input where necessary and responded to requests for assistance. ALRC has provided relevant documents, reports, advice, information, explanation and amplification of various reports. ALRC has provided guidance with the terms and terminology, which have been used to describe the role and responsibilities of individual stakeholders. ALRC has been particularly helpful in identifying and documenting the characteristics of the stakeholders whose contributions will be key to the SEIA study.

The development of the Baseline Assessment report[26] has also been extremely valuable in contributing to this report. The interviews with the stakeholders completed as part of the Baseline Assessment have provided much valuable reference information including identifying key stakeholders, understanding their potential contribution to the implementation of the SDI, and providing an initial assessment of their potential role and contribution to the socio-economic impact assessment work, which follows this study.

This report identifies the Government's key priorities regarding the implementation of the NSDI and is based on a review of geospatially related key policy documents and relevant international commitments. The core of this report is the reference documents, the use cases, and the stakeholder characteristics.

While the selection of some of national key policy documents was simple (for example EU and UN policy documents) some assumptions were made when selecting others and a key criterion for the selection of these other candidates was the potential positive impact of geospatial activity and input towards economic growth and improving the welfare of citizens.

Firstly, considering the reference documents outlined in section 3 we have the following observations:

- Central to the strategy of Government is the policy of EU integration and closer engagement with Europe. Closer integration with Europe is the goal, and this objective is recognized in many of the reference documents. A key policy document relating to European integration is the EU-Moldova Association Agreement. This Agreement highlights the need for reforms in democracy, the rule of law, human rights, good governance, a functioning market economy, and sustainable development and these themes are consistent across many of the reference documents referred to in the study.

- The key policies described in the reference documents are closely aligned with those of the UN and the Sustainable Development Goals.

- In addition, and of particular relevance to the implementation of the National SDI, are the more 'technical' policy documents relating to geospatial data. The implementation of the National SDI is based on INSPIRE[27]. This is recognised in the various technical strategy documents and provides for consistency in approach between the various Agencies. This consistency in approach will make spatial data more accessible and will promote cooperation and data sharing between agencies. Supporting this is the commitment to IGIF. IGIF is promoted through the UN-GGIM and is a framework for developing institutional

[26] Available on request by contacting ALRC

[27] https://inspire.ec.europa.eu/

arrangements for geospatial information management, especially in the context of assisting Governments to implement the 2030 agenda for sustainable development. In previous discussions with stakeholders, these goals are very well understood and have wide support.

In summary, the study found a great deal of consistency throughout the various reference documents both in terms of Policy and in terms of 'technical' Strategy. This consistency in approach will support the implementation of the SDI and will contribute to the development of a more sustainable society.

Secondly, considering the use cases described in section 4. Based on the policies described in the various reference documents, the study has used these to assess and inform the geospatial uses cases, which may be of relevance and provide support to the various policy objectives. The use cases cover a range of thematic areas including Land Management and Administration, Local Government, Urban Planning and Development, Agriculture/Forestry, Health and Social Care, e-Government Services, Transport, Water and Hydrology, Energy, Environment, and more generic uses cases such as Open Data, Addressing, and Digital Transformation. In general terms, the use cases have been aligned to a number of the key economic sectors (see Figure 2, page 9) and are consistent with the key policy documents in terms of how a National SDI could contribute to these various policies.

This report provides a summary of these candidate use cases. The use cases will help inform, and will contribute to the Socio-economic Impact Assessment. The use cases will be further investigated and developed through the stakeholder interviews together with analysis of relevant supporting documents and reports.

The final output from this study is the list of stakeholders. The list identifies many of the stakeholders, whose responsibilities include activities, which are considered likely to provide input to the Socio-economic Impact Assessment. The report describes the functions of the relevant agencies and provides an assessment of the likely influence of the agencies on the development of the NSDI.

The results show that numerous policy documents and international commitments can be relevant for the implementation of the National SDI. The results also indicate a good range of key thematic policy areas and associated economic sectors that could benefit from the continued development of the NSDI. If we consider the NSDI as a pyramid then the stakeholders provide the foundation, this foundation will support the use cases, and the use cases will support the implementation of the goals described in the various policy documents.

In summary, it is considered that Moldova has a strong basis for the implementation of the NSDI. There is a good legal framework, there is a very clear objective (EU integration), and there is a consistent approach across the various policy areas, supported by a stakeholder community whose geospatial activities are closely aligned to the various policy goals and objectives.