APPENDICES

STRATEGIC PATHWAY 3: FINANCIAL

APPENDIX 3.1: Example of IGIF 'Current and Desired Future' Dual-response survey

The example is forthcoming.

APPENDIX 3.2: Example of IGIF baseline survey

The example is forthcoming.

APPENDIX 3.3: Example of World Bank/FAO SDI diagnostic tool

The example is forthcoming.

APPENDIX 3.4: Example of a business model canvas

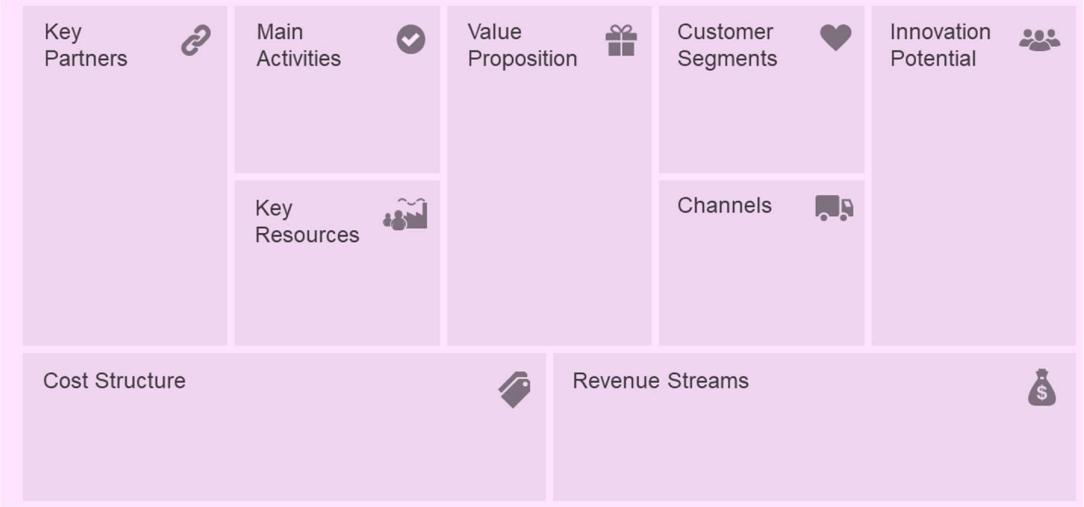
To assist countries in assessing their current business model and developing an enhanced or desired business model for integrated geospatial information management, a Business Model Canvas is helpful. The elements identified below are common to most business models and are applicable to a business model for the implementation of the United Nations Integrated Geospatial Information Framework.

The elements are:

- **Main Activities:** In terms of integrated geospatial information management, the main activities include the control of data production and maintenance; management of the information sharing and exchange (e.g. a geoportal), online orders and the distribution of the product; creation of a branding strategy; and the marketing and promotion of the geospatial data and information products and services.
- **Key Resources:** Are the most important assets needed to make a business model work. It is only through these resources that government, organizations, business and communities can generate value propositions and revenues. Key resources can be physical, financial, intellectual, or human.
- **Value Proposition:** This is the benefit that stakeholders and users (and customers) get from using geospatial information, products and services.
- **User Segments:** Relevant to product planning, development, marketing and delivery. It involves the division of the user (or customer) base into sectors, such as transport, health, education etc. and/or groups of individuals that are similar in specific ways, such as age, gender, interests and requirements.
- **Competition:** Who are the existing organizations active in the market, what are their strengths and weaknesses and how can you differentiate the products and services offered. Although they could, in the right circumstances be collaborators, as an example, both OpenStreetMap and Google may be considered as competitors.
- **Key Partners:** Refers to the relationships that government and organizations have with commercial, academic and community sectors that make the business model work. These can be the relationships with data suppliers, data creators, partners, and users etc.
- **Channels (to Market):** Refers to the chain of businesses or intermediaries through which a good or service passes until it reaches the end consumer or the final buyer. Distribution channels can include wholesalers, retailers, distributors, and even the internet.
- **Cost Structure:** Refers to the types and relative proportions of fixed and variable costs that government and organizations incur, and can be defined in smaller units, such as by product, service, product line, customer, division, or geographic region. It will be important to determine end-user charges for the use of government owned geospatial data, products or services, and specify the implications of the charging model to end-users. The cost structure may include:
    - **Open-access Model:** Universal free access.

- **Extract and Deliver Model**: A fee is charged to cover immediate service costs.
- **Subsidized Model:** Where a fee is charged, but falls under cost recovery or nominal cost recovery.
- **Cost Recovery Model:** That recovers all associated expenses or cost.
- **Freemium Model:** Where data is provided free of charge with a premium charged for value adding, such as advanced features and functionalities.
- **Full commercial Model:** Where the aim is to generate an appropriate return on investment and surpluses or profits.

- **Revenue Streams:** Refers to a source of revenue for government or an organization. A revenue stream is generally made up of either recurring revenue, transaction-based revenue, project revenue, or service revenue. In an 'open government' or 'open data' environment, the revenue stream typically refers to different types of taxes, levies, fees or charges that are either derived from, as an example, for-profit organizations or entities that use geospatial information, or taxes that are derived from using geospatial information, such as land and property tax revenues.
- **Innovation Potential:** Refers to enhancing value creation by making changes to an organization's operating model and its value proposition to users and or customers. For example, Government's shift to open data is often seen as a business model innovation.



Note:

This Business model has been adapted form that designed by: Business Model Foundry AG - the makers of Business Model Generation and Strategyzer See http://www.businessmodelgeneration.com

Appendix 3.5: Developing a business model for integrated geospatial information management – some considerations

Developing countries can develop new business models, replicating good and proven experiences from other countries, as well as lessons learned from more developed countries, when investing in integrated geospatial information management.

When developing a business model for implementation the United Nations Integrated Geospatial Information Framework nationally, considerations include:

- **Make the financial case:** Capitalizing on the benefits of geospatial information for new and improved government programs and services delivery, demonstrate the relevance of geospatial information while making the case for how geospatial information supports sustainability and improvement in social programs, environmental sustainability, grows economic activities and provides for the general well-being of its population.

- **Multi-stakeholder approach:** Opportunities for investment in a multi-stakeholder approach within government and with the private sector and the community. Collaboration with other government entities and different levels of government, as well as establishing business relationship with the private sector for specific products and services defines the stakeholders needed. Different stakeholders can invest in different facets of the national geospatial information management strategy (see SP1: Action 1.6.6);

- **Co-creation and start-ups:** Opportunities for co-creation of geospatial data and its maintenance with other organizations, including volunteers and citizen-science projects. There are also opportunities for using state-of-the-times start-up approaches to realize end user benefits quickly through continuous innovation. This approach to innovation by starting small while proving feasibility and viability could stimulate external interest in providing additional resources that may include development assistance grants;

- **Collaboration:** Opportunities for participation and mutual benefits with other government agencies and other levels of government, other organizations, businesses and community, as well as regional or cross-border collaboration, particularly in capacity and capability development. There are also opportunities for investment in service-based models (e.g. cloud computing and software as a service) including with the private technological providers;

- **Research institutions and centers of excellence:** Opportunities with universities and research institution, as well as centers of excellence that could serve as initial research, development and testing environments could spawn government support and eventual government adoption. This also could be an incubator and could also stimulate new business development interests;

Appendix 3.6: Examples of a geospatial program budget

A budget is a plan that is used to see and manage geospatial program funds (including possible revenues) and expenditures. Budgets that are designed as management tools are helpful toward achieving success of a geospatial program. Budgets that are high level without much detail are not very helpful in managing a geospatial program. The more detail, the greater the need to manage, monitor and report numbers. Too much detail and too frequent reporting can be counterproductive. Countries will need, depending on their fiscal policies and guidelines, to determine where the balance will be.

If this is a first attempt by a geospatial information management organization to plan, manage, control, and operate under a budget for a national geospatial program, organizing reports on a quarterly basis would be a good starting point, with managers providing and reviewing information contributing to the report on a monthly basis.

Creating the right categories to manage the budget is important. Too little detail does not provide enough information to support needed management decisions on spending. Too much detail is unnecessarily cumbersome. In starting out in budgeting a program, consider the examples below to determine the types and number of categories.

The example below shows a budget planning document that is used to help in estimating an annual budget. This form is helpful in getting started with estimating resources that reflect labor costs associated with geospatial activities. Information includes activities that the organization wants to track in terms of spending and resources, the number of full-time staff needed to conduct the work, identification of government or contractor staffing, the sub-organizational unit descriptor, the functions needed for the activity, and the fiscal years in which the activity is needed. The example shown is not comprehensive. It provides limited examples of activities and resources. A geospatial organization likely will have other functions and more staff to work on those tasks. This example is simply a guide on what can be considered in preparing a budget.

BUDGET PLANNING DOCUMENT

Activity Description	Quantity (number of staff)	Government or Contractor	Organizational Unit	Functions and Skill Set	Fiscal Years
Administrative and operational support and supervision	2.00	Government	Office No. 1	Administration, operations and project management.	FY 2021 – FY 2030
Manage collection and maintenance of addresses	4.00	Government	Office No. 1	Address completeness & quality	FY 2021 – FY 2030
Manage collection and maintenance of addresses	1.00	Contractor	Office No. 1	CAUS block identification, quality assurance	FY 2021 – FY 2030
Train Field Surveyors	1.00	Government	Office No. 7	Surveying functions and procedures, ability to conduct training	FY 2021 – FY 2025

Manage Field Surveying Support	2.00	Government	Office No. 7	Hiring practices, developing work assignments, or conducting field surveying	FY 2021 – FY 2025
Manage automation infrastructure	3.00	Government	Office No. 8	IT hardware management; manage software development	FY 2021 – FY 2030
IT Staff	4.00	Contractor	Office No. 8	Database management, software development	FY 2021 – FY 2030
Imagery acquisition	1.00	Government	Office No. 4	Research and acquire Imagery	FY 2021 – FY 2025
Imagery management	3.00	Government	Office No. 4	Imagery and imagery servers	FY 2021 - FY 2025
Grand Total					

Budget Summary Document: The example of a Budget Summary Document below is an illustration of a "made-up" budget for a geospatial information management organization. At a high level, it shows the total budget for a single fiscal year, the allocated amounts of funding based on sources of funding and a sample of spending breakdowns. While each country's budget circumstances will differ, the concept of accounting for estimated and fixed expenditures contributes to a well-managed national geospatial program.

Suggestions on calculating some of the estimates: The total estimates broken down by funds allocated to the geospatial information management organization and partners/stakeholders reflects the total amount requested for the annual budget. The sources of funding are estimates on what is expected, what has been committed by donors, and what funds may already exist from previous years. If a change occurs, for example, a donor country does not come through with funds for this current year, then significant adjustments must be made to the budget that includes reductions on expenses (and activities) to reflect the revised available budget. This is an example of why budget monitoring is critical.

Estimating the costs of labor -Full Time Equivalents (FTEs) – is not a precise exercise. Estimate the average salary of most employees. Err on estimating slightly higher (a minimum of 10%) and account for labor costs for managers, as they usually have higher salaries. Use the average amount and simply multiply by the estimated number of staff in the geospatial information management organization. From yearly experience, these numbers will become closer to dependable estimates over time. For purposes of the illustration below, a $2 per hour wage was used based on 2,000 work hours in a year. The example illustrates a significant dependence (50%) on development assistance and donor support. A national geospatial information management organization should not view development assistance and donor support as sustainable, that it will be available every year. Use of those funds should be planned carefully. Examples could include using a portion of the money to hire contract staff to supplement government employees to work on shorter term projects to their completion. Another partial use for donor funds is to have contracted companies provide products or services that have clear deliverables.

Other expenses that are included in the budget include expected costs such as space (facilities) and equipment, and IT purchases and maintenance as well as an allocation for replacing IT in a 5-10-year timeframe (these latter funds are "banked" so the expense in the budget is spread out over time and funds are available when needed). The last category focuses on employee related expenses beyond salaries. For example, health care, vacation time, pension fund, and other "overhead expenses" that cost money is accounted for. Other employee related expenses might include travel, training, and cash awards. While not everyone travels, for budget purposes, an amount is estimated for each employee to cover the organization's travel budget.

These categories are real examples but may not apply to a given country. As budgets are planned, the categories of where expenses are realized should fall into a specific accounting category. It is desirable to standardize categories based on experience so that analysis on spending as well as future planning are supported.

BUDGET SUMMARY DOCUMENT*

FY2021 BUDGET SUMMARY				
Geospatial Program	Dollars	%		
Geospatial Organization	$160,000	80.00%		
Allocated to Stakeholders (Sub-National Governments)	$40,000	20.00%		
Total Geospatial Operating Plan Budget	$200,000	100.00%		
Funding Sources	**Amount**	**Percentage**		
National Government (usually from taxation)	$100,000	50.00%		
Development Assistance/Donor Country	$100,000	50.00%		
Grand Total	**$200,000**	**100.00%**		

Cost Breakdown		**Total Full Time Equivalents (FTEs)**			
		Dollars	FTE Count		
FTE Funding		**$122,500**	**30.625**		

Contracts		**$40,000**			
	Geospatial Organization	$5,000			
	Donor Allocation	$35,000			
Other Objects (costs for equipment, and office space, IT, employee benefits)		**$37,500**			
	Space and Office Equipment	$6,500	*Space*	*$4,000*	
			Telecomm	*$500*	
			Cell Phone, Tablets	*$1,500*	
			Other Miscellaneous	*$500*	
	IT for Geospatial Program	$14,000			
			IT	*$7,000*	
			IT Reinvestment (IT replacement)	*$4,000*	
			HW/SW Maintenance	*$3,000*	
	Employee Costs and Benefits	$17,000			
			Travel	*$2,000*	
			Training	*$2,000*	
			Printing	*$2,000*	
			Pension and Cash Awards	*$11,000*	

**The categories and values used are illustrations and are not based on any actual budget. The budget categories and budget estimates will vary from country to country.*

10-Year Budget Estimation: It is recommended to plan and budget for future years so that leadership and managers understand the financial commitments to sustaining integrated geospatial information management. In the example below, a few high-level budget classes are proposed that summarize the funding needs and sources. Every organization must plan to improve over time. In the Development, Modernization and Enhancement class, the budget proposal shows an investment early in the decade which declines significantly in the fourth year as the lower numbers reflect maintenance of the earlier accomplishments.

The "Steady State" is expected in geospatial activities in order to maintain current capabilities throughout the decade. The increase from year to year reflects an expected rise in inflation of 3%. This rate will vary with each country and should be adjusted if economic conditions change. Donor funding in this example is assumed to have a 3-year commitment. In the fourth year, donor funding ceases (unless new agreements are established). As an illustration, in the sixth year, additional activities are planned which accounts for the proposed increase in the funding request.

In this example 10-year estimate, it is clear to quickly get an impression about what general level of funding is planned and expected over an extended period. This type of estimate is very helpful in promoting the geospatial program, exhibiting open and transparent plans and expectations, and communicates a need for leadership support in funding geospatial activities within the country.

10-YEAR BUDGET ESTIMATION WITH TEMPORARY DONOR SUPPORT AND PLANNED INCREASE IN INVESTMENT

Geospatial Programs	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**FY2029**	**FY2030**
Development, Modernization & Enhancement (DME)	$10,000	$13,000	$13,000	$1,500	$1,500	$1,500	$1,200	$1,000	$750	$500
Steady State (SS)	$90,000	$92,700	$95,481	$98,345	$101,295	$104,333	$107,463	$110,686	$114,006	$117,426
Donor Support	$100,000	$100,000	$100,000							
Summary of Current Funding	**$200,000**	**$205,700**	**$208,481**	**$99,845**	**$102,795**	**$105,833**	**$108663**	**$111,686**	**$114,756**	**$117,926**
Requested increase						*$10,000*	*$10,000*	*$10,000*	*$10,000*	*$10,000*
Summary of Proposed Funding	**$200,000**	**$205,700**	**$208,481**	**$99,845**	**$102,795**	**$115,833**	**$118663**	**$121,686**	**$124,756**	**$127,926**

Appendix 3.7: An example of a Socio-economic Impact Assessment approach

For countries that pursue a socio-economic impact assessment approach[1], the steps typically taken to justify investments in the implementation of the United Nations Integrated Geospatial Information Framework (IGIF) are:

1) Agree on scope and priorities;
2) Develop the engagement plan;
3) Gather the socio-economic evidence;
4) Analyze the information gathered; and
5) Justify the benefits.

These steps are explained as follows:

- **Step 1 - Scope and Priorities:** The first step is to agree on the terms of reference, deliverables and timeframes of socio-economic analysis with senior stakeholders involved in the implementation of the IGIF. This is important because there is considerable variability in the approach that will be adopted depending on the resources available and the level of certainty required.

- **Step 2 - Develop Engagement Plan:** Create a list of key individuals and groups in the priority sectors to be engaged. This will include organizations and individuals on both the supply (data producers) and demand (users) side, including commercial sector organizations. Having partners and stakeholders engaged in the planning discussions yields benefits to the organization as partners can offer, volunteer, and contribute to the goals and objectives of the program. Having the private sector engaged informs companies about plans where they can envision where their role can be in supporting the same goals and objectives. The organization benefits in learning about and having commitments for the shared roles and responsibilities from partnering organizations and levels of government and the private sector. The national geospatial information management organization cannot nor should they do everything themselves. This is a shared endeavor.

  For each stakeholder engagement, the most appropriate type of interaction needs to be assessed. In the majority of cases for the public sector, this should be achieved through face-to face interviews based on a small set of pre-circulated questions designed to open up discussion. However, for the private sector, in order to get a representative sample of inputs, market surveys can be designed and distributed. Trade associations and/or the statistical agency are possible sources of support in disseminating such surveys.

  The primary objective is to identify, where possible, the most significant quantifiable impacts based on national priorities and circumstances, with special emphasis on economic growth, increased productivity and improved citizen outcomes in the various sectors.

  This effort takes time which should be included in the project management timeline so that schedules are adhered to whenever possible. Questions will arise during the discovery

[1] This process is based on the socio-economic analysis conducted around the application of geospatial information to support the Albanian Integrated Land Management Program.

process, so provision needs to be made for an on-going dialogue by email or phone. Documenting discussions is important and agreements within the organization are critical for success.

- **Step 3 - Assemble Basic Economic Parameters:** Information underpinning the socio-economic assessment is derived from a variety of sources, including Economic Metrics

  - **Size and structure of the economy:** These metrics should ideally be gathered from the National Statistical System. The national accounts usually provide industry sector-level economic activity by NACE[2] codes - the international standard for this type of breakdown. Another source from the U.S. Bureau of Economic Analysis offers a list of the various economic accounts[3]

  - **Scaling Factors:** to allow comparison with other countries, these include (a) GDP per head of population; (b) Human Development Index; (c) Population size (rural / urban split); and (d) Physical characteristics – area, length of coastline, land cover.

  - **Cost-Benefit Analysis Assumptions:** If no guidance can be provided by National Financial authorities, then a good practice approach is to adopt regional development bank parameters, or those currently advised by the World Bank, [4] such as (a) the Life Cycle – a 12-year period, consisting of 5 years of the program followed by 7 years of use, this is commensurate with the infrastructural nature of the investment; and (b) discount rate of 12%.

  - **National and Regional Reports:** This includes a review of research sectoral reports produced for the Country. Useful sources include the World Bank, OECD and United Nations. To assist in the assessment of value and refining methodological approaches, studies of economic assessment from other disciplines and sectors can also be reviewed, particularly from land management, transport and environment sectors, for example.

- **Step 4 – Socio-economic Analysis**: Attachment I and Attachment II to this Appendix provide a range of examples of economic modelling of national geospatial information management and Earth Observation, respectively. There are numerous variations of expenditure justification analysis. Terms such as performance measurement, cost-benefit analysis, and cost-effectiveness analysis are common. All are concerned with comparing the benefits and costs of an initiative, although they may differ in terms of breadth and depth of scope.

[2] Statistical Classification of Economic Activities http://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-RA-07-015 (retrieved 10th March 2017)
[3] https://www.bea.gov/data/economic-accounts/national
[4] Discounting Costs and Benefits in Economic Analysis of World Bank Projects, OPSPQ May 2016

It is recommended that a Socio-Economic Impact Analysis approach is adopted. This approach expands economic impact analysis to include non-quantifiable social impacts in addition to the financial impacts. For example, issues such as environmental protection and national sovereignty, which cannot be reasonably converted to financial terms, are considered using non-financial metrics. These aspects rely primarily on descriptive analysis and illustrations. Where benefits and costs are quantified in similar measures, they can be compared directly. Where benefits and costs are in dissimilar measures, it will ultimately be up to the stakeholders to determine if the tradeoffs are worthwhile.

Where possible, adopt a standard approach to cost-benefit analysis, as outlined in, amongst other references, the United Kingdom Treasury Green Book[5]. Typically, this involves the following:

- **Identify Costs:** In principle, there are two major financial commitments that need to be made: a shorter-term commitment to the investment in development of knowledge, infrastructure, institutions and data; and a longer-term commitment to the operational sustainability of these that will require the establishment of a geospatial "economy" that provides tangible results.

  On the cost side of the business model, countries will need to consider (a) investment in the development of institutions, capacity development, infrastructure, data standards, legal and regulatory framework, consulting support and data required by central and local government, but also by the private sector, communities and individuals; (b) investment in the promotion and support of use of the IGIF by third parties, who will derive and create additional value to the economy; (c) operational funding for on-going capacity development, data maintenance, IT maintenance, management and distribution, infrastructure maintenance, etc.; (d) opportunities for collaborative investment with other stakeholders, also with the private sector; and (e) opportunity costs of not investing and thus losing an advantage.

  In the context of investment and operational expenses, it is important to understand the trend towards Data as a Service (DaaS) and Software as a Service (SaaS) platforms. In financial terms, this changes the balance between capital expenditure (investment) and operational expenditure (operations and management), which changes the profile of financial commitments.

- **Identify Benefits:** Integrated geospatial information management typically provides a wide range of benefits. These benefits can be segmented into infrastructure, economic development and wealth creation and public good. Infrastructure is an investment in the future that will create wealth and public good impacts over time. Infrastructure includes physical structures, institutional systems, knowledge and qualified human resources. Wealth creation benefits include the following concepts (a) Industrial and business development – creation or maintenance of knowledge-based economy entities, partnerships, networking and technology transfer among clusters of entities, universities, government, and international partners, and increased business, management and technical capabilities; (b) Productivity – increased capacity, skills and competitiveness of

[5] Treasury Green book webpage https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent (retrieved 13th February 2017)

national firms; (c) Employment – increased or sustained high-skilled jobs and reduction in the brain drain; and (d) Growth – increased uptake and sales of products and services, domestically and internationally;

Public good benefits include (a) Social – improved health and safety and regional development; (b) Political – improved national identity, unity, pride and sovereignty, improved international relations, international reputation and recognition of national capabilities, and international cooperation and peace; (c) Environmental – contributions to understanding of the earth, surveillance of pollution, and natural resource management; and (d) Knowledge – advancement of scientific knowledge, new technologies and processes, education, and Science & Technology careers.

Two principal techniques are usually adopted to calculate quantifiable benefits. These are (a) Primary Evidence: used for those benefits where the evidence from the engagement is strong and the monetary value substantial; and (b) Benefits Transfer: primary evidence is supplemented for significant benefits where, no or only poor evidence, is gathered from the engagement. Benefits transfer involves scaling impacts to the national level from case studies in other geographies with strong provenance, based upon metrics such as population, area and GDP.

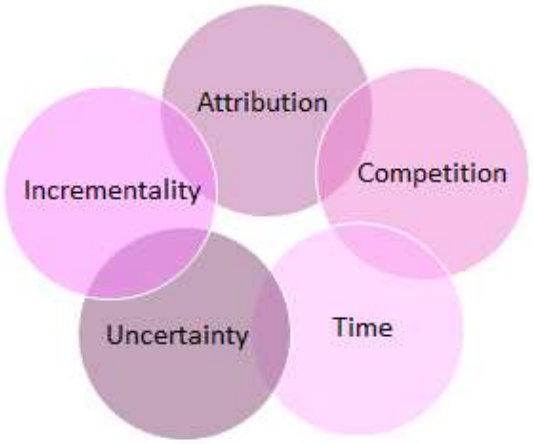
Countries will need to consider the following benefits (among others):

- benefits arising from recognizing land and property rights and taxation, disaster prevention, health, better asset management, transportation, etc.;
- benefits arising from increased economic activity (also in the private sector) and increased national competitiveness. Areas to be considered are among others tourism, infrastructure, technology innovation, …;
- benefits arising from improved decision making and effectiveness of government and the wider national economy;
- benefits arising from job creation in the geospatial and associated industries;
- benefits arising from improved ability by government to adhere to international agreements such as the 2030 Agenda for Sustainable Development, the Sendai Framework for Disaster Risk Reduction 2015-2030, the Small Island Developing States Accelerated Modalities of Action (SAMOA Pathway) are examples.
- benefits arising from attributable savings in the private sector and by consumers (potentially leading to increased tax income and investment);
- benefits arising from new products developed that could not exist without geospatial information;
- potential direct income to government from licensing of data or use of government's infrastructure. Even though income from licensing of data may be the most tangible result for a government organization, it may overall, not be the most significant benefit and hinder wider use of data in government or by the private sector.

A database of all identified benefits by use case and actor (user type) should be assembled. This should separate benefits into quantifiable and qualitative types. The benefits can then be assessed according to likely size of impact and any identified dis-benefits included.

In the situation where new products and services are being proposed as a result of implementing the IGIF, market surveys need to be conducted to estimate the demand and size of the market.

When conducting a socio-economic analysis, the following considerations should be kept in mind in the figure below.



Considerations for a Socio-economic Analysis

- **Incrementality:** The impacts and effects to be considered are those which are directly due to the implementation of the IGIF. These impacts and effects are called incremental, which is defined as the difference between what will happen as a result of the implementation and what would have happened without integrated geospatial information management. If nothing will change as a result of implementing the IGIF, incrementality will be zero.

- **Attribution:** Even if the implementation of the IGIF makes incremental differences in impacts, some fraction of the impacts may logically be attributable to other programs, funding sources, organizations or stimulants. Such incremental activities may give rise to impacts and effects that are not wholly (or fairly) attributable to integrated geospatial information management.

- **Competition:** Across the geospatial information landscape within a country, the private sector may provide geospatial information products and services that directly compete with the products and services of the geospatial information management organization, reducing the associated benefits. Decisions by government should be made to avoid duplication and to establish responsibility where it best serves the society, the environment and the economy. Determination of inherently governmental versus what products and services are best offered by the private sector and used in government is important.

- **Time:** Time frame plays an important role in the assessment of impacts. The major benefits attributable to the implementation of the IGIF will accrue to society long after its

completion and over many years into the future. This causes difficulties for identifying and measuring impacts and attributing them to the originating activity.

- **Uncertainty:** Any forecast about the future is inherently uncertain. Therefore, an important aspect of any analysis is the specification of the degree of confidence in the results. A sensitivity analysis should be conducted to ensure that ranges of values are examined for individual variables to assess the impact on the results.

From the information detailed above, a discounted cash flow model[6] should be created and populated. The key assessment criteria built into the model to assess the result are:

- Benefit to Cost Ratio (BCR) – An indicator that attempts to summarize the overall value for money of an investment. A BCR is the ratio of the benefits, relative to its costs, expressed in monetary terms.
- Net Present Value (NPV) - is the difference between the present value of funds inflows and the present value of funds outflows over a period of time.
- Internal Rate of Return (IRR) is a metric used in capital budgeting to estimate the profitability of potential investments. The IRR is a discount rate that makes the net present value (NPV) of all funds/cash flows from a particular project equal to zero.

- **Step 5: Justify the Benefits:** The final stage of the process is to create a narrative based upon the information gathered and analyzed, together with the results. A number of communication products will have to be created for the range of stakeholders involved from politicians to economists to senior decision makers to technical experts. This communication should involve a Unique Value Proposition, a detailed report, a standalone executive summary and a slide set of elevator pitches, for example. Ultimately, it is important that the overall economic justification for the investment is accepted at the top-level in Government.

  It should be noted that, social benefits and costs cannot, and should not, be reduced to a single monetary number. This is a contentious issue, as many policy makers are most comfortable with simple economic impact statements. However, purely economic measures can be fraught with difficulties when used for public sector decision analysis. First, dissimilar benefits and costs must be converted to a common denominator. For example, if safety is a benefit, what is the value of human life? Second, some benefits and costs cannot be quantified. For example, what is the value of national pride? Third, the nature of benefits and costs is hidden in the numbers. This hides the pros and cons of an initiative from stakeholders and therefore a simple numeric result is a poor tool for gaining support among different groups.

Attachment III of this Appendix describes an example of socio-economic analysis performed to support and justify the investment in an Integrated Land Management Program in Albania.

[6] Definition: Discounted cash flow (DCF) is a valuation method used to estimate the value of an investment based on its future cash flows. DCF analysis attempts to figure out the value of an investment today, based on projections of how much money it will generate in the future.

Appendix 3.7:
An example of a Socio-economic Impact Assessment approach

Attachment I
Literature review on economic modelling of national geospatial information management

There are relatively few studies of the economic value of geospatial information. Those that do exist are confined to a few developed countries and because of inconsistency in scope are not directly comparable. For instance, some attempt to cover all impacts of geospatial information for a country whilst others have a more limited scope in terms of the sectors of the economy assessed. Furthermore, there is no commonly agreed methodology for quantification.

This section summarizes those studies that have been undertaken and published in recent years and also includes a recent meta-analysis of return on investment in geospatial data and systems.

1. Natural Resources Canada (2015)

Commissioned by Natural Resources Canada and published in 2015, the Canadian Geomatics Environmental Scan and Value Study[7] is one of the most comprehensive studies undertaken. The scope is described as providing findings from all lines of enquiry related to the economic and non-economic benefits associated with geomatics technologies and services in Canada. In Canada, geomatics is taken to include all geospatial information activities, rather than the narrower land surveying context used in most other places.

The report was based upon a review of the literature and the input received during consultations with Geospatial Information suppliers in industry and government, users of geospatial information products and services, and providers of geospatial information education and training programs. Selected case studies were also conducted with users of geospatial information.

It considered three groups of socio-economic impacts:

i. Geomatics Products and Services: this is the value in the Canadian economy of the provision of geomatics products and services (i.e., supply side).

ii. Economic Productivity: this is the value in the Canadian economy of the use of geomatics products and services (i.e. demand side). The impact that geospatial information has had on the Canadian economy was estimated using a Computable General Equilibrium (CGE)[8] model.

iii. Social and Environmental Benefits: these are the social and environmental benefits of the use of geomatics products and services that are difficult to quantify in economic terms.

The quantifiable results were estimated for 2013 as:

[7] Link to study: https://www.nrcan.gc.ca/earth-sciences/geomatics/canadas-spatial-data-infrastructure/cgdi-initiatives/canadian-geomatics

[8] Smart A, Coote, A. Economic and Financial Modelling of the Impact of Geospatial Information - Techniques and Results for land administration in developing Nations. World Bank, Land and Poverty Conference 2017

i. A supply-side impact of about 2,450 private sector geomatics firms contributing CAN $2.3 billion to the Canadian economy;

ii. A demand-side impact from the use of geospatial information of CAN$20.7 billion – or 1.1% of national Gross Domestic Product (GDP);

iii. Generating approximately 19,000 jobs to the Canadian economy.

2. Ordnance Survey Ireland (2014)

The study titled 'Assessment of the Economic Value of the Geospatial Information Industry in Ireland'[9] looked at the value added to the Irish economy, the number of jobs generated by the geospatial information industry, and the savings delivered by that industry to the public sector. The project was undertaken by *Indecon*, an Irish-based economic analysis company, results were published in February 2014. The first section of the report assesses the direct supply-side contribution to the economy, using market survey results and interviews with experts, as follows:

- Revenue from sales of geospatial information related products/services of €117.5 million;
- Total value of exports of geospatial information products/services of €18.9 million;
- Number of Full Time Equivalent (FTE) employees 1,677;
- Expenditure on wages and salaries of €84.4 million;
- Expenditures by suppliers of geospatial information on non-labor inputs of €48.2m.

The above was used to estimate a gross value added for the sector in Ireland to be €69.3m.

The second section of the report attempts to quantify the demand-side impacts. It identifies significant or very significant benefits arising from using geospatial information and potential externalities from a market survey, as follows:

- Public and private sector cost savings: estimated public sector cost savings at €82 million per annum;
- Economic value of journey time savings: Private cars: €94.26 million per annum; Commercial vehicles: €185.81 million per annum
- Benefits to consumers of intensifying competition: estimated at €78m - €130m per annum;
- Wider impacts on innovation were not quantified

3. Value of Geo Services Global Study for Google (2016)

Google commissioned a detailed study[10] to look at the impact of the geospatial industry — the ecosystem of industries that rely on geospatial technology (both online and offline) — and the direct benefit it provides to people, businesses and society. The study was conducted by AlphaBeta, a strategy advisory business, to analyze the global impact of the geospatial industry in 2016. Consumer

[9] Link to study: http://www.osi.ie/About-Us/Ireland-GIS-Economic-Report.aspx
[10] The economic impact of geospatial services: how consumers, businesses and society benefit from location-based information: https://www.alphabeta.com/wp-content/uploads/2017/09/GeoSpatial-Report_Sept-2017.pdf

surveys were conducted across 22 countries spanning six regions, and other estimation approaches, such as big data analysis of online job postings, were adopted and found that geospatial services make an impact in three key ways:

- Consumer Benefits

  First, geospatial technology saves people's time and fuel: digital map users make commuters navigate faster through traffic and choose the most efficient route and travel options, shortening traveling time by 12% and helping people save time worth US$ 264 billion and US$ 20 billion in fuel. Digital maps also speed up shopping, by giving consumers information on store location, opening hours and product availability: consumers save more than 21 billion hours from more efficient purchasing decisions, worth US$ 283 based on local wage rates and employment levels.

- Business benefits

  Second, geospatial technology creates jobs and brings businesses more customers, especially small businesses: as an industry, geospatial services generate US$400 billion in revenue per year. However, their total economic contribution is several times higher. In fact, digital maps drive US$1.2 trillion of sales around the world, a significant share of which for small and medium businesses who use platforms such as "Google My Business" as a free marketing tool to drive customer traffic. More broadly, geospatial technology improves revenues and costs by at least 5 percent in sectors contributing more than 70 percent to global GDP, for example helping supermarkets open new stores in the most promising locations and mining workers remotely drive machines operating in dangerous environments.

- Societal benefits

  Finally, maps have positive spillover effects on the environment and societies around the world. Geospatial services are directly linked to the creation of approximately 4 million jobs. CO2 emissions from vehicles could be reduced by 1,686 million metric tons, through more efficient vehicle trips and alternative transportation options that are made easier by digital maps. Geospatial technology can also be leveraged to decrease emergency response time by up to 20% in some countries. It can help prepare for a natural disaster, for example, by highlighting flood risk or showing residents the best evacuation routes.

4. Local Public Services in England and Wales (2009)

The study titled, The Value of Geospatial Information to Local Public Service Delivery in England and Wales [11], was undertaken for the Local Government Association in England with the help of ConsultingWhere. It examines the economic impact of the use of geospatial information in local public service delivery in England and Wales, including municipalities, emergency services and public-sector organizations for the delivery of local health. Seven broad service areas were looked at: customer interface, transport and highways, planning and consultations, revenue and benefits, health and social care, safer communities and addresses. Based on these service areas, the estimated benefits from the adoption of geospatial information in local public service delivery in 2009 would be:

[11] ConsultingWhere study: http://www.local.gov.uk/research-geographic-information

- Gross Domestic Product (GDP) for England and Wales: £323 million higher than it would otherwise have been (around 0.02 percent of GDP);
- Government revenue from taxation: £44 million higher than it would otherwise have been;
- The delivery of goods and services by local public service providers: £232 million higher than it would otherwise have been.

5. Spatial Information in the New Zealand Economy (2008)

The report titled 'Spatial Information in the New Zealand Economy: Realising Productivity Gains'[12] was commissioned by Land Information New Zealand (LINZ) and led by ACIL Tasman (now ACIL Allen) economic consultants based in Sydney, describes how spatial information is used across many sectors of New Zealand's economy.

It quantifies the value of spatial information in the economy, estimates the gains available from removing barriers to spatial information thus making a greater contribution to productivity and describes and estimates the value of greater use of spatial information to innovation and product markets.

The use and re-use of spatial information is estimated to have added NZ $1.2 billion in productivity-related benefits to the New Zealand economy in 2008. This value is the result of increasing adoption of modern spatial information technologies, over the period 1995-2008, and is equivalent to slightly more than 0.6 per cent of GDP.

6. Return on Investment Global Meta-analysis (2015)

A recently published study titled "A Meta-Analysis on the Return on Investment of Geospatial Data and Systems: A Multi-Country Perspective[13]" looks at return on investment based on mainly cost-benefit studies and attempts to explain some variations across 82 cost-benefit assessments undertaken between 1994 and 2013. Multivariate regression methods are used to assess the size, significance and direction of individual effects. The results suggest that regional factors have the largest impact on the profitability of geospatial information. Returns in Australia and New Zealand, for example, are four times larger than in Europe. In addition, small-scale regional investments have a 2.5 times lower return than large-scale international investments. Overall, the expected benefits of geospatial information investments are approximately 3.2 times larger than the costs.

[12] Link to study: http://www.linz.govt.nz/about-linz/our-location-strategy/geospatial-projects/spatial-information-new-zealand-economy

[13] Trapp, N et al in Transactions in GIS, 2015, 19(2): 169–187

Appendix 3.7:
An example of a Socio-economic Impact Assessment approach

Attachment II
Literature review on economic modelling of Earth observation

There is a large body of literature on the value of: geospatial information, open data sharing, and Earth observations. At the GEO-XIV Plenary[14] in Washington DC there was a side event that brought together 100 professionals interested in the value of Earth observations, particularly from a socioeconomic perspective. The workshop included economists from NOAA, USGS and the World Bank talking about cost benefit analysis of using geospatial information as part of major or national infrastructure initiatives and programs. This was a first for the GEO community since almost 40% of the attendees were economists and the remainder geospatial professionals. A few key references are listed below:

- CODATA and GEO (2015): The Value of Open Data Sharing[15]. CODATA is the Committee on Data for Science and Technology of the International Council for Science (ICSU).

- John Loomis, Steve Koontz, Holly Miller, Leslie Richardson (2015): Valuing Geospatial Information[16]: Using the Contingent Valuation Method to Estimate the Economic Benefits of Landsat Satellite Imagery. The report estimated that the cumulative total worldwide economic benefit of making Landsat imagery freely available was over $2 billion. Economic benefits in the U.S. alone were estimated to be about $1.8 billion, which is nearly double to cost of Landsat 8. While the study found some willingness to pay for the data, charging a fee would have resulted in significant efficiency losses, e.g., over $37 million based on a fee of $100 per scene.

- European Commission (2016). Report on the Copernicus Downstream Sector and User Benefits[17]. The study identified examples of the economic contribution of the Copernicus Earth observation program to various projects and initiatives within eight value chains. For example: a 26% cost reduction of an irrigation management service in Austria; 60K yearly savings for construction companies using a work progress monitoring app; 60% higher precision for analysis of the impact of trans-boundary pollutants on air quality; 5% productivity gain for fish farmers by monitoring toxic algal blooms; 2% increased revenues for photovoltaic electricity producers by improving forecasts; and 172M forecast market for pastures insurance against natural hazards.

- Francoise Pearlman et al (2016). Assessing the Socioeconomic Impact and Value of Open Geospatial Information[18]. U.S. Geological Survey Open-File Report 2016–1036.

[14] http://earthobservations.org/geo14.php?t=plenary_documents
[15] http://www.earthobservations.org/documents/dsp/20151130_the_value_of_open_data_sharing.pdf
[16] http://www.asprs.org/a/publications/pers/2015journals/PERS_August_2015_Public/HTML/files/assets/basic-html/index.html#647
[17] http://www.copernicus.eu/sites/default/files/library/Copernicus_Report_Downstream_Sector_October_2016.pdf
[18] https://pubs.er.usgs.gov/publication/ofr20161036

Appendix 3.7:
An example of a Socio-economic Impact Assessment approach

Attachment III
Case Study - Albanian Integrated Land Management Program and Economic Analysis

This proven practice example describes the World Bank Group's support to the Government of Albania's (GOA) land sector during 2017 – 2018 through the creation of an Integrated Land Management Program (ILMP) and an associated economic analysis to identify the key geospatial interventions in improving the Albanian Integrated Geospatial Framework that would generate the most significant benefits in the land sector.

The land sector in Albania is under-performing and is stopping economic development in key areas of the country, such as the coastal zone. The lack of joined-up management of land and absence of leadership in the land sector has led to fragmented institutional arrangements, an inconsistent legal and regulatory framework and lack of a coherent policy framework on land. This is further exacerbated by poor quality land information, especially in property rights. This has created significant risk that deters investment in land, restricts the land market and is slowing the transition to a viable modern economy. There was an immediate need for systemic reform in the land sector through the introduction of an ILMP.

An ILMP roadmap was created to support six interventions in the land sector to allow land to deliver significantly to the Albanian economy: national land policy; enhanced land information; land market; state land management; tourism; and agriculture land allocation and registration. The selection of these interventions was driven by government policy priorities and the results of an economic benefits analysis, conducted by the World Bank Group to identify the key interventions in improving the land and geospatial information that would generate the most significant benefits in the land sector.[19] This analysis (see summary of the economic analysis approach below) confirmed a 2.5x Return on Investment (RoI) on a Euro 50 million investment. The economic analysis identified the following quantifiable benefit areas:

- Reduced duplication of data capture and maintenance associated with geospatial datasets within the Albanian Spatial Data Infrastructure;
- Reduction of court cases associated with land disputes;
- Reduction of direct damage costs associated with flooding;
- Support for increasing land tax revenue raised through municipalities;
- Reduced costs in planning and implementing key infrastructure, e.g. pipelines and roads;
- Expansion of tourism in the coastal zone;

[19] World Bank, "Albania Integrated Land Management Program Economic Analysis", Aanchal Annand and Andrew Coote, October 2017.

- Stimulated economic development and inward investment; and
- Improved road navigation services.

Although these quantified benefit areas supported the justification, using cost-benefit analysis, for investing in ILMP, there were many other elements of the land market that would require further economic analyses to determine the total size of the Albanian land market's optimal contribution to GDP. Comparable countries indicated that Albania could raise the contribution of the land market from 4.2% to 9% of GDP[20]; equivalent to €840M / year.

The total costs of the ILMP over a five-year period were around €124M, and the costs allocated to the six interventions are detailed in the table below:

	Activity	**Costs (€M)**
1.	National Land Policy & Property Rights Strategy	0.6
2.	Revise Geospatial Information Strategy & Geodetic Infrastructure	1.1
3.	Land Market	
3.1	Establish National Cadastral Authority	12.0
3.2	National Cadastral Authority ICT Infrastructure	4.4
3.3	National Cadastral Authority First Registration Completion & Data Quality Improvement	47.4
3.4	Establish Key Registers (excluding cadastral parcels)	28.4
3.5	Other Land Market Interventions	16.7
4.	Tourism	2.3
5.	State Land Management	8.3
6.	Agriculture (complete land allocation and registration)	4.4
	TOTAL COSTS	**€123.90**

Table 1: Estimated Costs of Implementing the ILMP

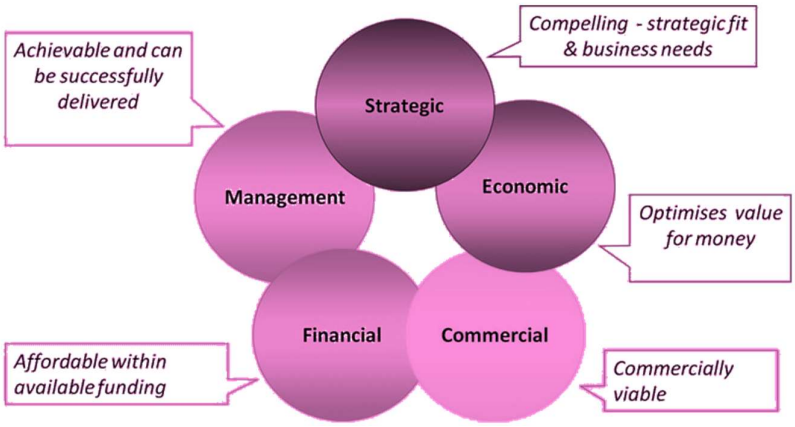
A key pre-requisite investment underlying success in the land sector involved radically improving the quality of the cadastre and land rights information managed by the National Land Registration and Cadastral Authority (IPRO). The very poor quality of this information was the key constraint to the 6 priority sector reforms in this analysis. The unreliable IPRO data and services cause the courts to be congested with property related disputes, create insecurity of land tenure that stops inward investment and significant portions of valuable state land are being usurped. An investment of €50M in IPRO data and systems would totally transform the land sector in Albania. This was identified as a priority intervention for the GoA, especially in the geographical areas that significantly contribute to the economic development of Albania.

[20] "Land Markets (3rd Edition)", Dale, P., Mahoney, R. and McLaren, R. RICS Research Report, December 2011.

Appendix 3.8: Components of a business case - five key perspectives

The business case covers five key perspectives – the strategic case (why now?); economic case (quantify the financial benefits including cost efficiencies and public good benefits); commercial case (how the customers and potential partners will be engaged); financial case (funding sources); and management plan (what capabilities and resources are required for implementation to be successfully achieved?).

The Business cases are typically broken down into five different aspects.



The five different aspects of a business case.

Strategic Case: This is the rationale for the implementation of the IGIF and is aligned to an organization and government priorities (see Section 3.6.14 - Strategic Opportunities of the Implementation Guide of the Integrated Geospatial Information Framework)

Economic case: This is the cost of the implementation relative to its value to the nation optimized as Value for Money (see Appendix 3.7- An example of a Socio-economic Impact Assessment approach).

Commercial Case: This is the economic development opportunities that include commercial viability, engagement and partnering opportunities with the commercial sector and how they will be handled as well as the external procurements.

Financial Case: This is the proposed detailed budget for the requested budget year with estimates for future years (see Section 3.6.12 – Annual Budget of the Implementation Guide of the Integrated Geospatial Information Framework).

Management Case: This is the evidence of sound project management approaches with associated measuring and monitoring of risks and outcomes.

Appendix 3.8: Components of a business case - five key perspectives

Attachment IV
Business case - Denmark Key Registers (Basic Data)[21]

The benefits of Open Data are often cited as:

- **New and expanded businesses can be realized from access to available open data**: Data are an essential raw material and can be integrated into a wide range of new information products and services, which build on efforts to analyze and visualize data from different sources. Opportunities for re-use have multiplied in recent years as technological developments have spurred advances in data production as well as data analysis, processing, and visualization. Facilitating re-use of this raw data creates new businesses and jobs and stimulates economic growth. Businesses which build on fundamental data usually depend on updates and changes from a government's IGIF so they can maintain their value-added offerings;

- **Greater Transparency**: Open data are a powerful instrument to increase transparency in public administration, improving the visibility of previously inaccessible information, informing citizens and business about policies, public spending and outcomes that may impact them. Transparency allows two-way communication of information where communities are informed about new plans, products and services and the user community communicates their reaction, both positive and negative, so that interests and needs are considered; and

- **Evidence-based policy making and administrative efficiency**: the availability of robust public data will lead to better evidence-based policy making at all levels of government, resulting in better public services.

A good example of this model in supporting core registers, including a significant amount of geospatial information in Denmark is summarized in Edgar 2017.

Objective – A Driver for Growth and Prosperity

Public authorities in Denmark register various core information about individuals, businesses, real properties, buildings, addresses, and more. This information, called basic data, is re-used throughout the public sector. Re-use of high-quality data is an essential basis for public authorities to perform their tasks properly and efficiently across units, administrations and sectors.

Good basic data for everyone is part of the common public-sector digitization strategy for 2011 to 2015 (eGovernment strategy 2011-2015), adopted by the government, Local Government Denmark and Danish Regions. The vision is that basic data are to be the high-quality common foundation for public sector administration; efficiently updated at one place and used by everyone – including the private sector. Open basic data will benefit public-sector efficiency as well as innovation and value creation by Danish society in general. With basic data as a new digital raw material, commercial products can be developed, and public information and services can be improved, providing for greater insight and stronger democracy.

Five Processes Toward the Goal

[21] https://en.digst.dk/media/14139/grunddata_uk_web_05102012_publication.pdf

1. In order to ensure the re-use of data and to prevent double registration and shadow registers, map data, cadastral maps, Central Business Register data, and company data will be financed by the government and released to the public and the private sectors, as is already the case with address and real property data. By releasing this basic data, public authorities and private businesses alike will be able to use it freely, for commercial as well as for non-commercial purposes, provided, of course, such use is lawful.

2. In order to enhance the quality of data, the registers of map data, real property data, address data, as well as business registers, will be expanded to include other necessary data. As a result, a number of existing registers will become redundant and therefore can be phased out.

3. In order to make it possible to link data, efforts will be made to ensure that all data conforms to the same technical requirements.

4. In order to improve the distribution of common public-sector data, a common infrastructure is to be established providing for stable and efficient distribution of data; a data distributor.

5. In order to ensure efficient, effective and coordinated development and use of basic data, a cross-institutional basic-data committee is to be established.

Tangible Benefits

Open basic data will provide the public, businesses and the authorities alike with a number of tangible benefits.

The Public - Smoother Interaction with Public Authorities

- Better public services in the form of speedier case processing and fewer errors in individual cases.
- Less reporting to public authorities, for example to correct errors.
- Less need for re-entering data in online self-service solutions, when forms are filled in automatically with relevant and fully up-to-date basic data.

Businesses - Less Red Tape, More Growth

- Less red tape – less reporting and registration.
- Faster digitization, fewer errors and more efficient and effective procedures.
- Cheaper procurement of public-sector data.
- Improved foundation for collaboration with the public sector due to the existence of common data.
- Improved as well as new opportunities to develop new data-based services and products.

Public Authorities - More Efficient and Effective Administration

- Efficient and effective maintenance of basic data and fewer redundant registers
- Operational savings on own IT systems and update of data locally

- Cheaper development of IT systems, when basic data are accessible from a single source
- Fewer manual workflows, fewer errors and shorter case-processing times
- Improved control e.g. of payments, so that social welfare fraud can be reduced.

Business Case - Free Access to Basic Data for Everyone

As a general rule, all basic data are to be made freely available to all public authorities, private businesses and individuals. This makes basic data a common digital resource, which can be exploited freely for commercial as well as non-commercial purposes. This means that basic data can be used for all purposes, ranging from hobby-related projects to fully commercial products and services. However, some basic data cannot be made accessible to everyone. This includes sensitive personal data, e.g. data from the Civil Registration System.

By releasing basic data, the public sector wants to remove the barriers to using public-sector basic data without demanding a share of revenues etc. Basic data should be fully exploited to improve efficiency, create growth and new and innovative digital services.

Even if basic data are made accessible for everyone, the public authorities will still have to spend resources on producing, maintaining and ensuring the quality of the data. This work will still have to be financed to ensure the continued availability of quality basic data. Therefore, the government and Local Government Denmark have agreed to redistribute the costs of basic data, so that public authorities contribute to basic data via their allocation or block grant.

Free access to good basic data for everyone is good business; for the public sector and for society in general. Once the initiatives have been fully implemented in 2020, revenues for society are expected to be approximately DKK 800 million (US$94 million) annually. Private-sector revenues will be up to DKK half a billion (US$58 million) annually, and it is expected that, for example, the real estate, insurance, financial, and telecom sectors, as well as GPS (sat-nav) manufacturers, public companies and entrepreneurs will be among those to benefit hugely from the initiatives. See figure below.

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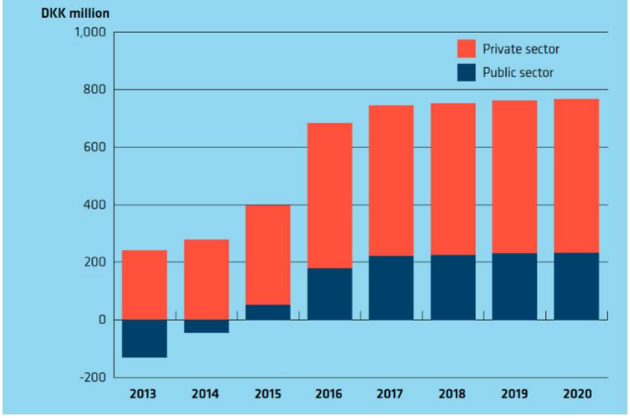
TOTAL PUBLIC-SECTOR NET SURPLUS/DEFICIT

DKK MILLION	2013	2014	2015	2016	2017	2018	2019	2020
Ministries	-108	-81	-50	-26	3	9	29	42
Municipalities	-24	24	79	143	165	169	174	175
Regions	1	11	23	33	43	43	43	43
TOTAL IMPACT	**-131**	**-45**	**52**	**149**	**211**	**221**	**246**	**260**

TOTAL NET SURPLUS/DEFICIT, BY SECTOR



Business Case - Basic Data for everyone

Appendix 3.8: Components of a business case - five key perspectives

Attachment V
Preparation of the business case for the proposed ILMP in Albania.

The Integrated Land Management Program (ILMP) in Albania required an underpinning information infrastructure of which geospatial data are the main component. Overall, the ILMP seeks to deliver:

- Reformed institutional / legal and policy frameworks – currently there are many agencies with overlapping responsibilities in different parts of the land sector;
- Multi-purpose cadastre – the official register of the quantity, boundary, value, and ownership of real estate and its use in urban and rural areas for many purposes; and
- Electronic access to full, integrated geospatial information through internet services to the public and private sectors and individuals.

Based on these benefits, the ILMP is expected to lead to the efficient, equitable and optimal utilization and management of Albania's land resources. This, in turn, would have a positive impact on many parts of the Albanian economy, including:

- Private sector investment – particularly tourism, land market and infrastructure development;
- Public sector efficiency – of institutions responsible for land administration, property taxation, civil emergencies, spatial planning, transport and agriculture;
- Citizens – through increased efficiency in road navigation and improved interactions with the public sector in respect to land transactions.

An extensive literature review was undertaken at the start of the project. It found a number of World Bank economic studies closely parallel to the objectives of the proposed program in other domains, such as meteorology and water management, and a number of comprehensive studies in the developed world of the economic value of geospatial data. However, there appeared to be little relating to the developing world, with an inference that lack of data had been a major impediment to previous attempts.

Through an intensive series of missions to Albania, including interviews with close to 100 people from more than 25 separate organizations, the team were able to estimate benefits using a mix of traditional methods, such as case studies and benefits transfer, but also conducting some experimental work using non-traditional, innovative quantitative approaches like the use of big data from social media.

The quantified benefits are summarized in following table -

Ref	Impact	Evidence	Methodology	Net Undiscounted Value of Impacts
1	National geospatial data sharing	Geospatial Information Agency cost estimates and usage assessment	Multiplier effect of information sharing	€38.3m (total for project period)

2	Reduced land-related court case costs	Court Case records Survey of Legal Professionals	Average court case cost x reduced case volumes	€2.6m (annual saving)
3	Reduced loss and damage from better flood prediction	Post-disaster Study (PDNA)	Expert judgement (4% improvement) from improved Digital Terrain Models	€0.7m-€2.0m (per 5-year event)
4	Property tax collection	Expert interviews and tax revenue records	Predictions of increased revenues from Municipalities	€2.1m – €2.5m (annual increase)
5	Cost savings in infrastructure development	Project costs from published reports and expert interviews	Potential saved costs of surveys and design for recent projects	€0.5m-1.5m (annual saving)
6	Land market growth	Regional Studies plus interviews with subject matter experts	National Accounts and Benefits Transfer	€5m – €46m (incremental annual growth after investment period)
7	Improved road navigation	Global Study	Benefits Transfer	Up to €3.7m p.a. (incremental growth)
8	Improved Government efficiency	Interviews	Predicted time savings per employee	€3.0-€4.0m (over project period)

Benefits of Improved IGIF in Land Sector

The quantitative results of the study were presented in the form of a cost-benefit analysis. The period of the analysis was 12 years (5 years of investment followed by 7 years of operation) and a discount rate of 12%.

The analysis results in a Net Present Value (NPV) of €62m million and a benefit-cost ratio (BCR) of 2.25, indicated the economic viability of the project. The Internal Rate of Return (IRR) was 49%. This IRR represented a significantly better return than a relevant comparison Economic Rate of Return (ERR) in Albania, which in 2018 were 5-15% depending on risk and length of loan.

The study concluded that this policy advice is a viable investment.

Additional non-market benefits were identified under the following headings:

- European Union Accession – the overriding political objective of the Government;
- Reduced Number of Property-related Court Cases – improving confidence in the justice system;
- Affordable Housing – through better planning and aiding social cohesion; and
- Climate Change Adaptation – improved environmental protection.

A series of next steps were identified:

- Generalize the Methodology – to enable the methodology to be applied more widely across the developing world. Globally, over 75% of the World Bank Land and Geospatial Unit's (GSULN) portfolio includes investments in IGIFs;
- Integrate into the WB-UNSD NSDI Toolkit – supporting a major initiative between the United Nations and World Bank on Global Geospatial Information Management (GGIM) and an Integrated Geospatial Information Framework;
- Enhance the Economic Analysis using Computable General Equilibrium (CGE) Modelling – enabling the results to be expressed in terms of macroeconomic parameters such as GDP; and
- Further Work on Social Media sources and Big Data Analytic Tools – to leverage these rich data sources, particularly where statistical and other economic data are not available.

Appendix 3.9: Developing an annual budget – some considerations

When developing an annual budget, organization should consider the budget level of detail, project management and budget management, budget decisions on accounting for different types of costs, budget monitoring, and what to do when funding plans break down:

Budget Level of Detail: The level of detail in a budget can vary from general to specific. General budgets have little detail. While general budgets usually offer greater flexibility in allocating spending, it is nearly impossible to determine the cost of a particular geospatial activity. This financial budget deficiency has a negative impact on sustainability. More detailed budgets specify an estimated funding level for different geospatial activities based on assumptions made during the budget estimation process. It is important to include geospatial managers in the budget estimation tasks as they should be responsible for monitoring and reporting the budget health for their area. Budget estimation is not a precise science. Overestimating and underestimating will occur. Experience is one of the better controls for more accurate estimating. Examples of expenditures that are difficult to estimate include: a new geospatial activity where no prior experience is available; contracting for goods or services that are new to the organization; IT hardware, software, and services; and some labor costs such as the amount of overtime (should be used on in critical circumstances – overtime should not be a regular planned expense). When under- and over estimating occur, budget rules (governance) should be followed to readjust the budget where possible.

In order to determine expenditures and costs for specific activities, the only way to accurately meet this requirement is to record time and materials for each activity. Costs at the project only level do not offer sufficient detail on a range of the most and least expenses for the project. Activity-based budgeting is the other extreme on the budgeting spectrum. In activity-based budgeting, time and materials are captured for a specified period of time for each day, for example, each 30-minute or 1-hour period. Project management systems (software and financial database) have to be in place to capture, summarize, and offer analysis of the results of activity-based budgeting. For a geospatial organization that is new to estimating and managing budgets, one approach would be to budget major activities that are milestones and over time, move toward more activity-based budget management.

Project Management and Budget: There is a direct connection between a budget and project management. Activities and tasks in a project management plan have a schedule and budget that should be aligned with each item, activity, and/or task that is managed and monitored. Major activities align with project milestones, which is an opportunity to monitor and evaluate the accuracy of budget estimates. Because geospatial organizations oftentimes serve many different types of support, having a portfolio of projects is common. In this case, the portfolio of projects has its own budget breakdowns. It is possible that different project portfolios are funded from their own funding source.

Unplanned and undocumented geospatial activities are more likely not to be funded. An exception might occur in times of national needs such as responding to a natural disaster. One common undocumented activity is geospatial research and development that allows an organization to stay current with new and evolving improvements and advancements. Without a dedicated line-item budget estimate for research (even a small allocation), oftentimes leaves an organization without sufficient funding to innovate and grow.

Budget Decisions on Accounting for Different Types of Costs: For example, if IT is centralized in an organization and the geospatial program is assessed fees to contribute to IT expenses, these fees should be included in the geospatial program budget. If the geospatial organization manages its own IT, then the full costs of procuring hardware and IT services and managing the IT operations needs to be included in the budget. Some geospatial programs separate IT from non-IT budget items because IT usually has higher costs and is prone to failures which are costly and have to be recouped.

Monitoring the Budget: One responsibility of geospatial leadership is to know the financial health of the organization and program. Monitoring the budget status is required and should be done at regular intervals (for example, monthly or quarterly). Preparing a budget variance report is a tool that helps in monitoring financial health. A budget variance report shows the difference between the amount budgeted and the actual spending level. Projected spending based on the project management schedule is also helpful in the budget variance report. For example, at the end of this month, a specific expenditure should be completed based on the schedule. This helps with various budgeting topics including planning the timing during a fiscal year where expenses are paid (outlays of funding), learning early where overspending may occur so necessary management steps can be taken to address the issues, and learning where spending falls below budget estimates so management decisions can realign the budget for other high priority needs.

When Funding Plans Break Down: There may be times when government funding is delayed, reduced or temporarily halted due to national circumstances. For example, if government legislators delay in passing funding authorizations, there can be a direct impact on a geospatial organization's ability to perform its mission. When this occurs, budget impact statements are helpful in prioritizing what work will occur and what activities will stop or be delayed. The greater the budget detail, the easier it is to make decisions on geospatial priorities.

Appendix 3.10 Possible financing models

Governments will need to determine the source of funding for integrated geospatial information management. Considerations include government allocation through its budgetary process, cooperative government organization funding agreements, development and donor assistance, revenues from geospatial products and services, and private sector investment.

A range of possible financing models (Gif and Coleman, 2015) that fit different circumstances and may be used in combination includes: i) government funding; ii) donor funding; iii) government owned or state owned enterprise; iv) outsourcing; and v) partnerships that may include government partnerships, public partnerships or private-public partnerships.

- **Government Funding:** Funding of an IGIF from separate budgets of different levels of government and from the different government ministries within each level of government. The amount of a budget for the implementation of the IGIF-related costs may require approval not only from the organization responsible for the work, but may require multiple approval levels including the highest level of government approval. These funds are derived from general taxation.

- **Donor Funding:** Depending on the nature of the IGIF, financing may be available from international financial or aid institutions, e.g. World Bank, Inter-American Development Bank, United Nations, country level aid agencies. The business case for investment must be tailored to fit with the donor's priorities, land administration, disaster risk management, economic growth and renewable energy are good alignments for integrated geospatial information management.

- **Government Owned Company or State-owned Enterprise:** Many countries have created this type of structure, which is a legal entity that undertakes commercial activities on behalf of an owner in this case government. Their legal status varies from being a government agency to a normal company with the state being the only shareholder or having a controlling position. Although these organizations answer to government, they generally are self-sufficient and do not rely exclusively on government allocation for their funding. A good example is Ordnance Survey of Great Britain (Ordnance Survey, 2018). Ordnance Survey recovers its costs by charging commercial-level prices for its highest accuracy data and services. Under its government-owned arrangements, it returns part of its profits to Government but is able to re-invest the remainder on product and service innovations. It is also able to raise money, if required, from commercial banks and to invest in commercial companies.

- **Outsourcing:** This term is used to refer to different models that implement types of build, own, operate or transfer[22] systems. In this category the private sector will provide elements of the construction, financing, operating and maintenance of the infrastructure for a limited concession period. For example, the NSW government in Australia has leased the state's land titles registry to a private organization for a 35-year concession, after accepting their bid of US$1.8 billion (Han, 2017). Similar arrangements have been implemented in parts of Canada, such as in Ontario, where Teranet is the exclusive provider of Ontario's online property search and registration. An

[22] Build–operate–transfer (BOT) or build–own–operate–transfer (BOOT) is a form of financing, wherein a private entity receives a concession from the private or public sector to finance, design, construct, own, and operate a facility stated in the concession contract.

interesting aspect of this funding arrangement is that Teranet is owned by the infrastructure arm of the Ontario Municipal Employee Retirement System.

- **Partnerships:** The collaboration among the different sectors of society aimed at implementing the IGIF, which usually involves the pooling of resources (financial and non-financial) to efficiently implement the IGIF. Under the umbrella of partnerships, several sub-categories exist, each with its own unique characteristics, described below.

    - Government Partnerships: This refers to the arrangement among the different agencies within a national government or between different levels of government in pooling resources for the efficient implementation of the IGIF. This approach has been used, for example, by central government to fund other national geospatial programs where one agency commits funding to another agency to assist with costs. In cases where different levels of government are involved, financial commitments are made from the different levels to share in costs and on-going expenses. These arrangements are oftentimes governed by Memorandum of Understanding or Memorandum of Agreement.

    - Public Sector Partnerships: This is the collaboration amongst various public sector bodies in implementing an IGIF. The collaboration can be financial, non-financial or a mixture of both. A good example is Norway where Geovekst, a joint funding regime, finances detailed, reference geospatial data. Several stakeholders have agreed on long term co-operation. National, regional and municipal public organizations and some public/private organizations, with given specific service and infrastructure responsibilities, cooperate by joint funding geospatial data (see Attachment V under this Appendix).

    - Public-Private Partnerships: The collaboration among the different levels of governments, quasi- government (public sector) organizations and the private sector in implementing an IGIF. Public budgets have limitations such as the amount of funds directed toward a government sponsored program or time limits on funding an activity. Access to long-term financing is challenging, particularly for emerging markets and developing economies. Government generally looks to assurances of spending taxpayer funds carefully and wisely. For developing countries, higher priority expenditures may take the place of other needed programs. The overall project finance markets partially recovered in 2014, but the deal flow of public-private partnerships (PPPs) has still been quite conservative in numbers as well as volumes. Lack of fiscal space, as well as the quest for better efficiency in projects and programs, has led to an increasing interest in PPPs globally, with efforts to provide the right projects and a strong framework for PPPs. The World Bank Group has produced an operational framework entitled 'Country Readiness Diagnostic for Public-Private-Partnerships, (World Bank, 2016) that diagnoses country PPP gaps and enhance the identification of country-tailored solutions. The end goal of the diagnostic is to provide strategic customized advice to client countries, so they can make informed decisions in determining an operational plan for their PPP program, the choice of public investment vis-à-vis PPP, and type of PPP.

    - Matching Ratios: This typically involves two or more parties working together to fund the implementation of the IGIF nationally. In this model one partner (e.g., federal, provincial or local governments, NGOs, companies, or community groups) would match (according to the specified ratio) the amount of funds invested in integrated geospatial information management by the other partner(s).

The funding approaches (UNGGIM, 2013) within developing countries can be difficult and complex due to higher priorities and economic circumstances and may require the creation of a pool of funds that are combinations of the funding models described above. In many countries, the lack of local financial resources means that geospatial information implementation may not be financially sustainable and therefore depends primarily on donor funds. Usually development assistance and donor support for these projects is time-limited and the future of many of these systems maybe unsustainable beyond the end of international assistance. This is one reason why a financial plan with an accompanying longer-range budget are so important in communicating funding needs for sustainable geospatial services and support.

Continuity and collaboration of funding may be more likely if donors are invited as partners to take part in the participative process defining the components of a country-level Action Plan for the implementation of the IGIF. In addition, the nine strategic pathways offer options for funding decisions based on national priorities and circumstances. Some activities can be funded early in the development phase while others of lesser priority are delayed.

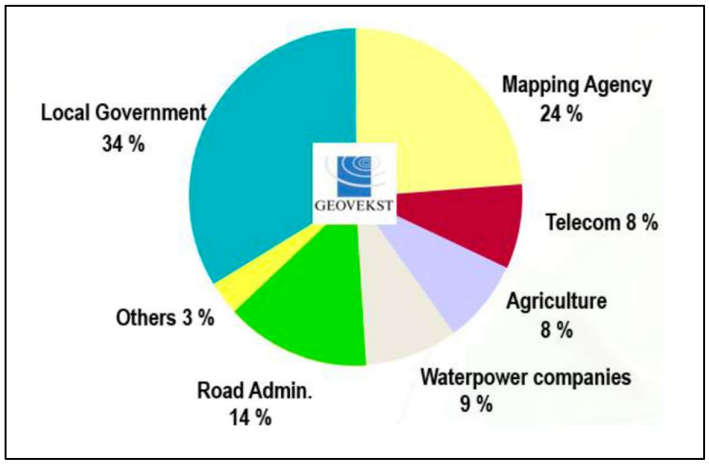
Appendix 3.10 Possible financing models

Attachment VI
Cost Sharing Model – the case of Norway[23]

Experience in Norway offers a proven practice of the impact of high-level political support, a long tradition of co-operation, and institutional adjustments on the business model adopted. The Norwegian Mapping Authority (NMA) obtains most of its revenue through central governmental funding, with only a small portion of revenue coming from sales; most data are free and open. The funding model is stable and secures production and maintenance of many kinds of data, including physical infrastructure, hydrography, elevation, place names, cadaster, building registers, address register etc.

Geovekst is joint funding regime in Norway of more than fifteen years for financing detailed, reference geospatial data where several stakeholders have agreed on long term co-operation. National, regional and municipal public organizations and some public/private organizations, with given specific service and infrastructure responsibilities, cooperate by joint funding of geospatial data. This participation includes 422 municipalities, the NMA, road authorities, agriculture authorities and others. The actual share of investment from each party varies somewhat from one year to the next. This joint investment leads to cheaper data capture and management and more standardized data, resulting in better services to end users.

The joint funding focuses on the production and maintenance of accurate, reference geospatial data, such as large-scale topographical maps, cadastral parcels, buildings, transport network, other infrastructure, land cover data, orthophoto and height data from LiDAR acquisition. More than 95% of all municipalities participate in the program, with only some major cities directly managing their geospatial information.



Geovekst Data Sharing Stakeholders

[23] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwip-fC8_I3fAhXIAsAKHSU5D4UQFjAAegQICBAC&url=https%3A%2F%2Fwww.conftool.com%2Flandandpoverty2018%2Findex.php%2F09-01-Lillethun-1069_paper.pdf%3Fpage%3DdownloadPaper%26filename%3D09-01-Lillethun-1069_paper.pdf%26form_id%3D1069%26form_version%3Dfinal&usg=AOvVaw1imdGGRhwtICFS6FtkGIxI

Norway also has specific programs on large investments on geospatial information, including:

- **Norwegian system for LiDAR data**: This is presently a five years project resulting in full-coverage of LiDAR scanning of the land territory. The project is funded by the government, and has support from several ministries, as this dataset has a multi-purpose function. Detailed data are developed for populated areas, areas of economic interest or other areas of particular interest. The data are crucial for natural risk zone mapping, such as flood and land slide susceptibility map data. The data are freely available, both for public bodies and for value-adders.

- **Norwegian system for orthophotos**: The orthophoto program is funded by several parties. The data are stored in a national store with a joint distribution system through the Norwegian Geoportal as an orthophoto mosaic. Updating frequency is high in settlements. The data are available to disaster risk management, land use planning and also private sector.

- **Mareano**. This is a governmental program to support mapping of seabed –depth and other physical parameters. The data are important in marine activities, fisheries, oil and gas, etc.