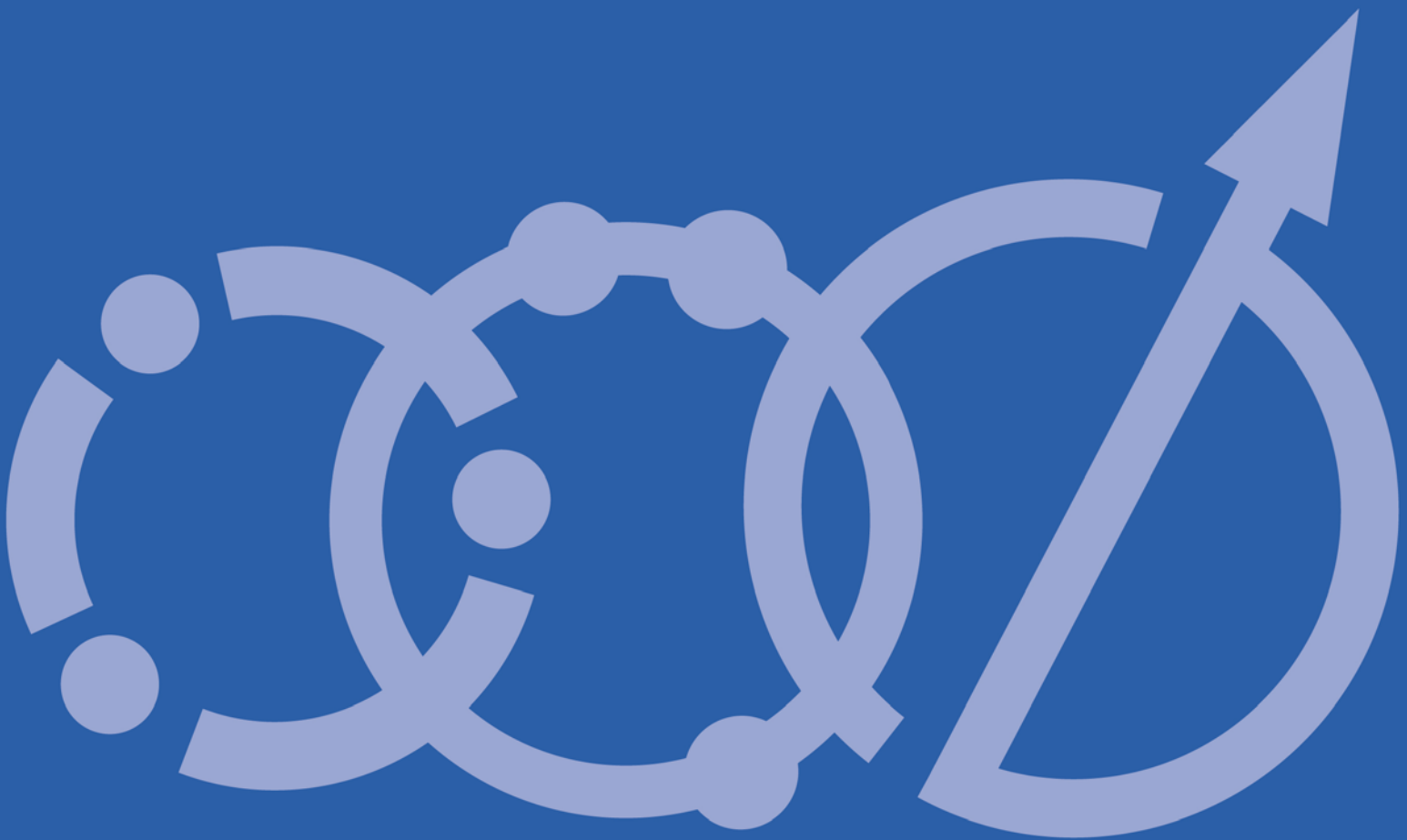
GEOSPATIAL FRAMEWORKS

Maximising your spatial investment

SRI LANKA SPATIAL DATA INFRASTRUCTURE ROAD MAP

(Including DMEM Pilot Project Road Map)

Government of Sri Lanka



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SRI LANKA SPATIAL DATA INFRASTRUCTURE ROAD MAP

DRAFT REPORT

26 NOVEMBER 2014

This document has been reviewed by the NSDI Working Group on 10-11th November 2014

Prepared by Dr Lesley Arnold

Spatial Data Infrastructure Consultant to the World Bank

Director Geospatial Frameworks

71 Darlington Road

Darlington, Western Australia, 6070, Australia

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EXECUTIVE SUMMARY

The Sri Lanka Spatial Data Infrastructure (SLSDI) Road Map is a companion manual to the SLSDI Strategy and SLSDI Framework documents. It contains the Disaster Management and Environment Management (DMEM) Pilot Project Road Map.

The SLSDI Road Map provides detailed steps towards achieving the short-term and long-term strategic goals outlined in the SLSDI Strategy and draws on the recommended methods documented in the SLSDI Framework along with justification of the approach.

The SLSDI Road Map identifies projects, which have an overarching objective to make government spatial information capabilities much more powerful and less expensive in the future.

A Focus on Priorities

The spatial infrastructure does not need to be completed in its entirety to start realising benefits. The Small steps made early in the process will achieve the most value and begin to accumulate economic benefits to the government and user community at large. It is not necessary to develop everything at once. Considerable benefits can be achieved by focusing on key priorities including.

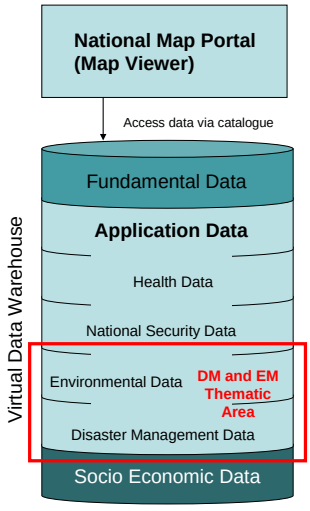
- Setting up the NSDI Office and committees (Section 2.2)
- Understanding SLSDI Stakeholder Needs (Section 2.3)
- Developing the requirements design for National Map Portal (Section 2.5)
- Developing the spatial data sharing policies (Section 3.4)
- Drafting and implementing the Spatial Data Management Charter (Section 2.9)
- Developing the Spatial Data Framework document as a common government resource (Section 2.6)
- Conducting an inventory of all fundamental and DMEM data themes (Sections 2.7 and 3.7)
- Piloting the DMEM Thematic Area (Section 3.6)

Taking smaller steps is also more cost effective, as the cost of implementation can be spanned over a number of years rather than all in the first year. Spatial data made available to the community in the early stages, while not a complete government set, can start to accrue a return on investment that can be allocated to achieving the next steps in the implementation.

Piloting the SLSDI

The DMEM Thematic Area of the SLSDI will be developed through the DMEM Pilot Project. This pilot will provide a test case for spatial data sharing across government. The pilot aims to deliver early results so that the capabilities of the SLSDI are made visible, benefits accrued early, and momentum is maintained towards the longer-term vision.

The DMEM Pilot will also build technical and policy skills required for the implementation and ongoing management of the SLSDI. It will establish a means of online access to fundamental data themes and DMEM data themes.



DMEM Thematic Area of the SLSDI

High Level Road Map

A Gantt chart for the SLSDI and DMEM Pilot Projects is included in this document (Section 4). A high-level view is provided below.

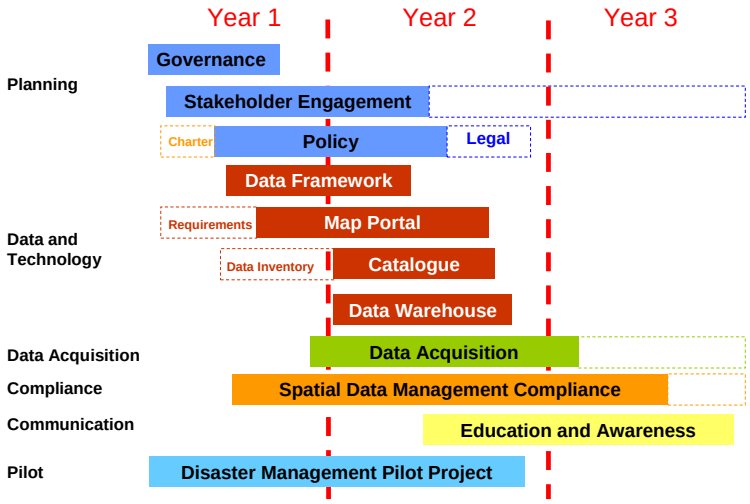
The planning stage includes establishing the SLSDI governance structure, engaging with stakeholders and developing a Spatial Data Management Charter and SLSDI policies. These are the first projects that require implementation. They are crucial at getting stakeholders on board and generating a common understanding of SLSDI goals and an awareness of policy compliance to support effective data sharing.

The Data and Technology stages deliver the National Map Portal, catalogue and data warehouse. The most critical step is to get the requirements for the technology correct in the first instance. Stakeholder input is essential. The organisation of government data is achieved through the Spatial Data Framework. This document will become a common reference point for all government agencies that acquire and use spatial information. A data inventory and gap analysis is required to understand current government capabilities and plan for future needs.

Understanding future needs and setting government priorities is an essential input to the Data Acquisition phase. This phase adopts a collaborative cross-government approach to acquiring data in order to eliminate government duplication in the collection of data.

The way data is collected and managed is to be compliant with standards and principles defined in policy. It is envisaged that government agencies will progressively adopt best practise methods overtime. The focus will be on the DMEM Thematic Area in the first instance.

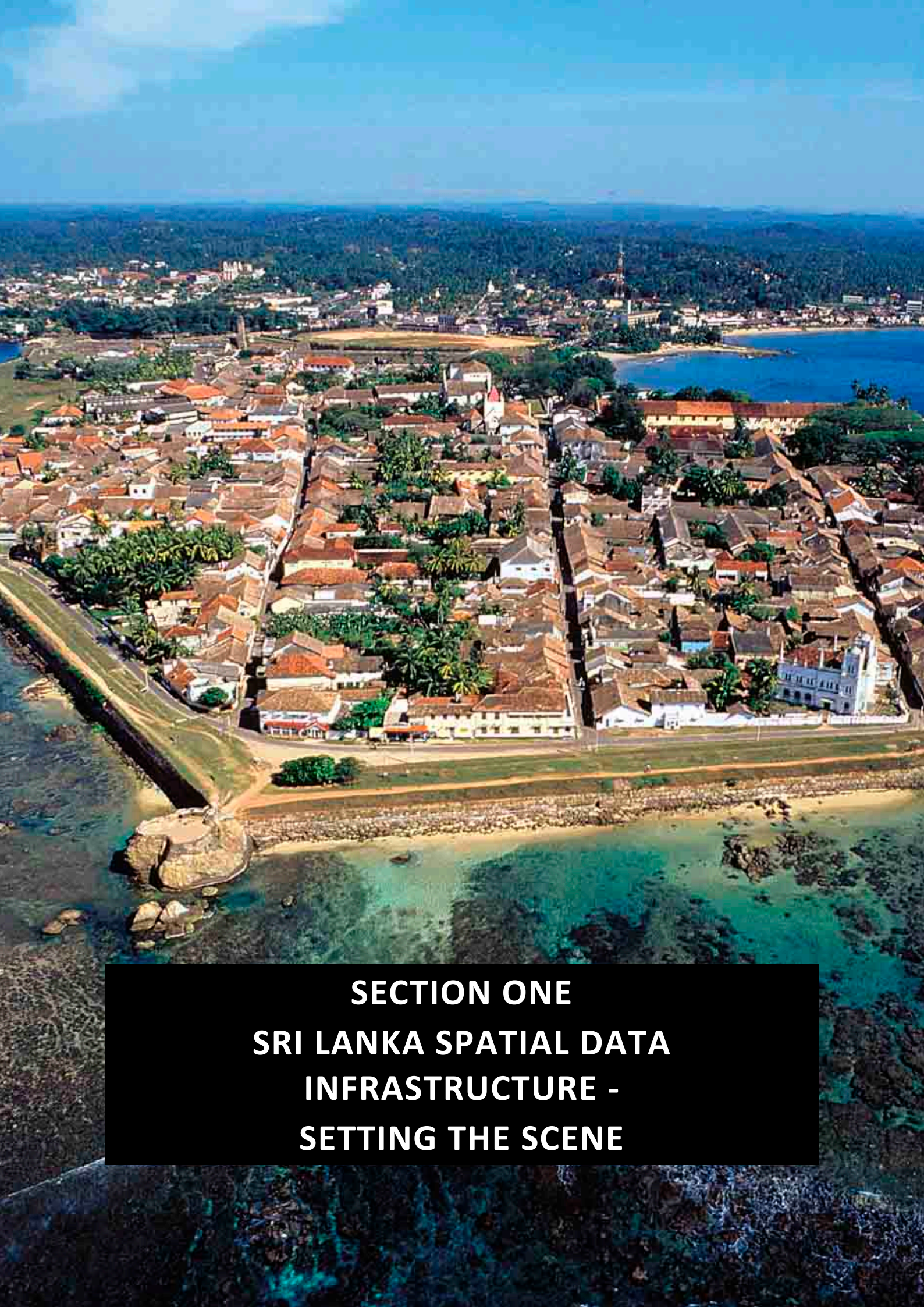
The DMEM Pilot will provide test cases for the Planning, Data and Technology, Data Acquisition and Compliance Projects. It will also be used as a demonstrator to educate and raise awareness of the National Map Portal within the community and in doing so promote the use of spatial data more widely.



High level SLSDI Road Map

Budget Allocation

The costs shown in this document are indicative only (Section 4) and subject to clarification through a more comprehensive financial analysis and request for proposals.



SECTION ONE
SRI LANKA SPATIAL DATA INFRASTRUCTURE - SETTING THE SCENE

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1. INTRODUCTION

1.1 ABOUT THIS ROAD MAP

The Sri Lanka Spatial Data Infrastructure (SLSDI) Road Map is a companion manual to the SLSDI Strategy and SLSDI Framework documents.

The SLSDI Road Map provides detailed steps towards achieving the short-term and long-term strategic goals outlined in the SLSDI Strategy and draws on the recommended methods documented in the SLSDI Framework along with justification of the approach.

The SLSDI Road Map includes a Disaster Management and Environment Management (DMEM) Pilot Project, which will deliver the Disaster Management and Environment Management (DMEM) Thematic Area for the SLSDI.

This DMEM Pilot Project will evaluate the SLSDI methods and importantly, demonstrate the value of integrated and accessible spatial information.

The DMEM Pilot Project requires the completion of some SLSDI activities as these are prerequisites for the DMEM Pilot, including the:

- drafting of policies that support data sharing across government; and
- implementation of the National Map Portal to enable spatial data to be viewed online

Consequently, the SLSDI and the DMEM Pilot Project Road Maps are interdependent and as such should be implemented simultaneously. In this way, components can be completed once - with benefits accruing to both the SLSDI implementation as well as the DMEM Thematic Area. This will make for a more cost effective SLSDI implementation.

1.2 STRATEGIC CONTEXT

The SLSDI and DMEM Pilot Project Road Maps have been developed with a view to delivering the strategic outcomes of the Spatial Data Infrastructure Strategy for Sri Lanka **– Powering Decision Making and Innovation Using Spatial Information Technologies.**

The vision for the Sri Lanka Spatial Data Infrastructure is to achieve:

> *"Sustainable development through effective use of spatial information for evidence-based decision making."*

This vision will be realised through four strategic goals. These goals are directed towards achieving:

- An accurate nationwide representation of the landscape that is readily accessible and easily integrated with economic, social and environmental geographies.
- Greater efficiency and productivity in the management and sharing of spatial data.
- Evidence-based decision making in government, business and the wider community through access to integrated spatial information.
- Spatial solutions readily available and widely used across Sri Lanka in response to emerging opportunities.

1.3 DELIVERING ON THE SLSDI STRATEGY

1.3.1 SLSDI Governance Model

The SLSDI Strategy proposes a new governance model for effective and sustainable data sharing across institutions and to meet accountability and outcome provisions of government. The process for establishing this new governance model is explained in Section 3.2 of the SLSDI Road Map. It includes guidelines for collaboration with Lead Agencies that acquire spatial information assets through major projects. The proposed project governance model for SLSDI projects is specified in Section 3.2 using the DMEM Pilot as an exemplar.

1.3.2 SLSDI Integrated Strategies

The SLSDI Strategy also proposes ten integrated strategies for delivering the Spatial Data Infrastructure for Sri Lanka. These integrated strategies combined will deliver the communication and coordination aspects of the SLSDI, as well as policy and standards, data and technology and education and awareness requirements. The integrated strategies are:

1. Stakeholder Engagement
2. Legal and Policy Framework
3. National Map Portal
4. Spatial Data Framework
5. National Spatial Data Catalogue
6. Spatial Data Warehouse
7. Spatial Data Management
8. Spatial Data Acquisition Program
9. Disaster Management Pilot
10. Education and Awareness Programs

The DMEM Pilot is one of these integrated strategies. The DMEM Pilot will case study and deliver a number of the SLSDI requirements including the Disaster Management and Environment Management Thematic Area of the SLSDI (Figure 1.1).

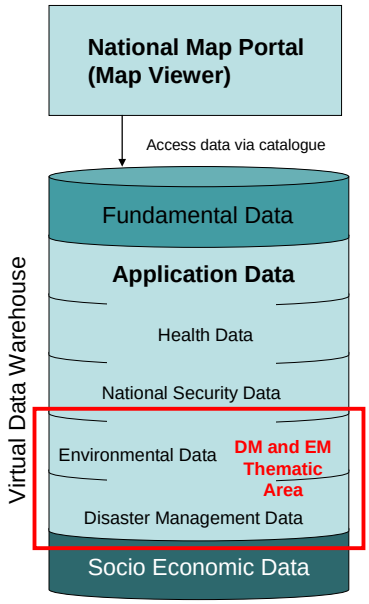

Figure 1.1 The DMEM Pilot Project will deliver the DMEM Thematic Area of the SLSDI

1.4 KEY OBJECTIVES

The SLSDI and DMEM Pilot Project Road Maps are designed to:

- Make sure that the NSDI Working Group, NSDI Office and DMEM Project Teams are aware of the technologies and capabilities required and the time they will be needed in order to deliver on the SLSDI strategy
- Build a common understanding and shared ownership of the SLSDI and DMEM Pilot Project
- Incorporate ideas and insights from team members representing the many functions involved in order to achieve a successful development process
- Forecast and prioritise project budgets based on stakeholder needs, business drivers and/or technology investments
- Set realistic time-frames and risk management strategies including identifying events or changes in conditions that signal a need to revisit the plan during the development journey

1.5 STRUCTURE OF THE DOCUMENT

This document is divided into four sections:

- **Section One: Setting the Scene** – explains the relationship between the SLSDI and DMEM Pilot Project.
- **Section Two: Sri Lanka Spatial Data Infrastructure Road Map** – details the major projects required to deliver on the spatial data infrastructure for Sri Lanka. Major Projects include:
    - SLSDI Governance
    - SLSDI Stakeholder Engagement
    - Legal and Policy Framework
    - National Map Portal
    - National Spatial Data Framework
    - National Spatial Data Catalogue
    - National Spatial Data Warehouse
    - Spatial Data Management
    - National Spatial Data Acquisition Program
    - SLSDI Education and Awareness Program
- **Section Three: DMEM Pilot Project Road Map** – details the project activities that pilot aspects of the SLSDI. Project Activities include:
    - Project Governance
    - Project Planning
    - Draft SLSDI Policy
    - Disaster Management Channel (Optional)
    - Data Inventory
    - Descriptive Metadata
    - Data Storage Solution

- Data Management Processes
- DMEM Spatial Data Acquisition Plan
- DMEM Pilot Education and Awareness Program

- **Section Four:** Budget Allocation and Schedule

1.6 RELATIONSHIP BETWEEN THE SLSDI AND DMEM PILOT PROJECT ROAD MAPS

The DMEM Pilot Project is a pilot implementation of the SLSDI. The objective is to:

- Pilot aspects of the SLSDI implementation so that lessons learned can be adopted early
- Complete some of the SLSDI deliverables, which are major dependencies for progressing towards full implementation of the SLSDI in the future

The SLSDI has ten major projects and these projects have a direct link with the DMEM Pilot Project. These linkages are explained in Table 1.1 In a number of instances the SLSDI Major projects are essential prerequisites for delivering the DMEM Pilot Project and the DMEM Thematic Area of the SLSDI. Prerequisites are noted in the DMEM Pilot Project Road Map where they occur.

Table 1.1 Interrelationship between the SLSDI Road Map and DMEM Pilot Project

SLSDI Major Projects	Relationship and Rationale	DMEM Pilot Project Activities
SLSDI Governance Establish the NSDI Office, Steering Committee, NSDI Council and Subcommittees	The **SLSDI Governance** (Section 2.2) seeks to promote information sharing and cooperation between organisations through the establishment of the NSDI Office. The **Project Governance** (Section 3.2) will demonstrate how lead agencies cooperate with the NSDI office when implementing projects that have significant spatial information components. The objective is to ensure that these projects do not operate in a silo, which is the customary approach; but rather promote an environment of collaboration. The NSDI office will then have oversight of project aims and these can be broadcast more broadly across the government sector.	**DMEM Project Governance** Establish the lead agency and DMEM Project Team
SLSDI Stakeholder Engagement Explore, analyse and document stakeholder requirements and aspirations	**SLSDI Stakeholder Engagement** (Section 2.3) is a critical stage in SLSDI implementation and requires a Stakeholder Engagement Model and Plan. The DMEM stakeholder group will form a *subset of* the SLSDI stakeholder community. The **Project Planning** phase (Section 3.3) will develop a stakeholder requirements matrix – describing common, essential and aspirational needs for the DMEM Thematic Area. This analysis will provide a case study for SLSDI stakeholder engagement processes from which lessons learned can be applied to the broader SLSDI community.	**Project Planning** Develop the DMEM Project Plan with input from stakeholders

SLSDI Major Projects	Relationship and Rationale	DMEM Pilot Project Activities
Legal and Policy Framework Identify laws and policies that encourage the effective management and exchange of spatial data	The **SLSDI Legal and Policy Framework** (Section 2.4) is a prerequisite for the DMEM Pilot Project as these legal and policy instruments are the lever by which government can promote best practise data sharing among organisations. The DMEM Pilot Project will **draft the SLSDI policies** and case study policy compliance (Section 3.4). These drafts will be used as a basis for evaluating the SLSDI Legal and Policy Framework to determine any impediments. This is an important step as it will highlight any issues with policy execution early and identify potential unintended consequences of policy implementation.	**Draft SLSDI Policy** Draft policy and case study policy compliance
National Map Portal Build a system that enables people to view layers of integrated spatial data produced by government sector agencies	The **National Map Portal** (Section 2.5) is the most visual component of the SLSDI. The DMEM Thematic Area will be delivered as part of the National Map Portal. Development will focus on delivering integrated layers of spatial information via a web portal and include fundamental data themes and disaster management and environment management data themes. The **Disaster Management Channel (Optional)** (Section 3.5) will deliver enhanced capabilities according to the priority needs of the DM community, such as predefined data views.	**Disaster Management Channel (Optional)** Implement predefined views for the disaster management community
National Spatial Data Framework Create a nationally recognised authoritative source of spatial data themes	The **National Spatial Data Framework** (Section 2.6) is the classification of spatial data into thematic areas. It provides users with an intuitive way to access data and a common reference for data custodians and system administrators. The National Data framework is a prerequisite for the DMEM Pilot Project as it requires spatial information from across the government sector. The **Data Inventory** (Section 3.6) is required to understand what information is currently available, what information needs to be captured and what information requires updating. This process will highlight any access restrictions.	**DMEM Thematic Area Data Inventory** Identify and list critical data sets for the DMEM Thematic Area

SLSDI Major Projects	Relationship and Rationale	DMEM Pilot Project Activities
National Spatial Data Catalogue Develop a library of metadata to enable people to search and query spatial data sets	The **National Spatial Data Catalogue** (Section 2.7) requires metadata for each spatial data set to enable users to search and access spatial information. The DMEM Pilot Project will create **descriptive metadata** (Section 3.7) for each of the data sets required for disaster management and environment management operations, as well as the fundamental spatial information datasets that provide contextual information for a range of applications. The DMEM Metadata Profiles will provide a standard that can be adopted for other government data sets.	**Descriptive Metadata** Develop descriptive metadata for DMEM data sets
National Spatial Data Warehouse Build a secure and sustainable data storage and dissemination environment	The **National Spatial Data Warehouse** (Section 2.8) is the government storage solution for spatial data. This data is accessed via the National Map Portal and Spatial data Catalogue. The Spatial Data Warehouse is a virtual environment consisting of both centralised and decentralised storage solutions. The DMEM Pilot Project will evaluate **data storage solutions** (Section 3.8) with a view to providing a secure gateway to government held data.	**Data Storage Solution** A secure data storage environment for DMEM data
Spatial Data Management Charter Develop a set of common principles for the management and exchange of spatial data	The SLSDI will require government agencies that manage spatial data to agree on a common set of 'best practise' principles for the management and exchange of spatial information. This memorandum of understanding is referred to as **the Spatial Data Management (SDM)** Charter (Section 2.9). The Charter will form the basis for, and input to, the principles underpinning the Legal and Policy Framework. The charter is a prerequisite for the DMEM Pilot Project. It is expected that agencies involved in the DMEM Pilot Project will adopt the SDM Charter. The DMEM Pilot Project will adopt **data management processes** (Section 3.9) that comply with the SDM Charter and, in doing so, provide an exemplar for the new SLSDI collaborative spatial data management environment.	**Data Management Process** Develop processes aligned to best practice management and exchange of spatial data

SLSDI Major Projects	Relationship and Rationale	DMEM Pilot Project Activities
National Spatial Data Acquisition Program Develop a program for spatial data collection, procurement and management	The **National Spatial Data Acquisition Program** (Section 2.10) provides cross-government oversight of any new spatial data sets acquired. The objective is to reduce the likelihood of duplicate data capture. Agencies are required to submit their Data Acquisition Plans as input to the National Program. The DMEM Pilot Project will require a strategic **DMEM Spatial Data Acquisition Plan** (Section 3.10) to progressively capture and update data essential to disaster management and environment management.	**DMEM Spatial Data Acquisition Plan** Develop a yearly plan for procuring and collecting spatial data for DMEM Thematic Area
SLSDI Education and Awareness Program Encourage people to change their perceptions and behaviours towards the use of spatial data	The **SLSDI Education and Awareness Program** (Section 2.11) is required for future capacity planning and to raise the awareness of SLSDI initiatives. The **DMEM Education and Awareness Program** (Section 3.11) will be conducted as a component of the DMEM Pilot Project to demonstrate the value of integrated spatial data and effective data sharing to the SLSDI community	**DMEM Education and Awareness Program** Demonstrate the value and capabilities of integrating spatial data to SLSDI Community

1.7 MONITORING AND EVALUATION

A monitoring and evaluation mechanism will be developed as part of the SLSDI Governance Program to ensure effective monitoring of whole-of-government spatial information activities as well as progress of activities supported under the Road Map.

Monitoring and Evaluation of the SLSDI Road Map will be performed by the NSDI Office. Information on progress will be collected and reported at agreed internals. The NSDI Office will post the SLSDI Road Map on its website, along with progress reports.

The reporting Frameworks (to be developed) will include formal updates to the NSDI Steering Committee, NSDI Council and NSDI Subcommittees. These will be delivered by the Director NSDI Office. Other target groups, determined through the stakeholder engagement process (Section 2.3.6) will also be informed of progress (Section 2.2.6).

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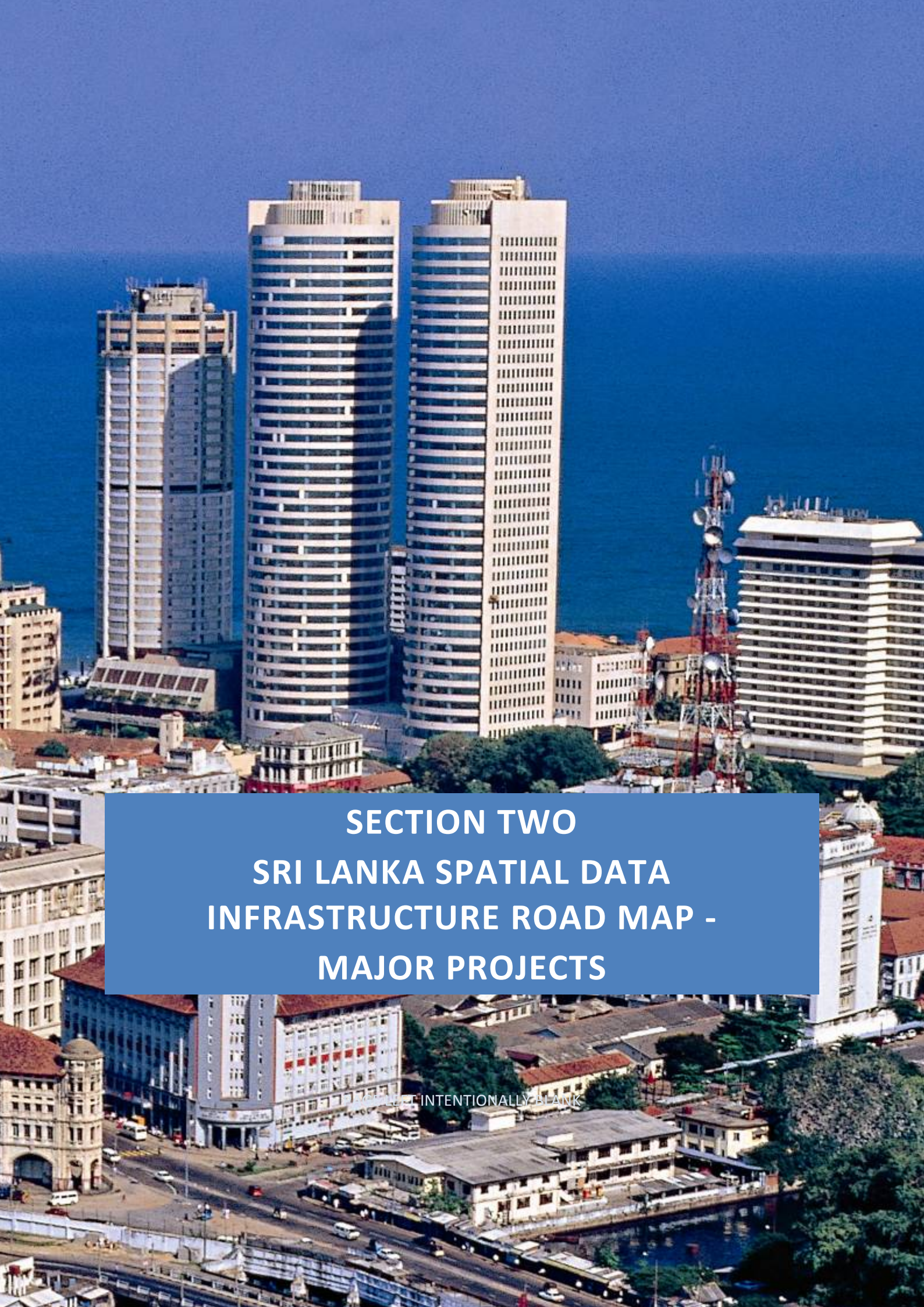

SECTION TWO
SRI LANKA SPATIAL DATA INFRASTRUCTURE ROAD MAP - MAJOR PROJECTS

2.1 SRI LANKA SPATIAL DATA INFRASTRUCTURE

The term infrastructure suggests a large expensive development. While the foundations of the infrastructure laid down today come at a cost, the overarching objective is to make government capabilities much more powerful and less expensive in the future.

The good news is that unlike other infrastructures, a spatial infrastructure does not need to be completed in its entirety to start realising benefits. In fact, the small steps made early on in the process will achieve the most value and begin to accumulate economic benefits to the government and user community at large. It is not necessary to develop everything at once. Considerable benefits can be achieved by focusing on key priorities.

Taking smaller steps is also more cost effective, as the cost of implementation can be spanned over a number of years rather than all in the first year. Spatial data made available to the community in the early stages, while not a complete set, can start to accrue a return on investment that can be allocated to achieving the next steps in the implementation process.

The road map identifies activities in a logical progression. However, there are some activities that are more important than others and critical to shaping the SLSDI in the early stages. There are six priorities:

- Priority 1: Set up the NSDI Office (Section 2.2)
- Priority 2: Understand Stakeholder Needs (Section 2.3)
- Priority 3: Requirements Design for National Map Portal (Section 2.5)
- Priority 4: Custodianship Policy (Section 2.4)
- Priority 5: Spatial Data Management Charter (Section 2.9)
- Priority 6. National Spatial Data Framework and data inventory of Fundamental Data Themes and DMEM Thematic Area (Section 2.6 and 2.7)

2.2 SLSDI GOVERNANCE

Establish a governance model to lead the reform in spatial data exchange across government

2.2.1 AGENCIES INVOLVED

Lead Ministry: Ministry of Land and Land Development

Implementation Agency: NSDI Working Group on behalf of government.

SLSDI Community: Organisations responsible for generating data, such as the Survey Department, Land and Land Use Policy Development, Forestry Department, Census and Statistics Department; and government departments who are significant users of spatial information.

2.2.2 BACKGROUND AND RATIONALE

Institutional coordination and collaboration will need to be strengthened in order to support the development of the SLSDI. Currently, institutional arrangements are based on official channels of information flows. The approach it subject to a high degree of bureaucracy for data requests, preparation and signing of agreements, and data transfers. Delays are frequent and the process is costly.

Fast tracking procedures is possible in the event of emergencies. However, the process is reliant on personal relationships, which while assisting with communication and action, can collapse when changes in personnel occur.

There is a need to develop enduring underpinning structures. The emerging changes in the spatial information industry require new governance arrangements that take into account the balance between public and private sectors, data sources and data users. It is also important to recognise the potential contribution from research and development bodies.

2.2.3 PROPOSED APPROACH

The SLSDI Strategy proposes the following framework (Figure 2.1). It includes the creation of a NSDI Office, NSDI Steering Committee, NSDI Council and subcommittees with subject matter expertise. From time to time the NSDI Office will implement spatial information related projects in collaboration with other institutions/organisations. This will require the establishment of short-term project teams through joint collaboration with lead agencies.

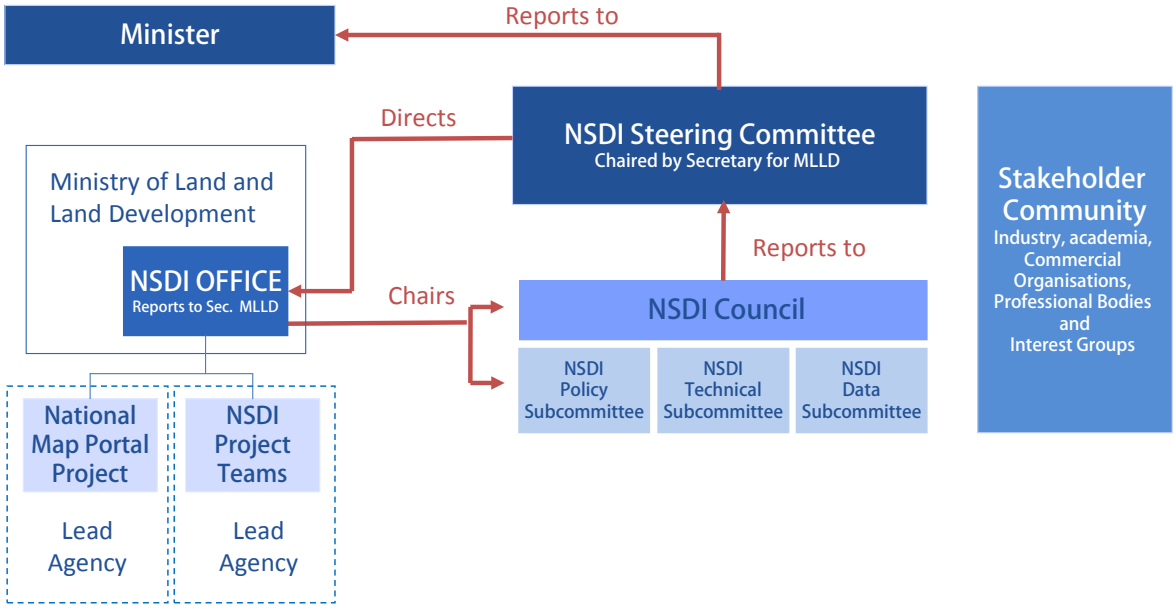

Figure 2.1 SLSDI Governance Model

Staffing for the NSDI Office coordination roles are proposed as follows:

- Director NSDI Office
- 1 Project Coordinator – NSDI Portal, Data Warehouse,
- 1 Project Coordinator – Spatial Data Framework and Catalogue
- 1 Project Manager – SLSDI Implementation Planning and Monitoring and Evaluation, Stakeholder Engagement Plan, Education and Awareness Program
- 1 Policy Officer- MOU Spatial Data Management, Policy development, Legal Act, Annual Policy Review
- Administrative Assistant

Importantly, positions will require staff to have a background in spatial information sciences and preferably have knowledge in the use of Geographic Information Systems.

2.2.4 OBJECTIVES

The objectives for establishing the NSDI Governance structure are:

- Provide a forum for the effective management and sharing of spatial information across the government sector.
- Provide a focal point for strategic national imperatives as well as institutional requirements.
- A governance model that is easily accessible and credible to participating institutions.
- A model that is driven from the top, so that participating institutions are well supported and guided in their daily tasks and decisions where the SLSDI mandate is concerned.
- Alertness to inter-agency cost-shifting where SLSDI programs and projects complement changing cross-government practises.

- Regular cross-sector and cross-committee SLSDI reporting and monitoring, complemented by re-evaluation of performance expectations and adjustments where necessary.

2.2.5 IMPLEMENTATION TIMEFRAME

First to second Quarter Year 1

2.2.6 ACTIVITIES

- Establish the **NSDI Office** as the central hub for the coordination and accountability for all NSDI activities.
  - Seek Cabinet Approval
  - Establish the organisational structure
  - Develop Terms of Reference, roles and responsibilities and code of conduct.
  - Determine number of staff required and create Position (job) Descriptions for permanent/part-time roles
  - Identify funding required for resourcing the office
  - Identify staff delegations and reporting structure
- Establish the following Committee Structure
  - NSDI Steering Committee, NSDI Council and Subcommittees (Legal and Policy, Technical Data) to provide strategic direction and endorse overall policy and strategic plans, ensuring alignment with whole-of-government policies and strategic priorities.
  - Seek Cabinet Approval for committees (if required)
  - Identify Committee Chair, Executive Officer, Committee Members and Administrative Support
  - Develop Terms of Reference, and roles and responsibilities
  - Frequency of Meetings, and Monitoring and Reporting Structure
- Develop a detailed SLSDI Implementation Plan using the Road Map as a guide and include prioritisation of future Thematic Areas
- Develop a Reporting Framework to monitor the achievement of Road Map outcomes. This includes formal updates to the NSDI Steering Committee, NSDI Council and NSDI Subcommittees. These will be delivered by the Director NSDI Office. Other target groups, determined through the stakeholder engagement process (Section 2.3.6), will also be informed of progress.

2.2.7 DELIVERABLES

- Approval for the creation of the NSDI Office, NSDI Steering Committee, NSDI Council and NSDI subcommittees.
- Terms of Reference for the NSDI Office and each Committee
- Fully functioning Committees

- Appropriate staff with delegated powers, funding and computing resources for NSDI Office
- Detailed SLSDI Implementation Plan
- Monitoring and Evaluation Framework for effective multi-stakeholder monitoring of activities under the Road Map.

2.2.8 OUTCOMES

- Delivery of the SLSDI strategic outcomes through effective leadership and coordination of governments spatial data resources

2.2.9 RISK MITIGATION

The ability to establish a governance framework to operationalise the NSDI has the following risks:

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
Cabinet does not endorse the proposed governance model	1	5	Seek clarification on issues and develop a new model based on feedback.
Stakeholder Community are suspicious of the proposed governance model and does not accept it.	1	5	Seek further consultation and feedback to understand issues with adoption
Lack of commitment from SLSDI community to resource committee/council member roles	3	3	Reduce scope and minimise number of meetings to what is achievable

2.2.10 BUDGET

- Single allocation of funds of **US$12,000** for a consultant to develop the organisation structure for the NSDI Office including position descriptions and committee charters/ToRs
- Recurrent budget allocation required to fund the NSDI Office positions and operations
- Single allocation of funds to set-up the NSDI Office (to be determined)

2.2.11 FUNDING STATUS

Local funding required. Ministry of Land and Land Development

2.2.12 CONTACT PERSONS

Additional Secretary, Ministry for Land and Land Development

2.3 SLSDI STAKEHOLDER ENGAGEMENT

Explore, analyse and document stakeholder requirements and aspirations

2.3.1 AGENCIES INVOLVED

Implementation Agency: Ministry of Land and Land Development with guidance from the NSDI Working Group (and later the NSDI Office once established).

SLSDI Stakeholder Community:

- Organisations responsible for generating data, such as the Survey Department, Forestry Department and Disaster Management Centre.
- Government departments and commercial enterprises who add value to the data.
- Information users such as administrators, managers, farmers co-operatives, individuals and the general public who acquire benefits from the availability of information.
- Community groups with a special interest in spatial information and its use such as professional bodies, and volunteered geographic information providers and hobbyists.

2.3.2 BACKGROUND AND RATIONALE

Stakeholders are integral to the development of the SLSDI and therefore buy-in and commitment, particularly from senior management, is critical to success. It is therefore important to develop a supportive governance environment that embraces stakeholders and acknowledges the importance of their role in the SLSDI development. Potential stakeholders will only become active participants if they see advantages for their organisations and if they do not feel threatened by the governance arrangements.

In Sri Lanka, the majority of stakeholders are the government data suppliers and users. Their role in the development and operation of the data access component of the infrastructure depends largely on government policies regarding data management, distribution and access, and cost recovery.

In addition, the objectives of SLSDI must reflect the needs of the society and interest groups, and not just the internal needs of institutions. Commercial entities will play a strong role as users of the National Map Portal; however they may also be suppliers of primary and value added data in the longer term.

The end-user community will be concerned about data access, functionality of the infrastructure tools, the amount and quality of the content - its accessibility, fees for data access and usage policies.

2.3.3 PROPOSED APPROACH

A participative approach to cooperation and coordination will be adopted to build on common interests and requirements. The approach will be documented as a Stakeholder Engagement Model and Plan

A stakeholder requirements matrix will be used to determine common, essential and aspirational needs. The following principles are adopted:

- Apply open and effective communication strategies
- Use clear and agreed information and feedback processes
- Work collaboratively to seek mutually beneficial outcomes where feasible
- Be inclusiveness by recognising, understanding and involving stakeholders in the process
- Conduct engagement in a manner that fosters mutual respect and trust

Identifying stakeholders will require the creation of a spatial information community profile and include groups who traditionally are underrepresented in planning efforts.

2.3.4 OBJECTIVES

The objectives for engaging with stakeholders are:

- Understand stakeholder concerns, views, requirements and expectations
- Better awareness of and ability to deal with issues of significance to stakeholders
- Respond coherently and appropriately to stakeholder needs
- Enhance the understanding and acceptance of the SLSDI
- Early identification of potential problems leading to better risk management
- Provide transparency, accountability and integrity in planning and implementation
- Opportunities to develop long-term and trusting relationships

2.2.5 IMPLEMENTATION TIMEFRAME

Second Quarter Year 1 and ongoing.

2.3.6 ACTIVITIES

- Develop the Stakeholder Engagement Model - PLAN, ENGAGE, RESPOND and MEASURE.
- Develop the Stakeholder Engagement Plan including:
  - Spatial Information Community Profile
  - Stakeholder Engagement Matrix: Identification of stakeholders and their level of influence
  - Design of the engagement process and methods including a checklist and communication plan
  - Consideration of logistics
  - A Risk Management Model
- Engage with Stakeholders - Case Study the SLSDI Stakeholder Engagement Model and Processes (Section 3.2)

- Evaluate the Engagement Process

2.3.7 DELIVERABLES

- A high quality Stakeholder Engagement Model and Plan (Document)
- Spatial Information Community Profile
- A Stakeholder requirements matrix – describing common, essential and aspirational needs
- Stakeholder Engagement Evaluation Plan and checklist

2.3.8 OUTCOMES

- All identified stakeholders have been engaged in the SLSDI planning and implementation.
- A survey of stakeholders indicates a sense of being valued contributors to the outcomes of SLSDI decisions.
- An SLSDI that meets user's requirements in terms of data availability, quality and usability.
- Increase in the number of non-government users of national map data for environmental, social and economic purposes year on year throughout the term of the SLSDI strategy.

2.3.9 RISK MITIGATION

The following risks to SLSDI performance from not being able to meet user requirements are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
Available spatial data sets do not meet user requirements	1	5	Seek further consultation and feedback to understand issues with adoption.
Funding not available to meet all user requirements	4	2	Produce a 5 year Plan showing future SLSDI developments and disseminate to stakeholders. In this way stakeholders will know that their needs are being considered.

2.3.10 BUDGET

- Single allocation of funds of US$15,000.00 for an International consultant to develop the Stakeholder Engagement Model Plan

2.3.11 FUNDING STATUS

Local and foreign funding required.

2.3.12 CONTACT PERSONS

Director NSDI Office, Ministry of Land and Land Development

2.4 LEGAL AND POLICY FRAMEWORK

Identify laws and policies that encourage the effective management and exchange of spatial data

2.4.1 AGENCIES INVOLVED

Implementation Agency: Ministry of Land and Land Development, NSDI Office

Committees: Legal and Policy Subcommittee with direction from NSDI Steering Committee, and with input from NSDI Council and Legal and Policy Subcommittee

SLSDI Community: Organisations responsible for generating data, such as the Survey Department, Land and Land Use Policy Development, Forestry Department, Census and Statistics Department; and Government departments who are significant users of spatial information.

2.4.2 BACKGROUND AND RATIONALE

Currently there are no policies or Legal Act for the management and sharing of spatial information in Sri Lanka. Policies are required to promote best practice in spatial data management, particularly in the areas of accessibility to, and usability of spatial information.

When developed in conjunction with government organisations and the private sector, policies can be used to overcome many barriers to information access, such as organisational boundaries; lack of consistent information standards; and use of incompatible or inappropriate technologies.

2.4.3 PROPOSED APPROACH

The proposed Legal and Policy Framework (Figure 2.2) considers all aspects of the spatial data management life cycle: from creation and initial storage; its dissemination and use as an information product; to the time when it becomes obsolete and is deleted. The data life-cycle management approach involves institutional in-house procedures and practices for policy compliance.

The Proposed Policy Framework is designed to address the concerns of government agencies through an integrated approach that:

- Explains the organisations role within the broader context of the SLSDI by designating roles and responsibilities for data custodians
- Includes guiding principles for data collection that can be readily adopted to ensure data collection is not duplicated
- Facilitates an environment of data sharing across the government sector by providing guidelines and techniques that assist in the streamlined management and exchange of spatial information
- Identifies how data should be managed by an organisation in terms of their existing operations. The intent is to enable organisations to progressively move towards the adoption

of standards, formats, metadata collection, and storage and archiving of data without having to reinvent workflows or build databases from scratch

- Addresses the concerns of data security and sensitivity by providing guiding principles that can be adopted by organisations in the course of their normal operations
- Specifies the requirements for data access and allows organisations to set their own pricing conditions

Importantly, it leaves the control of spatial data in the hands of the data producing organisations. This alleviates concerns associated with change, as change can be managed within the control of each participating organisation.

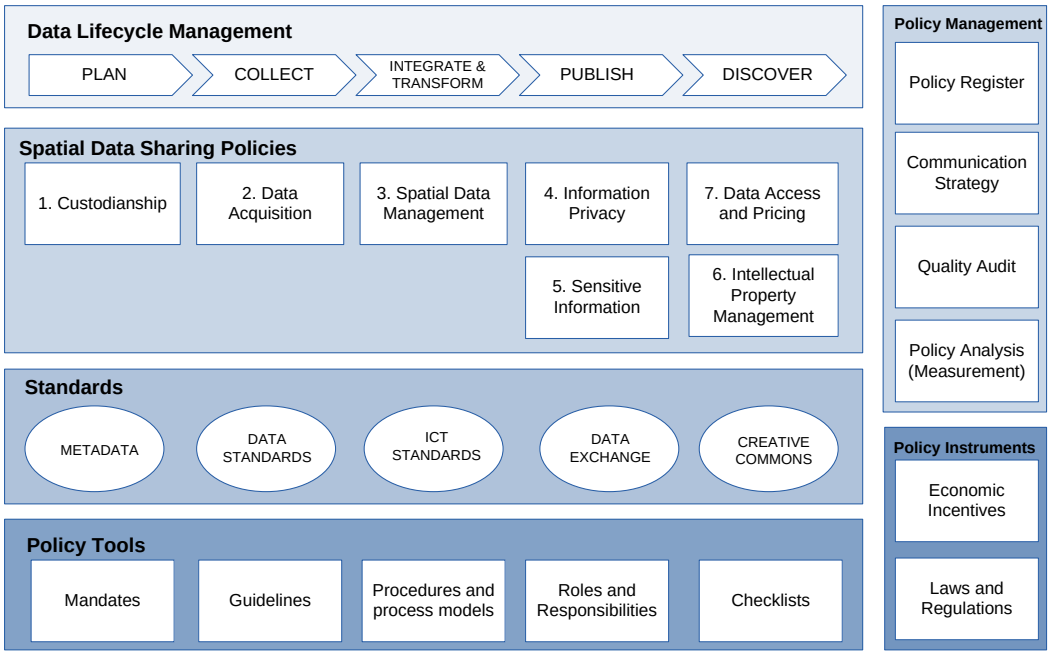

Figure 2.2 Proposed Legal and Policy Framework for SLSDI

2.4.4 OBJECTIVES

The objectives of the Legal and Policy Framework are to provide the foundation for:

- Effective spatial data management and sharing
- Easy, efficient and equitable access to spatial data
- Maximise the net benefits of spatial information to the community
- Data custodians manage spatial data as trustees for the Strategic use of resources for planning, recording and acquiring spatial data
- Eliminating duplication of effort in the collection and management of spatial data.
- Preserving confidentiality, privacy, security and intellectual property rights
- Promoting public/private partnerships to foster innovation and value-adding.
- Applying spatial data standards compatible and consistent with internationally recognised standards and guidelines
- Information security of stored and transmitted spatial data and provisions for long term care
- Developing a legal Act for data protection and spatial data sharing

2.4.5 IMPLEMENTATION TIMEFRAME

First Quarter Year 1

2.4.6 ACTIVITIES

- Develop a Policy Framework
- Policy Implementation (Drafting of Policy to be completed as part of the DMEM Pilot Project (Section 3.4.6))
- Develop a Policy Management Plan - Policy Register, Communication Strategy, Quality Audit, Policy Analysis (Measures) and Compliance Criteria
- Develop a Reporting Framework to monitor the benefits of policy adoption overtime
- Review policy annually
- Legal Documents:
  - Review existing Legal Documents for applicability to Spatial information e-government, Intellectual Property, Computer Crimes Act etc
  - Develop a Legal Act for Spatial Data Sharing (if required) to mandate compliance with policies

2.4.7 DELIVERABLES

- A set of policies designed to promote best practise in spatial data management and exchange
- A Legal and Policy Management Plan, Compliance Strategy and Reporting Framework for sound policy governance
- Legal 'Data Sharing' Act (optional at this stage)

2.4.8 OUTCOMES

- All government agencies that collect and use spatial information have adopted the Spatial Data Infrastructure Policies within policy timeframes

2.4.9 RISK MITIGATION

The following risks to the implementation of best practise spatial data management and exchange are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
Government institutions do not adopt the principles underpinning the policies.	1	5	Seek further consultation and feedback to understand issues with adoption.
The adoption of policy is not making a difference to data sharing practises across government.	1	5	Seek support from government leadership and conduct further education and awareness training with respect to policy compliance and value.

2.4.10 BUDGET

- Recurrent funding for NSDI Office Policy Officer to develop the Legal and Policy Framework (already allocated in NSDI Office budget allocation – (Section 2.2.10)).

2.4.11 FUNDING STATUS

Local funding required

2.4.12 CONTACT PERSONS

Director NSDI Office, Ministry of Land and Land Development

2.5 NATIONAL MAP PORTAL

Build a system that enables people to view layers of integrated spatial information

2.5.1 AGENCIES INVOLVED

Lead Agency: Ministry of Land and Land Development, NSDI Office

Implementation Agency: To be determined (TBD)..

SLSDI Community: Organisations responsible for making data available via the National Map Portal, such as the Survey Department, Land and Land Use Policy Development, Forestry Department, Census and Statistics Department; and government departments who are significant collectors of spatial information.

2.5.2 BACKGROUND AND RATIONAL

There is currently no central information portal for spatial information. The current mechanism for sharing spatial data is to replicate the data via customised exchanges of bulk data. This approach is cumbersome, resource intensive, and data is prone to becoming out-of-date. The methodology also limits the potential to capitalise on the true value of the nation's geographic information asset. It also results in inefficiencies, as limited awareness of existing datasets has lead organisations to duplicate data collection.

A National 'Web' Map Portal is required. This is a practical solution to accessing and visualising government spatial information. The Portal provides access to spatial information collected by various agencies and common tools to develop applications, which utilise spatial information.

2.5.3 PROPOSED APPROACH

The proposed approach is to evaluate alternative system designs to make an informed decision on the best way forward. There are three methods by which the National Map Portal can be deployed:

- A bespoke system using an open source software solution
- A commercial off-the-shelf (COTS) system
- A hybrid system

There are advantages and disadvantages with each approach. They are:

- A bespoke system is currently deployed by ICTA for eSriLanka (e-Government services). Electronic services are delivered via a comprehensive integrated platform called 'Lanka Gate'. At present, there is no facility to make spatial information available. However, Lanka Gate can be extended to include a National Map Portal using open source software. The advantage is that the portal can be integrated with the Lanka Gate existing infrastructure thereby reducing duplication. However, there is often higher implementation costs associated with bespoke systems and longer set-up times. These costs can be minimised by implementing essential functionality in the first instance and building capability overtime.

With a bespoke system, the government will not be tied to a particular vendor/IT company or maintenance contract. With this approach the government will have to maintain human resource skill sets for open source software development otherwise the approach will be unsustainable.

- Alternatively, COTS systems are often cheaper due to economies of scale and generally faster to set-up. They also frequently have more functionality than bespoke systems, although capabilities do not necessarily match requirements. With COTS there are usually ongoing monthly licenses and maintenance costs that may make the solution financially unsustainable. Nonetheless, with an annual maintenance contract the skills and expertise to manage implementation issues are always available through the vendor/supplier.
- A hybrid system provides the best of both worlds. It is usually cheaper and faster to set-up than fully bespoke software, but can be developed to closely match requirements than plain off-the-shelf software. This is only possible if there is off-the-shelf software available that is either open source, or otherwise flexible enough to be extended. Internal human resource skills in online technologies are a requirement.

Given the range of strengths and weaknesses, the proposed approach is to develop a detailed Requirements Design that can be used to issue a Request for Proposal (RFP). The RFP will include a request for a solution architecture, development costs and timeframes, maintenance services and ongoing recurrent costs.

In addition, given the difficulty in gauging the cost to build the National Map Portal it is proposed that a Request for Information (RFI) be conducted in the first instance to better understand costs and capabilities of solutions currently available in the marketplace.

Consideration needs to be given to open source as well as vendor-specific solutions.

2.5.4 OBJECTIVES

The objectives for creating the National Map Portal are to:

- Develop a system of spatial data sharing that can be sustained in the long term
- Provide government, industry and the community with streamlined access to nationwide spatial information
- Improve the quality of decision-making and service delivery times through having accessible, and current spatial information
- Increase the value of government spatial data by integrating it with other datasets

2.5.5 IMPLEMENTATION TIMEFRAME

First Quarter Year 1 – first Quarter Year 2

2.5.6 ACTIVITIES

- Request for Information
  - Develop high-level requirements for the National Map Portal and seek an indication of costs and capabilities through an invitation to potential vendors for a Request for Information
- Analysis of Requirements
  - Develop a detailed Requirements Design that identifies the attributes, capabilities, characteristics, and qualities required of the NMP Enabling Infrastructure. It should include customer, architectural, functional and performance requirements.
- Request for Proposal – Solution architecture and development
  - Develop Proposal Documentation
  - Seek proposals for solution architecture to meet required capabilities, implementation costs and timeframes, and ongoing maintenance costs.
  - Develop a requirements matrix. This will form part of the selection criteria.
- Options Analysis
  - Compare costs (development, installation, ongoing maintenance)
  - Comparison of capabilities against the Requirements Matrix
  - Select an option (supplier) based on outcomes of cost/benefits analysis
- System Design
  - Based on the solution architecture, the developer to undertake the detailed design of solutions in order to refine requirements and develop a detailed implementation plan
- Build, Test and Deploy
  - Deploy the map viewer and spatial services for visualisation and querying of agency data.
  - Connect data services from external agencies to allow refinement of technology, testing of the system and development of prototypes
  - Connect agency data through to the Map Portal (see interdependent Projects 2.6 and 2.7).
  - Deploy security services for identity and access management.
  - Specify the catalogue services including the ability to upload and export metadata (see interdependent Project 2.6)
  - Build the data upload and download capabilities.
  - Develop e-commerce facilities for chargeable products, such as subscriptions, cost per unit download
  - Incorporate metering services for availability, capacity, and incident and configuration management
- Pilot the Methods (See DMEM National Map Portal PilotSection 3.5)
- Ongoing Operations Management
  - Develop a Business Operations Management Plan including hours of operation, incident management and monitoring and reporting

- Produce the manuals for end-users, system administrators and support staff
- Prepare a marketing plan to raise awareness of data products to community (See also Stakeholder Engagement section 2.2)

2.5.7 DELIVERABLES

- An operational National Map Portal that delivers online access to layers of integrated spatial information for viewing and download
- A mechanism for government organisations to easily upload data for access by other government agencies, private sector, academia and the broader community.

2.5.8 OUTCOMES

- Savings in time for users through spatial information being available online to the community for fast and easy access through a single portal
- Increased government revenue generating capacity through the number of value added map based products available to the wider community
- Savings through improved productivity and decision making relating to rights and responsibilities relating to land due to better integration of data themes
- Increased level of trust and satisfaction with fundamental data sets and interactions with government

2.5.9 RISKS

The following risks to the implementation of the National Map Portal are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
Funding for development of the National Map Portal is not available	1	5	Implement essential components in first year and progressively fund new functionality overtime
The human resources for National Map Portal development are not available	1	5	Go out to market for development by external company
Limited skills in online technologies	1	2	Provide training and skills development

2.5.10 BUDGET

The National Map Portal is an essential prerequisite for the DMEM Thematic Area and will need to be developed as part of the DMEM Pilot Project

- Single Allocation of funds US$2,000 for a consultant to develop the National Map Portal High-level Requirements for the Request for Information

- Single Allocation of funds US$15,000 for a consultant to develop the National Map Portal Detailed Requirements Design
- Single allocation of funds to develop the National Map Portal (costs to be determined through the Request for Information (RFI) Process).
- Recurrent Budget allocation to fund the ongoing operational requirements of the National Map Portal (Costs to be determined through the Request for Information (RFI) Process).

2.5.11 FUNDING STATUS

Local and foreign funding required.

2.5.12 CONTACT PERSONS

Director NSDI Office, Ministry of Land and Land Development

2.6 NATIONAL SPATIAL DATA FRAMEWORK

Create a nationally recognised authoritative source of spatial data themes

2.6.1 AGENCIES INVOLVED

Lead Agency: Ministry for Land and Land Development, NSDI Office

Implementation Agency: Survey Department (to be confirmed) with guidance from the NSDI Council and NSDI Data Subcommittee

SLSDI Community: Organisations responsible for generating data, such as the Survey Department, Land and Land Use Policy Development, Forestry Department, Census and Statistics Department; and Government departments who are significant users of spatial information.

2.6.2 BACKGROUND AND RATIONALE

A key deliverable of the SLSDI is the formalisation of the Spatial Data Framework into commonly recognised themes. Currently, it is difficult to know what information is available and where it is held. This has led to several organisations collecting the same information. The Spatial Data Framework provides a way to organise spatial data so that it can be easily accessed by users, and managed by data custodians and system administrators.

The National Spatial Data Framework supports best practice data management and ensures that institutions are able to meet their obligations to government, improve the efficiency of work processes, and make data available for sharing, validation and reuse. To support these obligations, it is imperative that data management is done properly from the outset; through the stages of planning, collection, analysis, publication, archiving and later reuse.

There are numerous spatial data sets collected for specific business needs across government. The number and quality of these data sets is unknown. Socio-economic data is available from the Department of Census and Statistics; however, the usability of this data is not well understood.

There is a need to understand what spatial information is collected, by whom and for what purpose it is used for. Building a National Spatial Data Framework will answer these questions and provide the government with access to integrated fundamental, application and socio-economic data themes for decision making.

2.6.3 PROPOSED APPROACH

The proposed approach to the National Spatial Data Framework is to implement three primary tiers of information:

- Fundamental data themes that support multiple purposes
- Specific business application data layers, such as flood
- Socio- economic layers, such as census data

There will be 14 fundamental data themes and these themes will be a priority for the National Map Portal. These Data Themes are the responsibility of the Ministry of Land and Land Development, Survey Department. They are:

- Administrative Boundaries
- Geodetic Network
- Cadastre (Future data set)
- Transportation
- Utility
- Hydrography
- Land Use
- Reserves
- Place Names
- Imagery
- Buildings
- Topography
- Elevation
- Street Address (future data set)

Application and socio-economic data sets will be added progressively. A fourth tier for community layers can be considered for future implementation if required.

2.6.4 OBJECTIVES

The objectives for establishing the NSDI Data Framework are:

- To understand the range of spatial data sets currently collected by government
- To define data custodians for each data set to ensure the responsible management and ongoing integrity of the data sets
- To understand the gaps in data coverage and quality

2.6.5 IMPLEMENTATION TIMEFRAME

Second to Third Quarter Year 1

2.6.6 ACTIVITIES

- Conduct a Data Inventory of all data sets currently collected by government
  - Determine gaps in national coverage and prioritise for National Spatial Data Acquisition Program (Section 2.10)
  - Assess data sets according to 'Fit for Purpose' Criteria – currency, completeness, accuracy and coverage
- Document the Data Framework
  - Identify Data Themes and group data sets with similar characteristics
  - Incorporate Data Theme Profiles and Data Set Profiles specified for the Spatial Data Catalogue (Section 2.6)
  - Specify data standards and models
  - Set quality standards and compliance measures
  - Specify update frequency and version control
  - Prepare a Change Management Plan - Document current 'State to Future State' for each data theme/data set

- Data Access and Pricing (to be implemented in line with Policy (Section 2.3))
  - Develop a risk assessment tool to determine data access levels – government, public views, restricted views
  - Set the pricing structure (free and fee for value-added services)
  - Provide Open Data Certification for data sets that can be accessed free
- National Spatial Data Framework Consultation
  - Release the National Data Framework for Consultation
  - Conduct Information Session and or Workshops to achieve buy-in from participating agencies
  - Review feedback and adjust the National Spatial Data Framework document accordingly
- Operationalise the Data Framework
  - Establish the Governance model for the Data Framework including leadership roles and responsibilities - Theme Sponsors, Data Custodians, Users and Project Managers
  - Develop a Data Framework work plan with measurable outcomes

2.6.7 DELIVERABLES

- The Sri Lanka Spatial Data Framework – A Publication for reference by government, private sector and the community. Includes data theme classifications, data sets, data purpose, pricing and licensing arrangements, applicable data standards, and future status of each theme.

2.6.8 OUTCOMES

- Recognition of the National Spatial Data Framework as the authoritative reference by government, private, community, research and academia for all projects relating to infrastructure development, natural resource and environmental monitoring, disaster management and socio economic studies etc.

2.6.9 RISKS

As with any major undertaking, the development of the National Spatial Data Framework is subject to external influences that may delay progress. The risks to SLSDI implementation are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
Changing business activities in one or more organisations	3	1	A change in custodianship to be managed according to custodianship policy/guidelines
A requirement for greater levels of consultation than anticipated	3	2	Focus on getting the fundamental data themes/sets right in the first instance

2.6.10 BUDGET

The National Spatial Data Framework is an essential prerequisite for the DMEM Thematic Area and will need to be developed as part for the DMEM Pilot Project

- Single allocation of funds of US$10,000 for an International Consultant to develop the National Spatial Data Framework Template
- Single allocation of US$5,000 for a National Consultant to populate the National Spatial Data Framework Template

2.6.11 FUNDING STATUS

Local and foreign funding required.

2.6.12 CONTACT PERSONS

Director NSDI Office, Ministry of Land and Land Development

Surveyor General, Survey Department, Ministry for Land and Land Development.

2.7 NATIONAL SPATIAL DATA CATALOGUE

Develop a library of metadata to enable people to search and query spatial data sets

2.7.1 AGENCIES INVOLVED

Implementation Agency: Ministry of Land and Land Development - NSDI Office.

Lead Agency: To be confirmed

SLSDI Community: Organisations responsible for collecting spatial data, such as the Survey Department, Land and Land Use Policy Development, Forestry Department, Census and Statistics Department; and other government departments who are significant collectors of spatial information

2.7.2 BACKGROUND AND RATIONALE

A major deliverable of the spatial data infrastructure is the catalogue (or data library), which allows users to search for specific information. Building the catalogue requires descriptive metadata; that is, information about the spatial data. It includes the following:

- Purpose for which the data is intended
- Data collection methods and accuracy
- Projection specifications, scale, exchange format, compression and file type
- Content, quality and geographic extent
- Constraints and limitations on how the data can be used
- Data custodian's contact information

Descriptive metadata is important from the perspective of an organisation, user and system administrator/developer. Without descriptive metadata it is difficult for a user to access data and impossible to determine its suitability for mapping and analysis.

In establishing the National Spatial Data Catalogue all agency metadata will be converted to digital form, and metadata structures and definitions will be referenced to a standard.

A National Spatial Data Dictionary (vocabulary) will be created to permit the searching of metadata via the National Map Portal.

2.7.3 PROPOSED APPROACH

The National Spatial Data Catalogue will be structured according to the National Spatial Data Framework (Section 2.6).

The National Spatial Data Catalogue will be managed by a central coordinating team (to be advised) on behalf of government to ensure a consistent means of data access via the National Map Portal.

The management of descriptive and core metadata will remain with the organisation that collects and maintains the data itself. Each organisation will be required to adopt the agreed metadata schema.

The NSDI Office will create a Metadata Project to develop the standard metadata schema. The Data Subcommittee will provide advice and cross-agency representation for the development of this schema.

A metadata standard will be referenced when building the National Spatial Data Catalogue. This schema will be based on the ISO 19115 and ISO 19139 Metadata Standards. The intent is to create machine readable descriptive metadata for each data theme including:

- **Identification**: What is the name of the data set? Who developed the data set? What geographic area does it cover? What themes of information does it include? How current are the data? Are there restrictions on accessing or using the data?
- **Data Quality**: How good are the data? Is information available that allows a user to decide if the data are suitable for his or her purpose? What is the positional and attribute accuracy? Are the data complete? Was the consistency of the data verified? What data were used to create the data set, and what processes were applied to these sources?
- **Spatial Data Organisation**: What spatial data model was used to encode the spatial data? How many spatial objects are there? Are methods other than coordinates, such as street addresses, used to encode locations?
- **Spatial Reference**: Are coordinate locations encoded using longitude and latitude? Is a map projection or grid system used? What horizontal and vertical datums are used? What parameters should be used to convert the data to another coordinate system?
- **Entity and Attribute Information**: What geographic information (roads, houses, elevation, temperature, etc.) is included? How is this information encoded? Were codes used? What do the codes mean?
- **Distribution:** From whom can I obtain the data? What formats are available? What media are available? Are the data available online? What is the price of the data?
- **Metadata Reference:** When were the metadata compiled? By whom?

There are three levels at which metadata will be required for the National Spatial Data Catalogue (two are mandatory:

- Descriptive metadata– Data Theme Profiles (mandatory)
- Metadata for specific data sets– Data Set Profiles (mandatory)
- Core Metadata for specific data sets – data schema agency level metadata

A gap analysis between what metadata is available and what is required will be undertaken. Many of the geographic datasets collected and maintained by central government already have some form of metadata associated with them.

The catalogue and associated metadata will be maintained in 3 languages.

2.7.4 OBJECTIVES

The objectives for establishing the National Spatial Data Catalogue are:

- Achieve the orderly management of spatial data and the information necessary for users to access this information via the National Map Portal
- Provide a consistent whole-of-government metadata management strategy
- To collect appropriate metadata to accurately define and describe spatial data including content, geographic extent, purpose, characteristics, currency and accessibility, together with contact details for further information
- Provide users with detailed information about data provenance (collection methods, specifications and standards, and custodian) and its lineage (integration, processing and analysis techniques applied)

2.7.5 IMPLEMENTATION TIMEFRAME

Third to fourth Quarter Year 1

2.7.6 ACTIVITIES

- Metadata Standards
  - Define the metadata schema according to the ISO-19115 Metadata standard
  - Refine the schema to suit Sri Lankan context i.e. security classifications
  - Implement the metadata schema using the ISO 19139 Metadata XML Schema for enhanced interoperability
  - Develop an instruction manual for metadata creation for use by data custodians
- Metadata Creation
  - Develop the Data Theme Profiles
  - Develop the Data Set Profiles
  - Identify the data custodian and assign responsibility for creating the metadata according to the metadata schema and required profiles
  - Convert existing metadata records from various government agencies to a new central metadata profile (based on ISO 19139).
- Develop the Sri Lanka Spatial Data Dictionary (SLSDD) including a list of keywords that can be used in a search to find the metadata record
- Operationalising the Catalogue
  - Schema implementation
  - Facilitate the publication and discovery of spatial resource metadata using the “Publish-Find-Bind” pattern specified by the *Open Geospatial Consortium (OGC) Reference Model.*
  - Upload and export metadata via catalogue services (Section 2.4.6)

2.7.7 DELIVERABLES

- A National Spatial Data Catalogue (i.e. XML document)
- A metadata standard
- Descriptive Metadata for each Data Theme in the form of a standard profile
- Descriptive Metadata for each Data Set in the form of a standard profile
- National Spatial Data Dictionary
- Core agency-level metadata for each data set schema
- An instruction manual for metadata creation

2.7.8 OUTCOMES

- Enhance accessibility and the effective use of data via a common vocabulary and data dictionary
- Cost savings through the elimination of duplicated data collection practises through knowing what information is available

2.7.9 RISKS

There is a risk that poor or incomplete metadata will impact adversely on a user's ability to locate information via the National Map Portal. These risks are tabled below.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
Data producers consider the task of creating metadata too hard	3	1	Produce instruction manuals and provide training in metadata creation and management
Insufficient time to complete the task	3	3	Prioritise data sets so that those more frequently accessed will have sufficient metadata

2.7.10 BUDGET

- Single allocation of funds of **$6,000** for a National Consultant to work with agencies to document the descriptive metadata for data theme and data set profiles

2.7.11 FUNDING STATUS

Local and foreign funding required.

2.7.12 CONTACT PERSONS

Director NSDI Office, Ministry for Land and Land Development

2.8 NATIONAL SPATIAL DATA WAREHOUSE

Build a secure and sustainable data storage and dissemination environment

2.8.1 AGENCIES INVOLVED

Lead Agency: Ministry of Land and Land Development, NSDI Office.

Implementation Agency: Information Communication and Technology Agency (to be confirmed) with guidance from the NSDI Council and NSDI Technical and Data Subcommittees

SLSDI Community: Organisations responsible for making data available via the National Map Portal, such as the Survey Department, Land and Land Use Policy Development, Forestry Department, Census and Statistics Department; and government departments who are significant collectors of spatial information.

2.8.2 BACKGROUND AND RATIONALE

In order to disseminate spatial data through the National Map Portal, data will need to be stored in a secure and accessible environment. This is known as a data dissemination storage environment and is different from the maintenance storage environment where organisations perform their daily business activities.

Many agencies in Sri Lanka do not currently have dissemination databases and the maintenance databases are currently used for data extraction and delivery. This is a problem for data security when moving to an external data access environment.

There are two alternative virtual data warehousing solutions – a decentralised or centralised:

- **Decentralised Warehouse:** Agencies make data available on secure dissemination servers, which are accessible through the government network, such as Network-attached Solutions (NAS) storage devices. Access to data is managed through access services and loosely coupled with the National Map Portal. When considered at an individual agency basis, this approach makes good sense. However, many agencies do not have the capabilities to provide such a service and installing secure, industrial-strength dissemination servers is expensive.
- **Centralised Warehouse:** A shared Centralised Data Warehouse infrastructure is managed by a single data storage custodian on behalf of government. Data dissemination is tightly coupled with the National Map Portal. Organisations upload their spatial data via the Lanka Government Network (LGN). A cloud storage solution may be the most viable option.

Both approaches provide much needed additional storage capacity for government and data backup capabilities to reduce the risk of information loss. Currently, many organisations rely on computer hard disk storage and portable drives for backup. This means spatial information has limited accessibility and is subject to data loss through corrupted storage devices.

2.8.3 PROPOSED APPROACH

The proposed approach for the National Spatial Data Warehouse is to use a combination of both decentralised and centralised data warehousing techniques. The choice will depend on the storage infrastructure capabilities of individual agencies. Therefore, the method will be determined on a case by case basis. The options are as follows:

- Access an organisations spatial data from their dissemination database and use middleware to interconnect the data with the National Map Portal Enabling Infrastructure.
- Create a dissemination area in the government cloud storage. An organisation can upload data to the cloud via the Lanka Government Network.

2.8.4 OBJECTIVES

The objectives for establishing the National Spatial Data Warehouse are to:

- Enable adequate provision and long-term care of the government's spatial data holdings including disaster recovery and backup procedures
- Provide a secure environment where data can be transmitted through secure methods
- Provide fast access to data without interruptions to user experience

2.8.5 IMPLEMENTATION TIMEFRAME

Fourth Quarter Year 1 to First Quarter Year 2

2.8.6 ACTIVITIES

- Document the requirements for a storage solution including storage capacity needs, scalability, cost, performance, reliability and manageability
- Options Analysis for each agency - 'Cloud' solution, Network-attached Solution (NAS) or other
- Build/Test/Deploy
  - Develop an implementation Plan to deploy Data Warehouse solution/s
  - Develop middleware for decentralised access to agency data (Section 2.5)
  - Connect data through to the Map Portal (Section 2.5).
- Pilot the Methods (DMEM Pilot Project)
  - Develop a Pilot Project to demonstrate proof-of-concept of data storage solution and use this as a basis for refinement of the solution for other agencies (See DMEM Pilot Section 3.8)
  - Consider interim storage solutions to deliver specific benefits in the short term, which do not distract significantly from the overall implementation approach
- Ongoing Operations Management
  - Develop a Business Operations Management Plan for agency data storage compliance including data upload frequency, incident management and monitoring and reporting
  - Produce manuals for agency end-users, system administrators and support staff

2.8.7 DELIVERABLES

- A 'virtual' data warehouse environment that is a combination of centralised and decentralised data stores

2.8.8 OUTCOMES

- A virtual data warehousing environment that is reliable and has the capacity to meet current and future storage needs

2.8.9 RISKS

There is a risk that insecure or inaccessible data will impact adversely on being able to deliver data via the National Map Portal. These risks are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
Cost of data storage is too high and not a priority for some agencies	3	1	Implement a whole-of-government warehouse where economies of scale are likely to produce a better return on investment and assist small agencies to come on board
Data custodians do not make data available in an accessible storage environment	3	1	Familiarise agencies with data storage principles and benefits

2.8.10 BUDGET

- Single allocation of funds (to be determined) for a cloud storage solution to enable the development of a centralised data dissemination environment to be known as the National Spatial Data Warehouse
- Recurrent Budget allocation for maintenance costs associated with the warehouse (to be determined)
- Agency specific data dissemination environments are not costed at this time

2.8.11 FUNDING STATUS

Local and foreign funding required

2.8.12 CONTACT PERSONS

Director NSDI Office, Ministry for Land and Land Development

2.9 SPATIAL DATA MANAGEMENT

Develop a set of common principles for the management and exchange of spatial data

2.9.1 AGENCIES INVOLVED

Lead Agency: Ministry of Land and Land Development, NSDI Office.

SLSDI Community: Organisations responsible for collecting spatial information, such as the Survey Department, Forestry Department, Census and Statistics Department; and government departments who are significant collectors of spatial information.

2.9.2 BACKGROUND AND RATIONALE

Currently, it is not possible to access accurate and integrated spatial information across the whole of Sri Lanka with reliability. Investigations within government suggest that organisations spend more time collating and managing information than analysing data and generating benefits from it. Te reverse should be true.

The problem stems from the inability to readily share information. Technology and business processes (required to manage existing disconnected data sets) are well entrenched and therefore difficult to change - both culturally and financially.

Typically, data are managed in information silos across government with several versions of spatial data being created. This is primarily from a lack of awareness that data already exists, but also because data formats are not always compatible across organisations and data structures do not suit multiple government business needs. Reuse is therefore problematic. Cross-agency data sets are currently inconsistent in terms of currency and accuracy. Updates to data need to be manually reworked causing time delays and increased overheads.

There is a significant opportunity to derive benefits from the removal of functional impediments which give rise to duplication in data collection, access limitations and costly inefficiencies. This can be achieved through interoperability and agreements to share data using standards that support information exchange between cooperating organisations.

2.9.3 PROPOSED APPROACH

The proposed approach is to seek commitment to greater information sharing and access by means of an intergovernmental Charter for Spatial Data Management, which articulates the principles and some specific undertakings of data custodians. The Charter (bilateral agreement or Memorandum of Understanding) will be promoted between agency members of the SLSDI Community.

The Charter is a mechanism to formalise commitment by agencies to comply with SLSDI policies.

It is expected that all members of the SLSDI Council will agree to adopt, and provide leadership for a set of common operating principles and that these will be incorporated into the Charter. They are:

- **Access:** All data is consolidated and accessed in the most cost-effective way through the National Map Portal
- **Avoid Duplication:** All projects and activities that give rise to substantial datasets will establish at the outset whether suitable data already exist.
- **Standards Compliance:** Best practice guidelines and standards are used to manage the currency, completeness, accuracy and consistency of data to enhance the integration of individual and disparate data sets.
- **Metadata:** Appropriate metadata and common vocabulary is used to accurately define and describe spatial data including content, geographic extent, purpose, characteristics, currency and accessibility, together with contact details for further information.
- **Maintenance and Revision:** Data are revised and maintained according to a program of work that meets agency business priorities and broader government commitments.
- **Quality Assurance:** Appropriate audit processes are applied to each dataset to produce data that are fit for purpose before release.
- **Value Adding:** Data is in a form suitable for further value-adding by internal and external customers.
- **Legal Compliance:** Data is compliant with laws and regulations governing data attribution and usage, and is managed in accordance within approved privacy and data sensitivity guidelines.

In addition to the charter, there are several other aspects in which the SLSDI community will need to agree on if spatial data are to be managed within a whole-of-government context. The proposed approach is to develop a financial model, Intellectual Property Rights Management (IPRM) model and, licensing arrangements; and negotiate a government-wide software licensing/volume purchasing.

2.9.4 OBJECTIVES

The objectives for establishing the Charter for Spatial Data Management are to:

- Deliver best practice quality management processes to manage the currency, completeness, accuracy and consistency of data for a specified purpose
- Enhance the integration of individual and disparate data sets data using appropriate standards for the collection, maintenance and transfer of data
- Ensure data are compliant with laws and regulations, and managed in within approved guidelines
- Ensure data are held in a secure environment and with adequate provision for long-term care including disaster recovery and backup procedures

2.9.5 IMPLEMENTATION TIMEFRAME

First Quarter Year 1 and ongoing

2.9.6 ACTIVITIES

- Charter for Spatial Data Management
  - Draft and release the Charter to stakeholders for consultation, starting with the NSDI Council Members
  - Analyse stakeholder comments and adopt feedback as appropriate
  - Ratification of Charter by NSDI Steering Committee
  - Develop a Compliance Schedule (NSDI Council member organisations are a compliance priority)
  - Monitor and evaluate progress
- Produce Quality Management Guidelines. These will include reference to Standards and metadata; storage, maintenance and archival procedures; custodianship guidelines
- Establish Data Exchange Protocols including common information structures (data models) and search and retrieval protocols
- Develop the Financial Model – Open (free); Cost Recovery, Freemium, Full Commercial.
- Develop the Intellectual Property Management Model and agree on Copyright and Licensing Model

2.9.7 DELIVERABLES

- Charter for Spatial Data Management
- Quality Management Guidelines
- Data Exchange Protocols
- Compliance Schedule
- Financial Model
- Intellectual Property Management Model

2.9.8 OUTCOMES

- Savings associated with elimination of duplicated systems within policy timeframes
- Savings associated with improvements to the capture, storage and management of information progressively achieved through the term of the strategy
- Savings in productivity across the government sector through more efficient information flows

2.9.9 RISKS

There is a risk that best practise spatial data management processes are not adopted and that this will inhibit implementation of the SLSDI. These risks are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
Organisations do not agree with charter for Spatial Data Management	1	4	Refine the Charter so that it is acceptable to NSDI Council members and work with this priority group and closely manage cultural change
The financial model, IPRM model and copyright and licensing cannot be agreed upon	3	1	Engage a consultant to work through the issues impartially

2.9.10 BUDGET

The Spatial Data Management Charter is a an essential prerequisite for the DMEM Thematic Area and will need to be developed as part of the DMEM Pilot Project

- Single allocation of funds US$1000 for an International Consultant to draft the Spatial Data Management Charter

2.9.11 FUNDING STATUS

Local and Foreign Funding

2.9.12 CONTACT PERSONS

Director NSDI Office, Ministry for Land and Land Development

2.10 NATIONAL SPATIAL DATA ACQUISITION PROGRAM

Develop a program for spatial data collection, procurement and management

2.10.1 AGENCIES INVOLVED

Lead Ministry: Ministry of Land and Land Development, NSDI Office.

Implementation Agency: Survey Department with guidance from the NSDI Council and NSDI Data Subcommittee

SLSDI Community: Organisations responsible for capturing spatial data and those which are significant users. This includes academia and the general public that have specific data requirements.

2.10.2 BACKGROUND AND RATIONALE

Each year government agencies purchase a wide range of spatial information including aerial photography and satellite imagery. The cost of this information can run into millions of rupee per year. Competing business priorities across government, combined with financial pressures and skills shortages, make agreements on national data acquisition priorities and maintenance programs difficult. Given the potential for overlap, it is imperative that government adopt a more coordinated whole-of-government approach to ensure strategic investment and use of resources.

2.10.3 PROPOSED APPROACH

The proposed approach is for the Survey Department to manage the National Spatial Data Acquisition Program for geospatial and imagery on behalf of government. The objectives of the program are to:

- Understand spatial data requirements across the government sector
- Register all government spatial data acquisitions to avoid duplication and encourage sharing and reuse
- Call for requests from organisations across the government sector for geospatial data and imagery

Note: It will be difficult for the Survey Department to administer requests for data in the first few years due to limited funds and resources. The program will need to be phased in over a number of years. Nonetheless, the program will enable the government to understand fundamental data needs nationally, and be able to plan accordingly.

The National Spatial Data Acquisition Program will:

- Provide a coordinated approach to the acquisition of geospatial data and services, elevation models, and imagery (satellite, aerial and LIDAR) on behalf of government
- Provide access to data under more effective and consistent licence and copyright conditions, reducing barriers to sharing and re-use of data within government

- Increase the coordination of archiving, discovery and dissemination of spatial information
- Provide opportunities for spatial data acquisition partnerships

A new procurement/funding model may be required. Options are:

1. Agencies fund and manage there own spatial data capture program but register there data capture program with the Survey Department to avoid potential duplication; AND/OR
2. Survey Department receive an allocation of funds from central government to procure data on behalf of all organisations; AND/OR
3. Organisations contribute funds to the annual program in proportion to their data needs; AND/OR
4. Commercial revenues from value-added data are redirected back into the National Spatial Data Acquisition Program

A new National Spatial Data Acquisition Steering Committee is required to ensure the National Spatial Data Acquisition Program is managed with consideration to cross-government needs and in the National interest. This is different from the NSDI Steering Committee and is essentially an operational committee that assesses cross government data needs and priorities.

The National Spatial Data Acquisition Steering Committee will include relevant stakeholder representation. The committee's role is:

- Set the strategic direction for the operation of the Spatial Data Acquisition Program
- Ensure that the National Spatial Data Acquisition Program is operated in a manner that meets the relevant strategic objectives of the Sri Lankan Government
- Take responsibility for the feasibility, business plan and achievement of outcomes for National Spatial Data Acquisition Program
- Advise NSDI Council on the progress of the Spatial Data Acquisition Annual Capture Program
- Act as a Community of Practice for Spatial Data Users

Note: All Spatial Data Acquisition Suppliers/Users are eligible for a seat on the UAC. However, capacity may be capped for logistical purposes.

2.10.4 OBJECTIVES

The objective of the National Spatial Data Acquisition Program is to reduce costs associated with the capture, storage and management of information by:

- Planning, recording and acquiring spatial information through one channel
- Clear oversight of nationally/internationally funded projects that acquire spatial information
- Acquiring multi-user licenses for imagery to enable reuse by many organisations
- Maintaining a single version of key government spatial information
- Leveraging greater value through economies of scale and consolidated spend
- Establishing an annual program of work where organisations can register their requirements annually

2.10.5 IMPLEMENTATION TIMEFRAME

Third Quarter Year 1 to Third Quarter Year 2

2.10.6 ACTIVITIES

- Setup the National Spatial Data Acquisition Program Governance
  - Steering Committee
  - Technical/Production Implementation Teams (Survey Department)
- Establish a Panel of Suppliers and quality criteria for data acquisition (Optional)
- Determine the Data Acquisition Funding Model
- Identify data acquisition types and distribution mechanisms
- Set licensing conditions
- Develop the Reporting Framework and timeframes (i.e. bi-monthly updates to NSDI Council)

2.10.7 DELIVERABLES

- A National Spatial Data Acquisition Program Governance Model
- Annual National Spatial Data Acquisition Program made available on Survey Department Website or NSDI Office Website (TBD)

2.10.8 OUTCOMES

- Savings associated with elimination of duplicated data acquisition within policy timeframes
- Productivity improvement through ability to process bulk data thus achieving economies of scale
- Improvement in the accuracy of map coverage across the nation involving all relevant government agencies that focuses on identified significant areas and priority data themes

2.10.9 RISKS

There is a risk that agencies will not utilise a centralised spatial data acquisition program and duplicated data collection will continue to be the norm. These risks are tabled below.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
Organisations do not wish to be bound to an annual Spatial Data Acquisition Program	2	1	Include quarterly review to cater for agency changing priorities
Organisations distrustful of being able to obtain the right information at the right time	3	1	Develop the annual program and seek early clarification from agencies on scheduled activities and specifications

2.10.10 BUDGET

- Recurrent Budget allocation for Survey Department to manage the National Spatial Data Acquisition Program

2.10.11 FUNDING STATUS

Local Funding

2.10.12 CONTACT PERSONS

Director NSDI Office, Ministry of Land and Land Development

Surveyor General, Survey Department, Ministry for Land and Land development

2.11 EDUCATION AND AWARENESS PROGRAMS

Encourage people to change their behaviors towards the sharing and use of spatial information

2.11.1 AGENCIES INVOLVED

Lead Ministry: Ministry of Land and Land Development

Implementation Agency: NSDI Office.

SLSDI Community: Government, private sector, academia and the general community.

2.11.2 BACKGROUND AND RATIONALE

Having the technology to share spatial information is only one aspect of the SLSDI. It is just as important to have a high level of computer literacy skills within the community to ensure its use; and the professional skills in the workforce, to use it innovatively.

There is a need to actively promote spatial information and advertise the National Map Portal to the broader community. Whilst internet and web-based products are becoming increasingly popular, the majority of the community are not aware of how spatial information can be used. Yet it is the community that can provide valuable local spatial information. Limited computerisation and low computer literacy among the user population, means that a large component of the intended user group will not realise the full benefits of being able to access integrated spatial information online.

Making innovation work requires a workforce with a range of sophisticated skills. Building this capacity is crucial for economic development and growth. This calls for the active promotion of the spatial sciences and increased government partnerships with universities and training providers to ensure the profession has the necessary skills.

2.11.3 PROPOSED APPROACH

To ensure the best use of spatial information within the professional and general community the proposed approach to education and awareness is as follows:

- Communication: Establish a proper understanding on SLSDI and the work plan among stakeholders and general public to increase their understanding of issues and identify gaps in the use of spatial information technologies
- Capacity development: Enhance the skills of individuals and social groups through participatory training in the use of the National Map Portal
- Empowerment: Develops organisational competency, and in particular that of data custodianship, so that they can take responsibility for their role in the implementation of the SLSDI
- Public Awareness: Develop understanding within the community about the SLSDI and National Map Portal through various media

- Participation: Progressive empowerment from informing stakeholders, to consultation, to consensus building, to devolved decision making, risk taking and partnerships.
- Partnerships: Build cooperative working relations between organisations that contribute different skills, ideas, financial and technical support.

2.11.4 OBJECTIVES

The objectives for establishing an Education and Awareness Program are:

- Actively raise awareness of spatial information and promote the use of the National Map Portal to the community through various media.
- Capacity planning to identify the spatial core competencies and common skills sets required and incorporate these into existing training programs to increase the uptake of spatial technologies in the government sector.
- Support research, innovation and skills development through open access to spatial information.
- Change social norms, values, perceptions, and conversations about the value of spatial information through a communications program
- Remove barriers and create incentives to use spatial information more broadly and as part of daily life

2.11.5 IMPLEMENTATION TIMEFRAME

Second Quarter Year 2 and ongoing

2.11.6 ACTIVITIES

- Develop an Education and Awareness Strategy to promote an understanding of how the SLSDI supports economic, environmental and societal needs
- Develop a Communications Plan to sustain behavioural change over time by targeting different audiences with different messages and using different arguments
- Develop a cross-government Capacity Plan to target professional development in spatial technologies
- Conduct Education and Awareness activities to increase community participation as volunteer geographic information providers
- Develop an Innovation Incentives Program to increase awareness and use of spatial data

2.11.7 DELIVERABLES

- Education and Awareness Strategy
- Communications Plan
- Capacity Plan
- Innovation Incentive Program

2.11.8 OUTCOMES

- Increased community awareness and adoption of spatial technologies through education programs
- Increased community knowledge about Sri Lanka that is being used for general, professional and commercial purposes
- Increase in the number of public/private partnerships that stimulate use of spatial information through development of an innovative and competitive value adding industry
- Increase in the levels of usage of new spatial information products and services
- Increase year on year in the number of skilled volunteers that provide effective content to improve the accuracy of map data

2.11.9 RISKS

There is a risk that the education and awareness programs are not affective. These risks are tabled below.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
There is no increase in the use of spatial information via the National Map Portal	1	1	Refine the Education and Awareness Strategy
There is no evidence to indicate an increase in public private partnerships	3	3	Review policy
An increase in community volunteered data is not evident	2	1	Increase the number of community-based awareness programs

2.11.10 BUDGET

- Single allocation of US**$15,000** for a International Consultant to develop the Education and Awareness Program

2.11.11 FUNDING STATUS

Local and Foreign Funding

2.11.12 CONTACT PERSONS

Director NSDI Office, Ministry for Land and Land development

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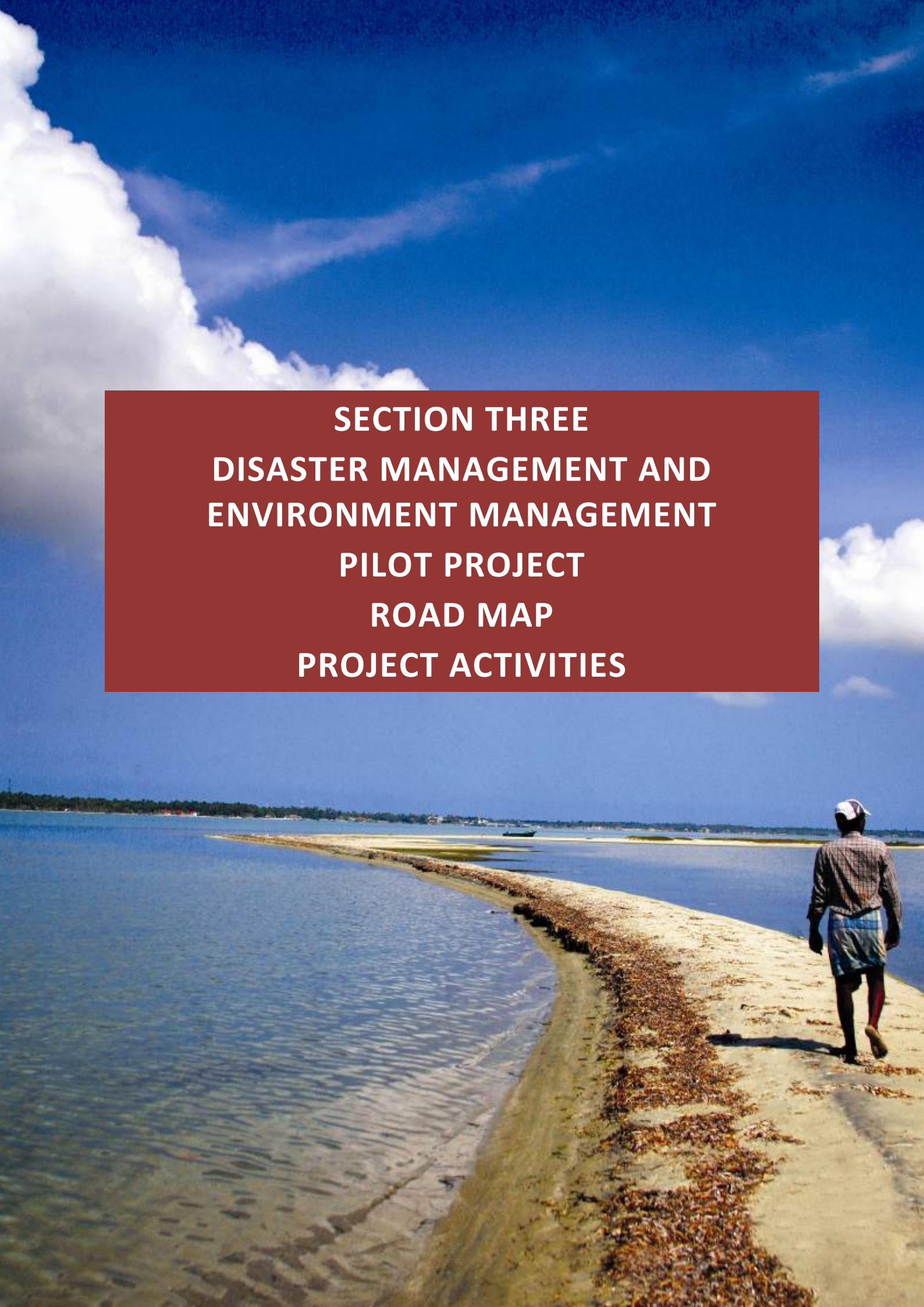

SECTION THREE
DISASTER MANAGEMENT AND ENVIRONMENT MANAGEMENT PILOT PROJECT
ROAD MAP
PROJECT ACTIVITIES

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3.1 DMEM PILOT PROJECT

Spatial information has an essential role in the management and coordination of emergency situations. It providers responders with a clear understanding of the geography and environment of an affected region, and specific logistical information such as evacuation routes, location of particular hazards, wind directions, population distribution and incident updates.

Post incident reviews of major emergency events have highlighted that agencies and personnel have been using different and sometimes conflicting maps during an event, or they have limited access to current data.

Spatial information offers many benefits in disaster management. Accurate and current information from a variety of sources can inform and thereby empower emergency responders. It assists both operation and strategic decision making, including prevention and planning phases.

Given the potential for multiple organisations to be involved in the mitigation, preparedness, response and recovery operations, it is essential that spatial information can be shared in an effective and timely manner across all organisations.

The Ministry for Disaster Management in conjunction with the Ministry for Environment are tasked with the challenge of developing a national spatial capability that provides easy access to spatial information through agreed standards and protocols. This Pilot Project is to leverage the Sri Lanka Spatial Data Infrastructure (SLSDI) being developed through the Ministry of Land and Land Development.

The DMEM Pilot Project will pilot the SLSDI capabilities and leverage the following:

- Ability to access spatial information through a single authoritative information channel
- Ability to find out what data is available from across various agencies
- An assurance that data are held in a secure environment with specific access mechanisms for sensitive data
- Ability to upload data to a central area so that it can be viewed by others in a way that is timely and affords improved safety and wellbeing for citizens in crisis situations

3.1.1 CASE FOR CHANGE

A Disaster Management Workshop, focussing on the usability of spatial information, was held 14th August 2014 at the Disaster Management Centre (See Appendix A). Delegates represented a cross section of organisations that are responsible for mitigating, preparing and responding to climatic and environmental disasters and subsequent recovery operations. The following issues were identified as those limiting current disaster management capability and capacity (See Appendix B). They include:

- **Data Interoperability:** Currently organisations' systems are disparate. Data sources, formats, symbology, standards, vocabularies and data models are different; meaning that emergency responders are unable to understand each others data.

- **Access Constraints:** Disaster response organisations are not able to access information in a timely manner. This is partly because of the lack of technological capability to easily share information; it is also due to a government culture of 'unease' with respect to information sharing, stemming from concerns that information will be misrepresented, used inappropriately and/or breach information privacy or security.
- **Poor Communication:** There are inconsistencies in the methods used to communicate information at all levels of the 'Mitigation, Preparedness, Response and Recovery' lifecycle because there is no common communication channel to share information.
- **Spatial Data Governance:** There is a lack of consensus regarding the roles and responsibilities associated with spatial data acquisition, creation, dissemination and use. There is a need for data sharing policies to promote common information management and exchange.
- **Data Quality:** The lack of metadata for disaster management-related data sets makes it difficult to identify whether a data set is fit for purpose.
- **Data Provenance and Lineage:** Users have uncertainties in relation to data managed by other organisations as the provenance and flow of information is unclear.

To address these issues, the disaster management sector requires a system that uses recognised standards for consistent management and exchange of spatial data. This system needs to be supported by a governance structure that promotes sustainable information sharing across the government sector, and a common platform for data discovery and access.

3.1.2 DISASTER MANAGEMENT REQUIREMENTS

Data Needs

- Hazard Assessment Mapping (What are the hazards)
- Vulnerability Assessment (Where are the risks)
- Demographic Distribution (Where are the people and what are their needs i.e. elderly, disabled, children)
- Infrastructure, Lifelines and Critical Facilities (Road, hospitals, power lines, water etc.)
- Logistics and Transportation Routes (Evacuation routes, safe zones)
- Human and Material Response Resources (Where are the responders and emergency vehicles)
- Communication Facilities (Early warning systems, mobile towers, district offices)

System Requirements

- Map Viewer
- Data upload and download facilities
- Internal system catalogue
- Ability to consume WMS and WFS spatial data via National Map Portal data services
- System operation 24 hours per day, 365 days per year
- An intranet restricted site to Disaster Management member organisations

- An extranet that provides open access to data to all community i.e. National Map Portal
- Ability to display live data feeds for weather related information, such as rain gauge data and meteorology data, and television video media

Capacity and Capability Needs

- Staff training in the use of GIS and online technologies including crowdsourcing
- Community education and awareness
- Community crowd-sourcing

Hardware Needs

- Mobile devices for capturing data in the field
- Computer screen/smart boards for Emergency Operations Centre

3.1.3 DISASTER MANAGEMENT CONCEPTUAL MODEL

The Disaster Management Pilot Project will develop spatial data sharing methods for the Sri Lanka Spatial Data Infrastructure. It will establish a means of online access to fundamental data themes and disaster management and environment management (DMEM) data themes. The DMEM Pilot Project will build technical and policy skills required for the implementation and ongoing management of the SLSDI.

The Disaster Management Pilot Project will use spatial information obtained from several organisations across the government sector. The pilot will test the following:

- Data availability and accessibility
- Multilayer approach to visualising data
- User access methods and restrictions
- Data storage and retrieval
- Implementation Road Map
- Spatial Data Sharing Policies
- Ability to consume Web Map Services
- Gap analysis on National capabilities
- Metadata creation
- Resource capacity and capabilities

The DMEM Pilot Project will develop the Disaster Management and Environment Management (DMEM) Thematic Area. This will be the first of many thematic areas that will form part of the Spatial Data Infrastructure. Lessons learned in developing the DMEM Thematic Area will be adopted for other themes.

The DMEM conceptual model (Figure 3.1) includes:

1. **Shared technology resources:** Access to current government data via the National Spatial Data Warehouse and the use of the data catalogue to find out what information is available.
2. **Data Upload:** Ability to upload Disaster Management Spatial Data to the National Map Portal for viewing by the community.

3. **GIS Capabilities:** A means of capturing and analysing spatial data pertinent to mitigation, preparedness, and response and recovery operations. This capture can be conducted in the office or field during an incident.
4. **Map Viewer:** A platform by which maps can be served out to a range of users (both internal and external) for viewing. The Disaster Management Channel is optional.
5. **Predefined Views:** Ability to create map views for specialised user needs. For example the mitigation view will include the location of National Projects where infrastructure renewal is taking place; the Hazards View will show flood and landslide risk zones, evacuation routes and location of people and critical infrastructure; the Response View will provide the location of response teams during an event; and the Recovery View will show damage assessment and recovery effort priorities for monitoring purposes.
6. **Field/Mobile Data Capture Capabilities:** Tools to capture and edit data in the field.
7. **Community Data:** Volunteered Geographic Information (VGI) is conducted via the map portal as a shared service. This information can be consumed via WFS/WFS.
8. **Dynamic Data Feeds:** The GIS can consume live data feeds from external websites or databases i.e. meteorological data showing the location of storms.

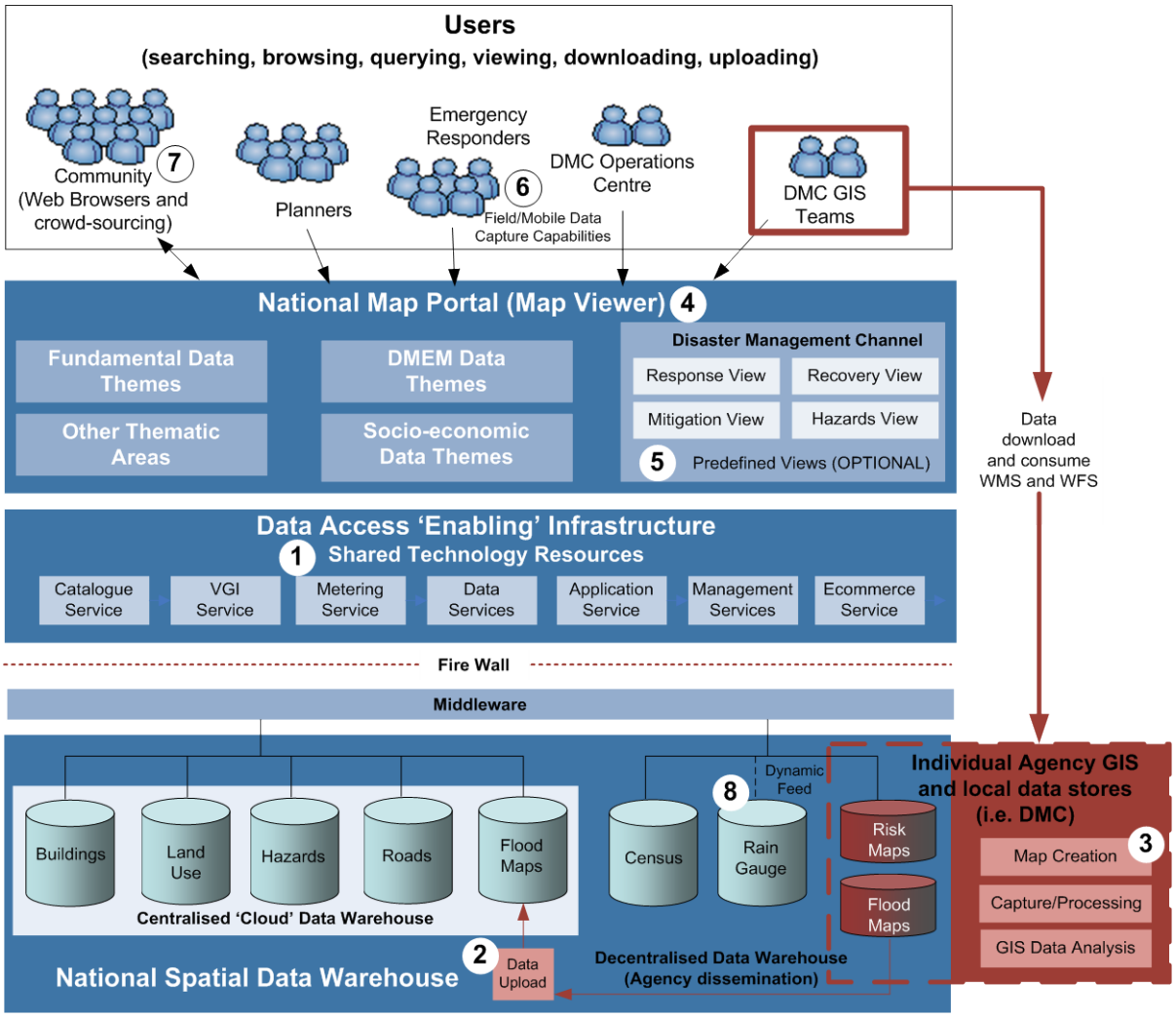

Figure 3.1 DMEM Conceptual Model

3.1.4 BENEFITS OF PILOTING SLSDI DEVELOPMENT

The implementation of a SLSDI involves deep cultural changes and it will be important to deliver results that are quick, measurable, contagious and extensible to keep stakeholders interested and focussed. Quick results are best delivered through a pilot project that can be used to demonstrate capability early.

The DMEM Project will make for an excellent SLSDI pilot. It can be used by the NSDI Office to conduct a gap analysis of SLSDI needs and highlight problem areas early including:

- Understand stakeholder needs for disaster management and build on these for the SLSDI
- Understand gaps in data needs and quality through an inventory of fundamental and application data sets for the DMEM Thematic Area
- Comprehend the extent to which data standards have been adopted across the government sector
- Build technical and policy skills required for the implementation and ongoing management of the SLSDI
- Create descriptive metadata for DMEM thematic data sets as a component of the National Spatial Data Catalogue
- Test data exchange protocols including the ability to consume Web Map Services and Web Features Services
- Understand data storage capacity requirements

3.1.5 AGENCIES INVOLVED

Lead Ministry: Ministry of Disaster Management (MDM) and Ministry for Environment and Renewable Energy (MERE) in conjunction with NSDI Office

Implementation Agency: Disaster Management Centre, which is mandated to coordinate disaster management nationally

Disaster Management Community: Organisations responsible for generating and using spatial data for Disaster Management, such as the Survey Department and Ministry of Environment and Renewable Energy

3.1.6 FUNDING STATUS

Local and Foreign funding allocated through UNDP under the CDMP Project

Funding for out years required.

3.1.7 CONTACT PERSONS

Project Leader, DMEM Pilot Project (To be determined)

3.2 DMEM PROJECT GOVERNANCE

Establish the lead agency and DMEM Project Team

3.2.1 BACKGROUND AND RATIONALE

One of the most important steps in any project is establishing the DMEM Project Team and governance structure. Having the right people, with the right skills is the first step towards a successful project. Projects fail when there is no management support and roles and responsibilities are unclear.

It is important that Project Governance is set in place early to provide leadership and accountability. This will define a clear purpose and build expectations, and establish trust within the team.

As a pilot implementation for the SLSDI, the DMEM Pilot Project has some unique governance challenges. The DMEM Project Team needs to be able to balance the delivery of the project, in addition to, providing cross-government oversight for the SLSDI components via the NSDI Office.

It is important that the project maintains alignment with the strategic direction of the SLSDI, and at the same time, case studies aspects of the SLSDI technologies, methods and processes. Findings can then be incorporated back into the overall SLSDI initiative to streamline future SLSDI developments and other Thematic Areas.

3.2.2 PROPOSED APPROACH

The proposed project governance approach provides a framework to test future SLSDI Project initiatives, where collaboration and cooperation is central to the SLSDI philosophy. Figure 3.2 provides a Project Governance view point and its alignment to the overarching NSDI Governance Framework. It provides appropriate levels of participation, decision-making ability and accountability. It includes the following aspects:

- A Lead Agency, in this instance the Ministry for Disaster Management (MDM), which has overall responsibility for project delivery. The Secretary MDM will report directly to the Minister Disaster Management as per normal procedures, and liaise with Secretaries Ministry for Land and Land Development and Ministry for Environment as appropriate.
- A cross-functional project team has responsibility for carrying out project tasks. The Project Leader will keep the Project Stakeholders informed of progress and provide them with opportunities to have input in to the development and implementation of the system.
- The NSDI Subcommittees will provide advice on legal and policy matters, technical methodologies, and data standards and processes.
- The NSDI Office will maintain oversight of the project and provide regular reports to the NSDI Council and NSDI Steering Committee via the Project Leader.

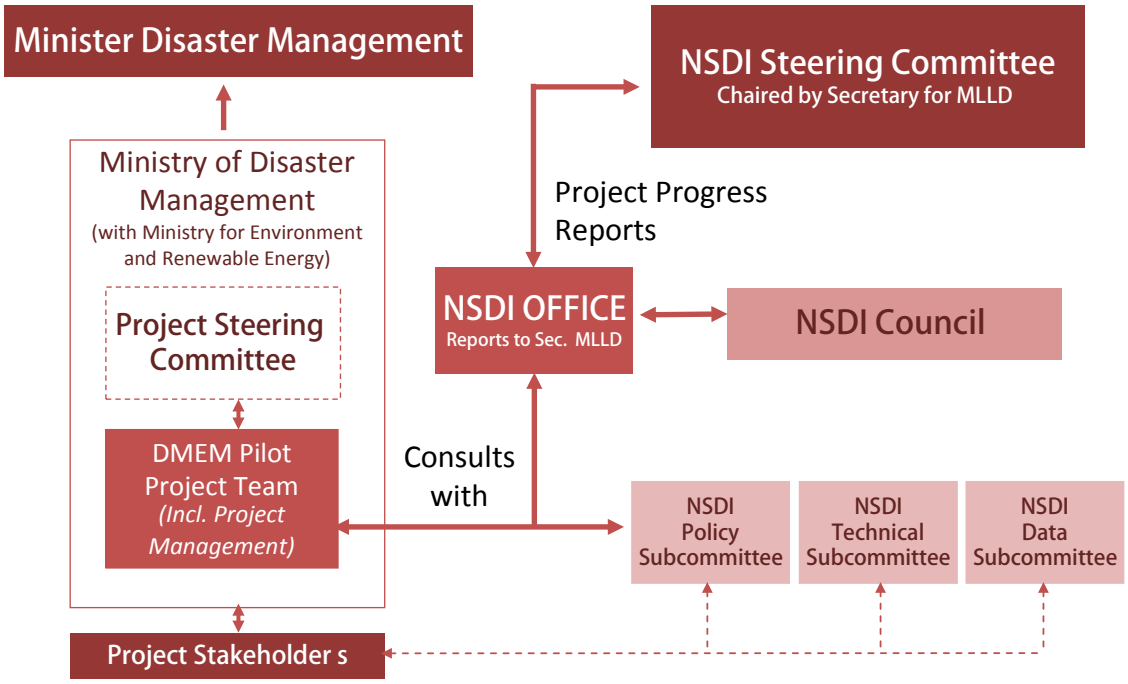

Figure 3.2 Project Governance Model within the context of the SLSDI

Staffing for the DMEM Project Team is proposed as follows:

- Project Leader – Implementation planning, monitoring and evaluation, consultation with DMEM stakeholders, Project Management;
- 1 x GIS/IT Project Officer – Develop Disaster Management System Requirements and Options Analysis working with independent consultant; oversee DMEM Pilot and NSDI Enabling Framework configuration management
- 1 x GIS Project Officer – Data Inventory and gap analysis (working with national consultant); Data Acquisition planning
- 1 GIS Project Officer – Metadata Creation for DMEM datasets (working with national consultant); Development of workflows and instruction manuals; produce quality management processes
- 1-2 x GIS Officers - New capture and processing of priority spatial data products, i.e. capture of building data. Conversion of DMEM data to required standards (Number of staff is dependent on outcomes of data inventory gap analysis and agency critical needs)
- 1 x Communications Officer – Manage DMEM Stakeholder Engagement Plan and DMEM Education and Awareness Program; Work with NSDI Office on Spatial Data Management Charter, Policy compliance matrix and be a member of the Policy Development Committee.

3.2.3 OBJECTIVES

The objectives for establishing the Project Governance Model are:

- Provide an exemplar for future SLSDI Project implementations
- Provide proper leadership so that projects have the best chance for success
- Ensure appropriate accountability and reporting mechanisms are in place
- To include stakeholders as an integral part of project development

3.2.4 IMPLEMENTATION TIMEFRAME

First Quarter Year 1

3.2.5 ACTIVITIES

- Establish the DMEM Project Team
  - Assign a Project Leader to be accountable for project implementation
  - Determine number of staff required and create Position Descriptions
  - Define team roles and responsibilities
  - Identify funding required for resourcing the DMEM Project Team
  - Identify reporting structure

3.2.6 DELIVERABLES

- Operational DMEM Project Team
- A DMEM Project Team - Appropriate staff with delegated powers, funding and computing resources
- A DMEM Project Team Reporting Framework

3.2.7 INTERDEPENDENCY WITH SLSDI ROAD MAP

- Establishes the Project Governance Model within the context of the SLSDI.
- Case studies project governance with an emphasis on broader reporting and communication to ensure whole-of-government objectives are considered

3.2.8 SLSDI PREREQUISITIES

- Establish the NSDI Office to provide cross-agency support for data sharing and DMEM Pilot Project implementation support

3.2.9 OUTCOMES

- Delivery of the Disaster Management Pilot Project outcomes through effective leadership and coordination
- Enhanced visibility of SLSDI project initiatives with the broader community through a reporting structure that embraces stakeholders

3.2.10 BUDGET

- Recurrent budget allocation required to fund the DMEM Project team positions and operations
- Single allocation of approximately US$6000 for project IT resources

3.2.11 RISKS

There is a risk that the Project Governance Model fails to deliver on project and whole-of-government outcomes. These risks are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
NSDI Office is not in place	3	1	Start project and communicate with NSDI Working Group until NSDI Office is set-up
Lack of skilled resources to fill the necessary project positions	1	5	Recruit externally Student vocational work can be used for some tasks

3.3 DMEM PROJECT PLANNING

Develop the DMEM Project Plan with input from key stakeholders

3.3.1 BACKGROUND AND RATIONALE

Project planning entails a series of decisions, from general and strategic decisions to specific operational ones, based on the gathering and analysis of information. This process requires input from stakeholders.

The output of the project planning process is a **project plan** that will be used by the project manager(s) to implement activities, monitor progress and make decisions.

Project planning is essential for a project's success, and as such is often considered the most important phase in project management. The effort spent in planning can save countless hours of confusion and re-work in the subsequent phases.

3.3.2 PROPOSED APPROACH

The involvement of internal and external stakeholders from the start of the project is critical to achieving optimal planning results. **Stakeholders** are those people who hold a stake in the project or may be affected by the project. It is recognised that failure to involve stakeholders in the planning process may lead to decisions being overruled, delayed, challenged, or questioned afterwards.

During the project planning phase, key stakeholders will be identified and their roles consider from the outset. Key stakeholders will include:

- DMEM Project Team members
- Partnering organisations
- Project Sponsors
- Politicians and decision makers
- Representatives from the target disaster management community
- The media, scientific community, and professional bodies.

3.3.3 OBJECTIVES

The objectives for project planning and stakeholder engagement are:

- Provide transparency, accountability and integrity in planning and implementation
- Understand stakeholder concerns, views, requirements and expectations.
- Better awareness of and ability to deal with issues of significance to stakeholders.
- Respond coherently and appropriately to stakeholder needs.
- Early identification of potential problems leading to better risk management.
- Opportunities to develop long-term and trusting relationships

- Enhance the understanding and acceptance of the Disaster Management Systems within the overall context of the SLSDI.

3.3.4 IMPLEMENTATION TIMEFRAME

First Quarter Year 1 (ongoing stakeholder engagement)

3.3.5 ACTIVITIES

- Prepare the Project Plan
  - Project Definition
  - Project Work Plan
  - Project Management Procedures
  - Establish performance measures - scope, schedule and cost.
  - Develop plans for risk management, quality, procurement, staffing and communications
  - Reporting Framework – review and approval, change requests etc.
- Stakeholder Engagement
  - Spatial Information Community Profile for disaster management
  - Identify stakeholders and prepare DMEM Stakeholder Engagement Matrix
  - Project level Communication plan.

3.3.6 DELIVERABLES

- Project Plan
- A Stakeholder Requirements Matrix – describing common, essential and aspirational needs for the Disaster Management System
- Project-level Communication Plan

3.3.7 INTERDEPENDENCY WITH SLSDI ROAD MAP

- Case study to assist in the development of the Stakeholder Engagement Model and Plan
- Subset of stakeholder information for incorporation into the SLSDI Stakeholder matrix

3.3.8 SLSDI PREREQUISITIES

- The SLSDI Stakeholder Engagement Model and Plan

3.3.9 OUTCOMES

- All identified stakeholders for DMEM Thematic Area have been engaged in the Project planning and implementation.
- A survey of DMEM stakeholders indicates a sense of being valued contributors to the outcomes of DMEM Thematic Area.
- The DMEM Pilot meets user's requirements in terms of data availability, quality and usability

3.3.10 BUDGET

- Single allocation of US**$2,000** for a national Consultant to develop the DMEM Stakeholder Requirements Matrix

3.3.11 RISKS

The following risks to project outcomes from not being able to meet user requirements are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
There is a lack of interest from the targeted disaster management stakeholder community	2	2	Fast track the SLSDI Engagement model and plan and in particular the risk Management Model
Cost of engaging stakeholders is too high	1	5	Fast track the SLSDI Engagement model and plan and in particular consideration of logistics.
Stakeholders indicate they do not feel involved	1	2	Develop a Checklist for the stakeholder engagement process

3.4 DRAFT SLSDI POLICY

Draft policy and case study compliance

3.4.1 BACKGROUND AND RATIONALE

Information sharing between organisations needs to be done in a way that allows the DMEM stakeholders and public to access the most up-to-date information on a daily basis. This requires agencies to comply with policies, standards and methods that support data interoperability and sharing.

3.4.2 PROPOSED APPROACH

It is a requirement that the Disaster Management Pilot Project draft the SLSDI policies. This is because a critical success factor is the management of data in accordance with specified standards, protocols and guidelines, and the ability to readily exchange information between agencies.

All policies will need to be drafted (See Legal and Policy Framework Section 2.4).

Priority should be given to evaluating the following as part of the DMEM Pilot implementation:

- **Custodianship Policy**– Data custodians will be identified during the data inventory process (Section 3.6). Data will be made available by custodians for integration with other data.
- **Data Acquisition Policy** – MDM will adopt the principles of data acquisition that ensure the most strategic use of resources for data acquisition and seek to partner with agencies rather than duplicate collection
- **Spatial Data Management Policy** – Data management will conform to industry best practise procedures and standards
- **Access to Sensitive Data Policy** – Consideration will be given to withholding sensitive data from public view

3.4.3 OBJECTIVES

The objectives of evaluating agency policy compliance are:

- To ensure that policy adequately provisions preserving confidentiality, privacy and security
- To highlight any issues participating agencies may have with spatial data management and sharing principles
- To test the philosophy for easy, efficient and equitable access to spatial data with participating agencies.
- To identify if there is a noticeable cultural change towards strategic use of resources for planning, recording and acquiring spatial data
- Evaluate the provisioning principles for long-term care of spatial data

3.4.4 IMPLEMENTATION TIMEFRAME

First to second Quarter Year 1

3.4.5 ACTIVITIES

- Policy Implementation
  - Prepare the Policy Implementation Plan – Business Case
  - Draft the policy documents – Custodianship, Data Acquisition, Spatial Data Management, Information Privacy, Sensitive Information, Data Access and Pricing.
  - Identify Policy Instruments - review existing legal documents for applicability to spatial data management.
  - Release the policy documents for consultation with Stakeholders
  - Conduct a Policy Workshop to achieve stakeholder buy in
  - Analyse stakeholder feedback and adopt as appropriate
  - Develop a Policy Compliance Strategy
  - Seek approval and launch policy documents
- Create a Policy Compliance Criteria Matrix using the draft policies as a basis
- Compare and contrast agencies ability to comply with draft policies
- Provide a Compliance Evaluation Report to the NSDI Office

3.4.6 DELIVERABLES

- Policy Compliance Criteria Matrix
- Policy Compliance Evaluation Report

3.4.7 INTERDEPENDENCY WITH SLSDI ROAD MAP

- A case study to assist in the development of the SLSDI Policies and Compliance Framework

3.4.8 SLSDI PREREQUISITIES

The drafting of policies is a an essential prerequisite for the DMEM Pilot Project and the delivery of the DMEM Thematic Area, and will need to be developed as part of the DMEM Pilot Project

- Single budget allocation of US$20,000 for an International Consultant to draft the policy documents and facilitate policy workshop and stakeholder buy-in

3.4.9 OUTCOMES

- Evidence that leads to the formulation of effective Spatial Data Infrastructure Policies for best practice spatial data management and exchange

3.4.10 BUDGET

- Single allocation of US**$20,000** for a national Consultant to draft the SLSDI policies and facilitate a consultation workshop

3.4.11 RISKS

The following risks to project outcomes from agencies not complying with draft policy are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
That agencies do not share data for the purpose of the Disaster Management Project as per policy principles	1	4	A payment option may need to be considered in the short term in order to realise other project outcomes

3.5 DMEM NATIONAL MAP PORTAL PILOT

Implement predefined views for the Disaster Management Community

3.5.1 BACKGROUND AND RATIONALE

The National Map Portal (Section 2.5) will allow users to view Disaster Management and Environment Management Thematic Data.

The DMEM Project will plot the National Map Portal according to the methodology outlined in section 2.5.

In addition the MDM has a requirement to analyse and create map data and serve this data out to the Disaster Management community in real-time and as predefined data views for easy and consistent reference.

This requires a specific viewing channel on the National Map Portal - one that could potentially be restricted to emergency responders during incident management if required. This is referred to as the Disaster Management Channel available through the National Map Portal.

3.5.2 PROPOSED APPROACH

Stage One

Pilot the National Map Portal National Map Portal according to the methodology outlined in section 2.5.

Alternatively, DMC has created a “RiskINFO” Application using GeoNode - an Open Source Platform for sharing spatial data and maps. This prototype is an ideal test-bed for organising overlays of spatial data for disaster management. It is a cost effective method and suitable for testing and showcasing the value of integrated spatial information to decision makers.

While the National Map Portal is being developed it is plausible to adopt an interim solution at minimal cost. For example, GeoNode may be used as a test-bed to demonstrate the benefits of multiple parties being able to view the same information at the same time. It may also be used to seek early feedback from users on interface design, usability and functionality. A small case study region may be selected to evaluate the availability and accessibility of spatial data held by organisations external to MDM. The case study may consider the ease with which data can be organised, shared and viewed, gauge system performance, and provide a means to conduct a gap analysis on capability.

Stage Two (Optional)

The Disaster Management Channel is OPTIONAL and proposed here to enhance usability across the disaster management sector, which requires tailored viewing solutions.

It is recommended that the requirements for the Disaster Management Channel be incorporated into the requirements design and 'Request for Proposal' for the National Map Portal (Section 2.5.2). In this way, it will be possible to identify similar requirements such as data viewing and storage, and in doing so, offset potential duplication.

3.5.3 OBJECTIVES

The objectives for implementing the piloting the National Map Portal are:

- Build technical skills required for the implementation and ongoing management of National Map Portal
- Provide a demonstrator to evaluate the capabilities and accessibility of spatial data and seek early feedback on design.
- Provide a public interface for stakeholders/citizens to view DMEM data in one location

3.5.4 IMPLEMENTATION TIMEFRAME

Third to Fourth Quarter Year 1

3.5.5 ACTIVITIES

Stage One: DMEM Pilot

- Pilot the Methods
  - Develop a Pilot Project to demonstrate proof-of-concept and provide a basis for refinement of the solution for other Thematic Areas
  - If necessary consider, interim solutions to deliver specific benefits in the short term, which do not distract significantly from the overall implementation approach, for example a low cost solution such as GeoNode can be used to demonstrate access and viewing capabilities
- Data
  - Seek agreement with external agencies to provide Disaster Management and Environment Management Thematic Area data
- Pilot Implementation and Planning
  - Design the Pilot Project
  - Select Study Area and capabilities (tools) to be tested
  - Conduct tests – data load, live data feeds, data manipulation, map creation, viewing, dissemination
  - Design Evaluation Criteria - system performance and capabilities, operations management, training
  - Report on findings
- Production Environment
  - Develop a Business Case to develop the full system based on pilot findings, the focus here will be on National Data Coverage

Stage Two: Disaster Management Channel (Optional)

- Requirements for the Disaster Management Channel: To be incorporated into the design requirements for the National Map Portal (Section 2.5)
- Channel Development: Design the data views for Mitigation, Preparedness, Response, Recovery

3.5.6 DELIVERABLES

- Requirements Design for the National map Portal (also see Section 2.5)
- Test cases for the National Map Portal
- Fully tested National Map Portal

3.3.7 INTERDEPENDENCY WITH SLSDI ROAD MAP

- Case study and demonstrate the functionality of a single map viewing system to SLSDI stakeholders to build an understanding of the proposed SLSDI and National Map Portal capabilities

3.3.8 SLSDI PREREQUISITIES

- National Map Portal (Section 2.5.2)

3.5.9 OUTCOMES

- A DMEM Thematic Area accessible via the National Map Portal that delivers a common operating picture and capabilities for cross-agency disaster management and environment management
- Reduction in time delays for emergency response to critical incidents through improved coordination and data sharing
- Better management of the environmental through being able to view DMEM data sets in a timely and consistent manner

3.5.10 BUDGET

- Single allocation of approximately **$10,000** to test the National Map Portal
- Single allocation of approximately US**$20,000** to build the Disaster Management Channel (Optional)

3.5.11 RISKS

The following risks to project outcomes are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
High cost of National Map Portal implementation is prohibiting completion	4	3	Plan full system implementation over 2-3 years. Consider open source solutions where possible

3.6 DATA INVENTORY

Identify critical environmental, socio-economic and community data sets for the Disaster Management

3.6.1 BACKGROUND AND RATIONALE

Disaster Management operations require spatial data sets that are critical for mitigation, preparedness, emergency response and recovery operations. Working out what information is critical to disaster management and where to get it is an important step in building a first class capability.

The Disaster Management Pilot will consider a subset of government data sets that will eventually presented in the National Map Portal in the longer term.

A data inventory for DMEM data sets is required. This inventory is not a duplication of SLSDI National Spatial Data Framework but rather a complimentary activity. Lessons learned will feed directly back into the development of the National Spatial Data Framework and provide an exemplar for developing the Data Theme and Data Set Profiles.

3.6.2 PROPOSED APPROACH

The focus of the data inventory will be on the identification of critical data needs and the categorisation and organisation of these data sets into data themes.

The data sets to be considered are those that provide a geographical context for disaster management and include fundamental topographic data, environmental data and census data. Importantly, the inventory also needs to include application data such as landside hazard maps and real-time data feeds such a rain gauge data and weather conditions.

Not all government spatial information is currently in digital format. Some of the country's wealth of knowledge is stored as paper-based documents/maps. This information will be considered during the data inventory process and gaps in data availability and coverage identified.

It will also be important to consider what community data is required and how this will be sourced, such as crowd-sourcing. The inventory will also need to consider data obtained from emergency management field operatives during incident management, as this information will form part of the Disaster Management and Environment Thematic Area, which will in turn serve to create the online catalogue required for the National Map Portal (Section 2.6).

Disaster Management and Environment Management data will be structured according to the National Spatial Data Framework and include the following tiers of information:

- Fundamental data themes, such as topographic and imagery
- Specific business application layers for Disaster Management and Environment Management Thematic Area such as hazard and climatic data
- Socio-economic layers, such as census data

A fourth tier for Community layers, such as reports from incident responders, may also be included but will be considered outside the pilot project scope.

3.6.3 OBJECTIVES

The objectives for conducting a data inventory of Disaster Management and Environment Management data are:

- To ensure that all data needs for disaster management are identified
- To understand the gaps in data coverage and quality

3.6.4 IMPLEMENTATION TIMEFRAME

Second to Third Quarter Year 1

3.6.5 ACTIVITIES

- Identify data sets required for disaster management and produce an inventory
- Categorise data according to the National Spatial Data Framework – Fundamental, Application, Socio-economic and Community
- Evaluate Data
  - Establish the 'Fit for Purpose' Criteria – currency, completeness, accuracy and coverage and identify where metadata does not exist or is unsuitable (Section 3.7)
  - Assess data standards and models for suitability
  - Identify where data sets do not exist
  - Conduct a Gap Analysis and report on findings (Report to feed into the DMEM Data Acquisition and Plan (Section 3.10)

3.6.6 DELIVERABLES

- Data inventory for Disaster Management and Environment Management Thematic Area
- Gap Analysis (report)

3.6.7 INTERDEPENDENCY WITH SLSDI ROAD MAP

- A case study to assist in the development of National Spatial Data Framework
- Partial completion of the inventory for cross-government data sets
- Lessons learned by way of an evaluation of the quality and usability of data

3.6.8 SLSDI PREREQUISITIES

- National Spatial Data Framework that includes a structure for Disaster Management and Environment Management Thematic Area

3.6.9 OUTCOMES

- A recognition from the broader disaster management community of data sets that have disaster management priority
- Cost avoidance through the elimination of duplicated data collection practises through knowing what information is available

3.6.10 BUDGET

- Single allocation of US**$2,500** for a national Consultant to undertake a data inventory and gap analysis of DMEM Thematic Area

3.6.11 RISKS

The following risks to project outcomes from not being able to complete a comprehensive data inventory are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
That agencies are not helpful in conducting the data inventory	1	4	Seek a letter of support from the Secretary to the Minister of MDM
Lack of government sector knowledge as to the likely location of data sets.	2	4	Employ a national consultant with understanding of cross government data sets

3.7 DESCRIPTIVE METADATA

Develop descriptive metadata for disaster management and environment management data sets

3.7.1 BACKGROUND AND RATIONALE

Metadata will assist the Ministry for Disaster Management (MDM) and Ministry for the Environment and Renewable Energy (MERE) to organise and publicise information about their data holdings in catalogue form. This avoids duplication of effort by ensuring that other organisations and stakeholders are aware of the existence of this data.

A 'lead' data custodian from MDM and MERE will need to be designated for the SLSDI Disaster Management and Environment Management Thematic Area. This lead custodian/s is to be the NSDI Office first point of contact for all DMEM data.

MDM and MERE currently collect some metadata about the data they create and for which they are the recognised custodian. This is important as it is difficult for users to access geospatial data and, when located, difficult to determine its usefulness for mapping and analysis.

In addition, much of the data collected by MDM is derived from other agency data sets where metadata is not available. Without this external agency metadata it is difficult for MDM to determine the reliability of data sets it creates, such as risk maps.

As part of the data inventory process (Section 3.6) it is important to understand where metadata exists, and its current format and reliability.

The next stage is to create the actual metadata. This activity applies to data sets for which MDM and MERE are custodians and also to the data sets that are obtained from other agencies, such as the Survey Department.

3.7.2 PROPOSED APPROACH

The proposed approach is to create metadata for each data set according to an agreed SLSDI standard (Section 2.7). This will be conducted in 3 stages:

- Stage 1: Will focus on creating metadata for data sets where MDM and MERE have custodianship
- Stage 2: Will work with data providing organisations, such as NBRO, to establish metadata for data sets critical for disaster management
- Stage 3: Will plan for future data sets, such as community data, that will form an integral part of disaster management operations in the future.

Each data set will be allocated to a Data Theme in the National Spatial Data Framework. Each data set will conform to the Sri Lanka Spatial Data Dictionary.

Metadata will conform to the Metadata Schema Standard ISO 19139.

Metadata profiles will include the following:

- Description: Define the data theme and provide a general overview
- Purpose: List general applications the data is suitable for
- Relationships: Describe how data is related with other data themes/data sets
- Data content: List datasets included in the data theme
- Status: Current and future state of the data set
- Standards: List published standards wherever possible
- Data set Stewardship: Organisation responsible for data theme content
- Data Set Custodian: Organisation responsible for producing and managing the individual data set.
- Primary Data Users & Stakeholders: Agencies actively using (or with the potential to use) the dataset

The DMEM Pilot Project will create an agency-specific data catalogue for MDM and MERE data sets for which they are the custodians. This catalogue is to be developed using XML or similar machine readable format.

3.7.3 OBJECTIVES

The objectives for collecting metadata for the Disaster Management and Environment Management data sets are:

- To enable users to make informed decisions about what information is appropriate to their needs
- To ensure the responsible management and ongoing integrity of the data sets and associated metadata by assigning a data custodian

3.7.4 IMPLEMENTATION TIMEFRAME

Second to Third Quarter Year 1

3.7.5 ACTIVITIES

- Metadata Creation
  - Adopt the SLSDI agree metadata standards and Sri Lanka Spatial Data Dictionary (SLSDD)
  - Develop a metadata profile for each Disaster Management and Environment Management data set working with data custodians
  - Assign responsibility for the ongoing upkeep of the metadata schema to the responsible agency
  - Convert existing MDM and MERE metadata records to the SLSDI metadata profile.
  - Adopt and implement the agreed schema for core metadata elements
- Create the MDM and MERE agency specific Spatial Data Catalogues for data sets that MDM and MERE are custodians for, respectively. This will streamline the development of the

National Spatial Data Catalogue as the agency data catalogues should be able to be consumed into the national catalogue automatically.

3.7.6 DELIVERABLES

- Descriptive Metadata for each DMEM data set in the form of a standard profile
- Core MDM and MERE-level metadata for each data set
- A MDM and MERE Agency-specific Data Catalogues (i.e. XML document)

3.7.7 INTERDEPENDENCY WITH SLSDI ROAD MAP

- A case study to assist in the development of National Spatial Data Catalogue

3.7.8 SLSDI PREREQUISITIES

- An instruction manual for metadata creation
- Metadata standards
- Sri Lanka Spatial Data Dictionary
- Metadata instruction manual

3.7.9 OUTCOMES

- Enhanced accessibility to spatial data sets via metadata records, and a common vocabulary and data dictionary

3.7.10 BUDGET

- The cost of developing the metadata is the responsibility of the data custodian

3.7.9 RISKS

The risks to the project outcomes stemming from not having adequate metadata are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
Data producers consider the task of creating metadata too hard	3	1	Conduct training sessions in metadata creation and management. Use an instruction manual for training
Insufficient time to complete the task	3	3	Prioritise data sets so that those more frequently accessed will have sufficient metadata

3.8 DATA STORAGE SOLUTION

A secure data storage environment for DMEM data

3.8.1 BACKGROUND AND RATIONALE

The Disaster Management Centre has an existing storage capability and this is available for the Pilot Project. The storage facility will need to be evaluated to determine its suitability for the DMEM Pilot Project. This includes storage capacity and performance and its suitability and accessibility as a decentralised warehouse in the broader SLSDI.

3.8.2 PROPOSED APPROACH

The DMEM Pilot Project storage solutions is dependent on the National Spatial Data Warehouse options analysis.

The Disaster Management and Environment Management Thematic Area will be used to case study the national solution that may include;

- A decentralised agency data storage solution with middleware that links data through to the National Map Portal; and/or
- A centralised data storage solution, such as cloud storage where DMEM data sets can be uploaded securely; and

. The DMEM Pilot Project will assess these solutions in terms of:

- Ability to effectively disseminate MDM and MERE data via the National Map Portal
- Mitigation of risk from a security, data protection and compliance perspective.
- Ensuring that the infrastructure is always available and is flexible enough to respond to business needs on-demand.
- The effective and efficient operation of the infrastructure in providing internal and external services.
- Security through identity and access management for external customers and internal users.

3.8.3 OBJECTIVES

The objectives for case studying the data storage solution as part of the DMEM Pilot is:

- Consider likely SLSDI storage capacity needs, performance and methods
- Enable adequate provision and long-term care of MDM spatial data holdings including disaster recovery and backup procedures
- Provide a secure environment where data can be transmitted through secure methods
- Provide fast access to data without interruptions to user experience

3.8.4 IMPLEMENTATION TIMEFRAME

Third Quarter Year 1

3.8.5 ACTIVITIES

- Evaluate the National Spatial Data Warehouse storage solution (Section 2.8.6) in terms of:
  - Storage capacity
  - System Performance including network bandwidth
  - Availability and incident management
  - Data security
  - Disaster recovery and backup procedures
  - Validate data archiving and disposal procedures

3.8.6 DELIVERABLES

- A storage capability that is suitable for conducting the DMEM Pilot Project

3.8.7 INTERDEPENDENCY WITH SLSDI ROAD MAP

- A Pilot Project to demonstrate proof-of-concept of the SLSDI data storage solution.

3.7.8 SLSDI PREREQUISITIES

- National Data Warehouse options analysis

3.8.9 OUTCOMES

- An understanding of storage requirements for the SLSDI including capacity to meet current and future business needs

3.8.10 BUDGET

- NIL

3.8.11 RISKS

The risks to the project outcomes stemming from not having an adequate storage solution are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
That the storage solution does not meet the Projects minimum requirements	1	5	Test early so that alternative options can be considered

3.9 DATA MANAGEMENT PROCESS

Develop workflows aligned to best practice management and exchange of spatial data

3.9.1 BACKGROUND AND RATIONALE

The DMEM Pilot Project provides an opportunity to demonstrate more effective and efficient workflows through the development of new methods and procedures, and a better understanding of collaborative data sharing principles across the broader government sector.

Cross-agency data sets are currently inconsistent in terms of currency and accuracy, and synchronisation is problematic because different data standards are used across the government sector. Well entrenched technology and business processes (required to manage existing disconnected data sets) are difficult to change - both culturally and financially.

A case study is warranted to demonstrate the business and social value of having integrated and accessible spatial information. Currently, information is not reaching the community in a timely manner, nor are there effective techniques to source local information from the community. The ability to quickly disseminate government information is particularly important when managing emergency situations and timely community knowledge is critical to prioritising operational resources.

3.9.2 PROPOSED APPROACH

The proposed approach is to apply best-practise spatial data management principles and the application of new technologies to demonstrate how improved methods of data exchange will facilitate the development of new capabilities. This will create a common understanding across the broader SLSDI community for the need for effective sharing of spatial data sets.

For the DMEM Pilot Project, the Disaster Management Centre will adopt the following measures in its custodianship role and, in doing so, case study the new data management workflows required to deliver data via the National Map Portal including:

- Use nationally agreed policies, data standards and guidelines
- Create metadata for each data set and adopt the national vocabulary
- Avoid collecting data that is already held by other agencies
- Provide a common-operating picture
- Revise spatial data sets according to MDM priorities and make this program of work available to other agencies through the National Spatial Data Acquisition Program
- Ensure data are made available in a format that can be valued-added by external users
- Ensure data are compliant with laws and regulations
- Ensure data sets are managed in accordance within approved privacy and data sensitivity guidelines.

3.9.3 OBJECTIVES

The objectives for adopting nationally agreed spatial data management guidelines are to:

- Enable system interoperability and data integration through compliance with National policies and standards
- Avoid duplication of effort across the government sector
- Support efficient access to disaster management-related data sets with due consideration to privacy and data sensitivity guidelines
- Enable all agencies involved in emergency operations to have access to the same information at the same time
- Maintain the quality of the datasets and be able to provide detailed quality statements (metadata) regarding source, reliability, accuracy, completeness and currency

3.9.4 IMPLEMENTATION TIMEFRAME

Second to Third Quarter Year 1

3.9.5 ACTIVITIES

- Document DMC data management workflows, data standards and quality management procedures for:
  - Data capture/sourcing/acquisition (include funding model)
  - Data modelling
  - Data processing
  - Data revision and maintenance (include funding model)
  - Data release (include IP, copyright and pricing)
  - Data Access/dissemination (include access levels)
  - Data storage, archival and disposal (See also section 3.8)
- Quality Management System (QMS)
  - Load all documented workflows into a central area (preferably online)
  - Provide links to related policies, standards, data vocabularies and other related documents
  - Train staff in the use of QMS and how to apply the new procedures
  - Provide checklists to assist staff to comply with new procedures
- Standards
  - Use ISO/international standards where appropriate
  - If necessary develop new standards for data where none exist and seek endorsement of these standards through the NSDI council for adoption as the National standard

3.9.6 DELIVERABLES

- Documented workflows for managing spatial data sets
- Quality Management System

3.9.7 INTERDEPENDENCY WITH SLSDI ROAD MAP

- Demonstrate leadership through the adoption of whole-of-government common operating principles as per the SLSDI Charter for Spatial Data Management.

3.9.8 SLSDI PREREQUISITIES

- Spatial Data Management Charter (Section 2.9)
- That a MDM representative is a member of the NSDI Council.
- That MDM agrees to and is a signatory to the SLSDI Spatial Data Management Charter

3.9.9 OUTCOMES

- Efficiencies in disaster management through ready access to integrated spatial data
- Savings in productivity across the government sector through improved information flows resulting from the application of policies, standards and guidelines.
- Savings associated with improvements to the capture, storage and management of information progressively achieved through the term of the strategy.

3.9.10 BUDGET

- DMEM Project team salaries (Section 2.2)

3.9.11 RISKS

The risks associated with not having adequate spatial data management processes in place are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
That data sets are not interoperable with the Disaster Management System and SLSDI broader requirements	1	3	In the short term convert data to a usable format. In the long term, work with external agencies to assist them in understanding the need for data standards and plan for change

3.10 DMEM SPATIAL DATA ACQUISITION PLAN

An annual plan for procuring and capturing spatial data for Disaster Management and Environment Management Thematic Area

3.10.1 BACKGROUND AND RATIONALE

There exist spatial data sets that are incomplete and there will be new data sets required for disaster management. These will take time to collect and will require a planned approach. The approach should not only consider disaster management priority needs but also government needs as a whole. This is in line with the SLSDI strategy for data acquistion.

3.10.2 PROPOSED APPROACH

It is proposed that the Survey Department manage the National Data Acquisition Program on behalf of government (Section 2.10). In this way the Survey Department will have oversight of cross-government priority data needs and be able to plan and advise accordingly. The intention of this planned approach is to avoid duplicate data collection. The underpinning philosophy is to capture once and use many times.

The proposed approach is for the DMC (in cooperation with MERE) to work the Survey Department to prioritise new data capture and maintenance of existing data sets required for disaster management. DMC is likely to be the first agency to work with Survey Department in this way. Importantly, DMC will set an example for other agencies. The Survey Department will be able to test the new processes for annual planning with DMC.

The Gap Analysis completed during the Data Inventory stage (Section 3.8) will be used to plan future data acquisitions and determine priority themes and administrative regions for updating. Priority areas include regions considered at high risk of natural disasters and where there are people living.

The Survey Department will make the Annual National Spatial Data Acquisition Program available online so that all organisations are aware of spatial data capture activities. The aim is to support reuse, sharing and avoid duplication of effort.

The actual data capture will be performed by the data custodian or in partnership with other agencies. For example, the Survey Department will be responsible for updating fundamental data sets according to an agreed whole-of-government priority plan. Alternatively, DMC may work in partnership with the Survey Department to capture a subset of fundamental data (i.e. buildings) according to an agreed standard. This type of partnership is proposed as it makes the best use of available GIS resources and project funding across government.

3.10.3 OBJECTIVES

The objectives in planning for future data collection through the National Spatial Data Acquisition Program are:

- To raise awareness across government of any spatial data capture projects so that multiple agencies can benefit from a single acquisition
- To foster the opportunity or agency partnerships
- To achieve data collection in a more timely manner through cooperative use of resources (both human and computing) to meet a national priority

3.10.4 IMPLEMENTATION TIMEFRAME

Fourth Quarter Year 1

3.10.5 ACTIVITIES

- Create an Annual Disaster Management and Environment Thematic Area Data Acquisition Plan
  - Prioritise data capture needs
  - State the capture specifications and dates
- Forward the proposed plan to the Survey Department for inclusion in the whole-government National Spatial Data Acquisition Program

3.10.6 DELIVERABLES

- Annual DMEM Thematic Area Spatial Data Acquisition Plan

3.10.7 INTERDEPENDENCY WITH SLSDI ROAD MAP

- Supports the development and use of a National Spatial Data Acquisition Program
- Provides NSDI Office with an exemplar for how agencies work with the Survey Department in the preparation of an annual data acquisition program to meet whole-of-government priorities.

3.10.8 SLSDI PREREQUISITIES

- NIL

3.10.9 OUTCOMES

- More timely collection of data required for disaster management
- Savings associated with elimination of duplicated data collection within policy timeframes
- Productivity improvement through working in collaboration with other agencies that have expertise in data collection for specific data themes

3.10.10 BUDGET

- DMEM Project team salaries (Section 2.2)

3.10.11 RISKS

The risks associated with not having the required data to meet disaster management needs are tabled below along with mitigation strategies.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
That external agencies are unable to resource data collection, such as environmental data, to meet disaster management needs in a timely manner	4	1	Consider allocating MDM project funding or MDM resources to external agencies to assist with data capture

3.11 DMEM EDUCATION AND AWARENESS PROGRAM

Demonstrate the value and capabilities of integrated spatial data to SLSDI Community

3.11.1 BACKGROUND AND RATIONALE

The pilot project for Disaster Management utilises a range of skill sets: from the use of GIS and online technologies to the implementation of policies and standards and the creation of metadata. Other government organisations can benefit from this experience and the lessons learned during the implementation of the DMEM Pilot.

In addition, the pilot project will deliver the DMEM Thematic Area that utilises integrated spatial information and collaborative data exchange practises that are relevant to the SLSDI. This will be a major achievement towards SLSDI implementation.

Consequently, the Disaster Management Pilot will make a suitable demonstrator for educational use and public awareness raising. It will also be a vehicle for the promotion of the SLSDI and its value in integrating spatial information collected by various organisations, and making it accessible to the professional and general community.

The pilot will also build momentum towards the longer-term vision of open access to spatial information. As an exemplar, it will highlight how the public sector can be more efficient in the delivery of integrated services and provide improved opportunities for community participation.

3.11.2 PROPOSED APPROACH

The proposed approach to education and awareness is as follows:

- Draft a Communication Plan to identify DMEM stakeholders, their concerns, proposed approaches for communication, channels, frequency etc
- Communicate the completion of the Disaster Management Pilot to stakeholders through various media including email, flyers and formal letters
- Conduct seminars and training sessions tailored to the needs of:
  - The emergency operations sector, which require specific training
  - DMEM Stakeholders, to increase their understanding of how spatial information technologies are applied in the disaster management sector.
  - Professional groups, such as the Geoinformatics Society of Sri Lanka
  - Community Groups and hobbyists, that have an interest in maps and community safety
  - Universities, on the value of spatial information in the disaster management sector
- Public Awareness campaigns to encourage community mapping.
- Continue to build cooperative working relations between organisations that can contribute different skills, ideas, financial and technical support, thus leading to the sustainability of the DMEM Thematic Area overtime.

3.11.3 OBJECTIVES

The objectives for establishing the DMEM Education and Awareness Program are:

- Educate about disaster management in the context of society and the environment
- Change knowledge and attitudes to the value of spatial information for disaster management and environment management
- Change social norms, values, perceptions, and conversations particularly with regard to the value of community mapping
- Sustain data sharing between organisations overtime

3.11.4 IMPLEMENTATION TIMEFRAME

Second Quarter Year 2

3.11.5 ACTIVITIES

- Develop an Education and Awareness Strategy and Plan to promote the DMEM Thematic Area and advance the SLSDI strategic outcomes
- Prepare a training package and deliver seminars and training sessions according to the Strategy and Plan

3.11.6 DELIVERABLES

- DMEM Education and Awareness Strategy and Plan
- Seminar and Training Materials

3.11.7 INTERDEPENDENCY WITH SLSDI ROAD MAP

- Provides a cases study for the SLSDI Education and Engagement Program

3.11.8 SLSDI PREREQUISITIES

- Delivery of the data and technology components of the SLSDI including the National Map Portal, data framework, data warehouse and catalogue

3.11.9 OUTCOMES

- Increased community awareness and adoption of spatial technologies through education programs.
- Increased community knowledge about disaster management spatial capabilities and technologies
- Increase year on year in the number of skilled volunteers that provide content to improve the accuracy of map data.

3.11.10 BUDGET

- Included in DMEM Project team salaries (Section 2.2)

3.11.11 RISKS

There is a risk that the DMEM Education and Awareness Programs are not affective. These risks are tabled below.

Risk	Likelihood (1 low-5 high)	Severity (1 low-5 high)	Mitigation Strategy
There is no increase in the use of spatial information via the National Map Portal	1	1	Refine the Education and Awareness Strategy
There is no evidence to indicate an increase in public private partnerships	3	3	Review policy
An increase in community volunteered data is not evident	2	1	Increase the number of community-based awareness programs

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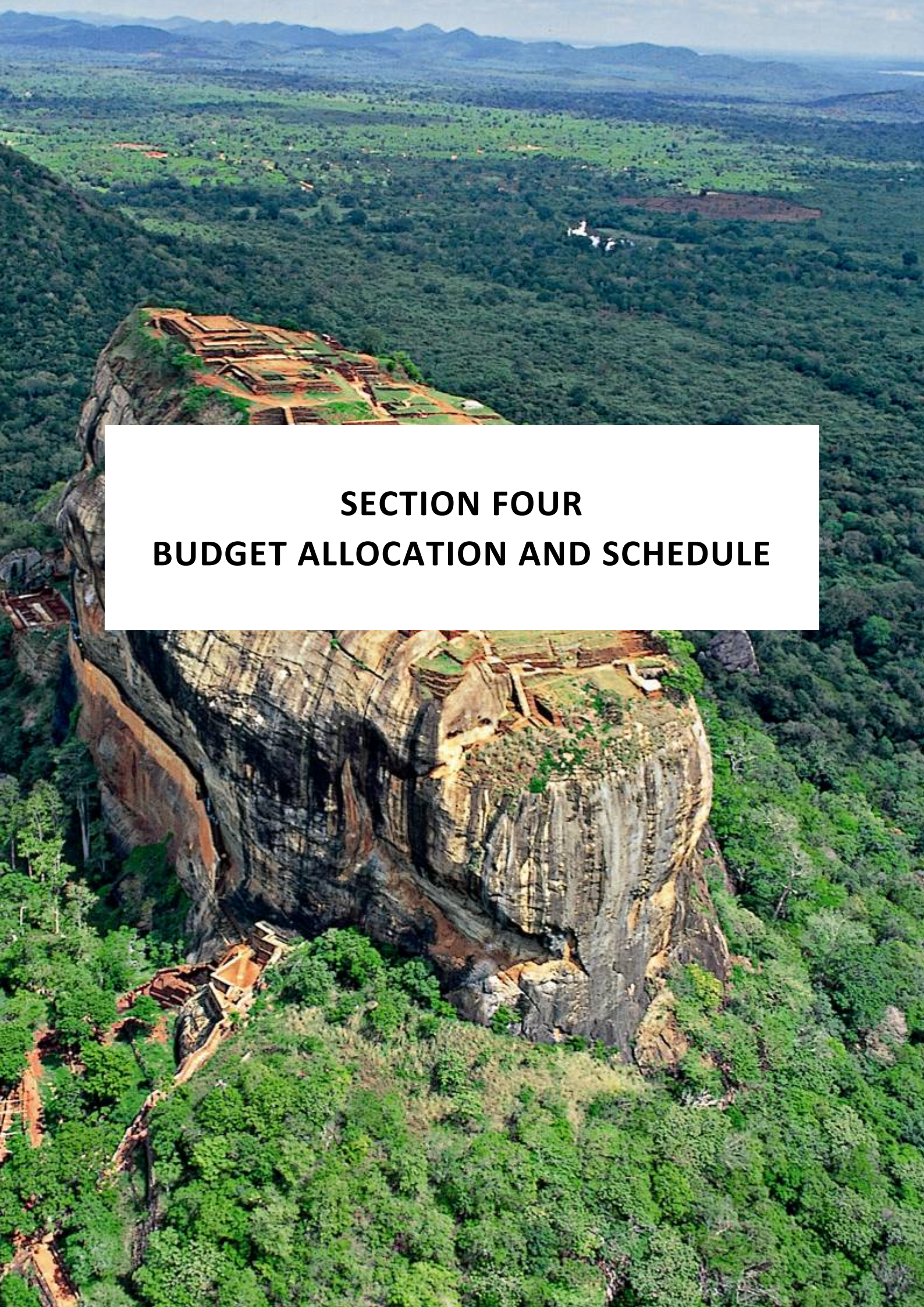


SECTION FOUR
BUDGET ALLOCATION AND SCHEDULE

4.1 BUDGET ALLOCATION

Table 4.1 provides estimates for major project activities identified in the SLSDI and DMEM Pilot Project Road Maps. Data and technology deliverables are a guesstimate only. A formal 'Request for Information' or 'Request for Proposal' is required.

Table 4.1 Budget estimates for SLSDI Major Projects and DMEM Pilot Project Activities

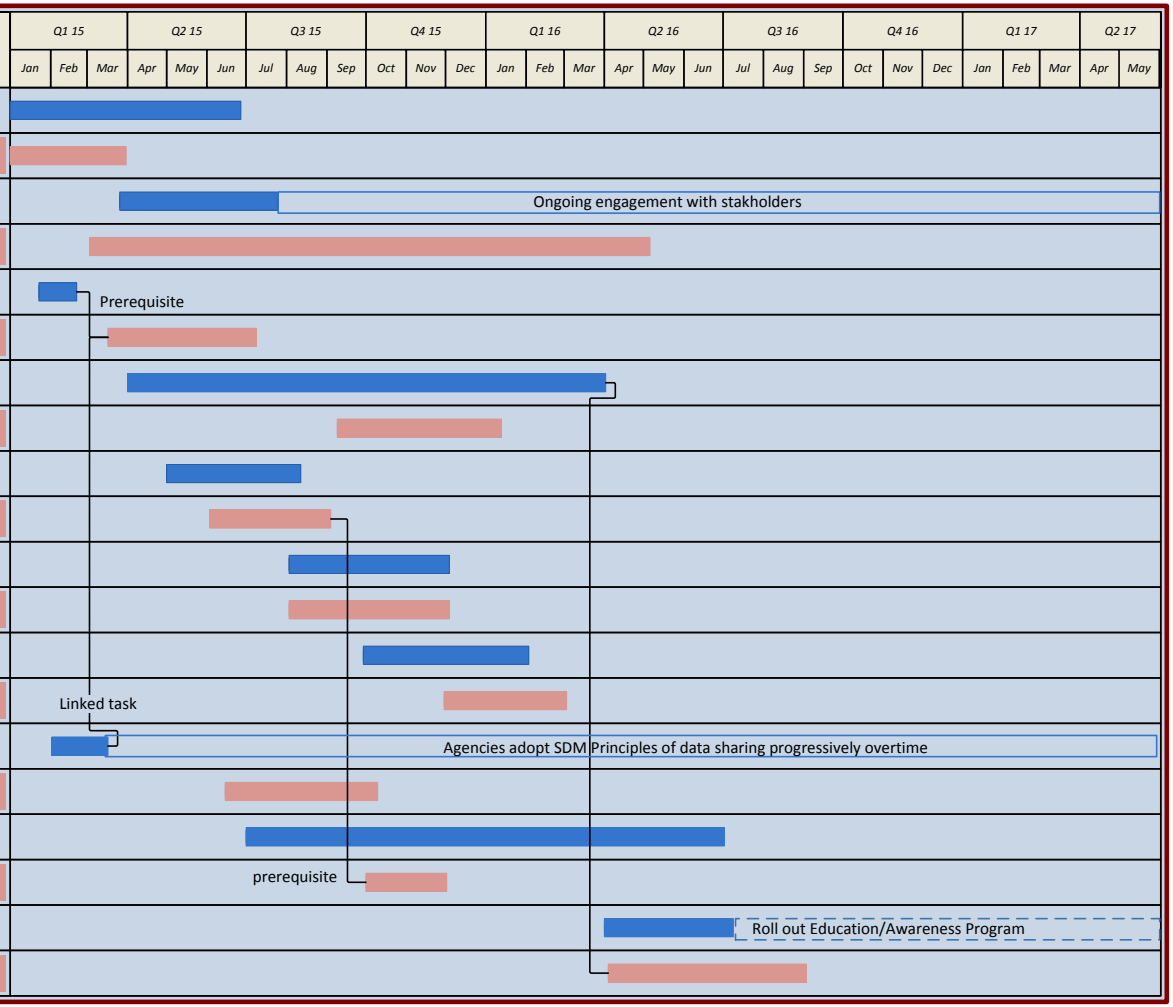
Note: Figures are shown in US dollars ** Priority task

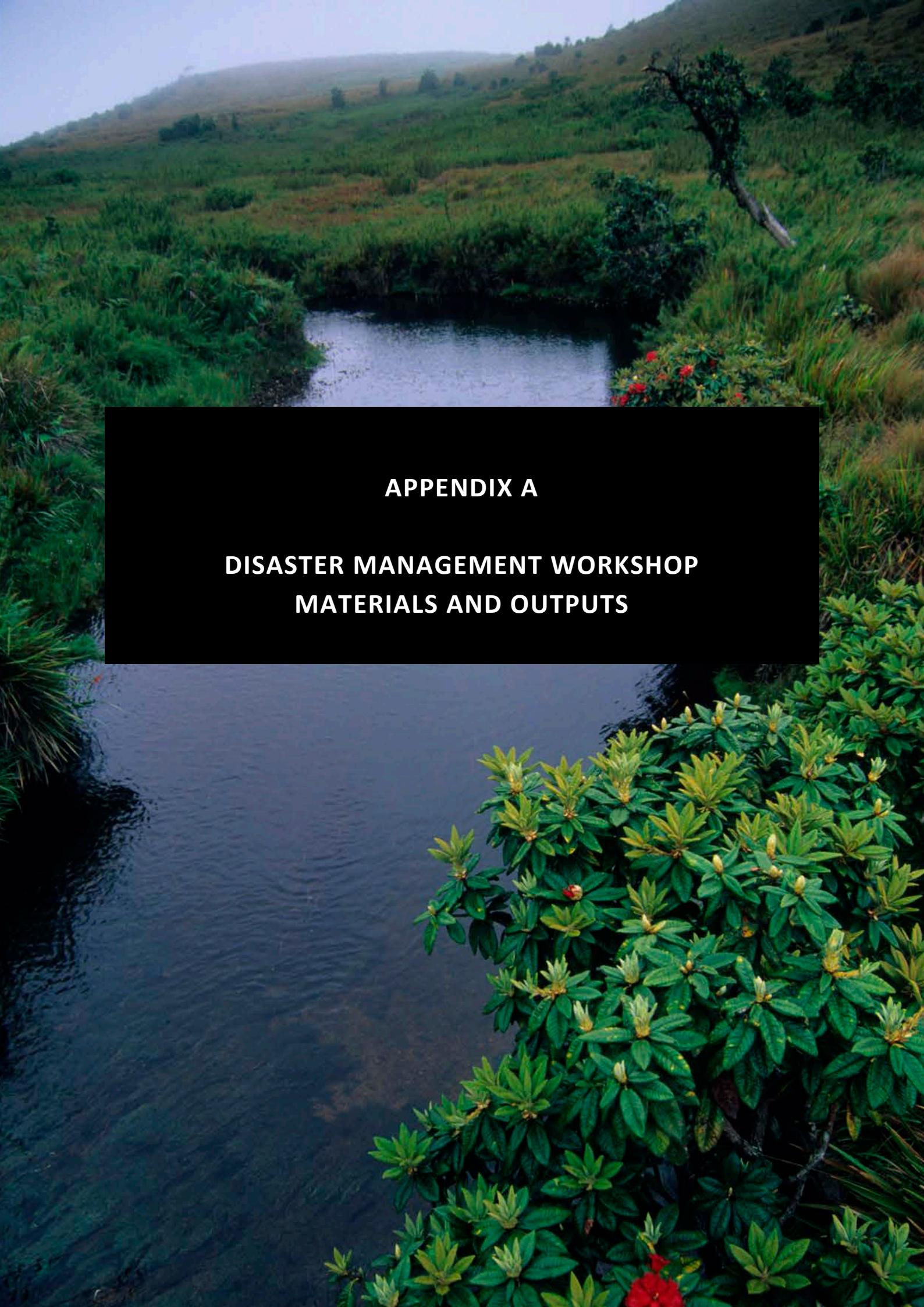
Major SLSDI Project	Other Funding	National Consultant	International Consultant	Data and Technology	Capital Required
SLSDI Governance**	$25,000 pa (Recurrent NSDI Office Staff)	-	$12,000 (Structure, positions etc)	TBD (NSDI Office Resources)	$12,000
DMEM Project Team	$15,000 Project Salaries			$6,000 Computing	$21,000
SLSDI Stakeholder Engagement	-		$15,000 (Model/Plan)	-	$15,000
DMEM Project Planning	-	$2,000 (Stakeholder Matrix)			$2,000
Legal and Policy Framework**	Included in Recurrent NSDI Office funding	-	-	-	-
Draft Policies and Case Study Compliance	Included in Project Salaries above	-	$20,000 (Draft Policies and workshop)	-	$20,000
National Map Portal**	TBD (ongoing management)	-	$17,000 (High-level and detailed Requirements)	$125,000 (Guesstimate)	$142,000 (Guesstimate)
DMEM National Map Portal Pilot	-	-	Requirements included in Map Portal development	$30,000 (Guesstimate)	$30,000 (Guesstimate) (Optional)
National Spatial Data Framework**	-	$2,000 (Populate Framework)	$10,000 (Develop Framework)	-	$12,000
DMEM Thematic Area Data Inventory**	Included in Project Salaries above	$2,500 (Gap Analysis)			$2,500

National Spatial Data Catalogue**		$6,000 (Metadata Profiles)		$50,000 (Guesstimate)	$56,000 (Guesstimate)
Descriptive Metadata		Agency 'in-kind' cost			
National Spatial Data Warehouse**	TBD (annual contract fees)	-	-	$50,000 (Guesstimate)	$50,000 (Guesstimate)
Data Storage	Agency-specific not costed	-	-	Included in Data Warehouse estimation above	-
Spatial Data Management	-	-	$1,000 (Charter)	-	$1,000
Data Management Processes	Included in Project Salaries above	-	-	-	-
National Spatial Data Acquisition Program	TBD by Survey Department	-	-	TBD (Unknown Requirements at this stage)	TBD
DMEM Spatial Data Acquisition Plan	Included in Project Salaries above				
SLSDI Education and Awareness Program			$18,000 (Program Dev)		$18,000
DMEM Education and Awareness Program	Included in Project Salaries above		Included in above Program		-
Totals	TBD	$12,500	$93,000	$211,000	$316,500

4.2 SLSDI GANTT CHART

ID	Task Name	Start	Finish	Duration
1	Establish NSDI Office & Committees (2.2 SLSDI Governance)	1/01/2015	26/06/2015	127d
2	**Establish the DMEM Project Team (3.2 DMEM Project Governance)**	1/01/2015	30/03/2015	63d
3	Plan for and engage with Stakeholders (2.3 SLSDI Stakeholders Engagement)	26/03/2015	24/07/2015	87d
4	**Engage with DMEM Stakeholders (3.3 DMEM Stakeholder Engagement)**	3/03/2015	5/05/2016	308d
5	Identify laws & Polices for data sharing (2.4 Legal and Policy Framework)	23/01/2015	20/02/2015	21d
6	**Draft data sharing Policy (3.4 Draft SLSDI Policy)**	17/03/2015	8/07/2015	82d
7	Map Portal: Requirements Design & build (2.5 National Map Portal)	1/04/2015	1/04/2016	263d
8	**Pilot National Map Portal Capabilities (3.5 DMEM NMP Pilot)**	9/09/2015	12/01/2016	90d
9	Organise and Identify data sets (2.6 National Spatial Data Framework)	1/05/2015	11/08/2015	73d
10	**Conduct gap analysis on DMEM data (3.6 Data Inventory)**	3/06/2015	3/09/2015	67d
11	Construct a library of metadata (2.7 National Spatial Data Catalogue)	3/08/2015	3/12/2015	89d
12	**Create the DMEM Metadata (3.7 Descriptive Metadata)**	3/08/2015	3/12/2015	89d
13	Evaluate and build virtual data store (2.8 National Spatial Data Warehouse)	29/09/2015	2/02/2016	91d
14	**Pilot data storage solution (3.8 Data Storage Solution)**	30/11/2015	2/03/2016	68d
15	Develop/adopt the SDM Charter (2.9 Spatial Data Management)	2/02/2015	16/03/2015	31d
16	**DMEM Pilot to implement best practice (3.9 Data Management Processes)**	15/06/2015	9/10/2015	85d
17	Develop/manage annual data capture (2.10 Spatial Data Acquisition Program)	1/07/2015	1/07/2016	263d
18	**Prepare/submit DMEM data capture plan (3.10 DMEM Data Acquisition)**	1/10/2015	1/12/2015	44d
19	Develop national awareness program (2.11 SLSDI Education and Awareness)	1/04/2016	8/07/2016	71d
20	**Demo SLSDI DMEM Thematic Area (3.11 DMEM Education and Awareness)**	4/04/2016	2/09/2016	110d





APPENDIX A

DISASTER MANAGEMENT WORKSHOP MATERIALS AND OUTPUTS

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National Spatial Data Infrastructure - Disaster and Environmental Management Workshop

Organised by Ministry of Disaster Management

Date: 14th August 2014 Venue: Conference Room, Ministry of Disaster Management

Time	Agenda Item
8.30 – 9.00	Registration and arrival of attendees
9:00 – 9:20	Opening Remarks by **Ms. S.M. Mohamed, Secretary, Ministry of Disaster Management**
9.20 – 9.30	Progress of SLSDI Development –by **Mr. Wasantha Deshapriya, Director Info-Communication technology Agency**
9.30 – 10.20	**Information Session** SLSDI Strategy: Goals and Strategic Actions by **Dr. Lesley Arnold** Disaster Management System: What will you need? by **Dr. Lesley Arnold** *Session Objective: To understand the current SLSDI development and its progress, strategic pathways and pilot project of the Disaster Management / Environmental Management implementations.*
10:20 – 10:35	Q&A Panel Session
10.35 – 11.00	**Refreshments**
11.00 – 13.00	Workshop Session 01: Understanding Disaster Management / Environmental Management Issues **Group Activity / Presentations (04 Groups)** DM/ EM scenario based activity to identify needs, usage and issue of spatial data sharing for effective decision making *Session Objective: To understand (a) what disaster management activities carried out by various government agencies; (b) what data sets and products are created.* *(c) how data shared by each data producers (d) what issues faced by data producer and user agencies (e) What applications will need in each sectors*
13.00 – 13.45	**Lunch**
13.45 – 15.00	Wrap-up Presentation by Lesley Followed by discussion
15.00	**Vote of Thanks and Next Steps (5 Mins)** Refreshment

DISASTER AND ENVIRONMENTAL MANAGEMENT WORKSHOP

14th August 2014, Disaster Management Centre

Spatial information has an essential role in the management and coordination of emergency situations. It providers responders with a clear understanding of the geography and environment of an affected region, and specific logistical information such as evacuation routes, location of particular hazards, wind directions, population distribution and incident updates.

Post incident reviews of major emergency events have highlighted that agencies and personnel have been using different and sometimes conflicting maps during an event, or they have limited access to current data.

Spatial information offers many benefits in disaster management. Accurate and current information from a variety of sources can inform and thereby empower emergency responders. It assists both operation and strategic decision making, including prevention and planning phases.

Given the potential for multiple organisations to be involved in the mitigation, preparedness, response and recovery operations, it is essential that spatial information can be shared in an effective and timely manner across all organisations.

The Ministry for Disaster Management in conjunction with the Ministry for Environment are tasked with the challenge of developing a national spatial capability that provides easy access to spatial information, through agreed standards and protocols. This system is to leverage the Sri Lanka Spatial Data Infrastructure (SLSDI) being developed through the Ministry of Land and Land Development. It will afford a robust test case for the SLSDI and present early results to demonstrate capabilities of data sharing between government agencies.

Workshop Objectives

To understand the **critical issues** currently faced by emergency responders in protecting people and the environment.

- To establish a shared **vision** for the Disaster and Environmental Management System.
- To understand what **roles and responsibilities** each organisation will play in the delivery of a first class Disaster and Environmental Management System.
- To develop high-level **system capability** requirements.

Scenarios for Workshop

SCENARIO 01 – Floods / Landslides in Kalutara

Heavy rain started in the area of the western slopes of central hills from 8.00 pm onwards. The Disaster Management Centre reported that the Districts of Kalutara, Colombo, Gampaha and Ratnapura had received intense rainfall over night.

Several Divisional secretaries of Kalutara had been flooded and an incident was reported to the MDM head office at 2.00 am. Emergency Operation Centre (EOC) coordinated with the Meteorology and Irrigation Departments to figure out incoming situation.

Palindanuwara, Agalawatta and lower part of Kalu river were heavily flooded by 6.00 am next day. Many roads were blocked by slope failures. 3 major landslides were reported from Agalawatta and Matugama regions.

Number of affected population was under estimation by authorizes.

Meteorology Department reported that the 24 hour rainfall was 280 mm in the nearest station to Agalawatta.

SCENARIO 02 – Explosion in Factory

It is the busiest working day. Time is 1.00 pm. Schools are set to close at 1.30 pm as usual.

An explosion occurs at chemical plant in Ratmalana area, 1 km away from the Galle road. Local news media are reporting that an undetermined number of chemical factory's employees have been injured or killed and officials are trying to determine to what extent deadly toxins have been released in to the air.

There are 5 schools around the city and students will be moving along the main road and city. Several other factories as well as the domestic airport are also located in the vicinity.

Police 119 call centre received information just after the explosion and informed authorities including MDM thereafter.

SCENARIO 03 – Strong Winds

08th June 2013, evening was calm. Fishermen in Southern Coast rushed to fishing during the night.

By 11.00 pm, a heavy wind had started to blow out South Western slopes including Galle, Kalutara and Colombo Districts. Situation was reported to MDM at midnight and exact area under affected and threat level was unknown.

Met Department issued warning for strong winds along south west face of the central hills on 09th June at 3.00 am.

By 5.00 am, it was reported that the thousands of houses and power lines had been destroyed in 3 districts. It was also reported about 55 fishermen who left to sea the previous night had disappeared.

SCENARIO 04 – Forest Fire in Ohiya

MDM Call Centre received a message indicating Pinus Forest in Ohiya was under fire and the situation worsening. It was also realized that the railway track and Ohiya Rail Station were also at risk of fire.

Two trains were scheduled to reach the area at 3.00 am.

MDM coordinated with the Railway Department and made the necessary arrangements to stop the trains at both ends. The Airforce was informed requesting to 2 helicopters at 3.00 am.

DISASTER MANAGEMENT Workshop Group Activities session 11:00 – 13:00

Session Objective: To understand:

(a) What disaster management activities carried out by various government agencies?

(b) What data sets and products are created?

(c) How data is shared by each data producer?

(d) What issues are faced by data producer and user agencies?

(e) What applications will be needed across the emergency management sector?

SCENARIO OUESTIONS

1. What are the hazards?
2. What is at risk and what will you protect? (Consider people and critical lifelines?
3. What do you need to track?
4. What data will you need and who can supply it?
5. How current does this information need to be?
6. Are there issues with getting the right information?
7. Are there any data gaps?
8. Who will use this data and what is their role?
9. Where will you use this data?
10. What information needs to be disseminated during emergency response, how often and who to?
11. What are the challenges you currently face in responding to disaster?
12. What should the disaster management capability be like in the future?

Scenario 1: Answer Sheet

Question	Answer
1. What are the hazards?	Floods, Landslides (Slope Failures)
2. What is at risk and what will you protect?	Lives, critical infrastructure, houses, livelihoods, flora and fauna, commercial fishing industry, utilities
3. What do you need to track?	Rainfall (intensity and cumulative), river gauge readings. Validated landslide models and hazard maps. Note: Need agency cooperation
4. What data will you need and who can supply it?	Rainfall (DOM), River Gauge Readings (ID), Elevation Data, Soil, population, boundary, landform, engineering properties, and soli (Irrigation), Hydrological data, land use and land management (NBRO), Infrastructure Accessibility, Critical Facilities, Buildings type
5. How current does this information need to be	Real time dynamic data, statistic data as most recent as possible
6. Are there issues with getting the right information?	Yes, lack of cooperation and communication a problem Lack of real-time data; Lack of 24/7 operating system; Lack of automated weather station system (AWS) Lack of data sharing mechanism; Legal issues and time taken to issue data
7. Are there any data gaps?	Yes, there are data gaps. There is not information about data availability. Need latest baseline data. Note: Need to have an inventory of data
8. Who will use this data?	Disaster Managers, Decision makers, Policy Makers, Researchers, Donor Agencies, Politicians, community, and technical organisations
9. Where will you use this data?	NBRO, ID, Met, MDM, NDRMC
10. What information needs to be disseminated during emergency response, how often and who to?	Inundation Areas (Flood), Landslide Prone Areas, Evacuation Routes and Locations of Evacuation Centres, Data needs to be disseminated at least every 6 hours Data required by MDM, District and Divisional Secretaries, Forces, NDRSC
11. What are the challenges you currently face in responding to disaster?	Lack of real-time and accurate data; Lack of education and awareness; Lack of communication, cooperation and collaboration for effective coordination; Lack of high-end technology and experts; funds No backup facilities/alternative in case of system and process failures. Attitudes, lack of expertise to action identifiable information
12. Summary: What should the disaster management capability be like in the future?	There should be retime warnings and alerts system which is open for all involved parties. Need to develop the risk maps (after all hazard maps). Open information Sharing; Mitigation Plans; Disaster Resilience nationwide One stop shop or open information sharing mechanism

Scenario 2: Answer Sheet

Question	Answer
1. What are the hazards?	Air Pollution; Fire Hazards, Water Contamination, Road accidents
2. What is at risk and what will you protect?	Lives (especially students), property, injuries and the environment (air, water), airport
3. What do you need to track?	Type of chemicals being transported (HAZMAT Team) and there impact Location and surrounding areas, types of industries, sensitive environment elements, water bodies, Potential devastation in the surrounding location Identification of affected people and transportation to hospital/safe areas Identify high risk areas and safety areas and be aware of location changes overtime
4. What data will you need and who can supply it?	Population , roads, factories and the types of chemicals they use, residences, landuse. Critical infrastructure; waterways Wind direction and speed Government administrative data Data available from: MET, CEA, Divisional Secretaries, Survey Department, Dept Census and Statistics, Dept of Education
5. How current does this information need to be	Need real-time data
6. Are there issues with getting the right information?	Yes. Because of the mandate of institutions, data sharing mechanism, priorities are different, copyrights of the information, using different formats, coordinating mechanism, correct channel.
7. Are there any data gaps?	Yes, unavailability of some baseline data. No proper updating mechanism Capacity and chemical related data not available nor data relating to area of impact i.e. buffer zones
8. Who will use this data?	MDM, Hazmat, Emergency response teams, Divisional Secretaries, CEA
9. Where will you use this data?	Use as cloud systems, MDM (EOC)
10. What information needs to be disseminated during emergency response, how often and who to?	Demarcation of risk areas (high, medium low) Evacuation path to be used/alternative routes; Hospitals with necessary resources. Capacity of hospitals for emergency. Emergency teams and Administrative bodies require this information
11. What are the challenges you currently face in responding to disaster?	Unavailability of baseline data; no p[roper coordinating sharing mechanism; ack of technical support; lack of reliable communication method
12. Summary: What should the disaster management capability be like in the future?	Availability of data in real-time in central location which we can organise as different layers Ability to analyse data for decision making Capacity building across government sector achieves GIS technology savvy workforce

Scenario 3: Answer Sheet

Question	Answer
1. What are the hazards?	High Wind; coastal erosion; coastal flooding; fallen trees, property damage
2. What is at risk and what will you protect?	Fisherman, boats – Lives, livelihoods and houses Houses and businesses – hospitals, schools Infrastructure – electricity and water Road traffic – transport network, fishing harbours, businesses
3. What do you need to track?	Positions of fisherman and how many are fishing; numbe4r of boats with life saving equipment Wind direction and wind speed Wind speed monitors, wave pattern monitors Control room that shows fisherman and a register of sea going boats and number of boats What type of ships (navy), coast guards in the sea at the time in the area Track mode of transport (train busses and how many passengers hey are carrying
4. What data will you need and who can supply it?	MET – weather data NARA, MFAD, Fisheries, Navy, RDA, DSDW
5. How current does this information need to be	Wind data – real-time; Boats and fisherman real-time Waves and oceanographic data – real-time
6. Are there issues with getting the right information?	Yes.
7. Are there any data gaps?	Lack of an effective coordination mechanism and lack of early warning systems and signage
8. Who will use this data?	Those institutions mandated for emergency response; communities in affected areas; policy makers; media and journalists; banks and insurance companies, Divisional Secretaries ; Social Services Dept.
9. Where will you use this data?	Relevant Institutions and offices, MET, MDM; Financial Institutions, Administrative Institutions
10. What information needs to be disseminated during emergency response, how often and who to?	Wind speed and wind pattern – ½ hourly - fisherman Weather information – real-time or half hourly MDM Weather and situational updates – hourly - media
11. What are the challenges you currently face in responding to disaster?	Proper coordination; real-time data availability; accuracy of data; inadequate understanding of a proper dissemination mechanism of data; Capacity with in institutions to generate required data in real-time Mechanism to send required data to data users fast Pressure of legal and administrative barriers in sharing policy Difficulties in data sharing mechanism and policy
12. Summary: What should the disaster management capability be like in the future?	All in one control system

Scenario 4: Answer Sheet

Question	Answer
1. What are the hazards?	Forest Fire, smoke inhalation, reduced vision
2. What is at risk and what will you protect?	Railway Station – transportation to upcountry – infrastructure Flora and fauna – forest and animals People – villagers, people on trains, tourists
3. What do you need to track?	Extent of forest fire Wind direction and speed; weather conditions Location information and land use patterns
4. What data will you need and who can supply it?	Road and railways; population data; buildings Nearest police station/hospital; details of volunteer committee Land use and land cover Available resources (LC/DSD) people and equipment Real-time data tracking trains/passengers Endemic species/wildlife
5. How current does this information need to be	Fundamental data layers – annual Weather data (rain/wind/humidity) – real-time
6. Are there issues with getting the right information?	Yes. Non-availability of data; whether the data is updated. Knowing its reliability; lack of data sharing environment Don't know who is having what type if data
7. Are there any data gaps?	Extent of fire and the locations Lack of data on the human resources (i.e. where are the fire-fighters) Water capacity; Information about endangered species; Data about campers/tourists
8. Who will use this data?	DMC, Forest Dept, Local Authorities; District Secretariat; Wildlife Dept
9. Where will you use this data?	AT DMC – Emergency Operations Centre
10. What information needs to be disseminated during emergency response, how often and who to?	Railway Department – locations Villagers early warning system, severity Schools, DS Divisions (every 3 hours)
11. What are the challenges you currently face in responding to disaster?	Being able to process data in real-time; No proper data sharing policy Being able to implement 24/7
12. Summary: What should the disaster management capability be like in the future?	A proper data sharing policy for real-time/non real-time data to establish EOC at each DS Division.