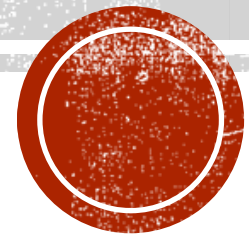


SPATIAL DATA INFRASTRUCTURE

Pravesh Yagol



MODERN PROBLEM

- We have islands of spatial data
 - Spatial data, which is available in different departments, authorities etc. cannot be used / integrated due to ...
 - *Lack of standards*
 - *Different degrees of quality*
 - *Lack of harmonization between different datasets*
 - *Incompatible data models & encodings*
 - Discovery of already existing spatial data is difficult
 - *Descriptions of available datasets are missing or not published*
 - Data policy restrictions
 - *Unclear access rights and licensing policies*
 - *Missing pricing models*



THE CONCEPT OF SDI

Geo-information as commodity;

- Can be brought and sold; thus has a value,
- Value can be added in various processing steps,
- Different value for different applications and change of value in time.



THE CONCEPT OF SDI

- Our GIS System is a sub-system of a greater system
- GIS Systems can be more effective through communication, networking and sharing of data i.e. through building of a SDI.



WHAT IS A SPATIAL DATA INFRASTRUCTURE?

- SDI stands for *Spatial Data Infrastructure*.
- In America it is known as SDI
- In Europe it is known as GII i.e. *Geographic Information Infrastructure* and
- In Canada and Australia, it is known as GDI i.e. *Geospatial Data Infrastructure*.



WHAT IS A SPATIAL DATA INFRASTRUCTURE?

- “The SDI provides a basis for spatial data *discovery, evaluation, and application* for users and providers within all levels of government, the commercial sector, the non-profit sector, academia and by citizens in general.”

• *--The SDI Cookbook*
<http://www.gsdi.org>

- ‘the technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilization of geospatial data’.



SDI: DEFINITIONS

- “The term ‘Spatial Data Infrastructure’ (SDI) is used to denote the relevant base collection of technologies, policies and institutional arrangements that facilitate the availability of and access to spatial data.”
- “An SDI is the technology, policies, standards, human resources, and related activities necessary to acquire, process, distribute, use, maintain, and preserve spatial data.”



SDI: GUIDING PRINCIPLES

- **Data stewardship, data security**

Data should be collected once and maintained at the level where this can be done most effectively.

- **Data accessibility, data interoperability**

It must be possible to combine seamlessly spatial data from different sources across Country and share it between many users and applications.

- **Data reusability, data synchronization**

It must be possible for spatial data collected at one level to be shared between all different levels, e.g. detailed for those exhaustive investigations, general for strategic purposes.

- **Data availability**

Spatial data needed for good governance at all levels should be abundant and widely available under conditions that do not restrain its extensive use.



SDI: GUIDING PRINCIPLES

- **Data discoverability, data validity, data rights**

It must be easy to discover which spatial data is available that fits the needs for a particular use and under what conditions it can be acquired and used.

- **Data usability**

Spatial data must become easy to understand and interpret because it can be visualised within the appropriate context and selected in a user-friendly way.

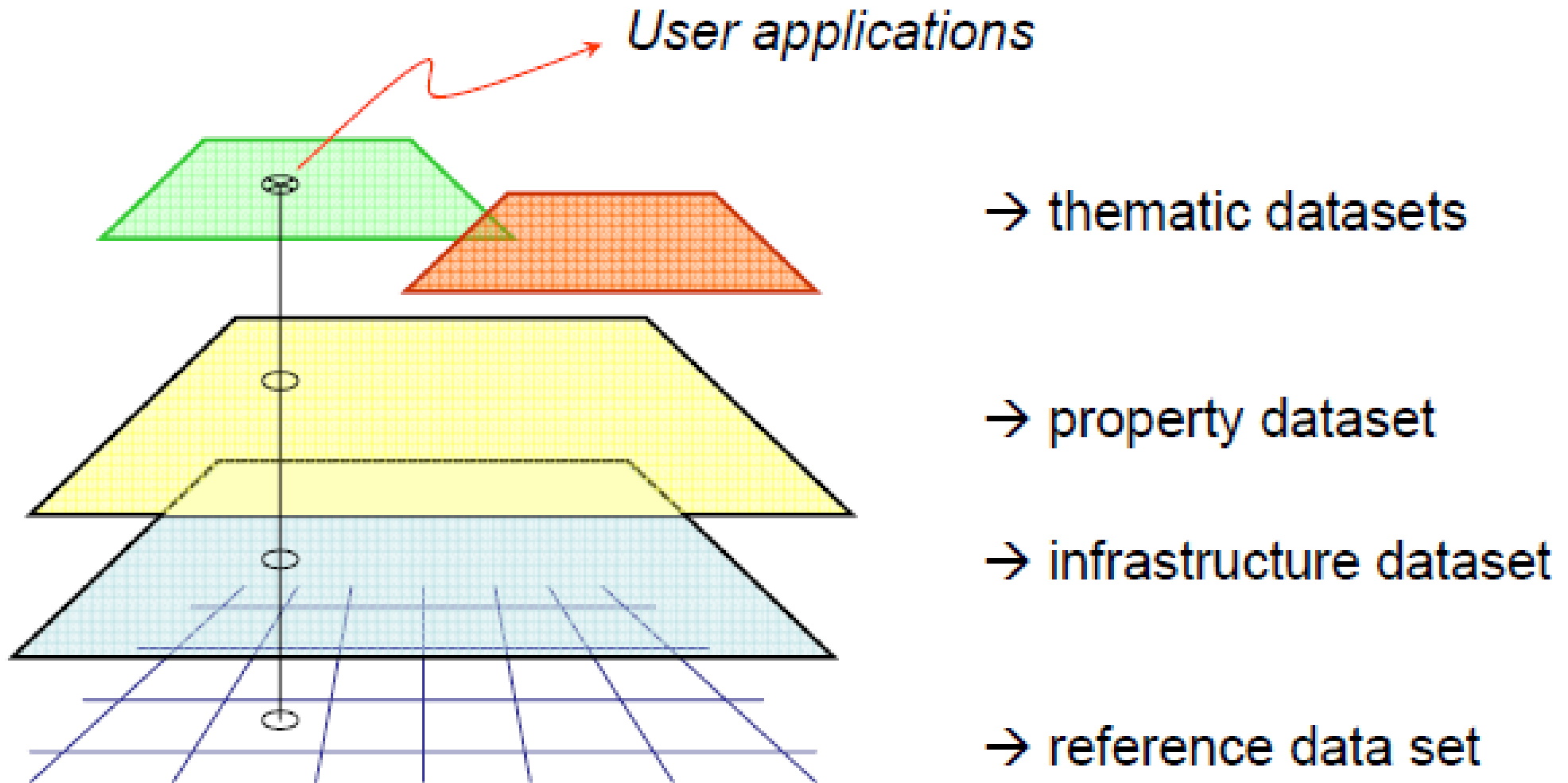


SDI: CHALLENGE

- Nowadays we need to be able to achieve easy integration between and applications such as:
 - Land use planning
 - Development and construction
 - Buried Services [particularly utilities, pipes and cables]
 - Property transaction [seeking, buying, selling]
 - Transport management and navigation applications,
 - Democracy
 - Environmental risk management
 - Location based services
 - Health
 - Security
 - ...



SDI: CHALLENGE



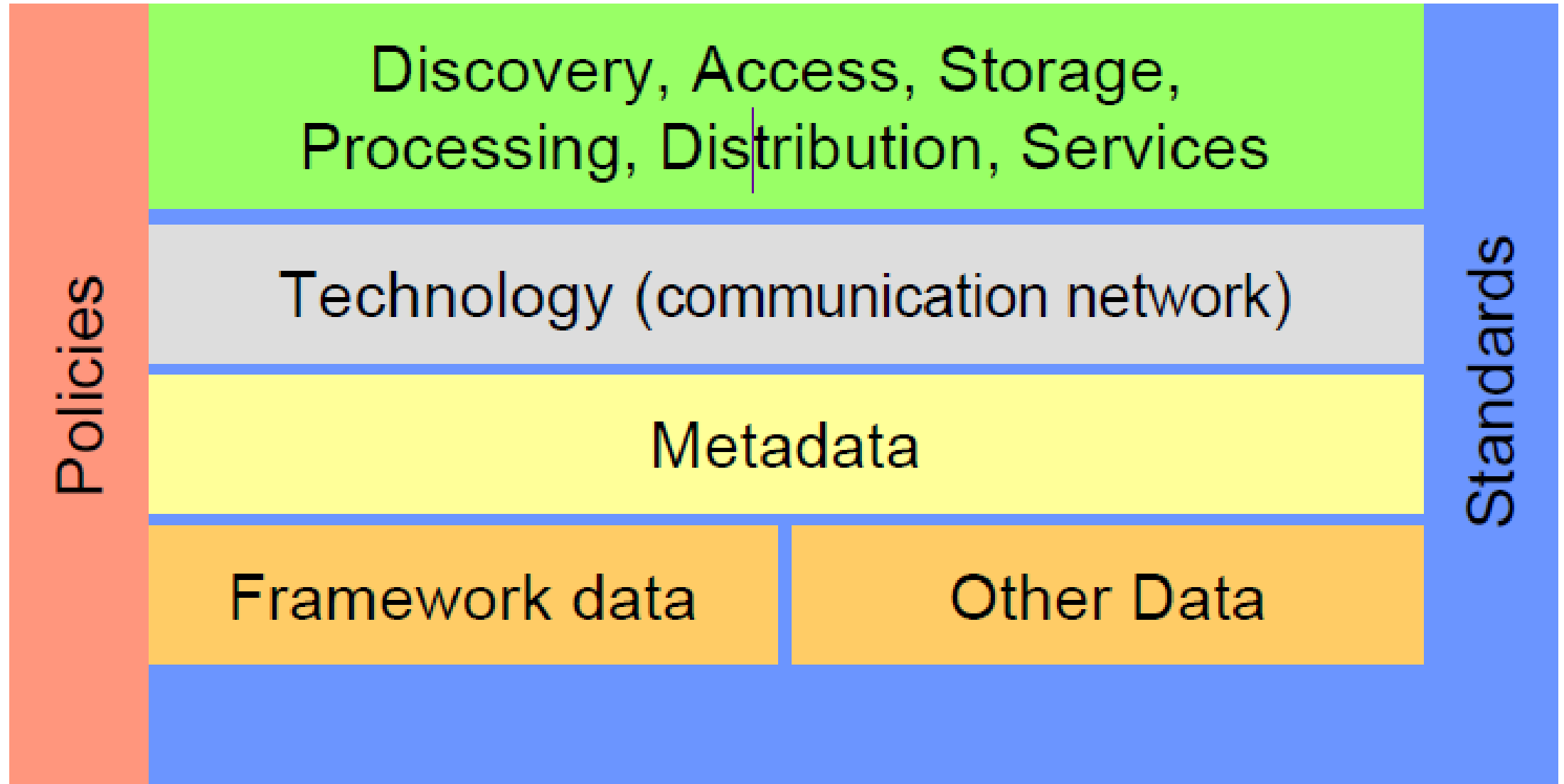
GOALS

- The goals of a Spatial Data Infrastructure are:
 1. to reduce duplication of effort among agencies,
 2. to improve quality and reduce costs related to spatial data,
 3. to make spatial data more accessible to the public,
 4. to increase the benefits of using available data, and
 5. to establish key partnerships between provinces, Municipalities, cities, academia, and the private sector to increase data availability and use.

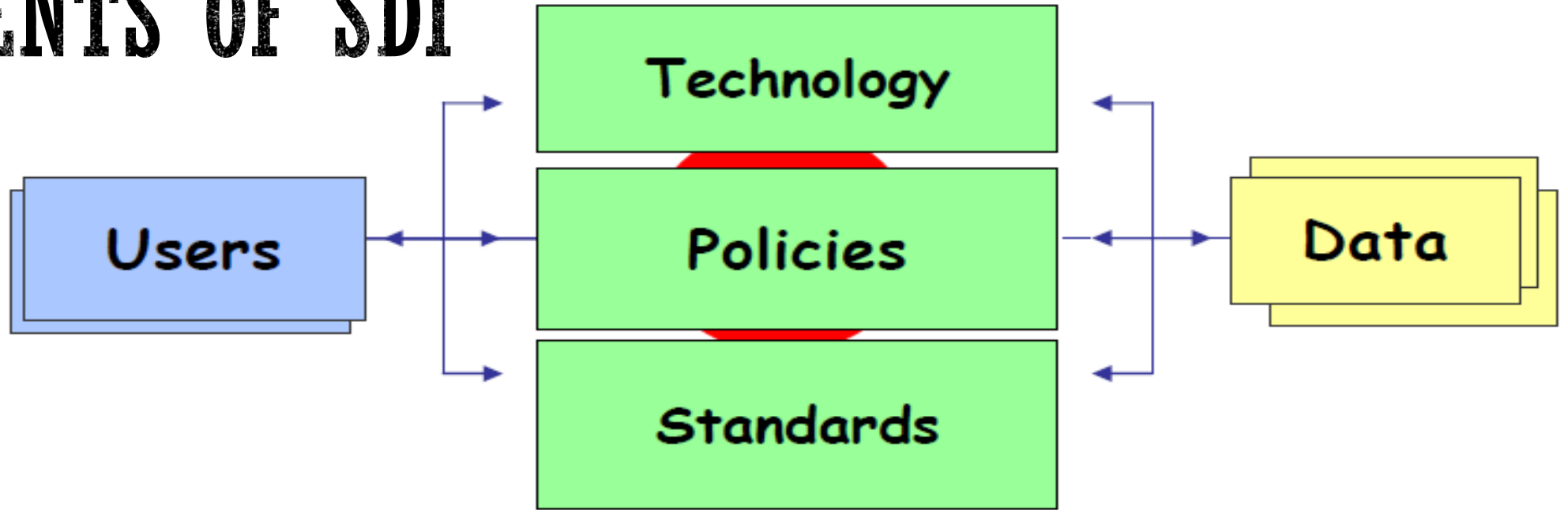


COMPONENTS OF SDI

... the building blocks in a nutshell



COMPONENTS OF SDI



Data:

Fundamental Datasets

Users:

Applications and use

Policies, etc.:

Institutional framework

Technology:

Access, Distribution, Storage

Standards:

Data Models, Metadata, Transfer

DATA

There are two categories of Geo-spatial data;

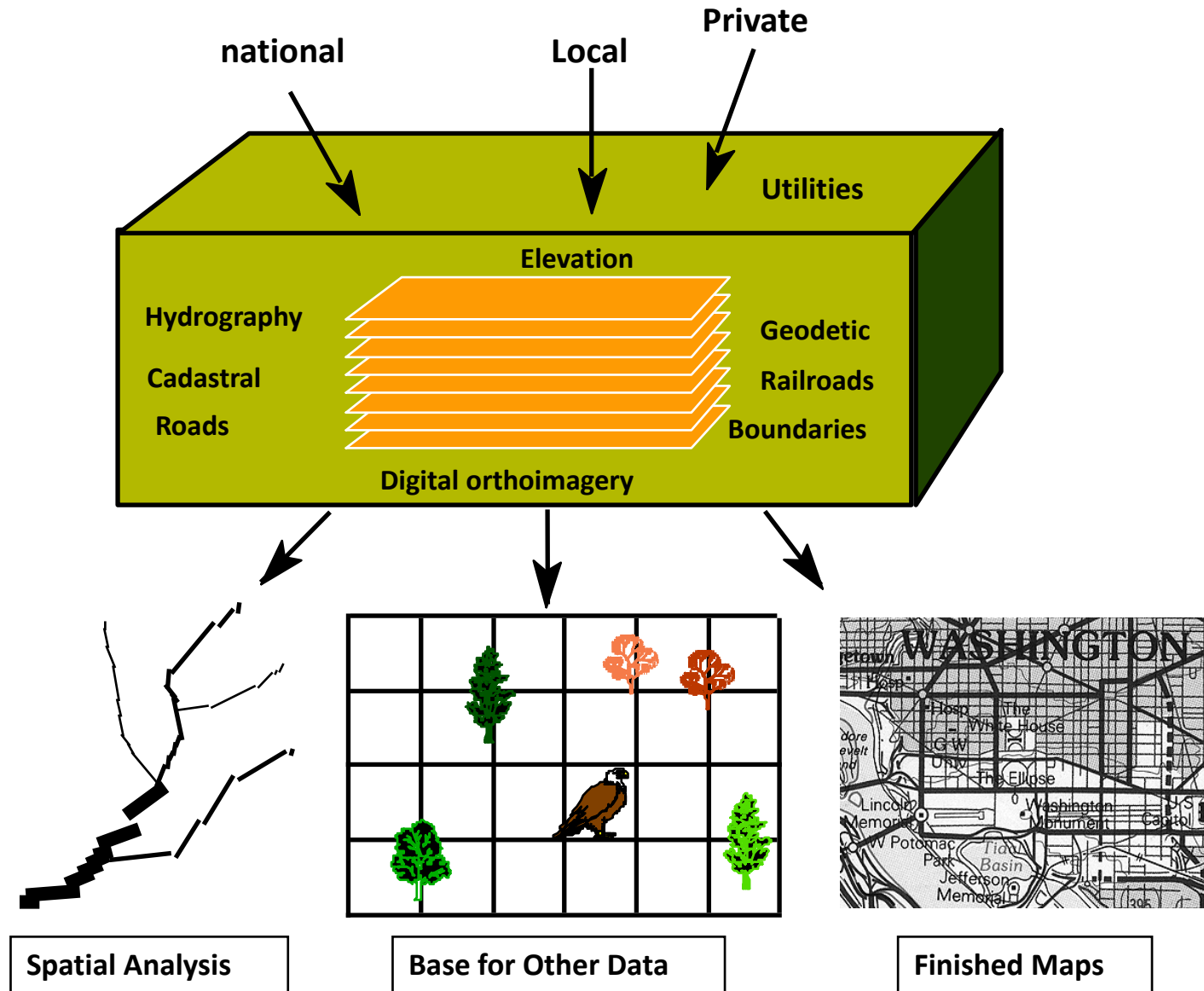
1. Framework data

2. Other spatial data

- Data sets developed to a common content specification for high re-use potential. These are known as “Framework” data.
- Other spatial data usually derived for a single purpose but made available for potential re-use. These are known as “other spatial data”



FRAMEWORK DATA



CATEGORIES OF GEOSPATIAL DATA

Framework Data

Topography

Transportation

Cadastral information

Geodetic control

Geographical names

Administrative boundaries

Other spatial data

Geology

Demographics

Land use

Utilities

Soils



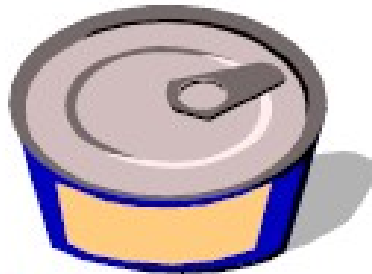
METADATA

SUPPOSE THERE ARE 2 IDENTICAL CANS
WITHOUT LABELS



Cat Food

Which of the two will you select for eating?



Tuna

Without the label how would you differentiate tuna
from cat food?



WHAT IS METADATA?

- Metadata is a critical component to make a dataset complete.
- Metadata is a description of the...
 - content,
 - quality,
 - condition,
 - and other characteristics of the data
 - who,
 - when,
 - how,
 - why

of a dataset

- It describes **who**, **what**, **when**, **where**, **why**, and **how** about every facet of the data that are being documented.



METADATA

Metadata is data about (spatial) data. Metadata covers four areas:

- **Availability:** Information needed to determine the sets of data that exist for a geographic location.
- **Fitness for use:** Information needed to determine if a set of data fits a specific need.
- **Access:** Information needed to retrieve an identified set of data.
- **Format:** Information needed to process and use a set of data.



STANDARDS



- Meta data standards
- Transfer standards
- Quality standards
- Web Mapping Standards
- Interoperability

ISO TC 211
OGC



Tembo, E. 2008, *Challenges of implementing SDI in Botswana*
GDEST Conference Cape Town 17-19 March 2008

<http://www.state.gov/documents/organization/110928.pdf>

_Access Date 20September 2008



STANDARDS

A standard is a document established by consensus and approved by a recognized body, that provides for common and repeated use, rules, guidelines and characteristics **for activities or their results**, aimed at the achievement of optimum degree of order in a given context.

-International Organization for Standardization (ISO)



Standardization



Need for standardization?

- Ensures quality, safety and efficiency
- Develop market relevant International Standards
- Facilitate free and fair global trade
- Manage resources equitably and durably



Standardization



- Many standardization activities exist with different roles and responsibilities that are relevant to SDI:
 - International Organization of Standardization (*ISO TC 211, TC 204, JTC-1*)
 - World Wide Web Consortium (W3C)
 - Open Geospatial Consortium (OGC)
 - National Standards Organizations



Who uses GI Standards ?

All mapping and other agencies that produce, distribute or utilise geographic information use GI standards.

All geo-engineering institutions which support planning and infrastructures such as communication, transportation and utilities also use GI standards.



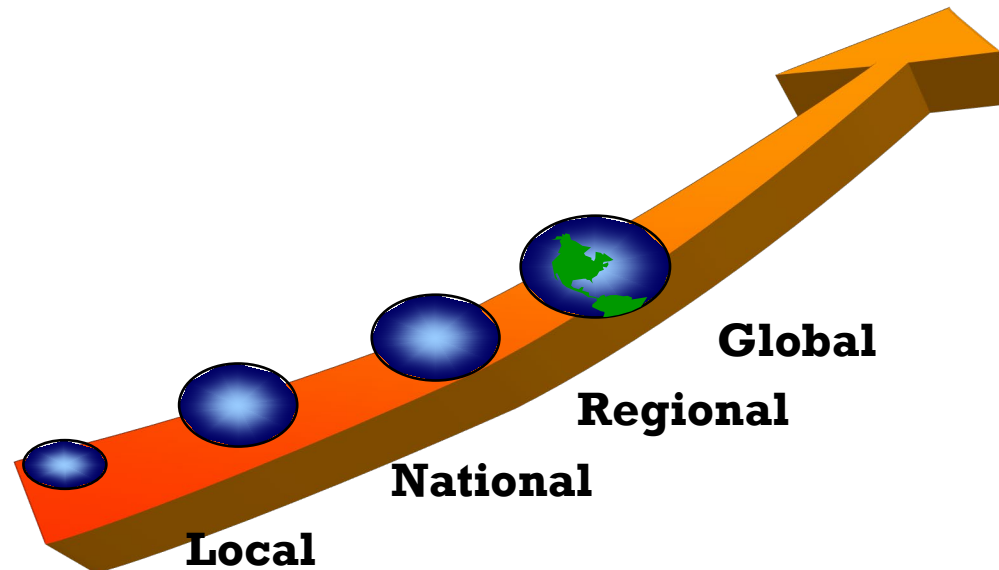
Why build a SDI?

- Building SDI focuses on “build data once and use it many times for many applications”.
- More specifically, a SDI focuses on;
 - minimizing data duplication among agencies,
 - maximizing the data sharing.
 - sharing costs of data creation and maintenance.
 - improving data quality using a common standard.
 - establishing key partnership among data producer and users.
 - improving access to geo-information hosted in different organizations.



SDIs at different levels

- SDIs have been developed at different Levels to better manage and utilize their spatial data assets keeping in the view;
- Local GI System is a sub-system of National GI system
- National GI System is a sub-system of Regional and Global GI system



National level SDIs in the world

- SDI as a world wide movement at national level concerned with management of national geographic information assets.
- Countries throughout the world are developing National SDI with increasing number per year;
 - 1996 – 11 countries
 - 1998 – 56 countries
 - 2003 – 120 countries
 - Till now- More than 140 countries



Survey Department: Organizational Structure

Survey Department



**Topographical
Survey and Land
Use Management
Division**



**Geodetic
Survey
Division**



**Geographical
Information
Infrastructure
Division**



**Cadastral
Survey
Division**



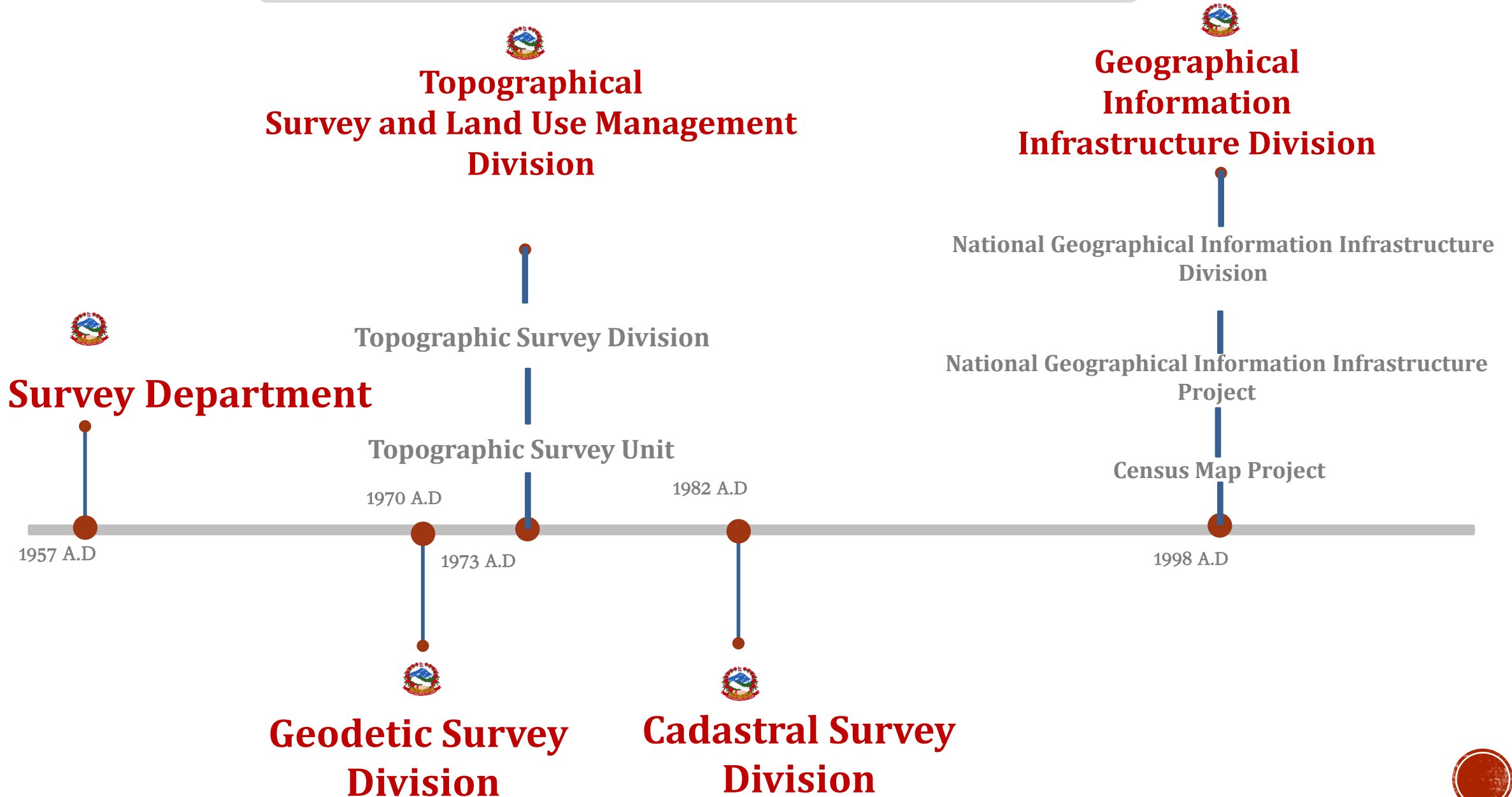
**District Survey Offices
(131)**

**Special Survey
Offices (5)**

**Digital Survey
Office (1)**



SURVEY DEPARTMENT: HISTORICAL BACKGROUND



GEOGRAPHIC INFORMATION INFRASTRUCTURE DIVISION

Mission

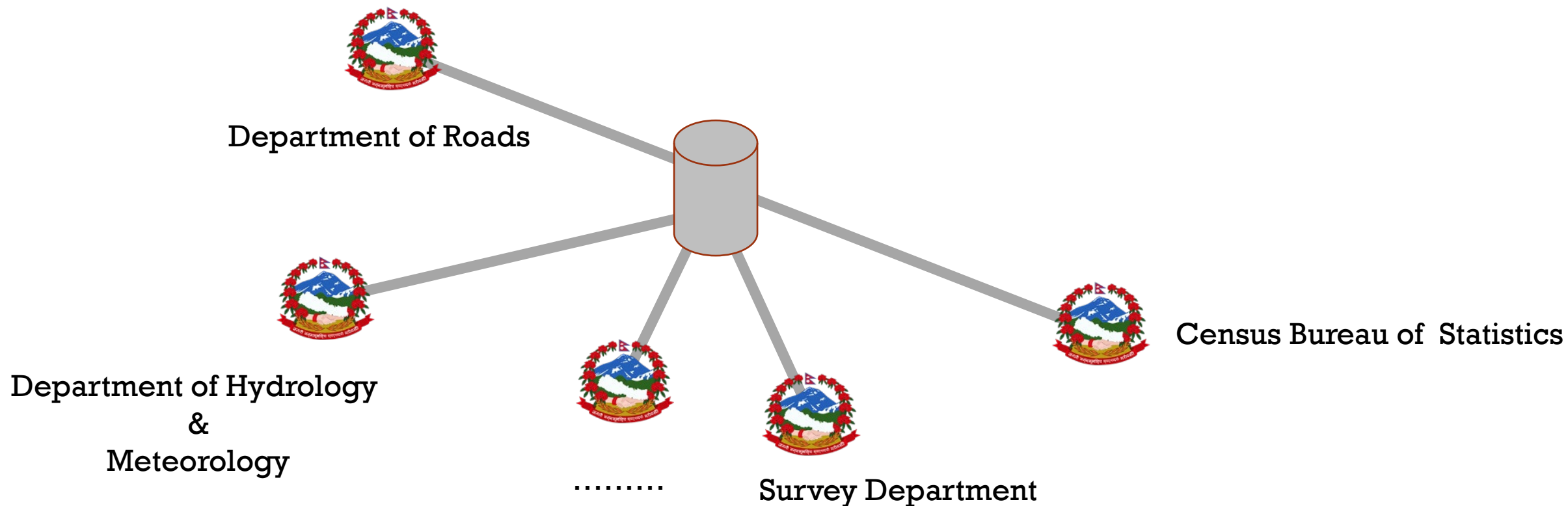
To strengthen planning and resource management in Nepal through the development of a geographic information infrastructure for the access of geographic and related data for decision-making.

Objectives

To develop an NGII platform to facilitate data sharing among Survey Department, Central Bureau of Statistics and participating agencies.



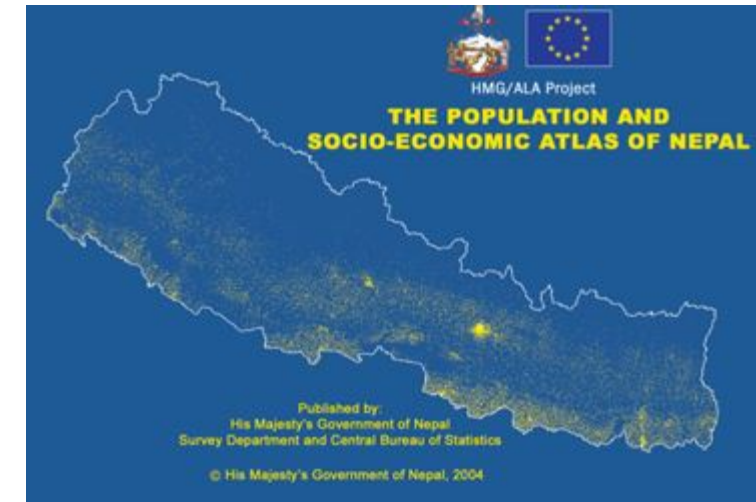
Geographical Information Infrastructure Program



Geographical Information Infrastructure Program

Major Activities

- **Dissemination of Geographical Information for Nation Building**
 - **National Spatial Data Infrastructure Clearing House**
 - **Freely Available Topographic Maps (1:1000000) and Administrative Boundary**
- **Standardization of Geographical Information**
- **Publication of Metadata of Geographical Information**
- **Preparation of digital topographic database of different scale**
- **Publication of Population and Socio-Economic Atlas**





Welcome to National Spatial Data Center : Geoportal

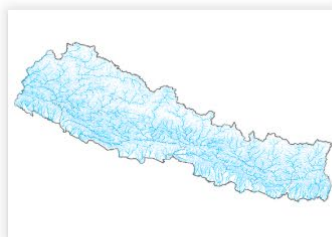
A National Spatial Data Infrastructure (NSDI) Clearinghouse / Data Center to
enhance the public reach and easy access to the authentic Geospatial
Dataset provided by the Survey Department, Nepal.

[Search](#)[Advance Search](#)

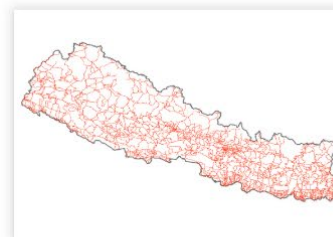
Metadata & Clearing House Services



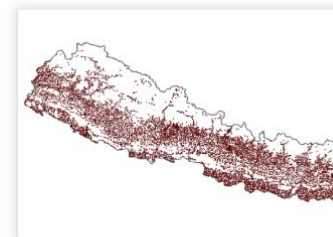
Utility Lines (1:250000)



Hydrography (1:1000000)



Transportation (1:1000000)



Building (1:25000)

