Building a NSDI to support Bahrain's National Geospatial Development

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Central Informatics Organization (CIO)

Central Informatics (CIO) plays a leading role in the implementation of information technology (IT) in the Kingdom of Bahrain and holds the responsibility of:

- Maintaining the National address database.

- Managing and controlling the Central Population Registry (CPR).

- Maintaining a National Geospatial Database and Supporting the existing and new GIS users in the Government and the services sector.

- Imparting the functions of implementation of Information Technology (IT) at National level.

- Managing the functionalities related to National Statistics.

GIS Directorate

The GIS Directorate was established to cater to the increasing needs of geographic information in the Kingdom and to support decision making and other government processes and operations.

Services rendered includes but not limited to:

- GIS oriented Technical support to all stakeholders, Government, and Private Sectors.
- Implementing and maintaining the NSDI for the Kingdom of Bahrain.
- Providing consultancy services to Government organizations in the field of GIS
- Pioneer in providing GIS training for Government employees and stakeholders.

GIS Technical Support

GIS Directorate

GIS Training   **Consultancy Services**

Status Quo of Bahrain Spatial Data "Pre BSDI"

1
- **More than 42 Government units using GIS individually.**

2
- **Absence of data sharing and systems integration.**

3
- **Many data formats.**

4
- **No standards for: GIS software, procedures, applications, and spatial database.**

Background - NGISSC

National GIS Steering Committee (NGISSC) was established in compliance to the Government Decree, dated January 24, 2004 – vide Resolution No. (3) by Honorable His Royal Highness the Prime Minister Prince Khalifa Bin Salman Al Khalifa.

➢ **National GIS Steering Committee objectives**

- ▪ Make GIS available to improve the efficiency of ministries and public and private organizations;

- ▪ Create a Spatial Data Clearinghouse with a centralized data repository.

- ▪ Direct and support the development of integrated GIS systems;

- ▪ Define the priorities in the development of GIS databases and study and evaluate GIS development proposals;

- ▪ Propose strategies and standards for **GIS data exchange**

# Bahrain Spatial Data Infrastructure(BSDI)

The GIS Directorate (CIO), Kingdom of Bahrain, in compliance of a Government Decree made by Honorable His Royal Highness the Prime Minister Prince Khalifa Bin Salman Al Khalifa, and directives of National GIS Steering Committee (NGISSC) officially initiated the National Spatial Data Infrastructure (NSDI), for the Kingdom of Bahrain, in February 2005.

The GIS Directorate, CIO, in the official capacity of a nominated member of National GIS Steering Committee (NGISSC) administrates Bahrain Spatial Data Infrastructure (BSDI) Portal, to disseminate spatial data.

6
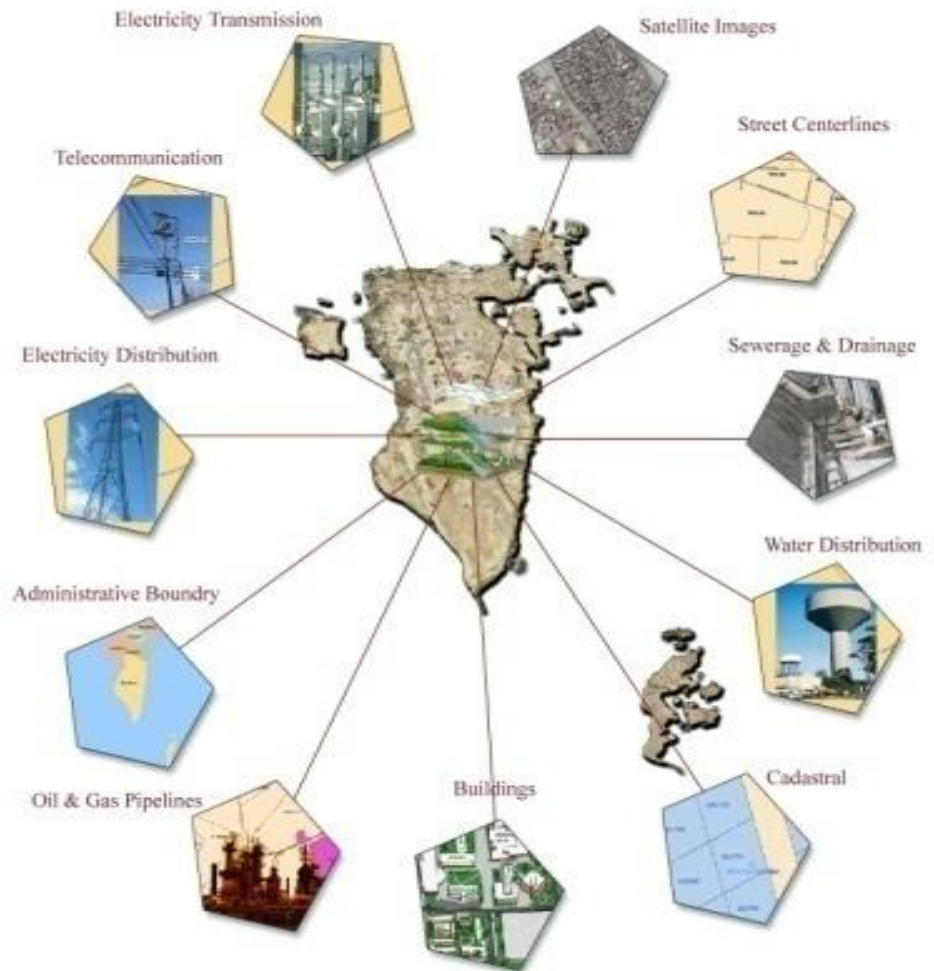
Targeted Groups
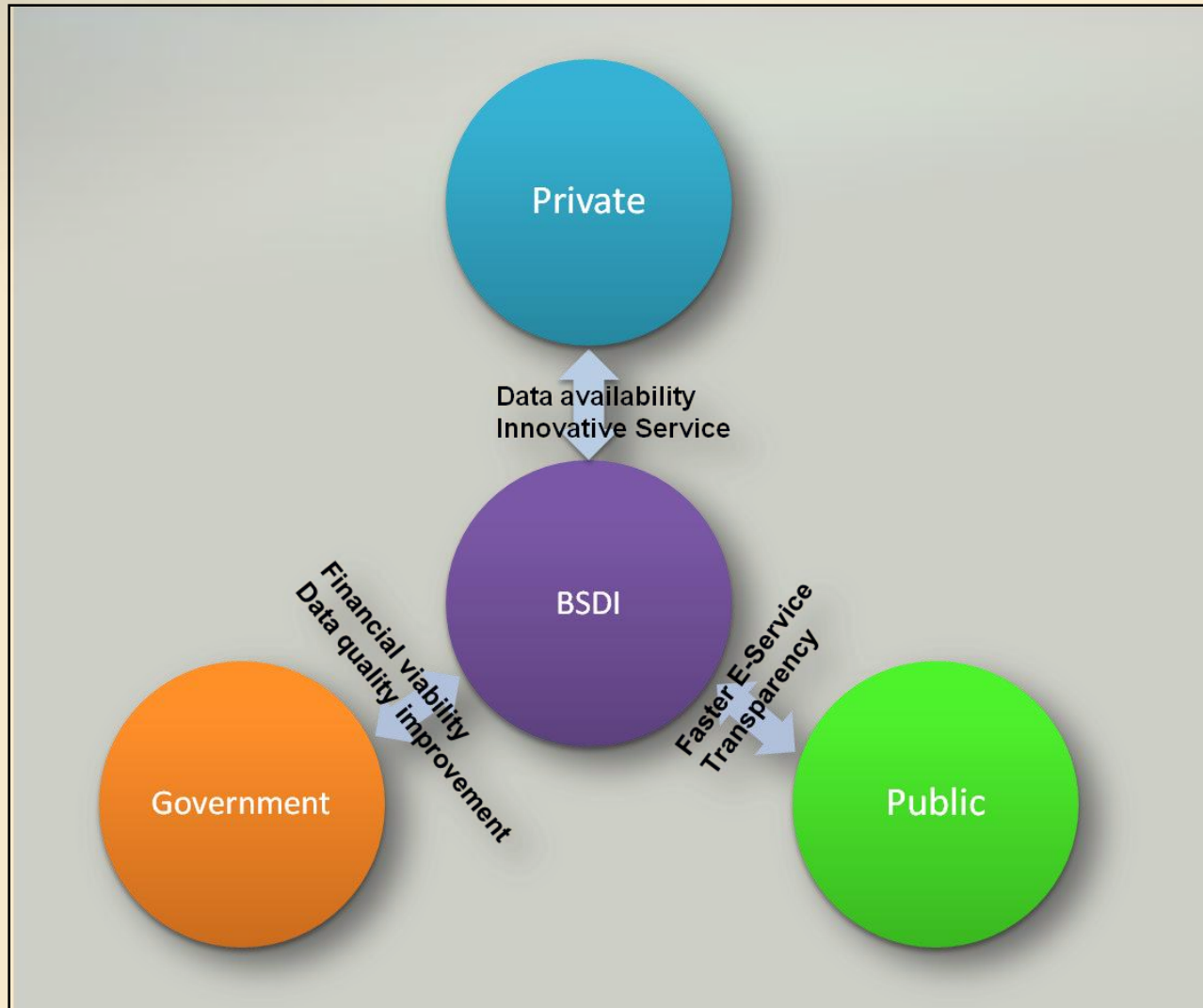
BSDI Portal – Data Layers

- Addresses.
- Electricity Network.
- Water Network.
- Telecommunication Infrastructure.
- Topographic maps.
- Cadastral.
- Buildings Polygons.
- Street centerlines.
- Oil & Gas Pipelines.
- Sewerage & Drainage
- Administrative Boundaries
- Point of Interest (POI)
- Satellite Images
- Demographic Data
- Marine Layers

قاعدة المعلومات الجغرافية الوطنية
Bahrain Spatial Data Infrastructure (BSDI)

Electricity Transmission & Distribution

Satellite Images

Telecommunication

Street Centerlines

Addresses

Sewerage & Drainage

Administrative Boundry

Water Transmission & Distribution

Oil & Gas Pipelines

Buildings

Cadastral

BSDI Main Stakeholders

SDI Main Components

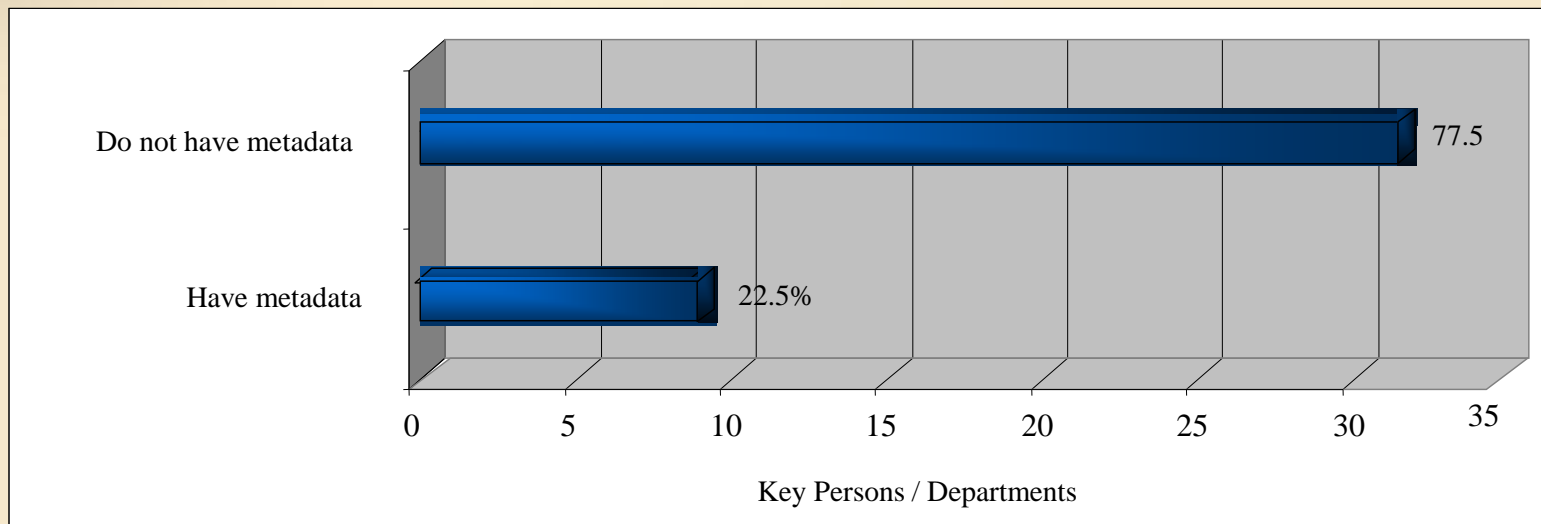| KEY TO INDICATORS	Access network	Awareness	Cost recovery	Data exchange	Data ownership	Data quality	Digital datasets (availability)	Financial resources	Institutional framework	Human resources	Leadership	Legal arrangements	Metadata (availability)	Network infrastructure	Organizational characteristics	Procedure	Public/Private partnership	Partnership	Policy	Standards	Services	SDI culture	Technology
ANZLIC (Australia)	■					■	■		■				■	■	■				■	■			
FGDC (USA)	■				■		■		■	■	■	■	■		■		■		■	■			■
Executive order of US (94)				■			■			■					■		■		■	■			■
CGDI (Canada)	■		■	■			■	■					■		■		■	■	■	■	■		■
NGDF (UK)	■		■		■			■					■		■		■	■	■	■	■	■	

NSDI Components

Assessment of the local conditions in Relation to NSDI Implementation
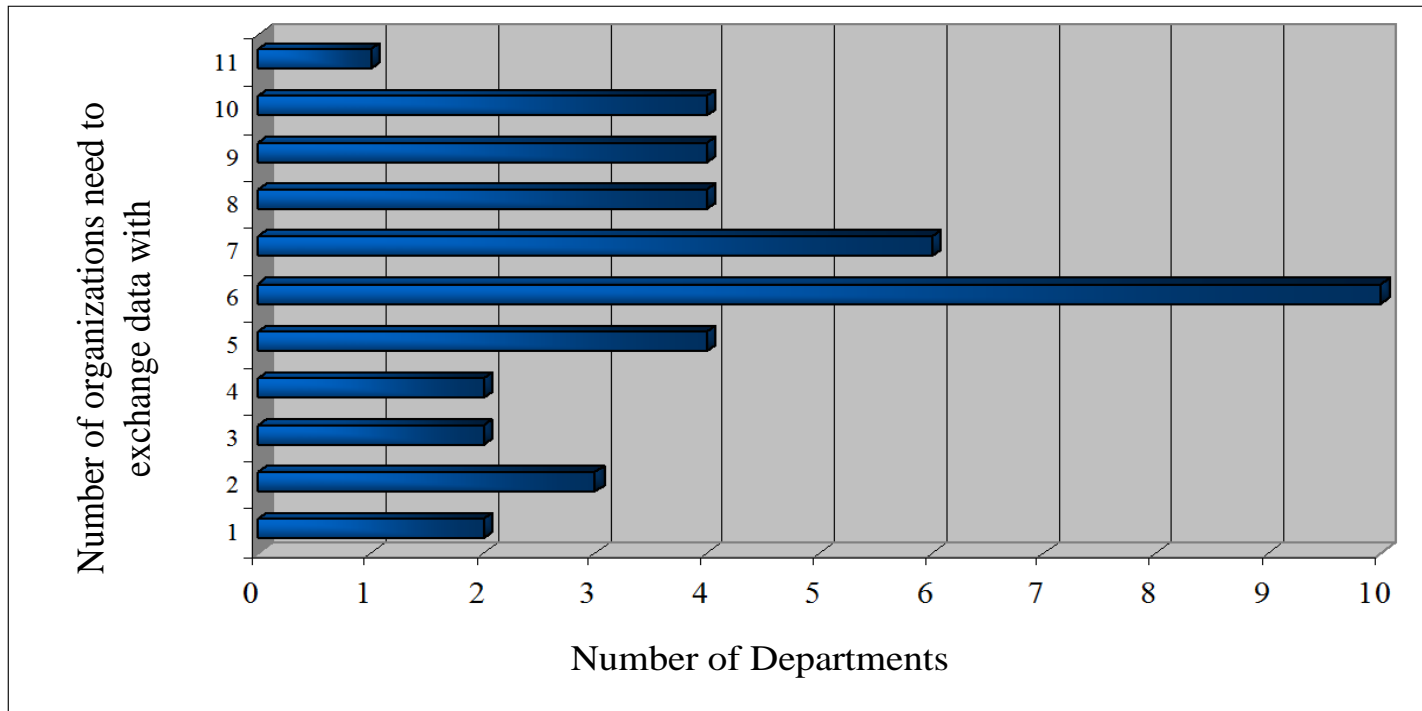
The Metadata of the Geospatial Data

The Departmental Tasks Performed using Geospatial Data

Chart showing Key Persons / Departments by percentage of departmental tasks performed using geospatial data:
- More than 75 percent: 26.2
- 50 to 75 percent: 19.1
- 25 to 50 percent: 21.4
- Less than 25 percent: 33.3%

X-axis: Key Persons / Departments (0 to 16)
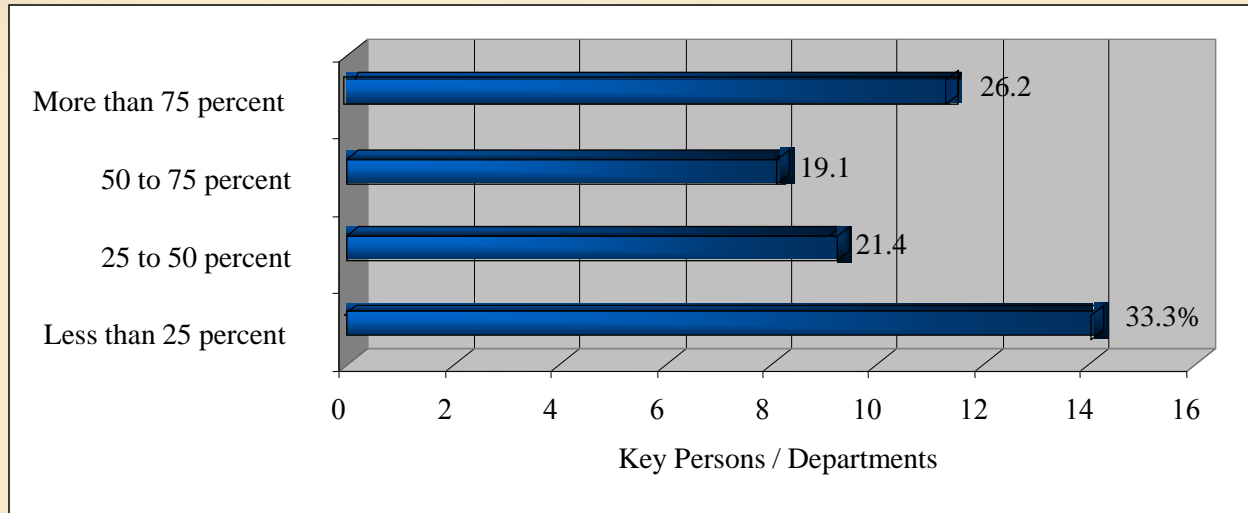
The Exchange of Data with other Organizations

BSDI Components

STANDARDS
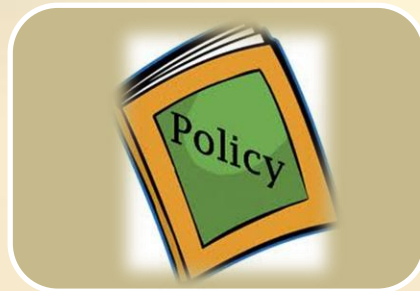
POLICY
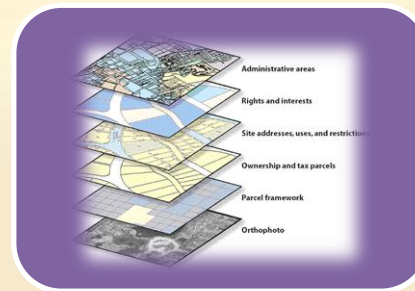
DATA

HUMAN RESOURCE

FINANCIAL RESOURCE

COST RECOVERY

TRAINING

COORDINATION

Bahrain Data Standards

It is a reference document for the technical specifications of the Geospatial Data in the Kingdom, which constitute a reference for the Kingdoms Public and Private sectors entities to ensure the data and systems matching between all relevant entities.

Bahrain Data Standards

Bahrain Data Exchange Policy

Bahrain Data Exchange Policy

A consolidated document which covers the Data exchange details and Privileges through the Bahrain Spatial Data Infrastructure.

Training - GIS Concepts

Training on:

1- GIS Concepts.   2-Remote Sensing.   3-BSDI Training.

GIS Awareness Programs

OGC Workshop - 2012

GIS Awareness Programs

GIS Day- 2012

Partnerships

MEMBER

MOU Signed

BSDI Initiative Achievements

Main Achievements

Achievement	Example	Status
Institutional Framework	(e.g. data sharing policies, data pricing policies, etc.).	*Published*
Technical Standards	(data format, data exchange, software, metadata, etc.).	*Published*
Fundamental Datasets	(e.g. geographic datasets, Basic map features, etc.).	*Achieved*
Technical Framework	(e.g. actual hardware, communication facilities, etc.).	*Achieved*
BSDI Portal	Data Sharing, Clearing house	*Implemented*
E-WayLeave	Service Oriented Application	*Implemented*

Return On Investment of BSDI

ROI

Category	Value
Service Delivery Time	72%
Cost Reduction	64%
Data Avalibity	100%
Data Uniformaty	87%
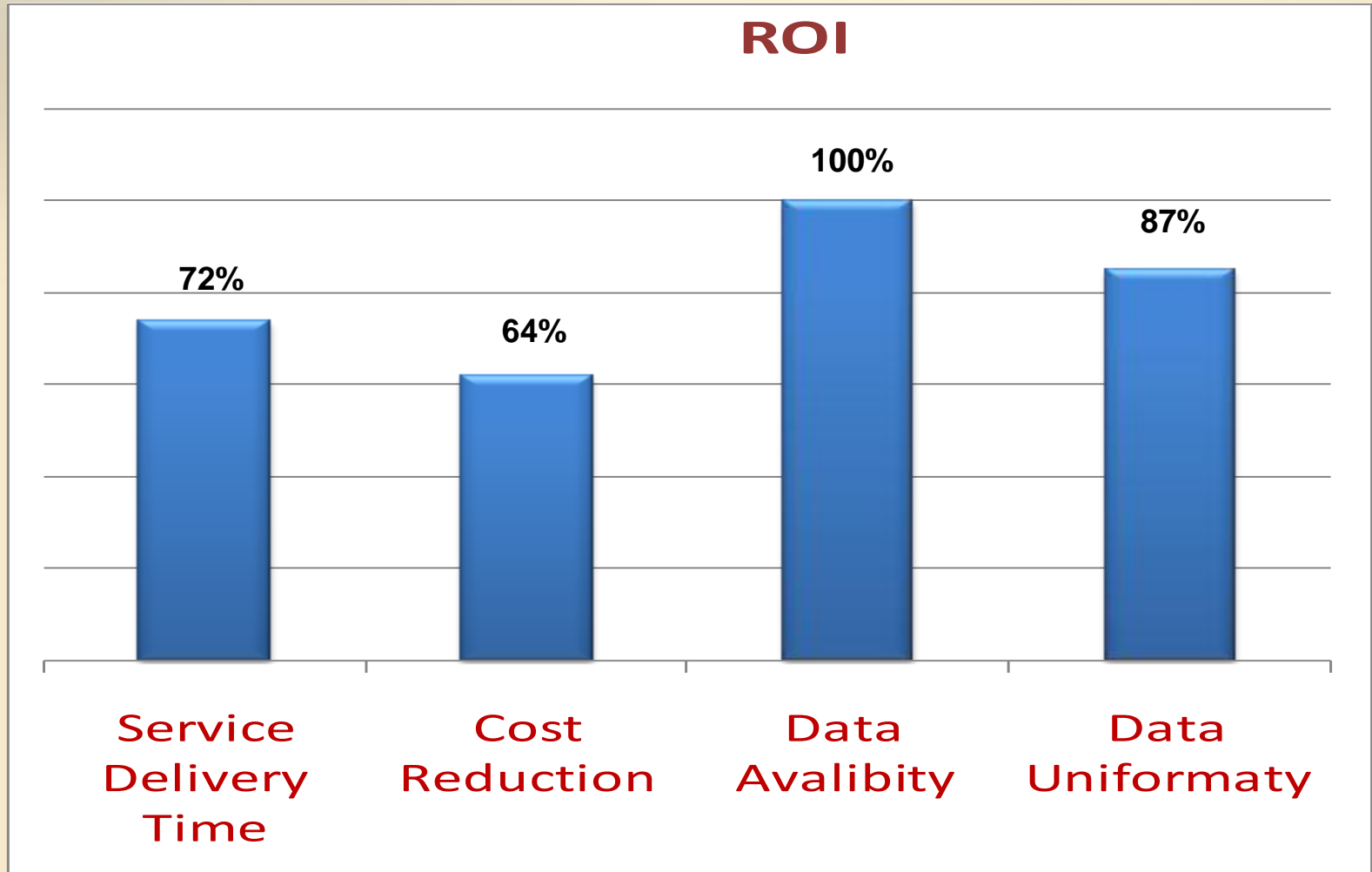
Challenges & Solutions

- **Data Inconsistency - Mismatched coordinate system, Missing & Incomplete Data, Data Duplication, Limited documentation**

- **Bahrain Spatial Data Standards – Appropriate Data, Technology, Procedures were established.**

- **Ensured Effective Sharing & Dissemination**

- **Stakeholders committed to follow standards through legislation**

Challenges & Solutions

Challenge

- **Barriers** – Cultural, Institutional & Legal barriers prevented or delayed the sharing of spatial data

Solution

- **Bahrain Data Exchange Policy** developed – Binding deed for data exchange for parties involved and their agreement regarding exchange procedures & protection of data and data sources

Challenges & Solutions

Challenge

- **Stakeholder Engagement - Integrating existing GIS data and procedures across the BSDI community is a matter of proactive stakeholder engagement and consultation to avoid redundant and often inconsistent spatial datasets. Engaging the stakeholder's to support the initiative was a major challenge**

Solution

- **A transaction – based data maintenance approach was taken whereby entities had to streamline their workflows to update the spatial data they are responsible for by recording changes on the ground as they occur as part of their business processes.**

Challenges & Solutions

Challenge

- **Data Security – Prime Concern for many Stakeholders**

Solution

- **BSDI portal has thus been hosted within Bahrain Governmental Data Network with highest possible security and network management services with antivirus, firewalls and automated regular backups.**

BSDI Evolution

BSDI Evolution rapid but natural

- **Steady growth of Stakeholder entities participation in the program which currently has crossed 63.**

- **From the initial 40/50 data layers, there has been an expansion of data clearing house to over 157 data layers.**

- **In terms of information provided, BSDI has shifted from a 2D static system to 3D Dynamic System. It is now more demand driven rather than being supply driven.**

- **With SDI available to wider user community outside the professional group and the demand for more diverse services for decision making, the BSDI initiative 2011 onward underwent a paradigm shift from "data-centric" focus to Service-centric" mode**

BSDI Paradigm Shift

Data Centric

- Facilitate Access & Share Geospatial Data
- Technical Standards
- Institutional Policies
- Access Network
- Infrastructure Framework

Service Oriented

- Service Oriented Apps.
- Linked Services across Organization, Entities & Discipline.
- More effective cross-organization & inter-agency decision making in priority areas

Outreach

ArcGIS Online

A cloud-based system for mapping and geospatial content management. Users can log in, access their account, and make maps and apps. They can save, organize, and share these maps and apps, as well as other related geographic information.

Information Sharing & Community Outreach

❖ **General Public**

❖ **Scientific, Engineering & Academic Community**

❖ **Local, Regional & Global Community**

BSDI Strategic Objectives (2012 – 2016)

Project Title	Year of Completion
Government organizations will be 'Spatially Enabled'.	2012
Fully operational SDI database satisfying Public & Private Sector end users.	2012
Increase the role of the Private Sector in the Geospatial domain.	2013
Operational cost recovery (about 40%).	2014
New Bahraini citizens qualified graduates to supplement market needs in GIS .	2016

Application Implementation

Ministry of Social Development

Ministry of Education

Ministry of Health

Ministry of Housing
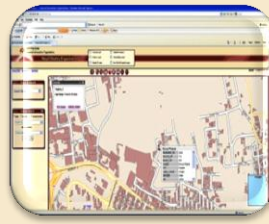
Ministry of Islamic Affairs

Ministry of Labor

PMEW

Ministry of Information

General Organization for Youth & Sport (GOYS)

The Royal Charity Organization

National Wayleave System

Bahrain Internet Exchange (BIX)

Regional Cooperation Initiative

- **CIO initiated in 2008 SDI at Regional level for GCC Countries.**
- **GIS Directorate, CIO, glad to take up the initiative to coordinate and setting up SDI at a regional level (GCC & Middle EAST).**

Thank you