The Second United Nations World Geospatial Information Congress

Technical Programme : TP5C
Operationalizing the United Nations-Integrated Geospatial Information Framework (UN-IGIF) at the country-level

Implementation of IGIF in India – Status and Strategy

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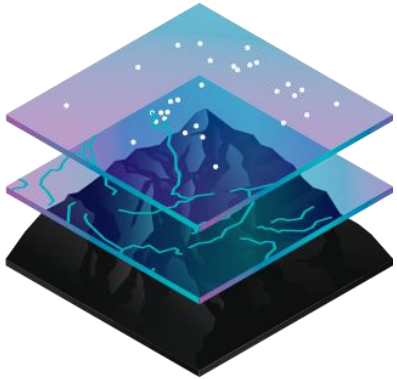
LJ University
University with a Difference

Introduction

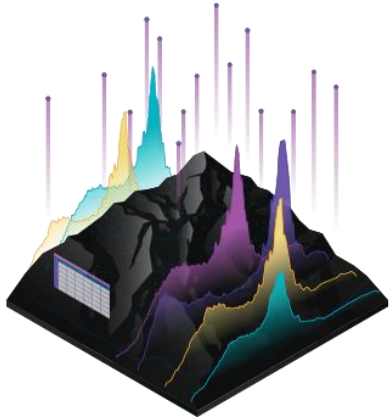
- Thomas Friedman's book The World is Flat' mentions Fourth Industrial Revolution includes digital advancements some of those are Al, IoT and Big Data too.
- Innovative Technology such as miniature sensors, Cloud and Artificial Intelligence, small satellites and drones are the new sources of Data.
- Real Time data together with geospatial infrastructure impacted on Human Development and Quality of Life.
- The Geospatial Readiness Index represents the success in the mission of sustainable development.
- A National Geospatial Infrastructure and knowledge Platform is MUST for an effective planning, implementation and monitoring of national programs, provides the foundation for
  - good governance,
  - Innovation,
  - entrepreneurship and
  - knowledge economy.

Dimensions of Geospatial Information Foundation



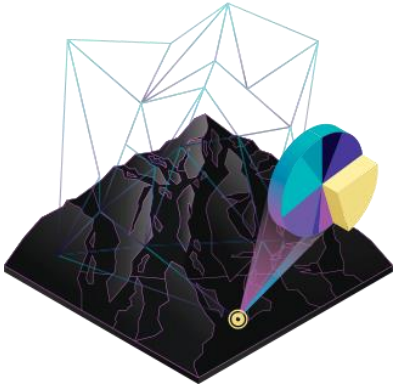
Maps

Maps are the geographic container for the data layers and analytics you want to work with. GIS maps are easily shared and embedded in apps, and accessible by virtually everyone, everywhere.



Data

GIS integrates many different kinds of data layers using spatial location. Most data has a geographic component. GIS data includes imagery, features, and basemaps linked to spreadsheets and tables.



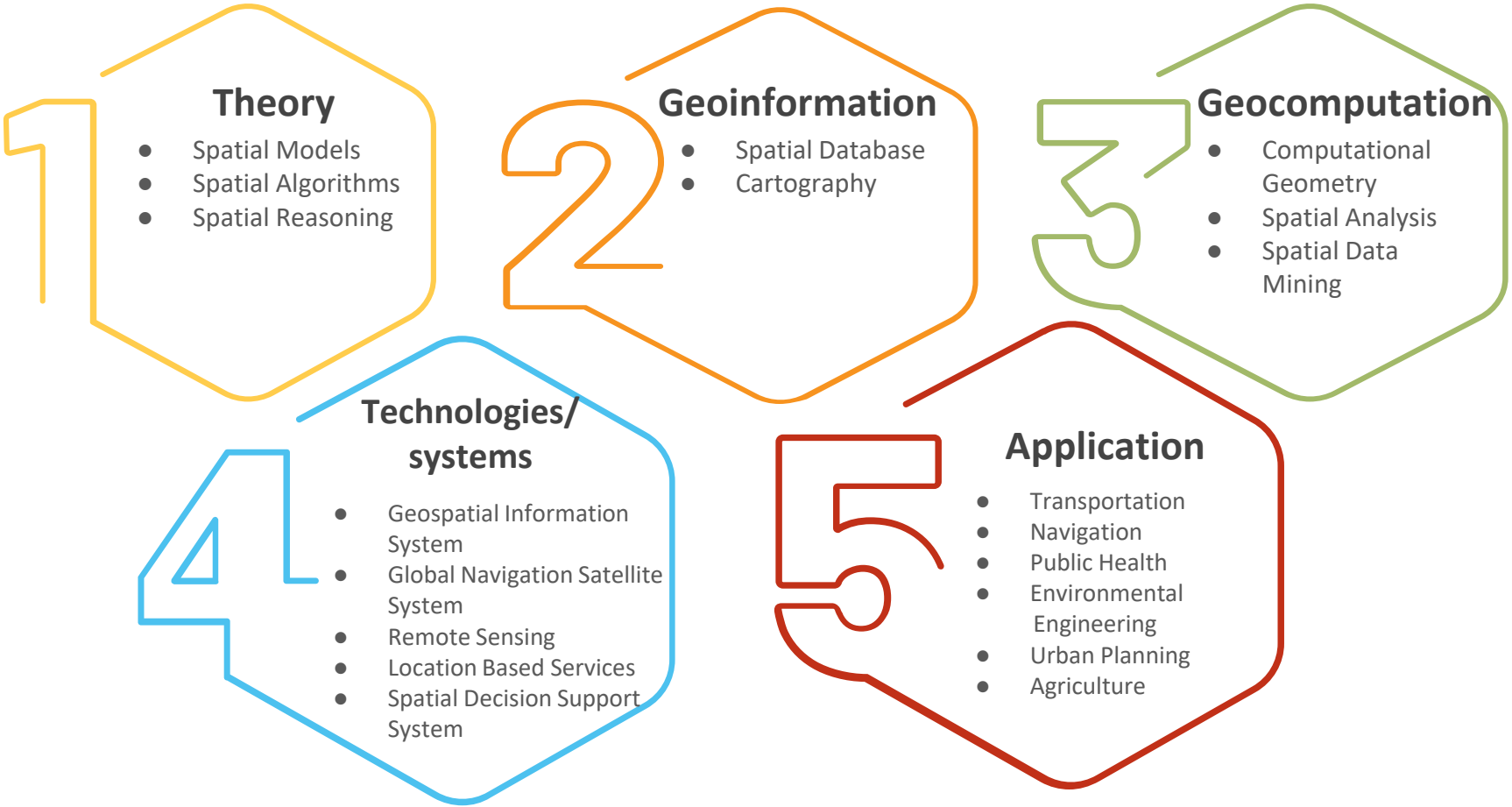
Analysis

Spatial analysis lets you evaluate suitability and capability, estimate and predict, interpret and understand, and much more, lending new perspectives to your insight and decision-making.

Apps

Apps provide focused user experiences for getting work done and bringing GIS to life for everyone. GIS apps work virtually everywhere: on your mobile phones, tablets, in web browsers, and on desktops.

Horizon of Geogrphic Information Frame



Integrated Geospatial Information Framework (IGIF)

Overarching Strategic Framework

Provides a Basis & Guide for Geospatial Information & Management through:

- Developing
- Integrating
- Stregthening
- Maximizing

Implementation Guide

Assist in Bridging the Gaps:

- Geospatial Digital Divide
- Secure Socio-Economic Security
- Leave no one Behind

Country Level Action Plan

Focuses on Location Information integrated with meaningful data to:

- Solve Societal & Environmental Problems
- Act as a catalyst
- Economic Growth and Opportunities
- Understand the benefits priorities to achieve SDGs

Country-level Action Plan (CAP)

National Priorities: Recommendations

HOW
Guidance
Options
Actions

WHEN & WHOM
Processes
Templates
Resources
Examples
Materials
Use Cases

COMPONENTS


Governance and Institutions


Data


Partnerships


Legal and Policy


Innovation


Capacity and Education


Financial


Standards


Communication and Engagement

INDICATORS

IN LINE WITH

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030.

The 17 SDGs are integrated —that is, they recognize that action in one area will affect outcomes in others, and that development must balanced social, economic and environmental sustainability.

National Strategies to achieve SDGs

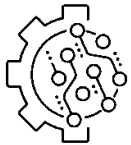
01 Mapping of Ministries & Programmes

02 Identification of Indicators

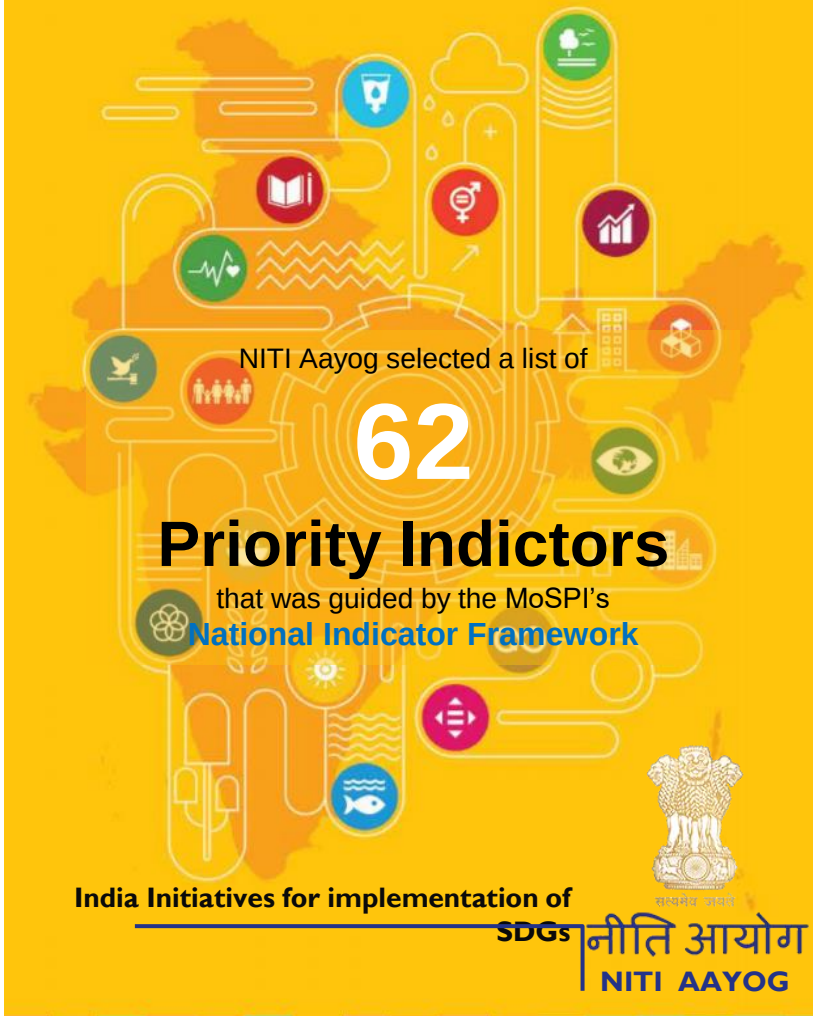
03 Consultations with stakeholders

04 Dovetailing the National Development Agenda with SDGs

Meticulous Implementation of Schemes aligned with SDG targets 05



06 Rigorous outcome based monitoring



Source: http://niti.gov.in/sites/default/files/2019-01/SDX_Index_India_21.12.2018_2.pdf

National Programmes/ Initiatives aligned with IGIF

NITI Aayog selected a list of

62

Priority Indictors

that was guided by the MoSPI's National Indicator Framework

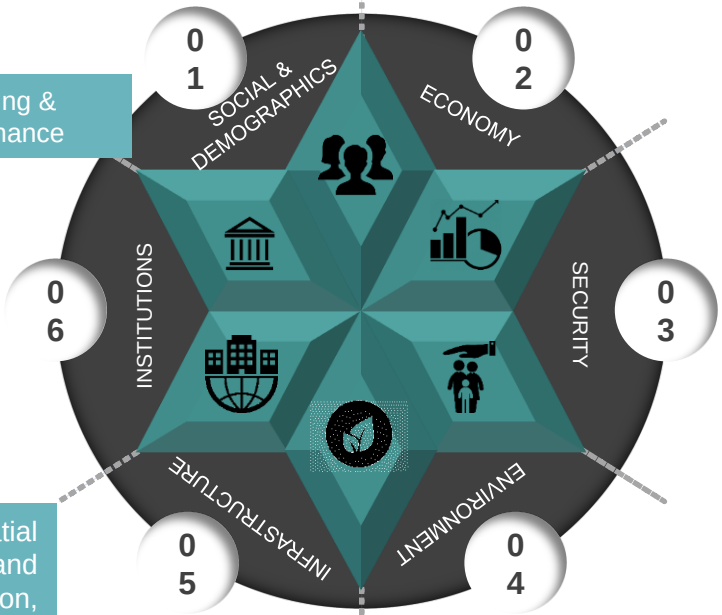
नीति आयोग
NITI AAYOG

Source: http://niti.gov.in/sites/default/files/2019-01/SDX_Index_India_21.12.2018_2.pdf

IDENTIFYING BASIC PARAMETER S

Planning & Governance

Health, Education, Culture etc



Ecosystem

INCLUSIVE

Water, Energy, Spatial configuration and location, Transportation, Green Infrastructure, Defense structure, Sheltering, Building & Design, Technology & Information

QUALITY OF LIFE

ENVIRONMENT	01
PHYSICAL	02
MOBILITY	03
SOCIAL	04
ECONOMICAL	05
POLITICAL	06

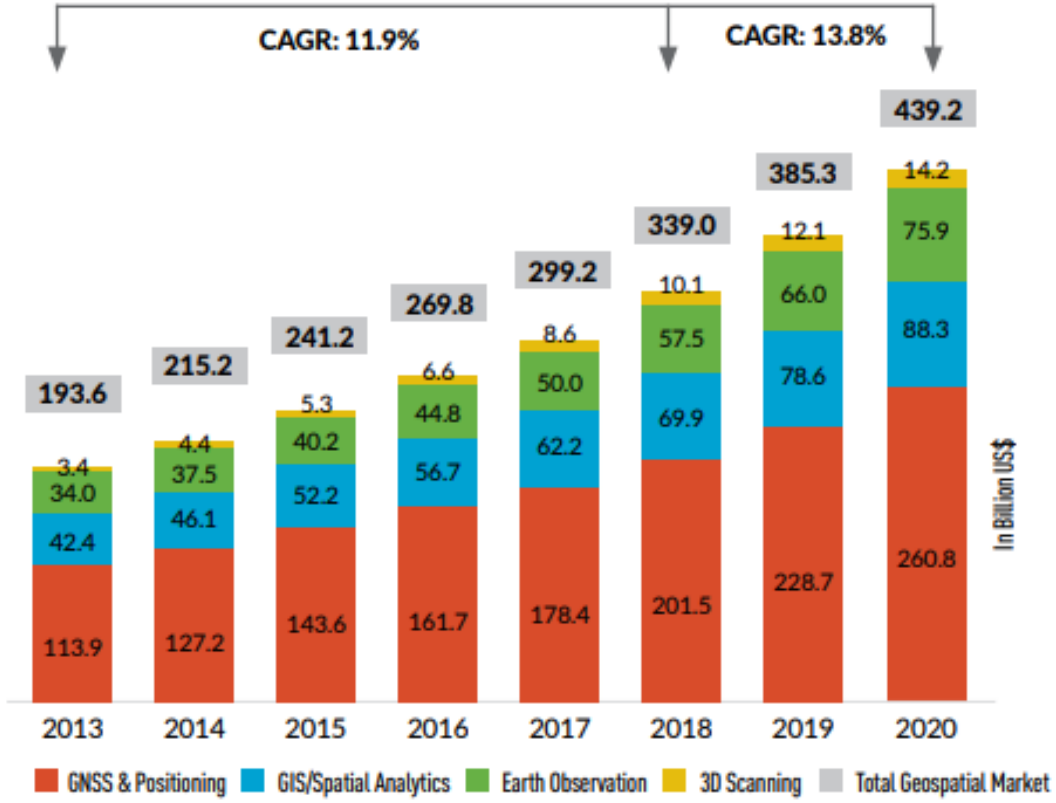
Strategic Target Pathways - Country-level Action Plan

Nine strategic and operational needs of a country when operationalizing the IGIF:

1. DEFINING STANDARDS:
2. ADAPTATION OF OPEN STANDARDS:
3. ASSIGNING THE VALUES & IMPORTANCE TO THE STANDARDS:
4. DESCRIBING GOOD PRACTICES ON GEOSPATIAL STANDARDS:
5. IDENTIFICATION OF THE STAKEHOLDERS:
6. DEVISING GOAL-BASED APPROACH TO ATTAIN GEOSPATIAL CAPABILITIES:
7. CHARACTERIZING EMERGING STANDARDS AND TRENDS;
8. PROVIDING CONCRETE EXAMPLES OF STANDARDS IN USE;
9. SUGGESTIONS: towards implementation and target achievement

Global Geospatial Market Size

- Geospatial industry is among the fastest growing industries globally and is helping translate innovation into business practices in multiple sectors.
- Geospatial technology, which was earlier associated with just mapping, is today pushing industrial processes, offering immense value in terms of enhancing productivity, cost effectiveness, transparency, safety and project management. The global geospatial market is growing steadily.
- **In 2018, the market was worth USD 339 billion and is forecast to grow to USD 439.2 billion by 2020, at a CAGR of 13.8%**



Source: Geospatial policy for new India 2019

Geospatial Market in India – Yesterday & Tomorrow

Employment

2,51,300
22,00,000

Geospatial Economy

INR 20,629 cr
INR 99,000 cr

Domestic Market

INR 7,679 cr
INR 36,000 cr

Export of Services

INR 6,659 cr
INR 32,000 cr

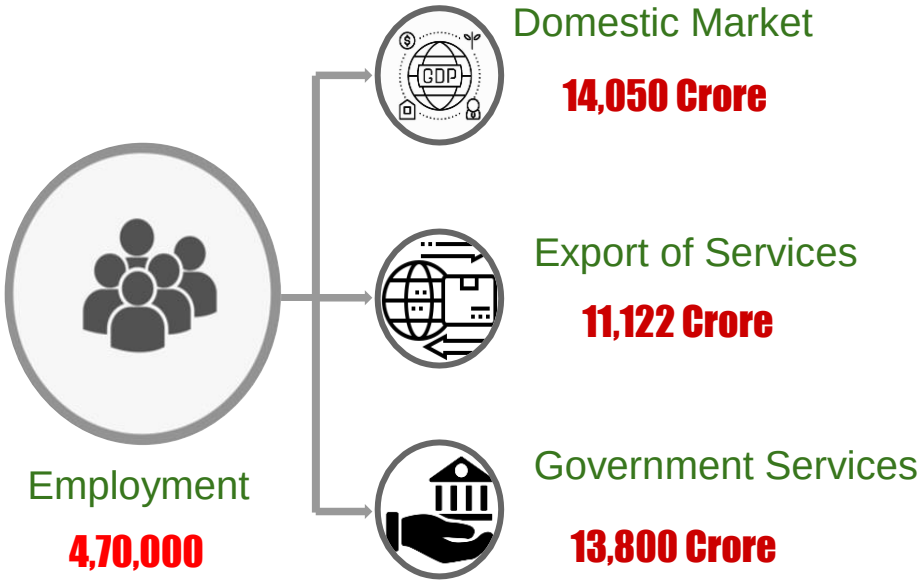
Government Services

INR 6,291 cr
INR 31,000 cr

2017-18 (INR)
2029-30 (INR)

Source :Geospatial Policy for New India 2019

Geospatial Market in India – Year 2021

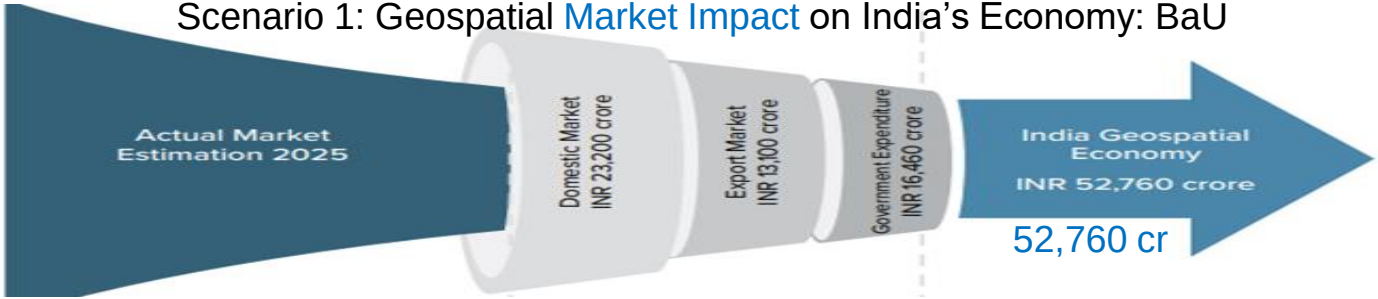


COMPONENTS	VALUE IN INR
INDIAN GEOSPATIAL ECONOMY (Total)	38,972 crores
Domestic Market (36%)	14,050 crores
Export Market (29%)	11,122 crore
Government Spending on Geo-Tech (35%)	13,800 crores
EMPLOYMENT (Total)	4,70,000 (Persons)
Employment in Domestic Market (Out of Total 69.50%)	3,26,000 (Persons)
Employment in Export Services	85,000 (Persons)

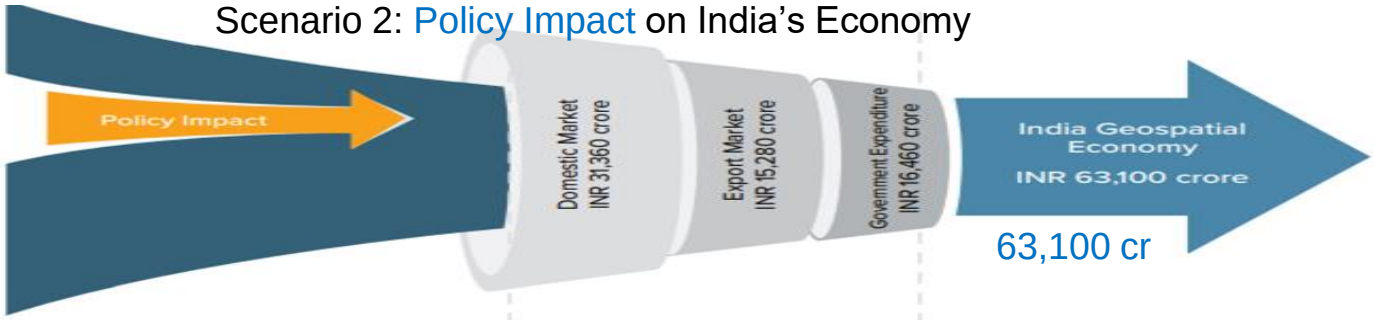
Source :Geospatial Artha report

Indian Geospatial Economy Forecast of 2025

Scenario 1: Geospatial Market Impact on India's Economy: BaU

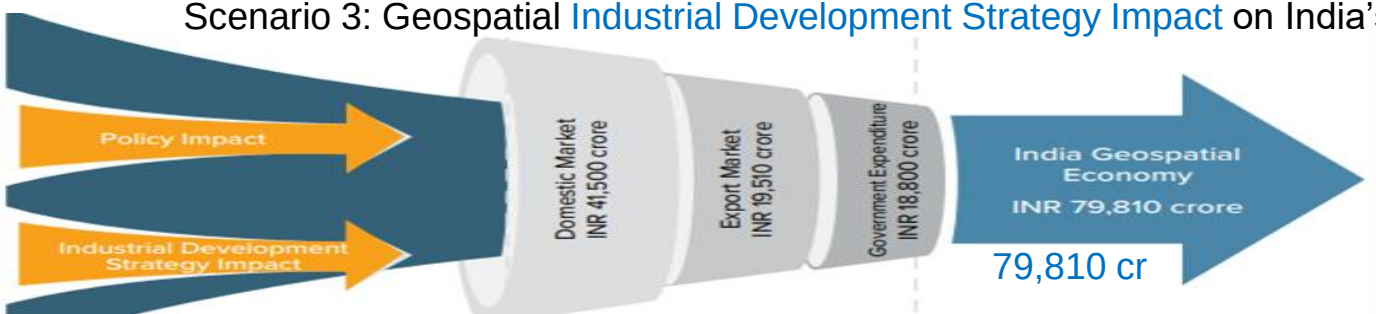


Scenario 2: Policy Impact on India's Economy



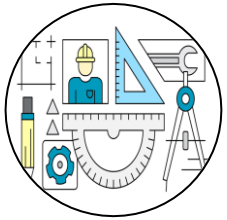
: **Method vs Strategy**

Scenario 3: Geospatial Industrial Development Strategy Impact on India's Economy



Source :Geospatial World Analysis

Sectors influenced by IGIF



Engineering

Construction

Sustainable Development

Utilities

Planning Smart Cities

Management

Climate Change

Smart Governance

Infrastructure

Oil & Gas

Building Information

Power

Water Distribution

Mining

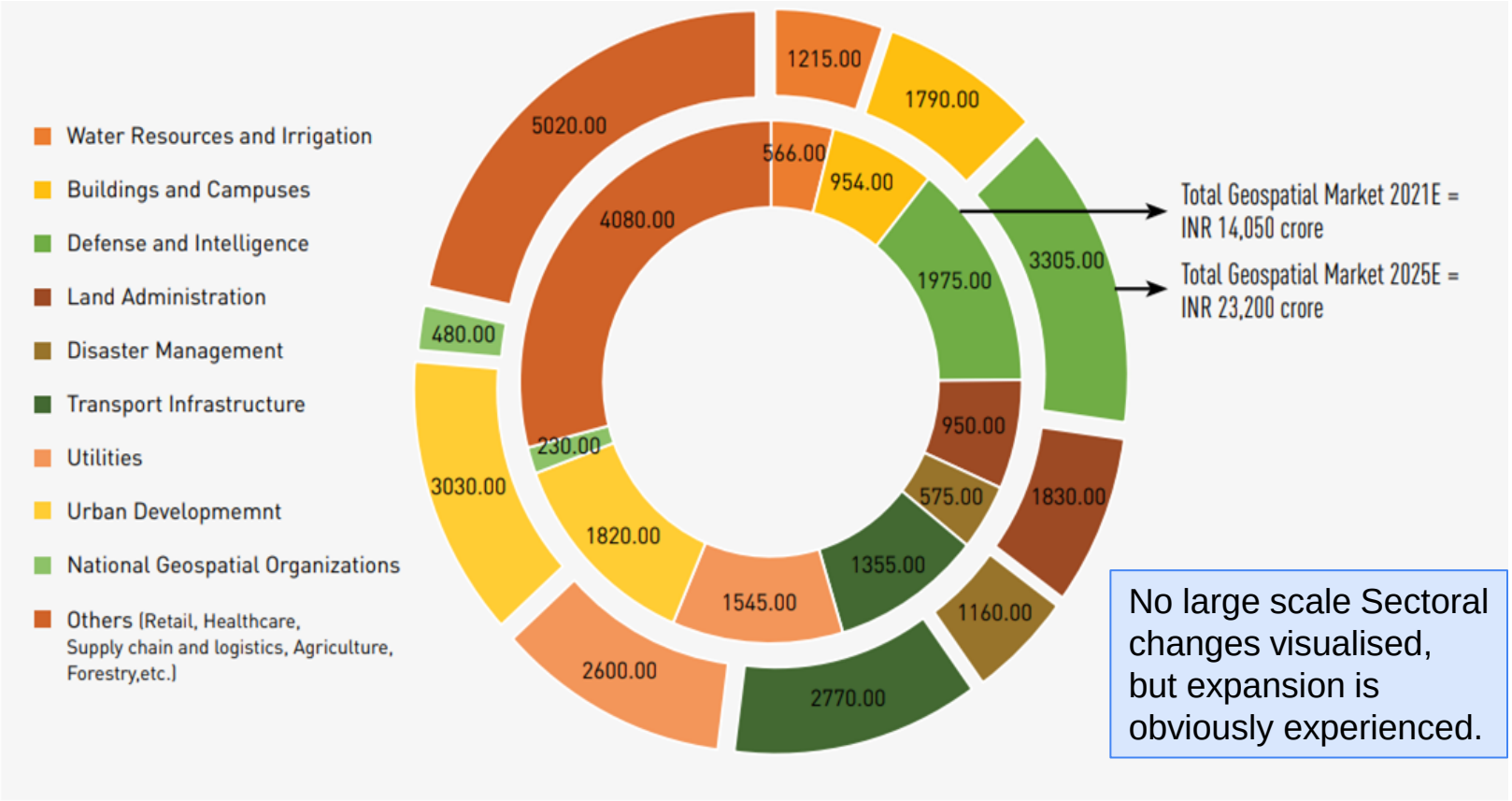
Logistics

Environment

Information Technology

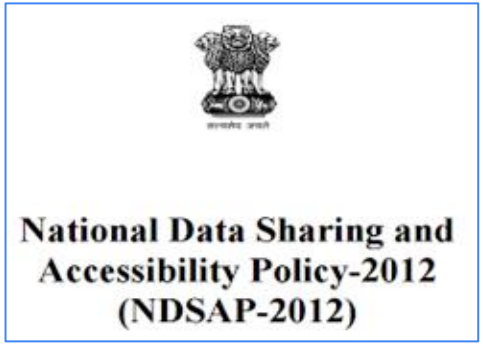
Port & Marine

Indian Geospatial Economy Forecast of 2021 & 2025



Source: Geospatial World Analysis

Data & Geospatial Technology related Policies



National Data Sharing and Accessibility Policy 2012

Draft Space Remote Sensing Policy - 2020

National Education Policy 2020

National Geospatial Policy 2021

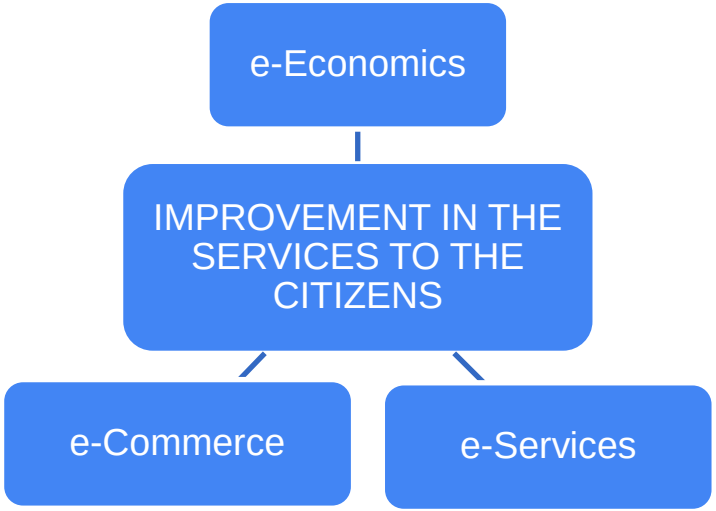
SATNAV Policy-2021

New Drones Policy 2021

National Geospatial Policy 2021

VISION

- India will have a coherent national location data framework by 2030.
- Geospatial industries will flourish in an enabling policy and legal framework.
- The benefits of Geospatial data will reach to the common citizens of the country.
- Improvement in Services to the Citizens
- New insight, New Services & New Business
- Increase in Spatial Capabilities
- Enhanced Geospatial Readiness
- Innovations
- Social, Economic and Environmental Benefits



National Geospatial Policy (NGP), 2021

Launch of Google Street View - 2021

Ten cities of India under the Guidelines of the National Geospatial Policy (NGP), 2021, launched Google Street View

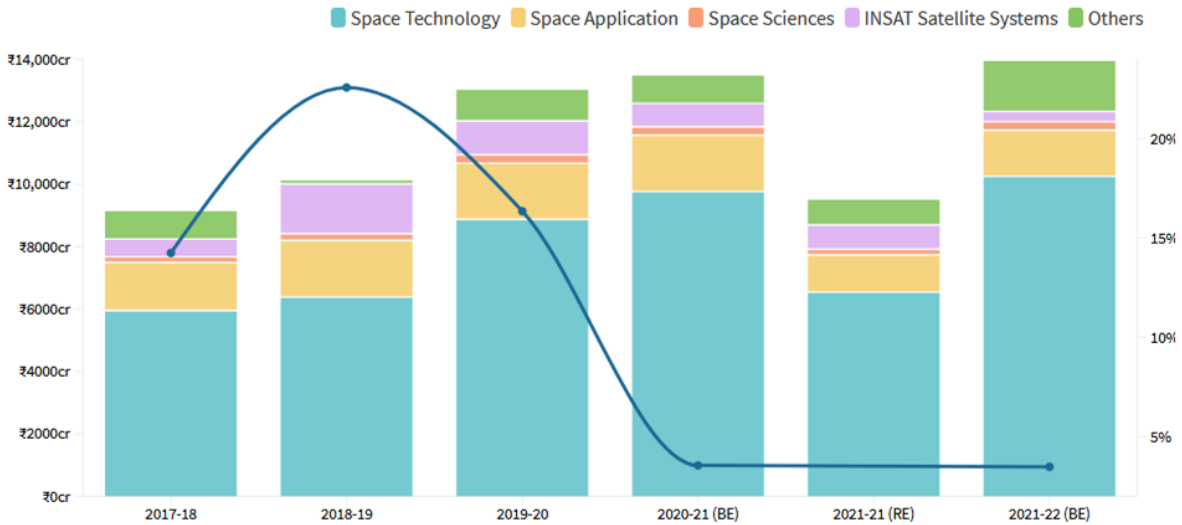
NGP 2021 lets Indian companies collect map data and license it to others – Privatisation Initiative

- Google Street View is **an immersive 360-degree view of a location captured using special cameras mounted on vehicles or on backpacks** by data collectors moving around the city streets.
- The images are then **patched together to create 360-degree view which users** can swipe through to get a detailed view of the location.
- It is available to view on **Android and iOS** using the app, or as a web viewer.

Source :Google Maps

Indian Space Research Organisation – Understanding the Importance towards Achieving National Goals

- Indian Space Research Organisation (ISRO) gears up for Gaganyaan — India's first human spaceflight mission.
- Rs 13,700 crore earmarked for the Department of Space for 2022-23
- Budget allocation increased by 3.5% for 2021-22



Source: Budget documents

Year	Budget in Cr. Rs
2018-2019	9918
2019-2020	10252
2020-2021	9761
2021-2022	12642
2022-2023	13700

National Spatial Data

- Topographic surveys, Geological surve surveys, Cadastral surveys, various Na Resources Inventory Programmes and use of the remote sensing images, Indi very rich Asset of Maps.
- Availability of precision, high-resolution satellite images, data, GIS, GPS, the le accuracy and information content of sp datasets too is extremely high.
- National Spatial Data Infrastructure (NS has been recognised on information transparency and sharing.
- Helps to citizens, society, private enterp and government to access, to use and grow.

Source :Federal geographic data committee (FGDC)

FUNCTIONAL ECOSYSTEM

Scientific Computing Platform	Special-purpose Lab Facility	Open Scientific Computing Platform	Open Scientific Data Cloud	Open Reusable Components
Scientific Workflows and Visualizations	Experiments and Results Restricted to the Lab	Scientific Workflow Sharing Platform	Interactive Reproducible Analysis Platform	Data Visualization Platform
Geospatial Data Sharing Platforms	Spatial Data Infrastructures	Open Government Data Platform	Linked Open Data	Community Contributed Mapping Platform
Geospatial Software and Services	Vendor Products ESRI, Pitney Bowes Intergraph, Manifold Autodesk	Open Source Desktop GIS	Web Based Standard Compliant GIS	Plug-in Based Desktop GIS
Survey and Photogrammetry	Conventional Survey and Photogrammetry	Mobile Applications ODK, KoBo, GeoODK, GIS Cloud MDC, NextGIS, MapIt GIS, SMART	Low Cost Survey-Grade Drone Mapping	3D / AR/ VR Platform WRLD, Wikitude, CityEngine ARCore, Cardboard
Education and Training	Conventional GIS Reference Degree Courses Certificate Programs Professional Training	Geospatial Curriculum / BoK	Geospatial Technology Competency Model	GIS Courses MOOC

The Integrated Geospatial Information Framework (IGIF)

VISION

The efficient use of geospatial information by all countries to effectively measure, monitor and achieve sustainable social, economic and environmental development – leaving no one behind

MISSION

To promote and support innovation and provide the leadership, coordination and standards necessary to deliver integrated geospatial information that can be leveraged to find sustainable solutions for social, economic and environmental development.

STRATEGIC DRIVERS

National Development Agenda ● National Strategic Priorities ● National Transformation Programme ● Community Expectations ● Multilateral trade agreements ● Transforming our World: 2030 Agenda for Sustainable Development ● New Urban Agenda ● Sendai Framework for Disaster Risk Reduction 2015–2030 ● Addis Ababa Action Agenda ● Small Island Developing States Accelerated Modalities of Action (SAMOA Pathway) ● United Nations Framework Convention on Climate Change (Paris Agreement) ● United Nations Ocean Conference: Call for Action

UNDERPINNING PRINCIPLES

Strategic Enablement	Transparent and Accountable	Reliable, Accessible and Easily Used	Collaboration and Cooperation	Integrative Solution	Sustainable and Valued	Leadership and Commitment

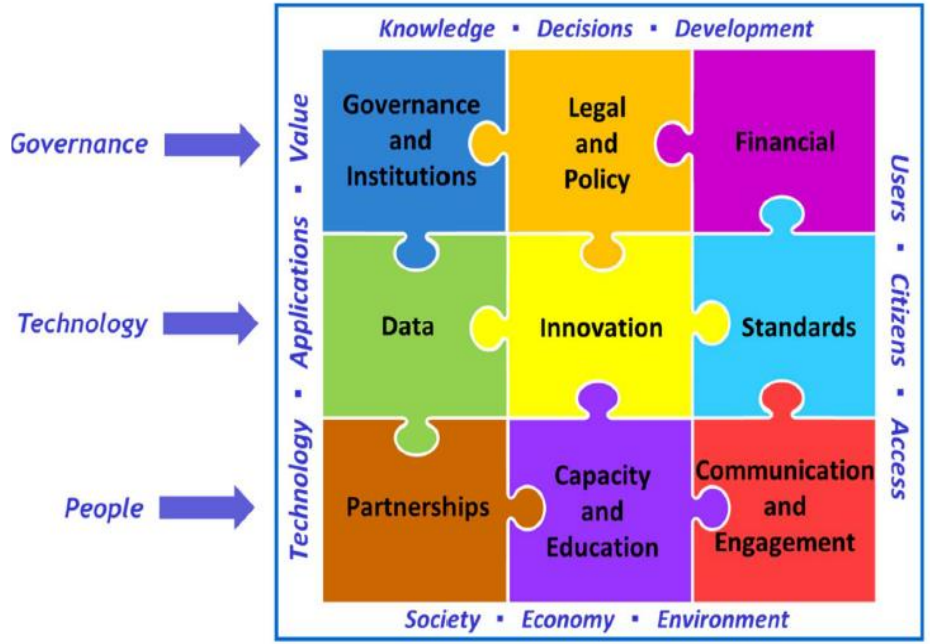
GOALS

Effective Geospatial Information Management	Increased Capacity, Capability and Knowledge Transfer	Integrated Geospatial Information Systems and Services	Economic Return on Investment
Sustainable Education and Training Programs	International Cooperation and Partnerships Leveraged	Enhanced National Engagement and Communication	Enriched Societal Value and Benefits

STRATEGIC PATHWAYS

Governance and Institutions	Legal and Policy	Financial	Data	Innovation	Standards	Partnerships	Capacity and Education	Communication and Engagement
Governance model	Legislation	Business model	Fundamental data themes	Technological advances	Legal interoperability	Cross-sector and interdisciplinary cooperation	Awareness raising	Stakeholder identification
Institutional structures	Implementation and accountability	Investment	Data supply chain interlinkages	Promoting innovation and creativity	Semantic interoperability	Community participation	Entrepreneurship	Planning and execution
Leadership	Norms, policies and guides	Partnerships and opportunities	Custodianship, acquisition and management	Process improvement	Data interoperability	Industry partnerships and joint ventures	Formal education	Integrated engagement strategies
Value proposition	Data protection and licensing	Benefits realization	Data curation and delivery	Bridging the digital divide	Technical interoperability	International collaboration	Professional workplace training	Monitoring and evaluation

Knowledge | Decisions | Development | Society | Economy | Environment | Users | Citizens | Access | Technology | Applications | Value



Source: IGIF, Part 1: The Overarching Framework, Page – 10, 21

SP 1

Governance and Institutions

Components

Governance Model,
Institutional Structure
Leadership,
Value Proposition

Ministry of Science and Technology

India's allocation of business rule 1961

Department of Science and Technology (Nodal Agency)

National Level Node

Survey of India (SoI)

National Atlas and Thematic Map Organisation (NATMO)

National Spatial Data Infrastructure (NSDI)

Sub-national Node

Geospatial and Cartography

विज्ञान एवं प्रौद्योगिकी मंत्रालय
MINISTRY OF SCIENCE AND TECHNOLOGY
सत्यमेव जयते

Prime Minister Office

Space Commission and Department of Space

Indian Space Research Organisation (ISRO)

National Level Node

Indian Institute of Remote Sensing (IIRS)

National Remote Sensing Centre (NRSC)

Space Application Centre (SAC)

Sub-national Node

Remote Sensing

Department of Space
Indian Space
Research Organisation

ISRO Centres

Source: The Planetary Society & ISRO

SP 2

Legal and Policy

Components

Governance Model, Institutional Structure Leadership, Value Proposition

15 policies/act/ rules from 6 different ministries, among which *4 are in draft stage.*

Legal & Policy Framework

Department of Science and Technology (DST)
National Map Policy

Department of Space
Remote Sensing Data Policy

Ministry of Civil Aviation
UAV Operations, Civil Aviation Requirement for aerial flying etc

Department of Science and Technology (DST)
(National Data Sharing & Accessibility Policy

Ministry of Finance
Controls on Map Trade, Imports& Exports Clearances

Ministry of Defence
Policies on maps, Digital Data, Aerial Survey, Remote Sensing

Ministry of Home Affairs
Criminal Law amendments Act

Promotion of Geospatial

Ministry of Science and Technology- Department of Science and Technology (DST)- Nodal agency for Promotion of Geographic Information System (GIS) in the Country

National Spatial Data Infrastructure
data management with the participation of various national & state level partnering organisations

Data Acquisition
Foundation & Thematic data → **Data Sharing & Accessibility** (Data Management) →

Geospatial Technology &Solutions

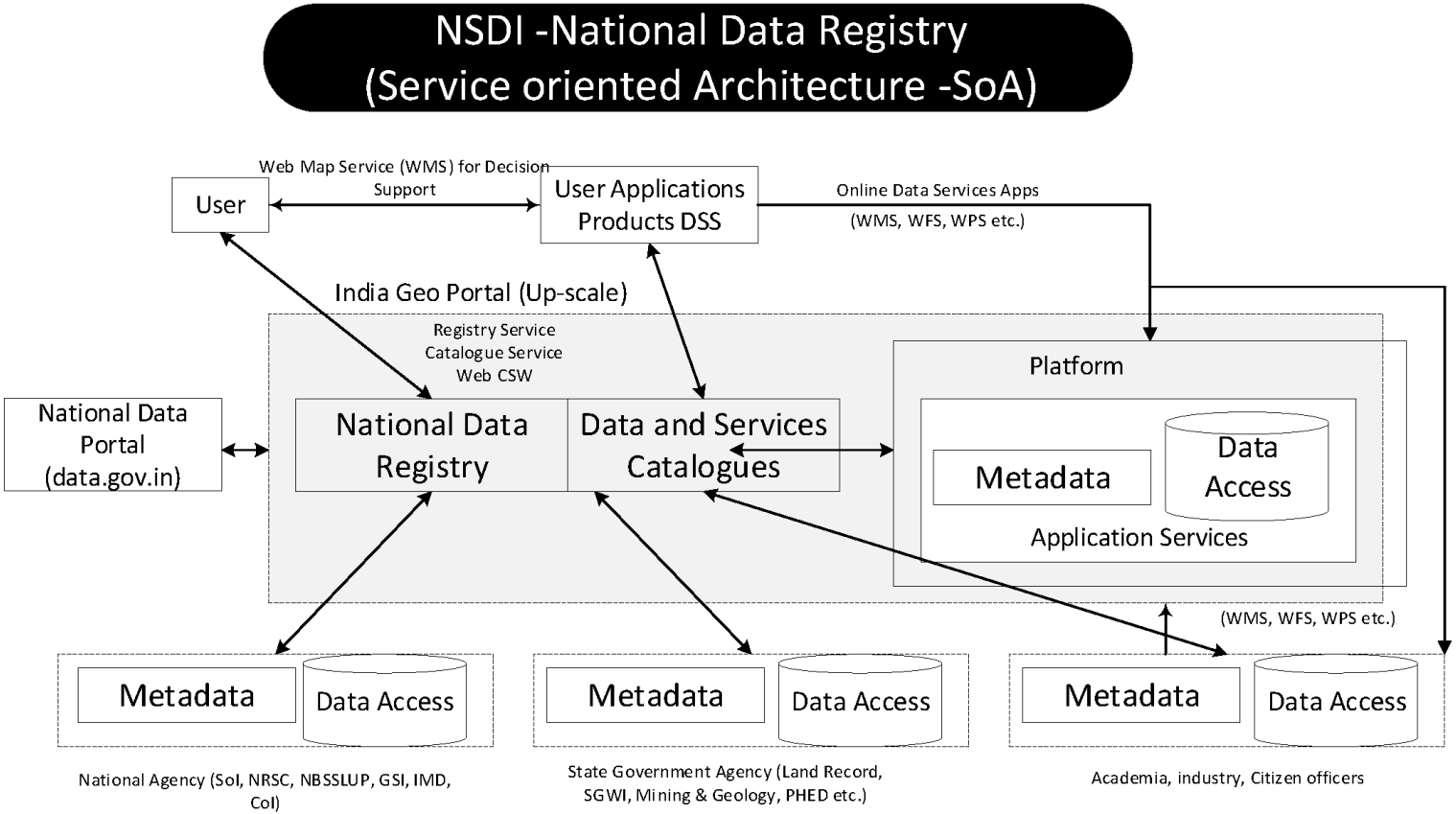
Source: India Country Report, Submitted to UN-GGIM, 202

SP 4

Data

Components

Fundamental Data theme
Data supply chain interlinkages, custodianship, acquisitio and managements
Benefits Realisation



Source: NSDI, 2012

SP 8

Capacity and Education

Components

Awareness raising,
Entrepreneurship,
Formal Education,
Professional workplace training

•India has a wide spectrum of capacity building programmers from school level elementary geospatial education to the formal education.

•The **National Geospatial Taskforce** of the ministry of Education, GoI, framed out the three **pyramidical layers of the geospatial expert** - base level consists of skilled workforce for ground data collection, intermediate level includes professional experts for processing the data and the apex tier include the experts having requisite knowledge and qualification for conceptualizing and implementing projects.

•The **National Geospatial Program (NGP)** is regularly hosted by DST for enhancing the skill of decision makers.

•The formal education in Remote Sensing and GIS includes at Graduation Level (BSc, BE), Master Level (M.Sc., MTech, Post Graduate diploma etc.)

•The **ISRO's Edusat outreach** Programme is an open source learning Programme regularly hosted in online mode for the students, researchers and other professionals.

•India's private partner like **ESRI's Geospatial for school** has also revolutionized the GIS capacity building programme in futuristic long term vision.

SP 9

Communication and Engagement

Components

Awareness raising,
Entrepreneurship,
Formal Education,
Professional workplace training

•India has a strong multi-stakeholder engagement to build a collaborative geospatial environment.

•Community participation and participatory GIS based approaches also introduced in various sectors for the purpose of community development.

•The various developmental flagship programmed like MGNREGA, SAVIMTA, are provisioned to incorporate the community participation in planning and implementation at local level.

Technology for Development


THANK
YOU