



# Geospatial चौपाल

17-18 March 2018 | Ram Ganga Resort, Jim Corbett Park, Uttarakhand



## India Geospatial Strategy Vision 2022

Maps are not just driving apps today; they are driving economies too. In this progressively interconnected world, one of the most powerful way of exploring the physical and digital landscapes for businesses and governments today is through the 'where' dimension.

*Where does India feature in this?*



# New India Vision

India free of Poverty, Dirt & Squalor, Corruption, Terrorism, Casteism and Communalism  
( Swachh, Swastha, Shikshit, Sampann, Saksham, Surakshit Bharat by 2022)

## Plan 2022: Integrated or Umbrella Programs

Roads	Railways	Waterways	Aviation	Energy	Urban & Rural Development	Mining	Natural resources	Agriculture	Digital India, Security, Finance, Skill Dev.
<ul style="list-style-type: none"> <li>Bharatmala, Sagarmala, Waterways</li> <li>Integrated Power Development Scheme(IPDS), UDAY</li> <li>Smart Cities, AMRUT, Housing</li> <li>RURBAN clusters</li> </ul>						<ul style="list-style-type: none"> <li>National Hydrology Project (NHP)</li> <li>Groundwater Management (NGWM)</li> <li>Environment Monitoring</li> <li>River Rejuvenation Programs</li> <li>Doubling farm income</li> </ul>		<ul style="list-style-type: none"> <li>E-kranti</li> <li>Police and armed forces modernization</li> <li>Direct transfers</li> <li>Insurance</li> </ul>	

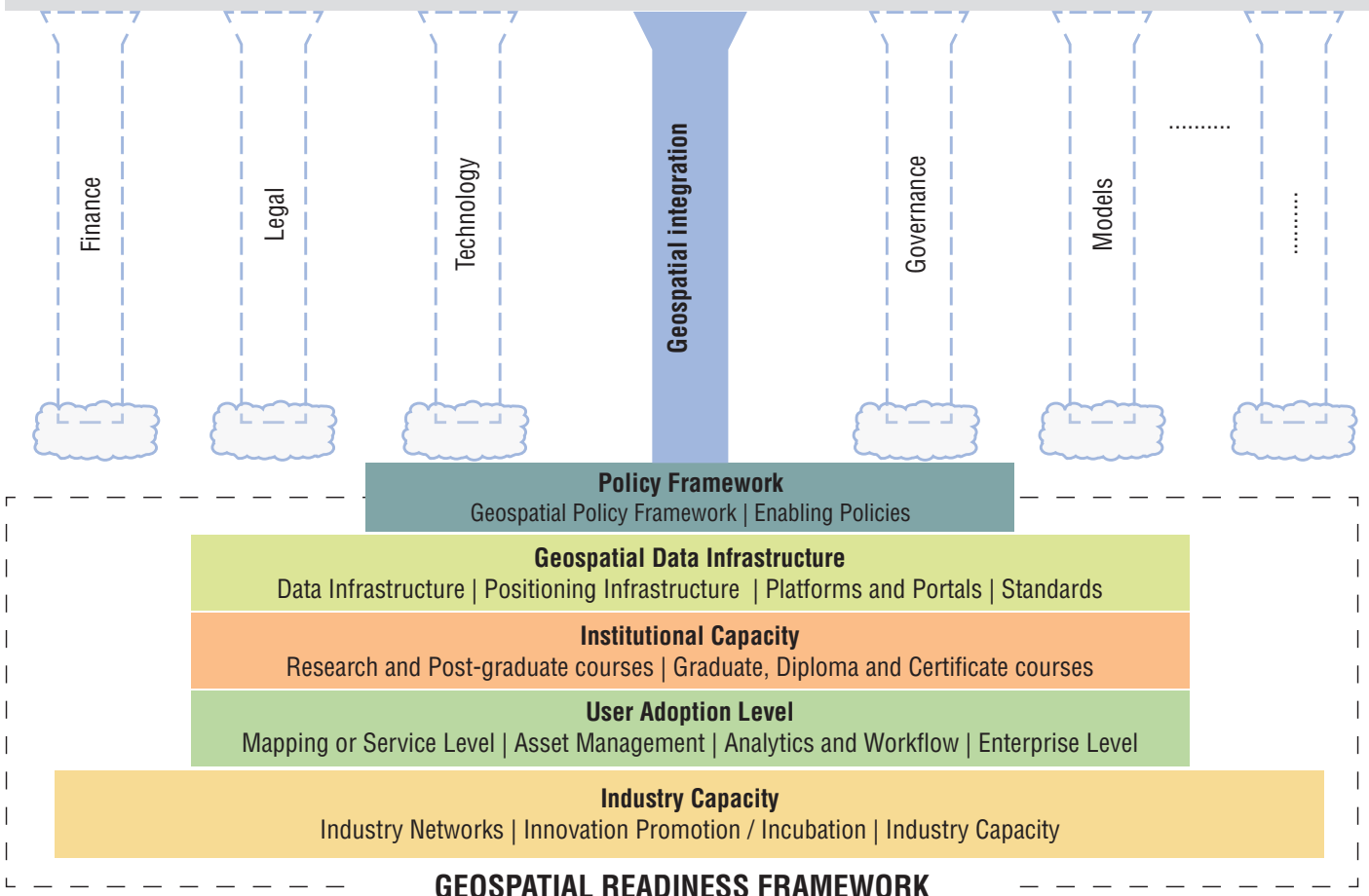
### Key contexts

- 40th place in the global competitiveness ranking of 137 countries by the World Economic Forum (WEF) 2017-18 report
- 107th in United Nations(UN) e-government survey 2016 among 193 countries
- 131th place in Human Development Index report 2016 (HDI) among 188 countries by United Nations(UN) improving only 4 ranks since 1990 i.e. last 25 years.

### Emerging perspectives

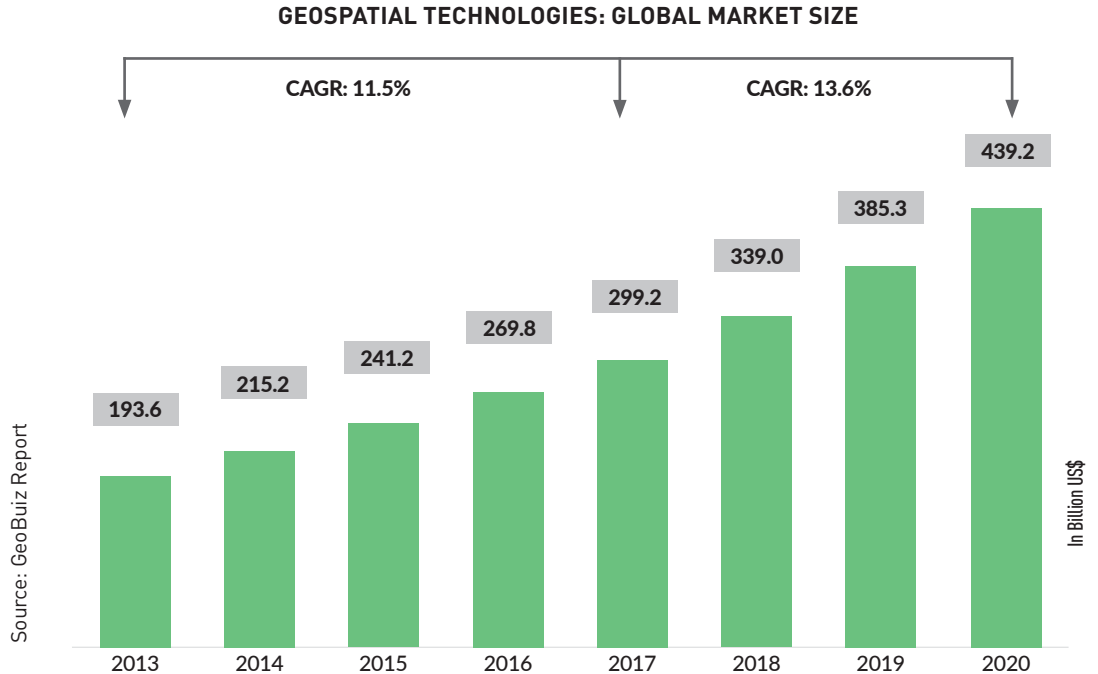
- Ubiquitous digital technology ecosystems
- Rise of trillion dollar state economies in India

## Strategic Enablers

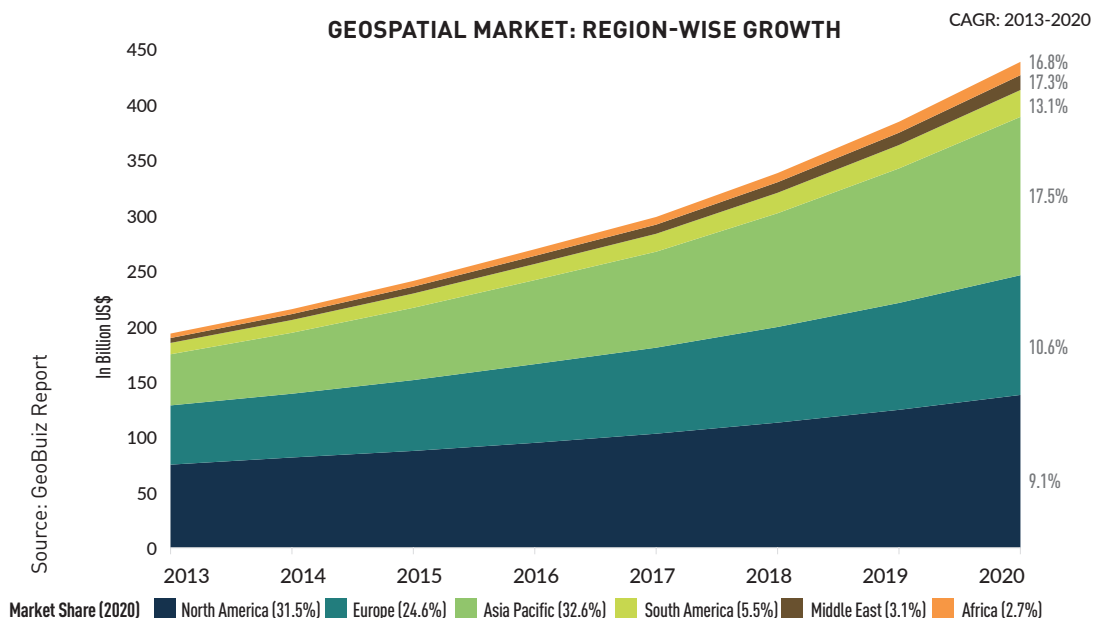


## Geospatial industry and its socio-economic impact

Geospatial industry has emerged as one of the fastest growing industries globally. Today, it is helping in translation of innovation into business practices across governance, developmental activities, enterprises and society. Over the years, it has transformed itself from a mere mapping tool, to an industrial process offering value in terms of enhancing productivity, cost effectiveness, transparency, safety and project management.



The cumulative geospatial industry was valued at about **\$299.2 billion** in 2017 and is projected to touch **\$439 billion** by 2020, growing at **13.6%**. The sustained growth is a direct result of continuous technology advancements, democratization of geospatial information riding on integration with advancing technologies and resultant innovative business models. It is estimated that the value derived for the global economy through geospatial is well over **\$2,000 billion** (GeoBuiz 2018). However, the total contribution is considered to be several times higher, since the exponential benefits of spatial dimension being realized by citizens globally is difficult to measure.



The Geobuiz 2018, brought out by Geospatial Media & Communications, finds that a **huge proportion of this growth will come from the Asia Pacific market. It will in fact take over the North America market to command about 32.6% by 2020 market share, with a sharp growth rate of 17.5% CAGR. It goes without saying, India and China, with their continued focus on infrastructure will be driving the growth in this region.**

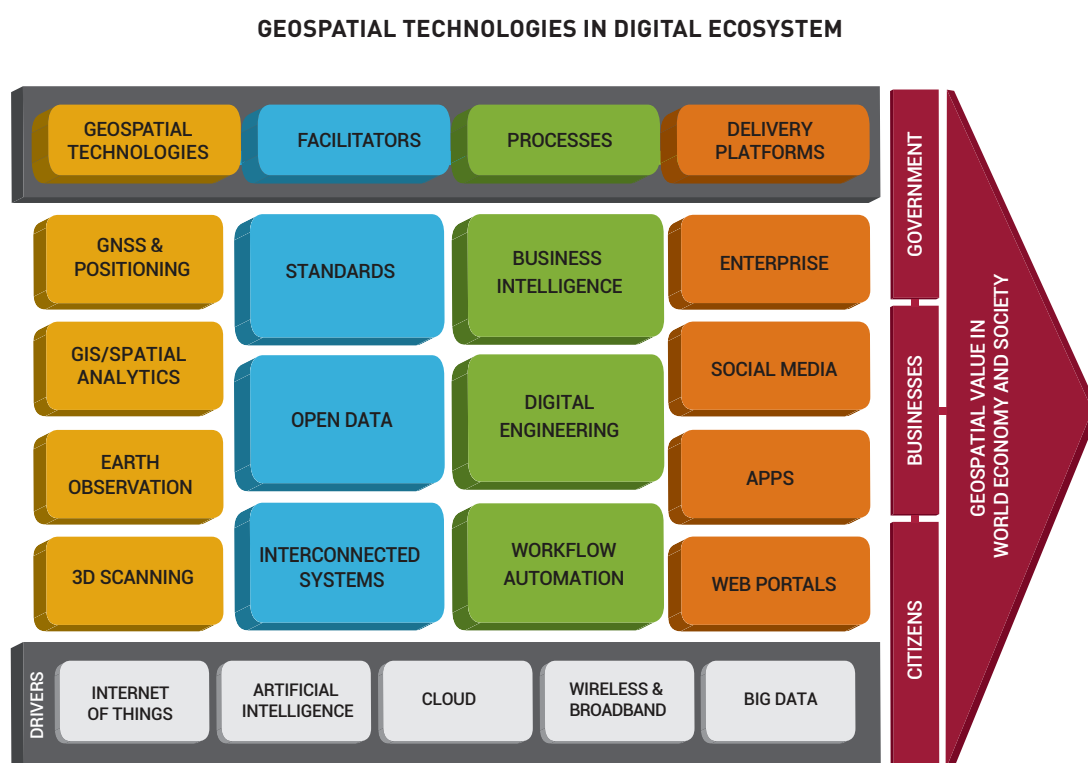
### Geospatial in a digital age

As we usher in a digital revolution, the relevance of geospatial information and technology continues to build on its growth momentum. With the 'where' dimension becoming fundamental to all decision-making, geospatial has in fact emerged as enabler of the entire digital space.

The traditional silos segmenting geospatial functionalities are being dissolved with spatial integration driven by digital technologies, in the process shortening the time lag between data capture, processing, analysis and delivery of a unified picture of the real world.

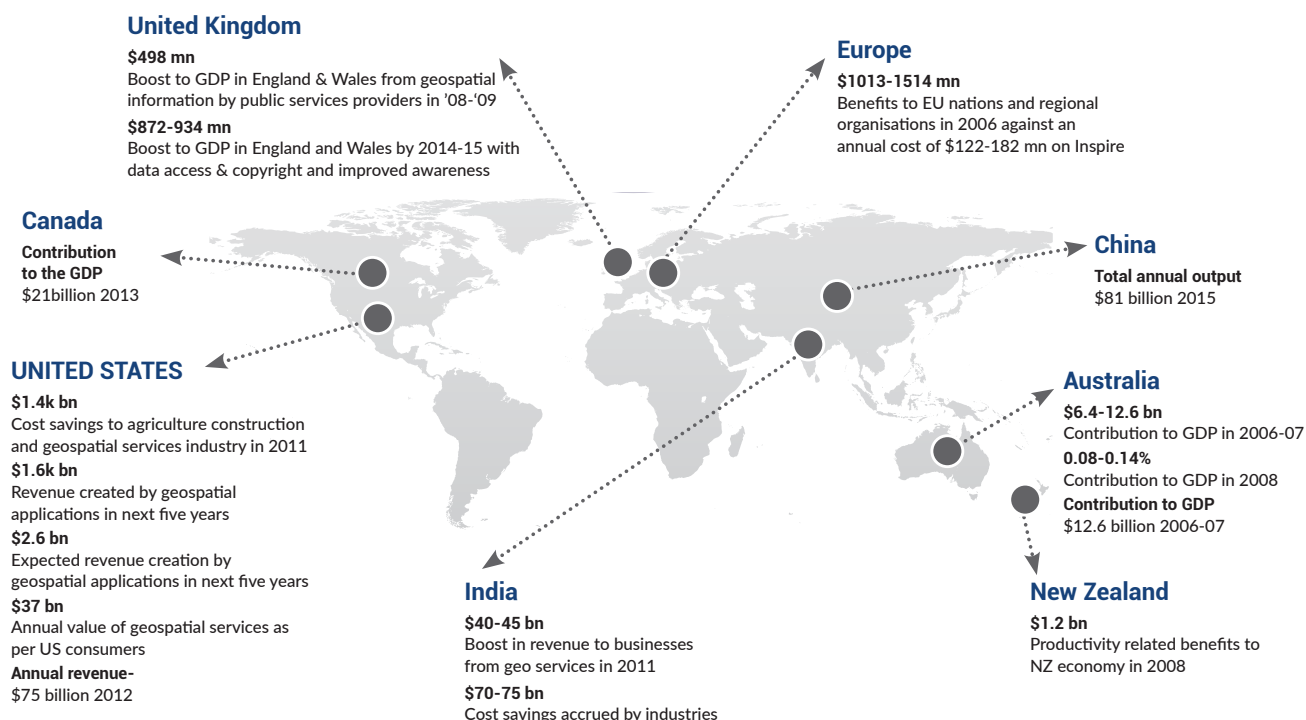
New-age technologies like IoT, Artificial Intelligence, Cloud, Wireless & Broadband and Big Data are empowering the assimilation of spatial information into existing business processes, enhancing overall understanding and comprehension of complex socio-economic environment for better results.

These rapid advancements have also made geospatial information crucial for planning, monitoring, management, analysis, decision making and improving overall productivity and efficiency of businesses for several industry verticals.



Source: GeoBuiz-18 Report

## GEOSPATIAL TECHNOLOGIES CONTRIBUTING TO ECONOMY



## Value of geospatial in economy and society

Various published studies have found geospatial technologies making substantial contribution to major economies.

Different countries operate at different levels of technology adoption and usage of geospatial information, depending on institutional and operational framework, data sharing policies, level of trained human resources, leadership effectiveness, availability of funds and other factors.

A glance at the Countries Geospatial Readiness Index (CGRI) 2018 in the GeoBuiz report finds close correlation between the leaders on the index and those ranking high on UNDP's Human Development Index. Simply put, countries that are high in adoption of geospatial technologies stand to gain more than others in terms of contribution to GDP, higher standard of living for citizens and high-quality infrastructure. For instance, it is no surprise that the US, UK, Germany, Singapore, and The Netherlands rank among the top five on the CGRI.

### INDIA GEOSPATIAL READINESS VS OTHER PARAMETERS

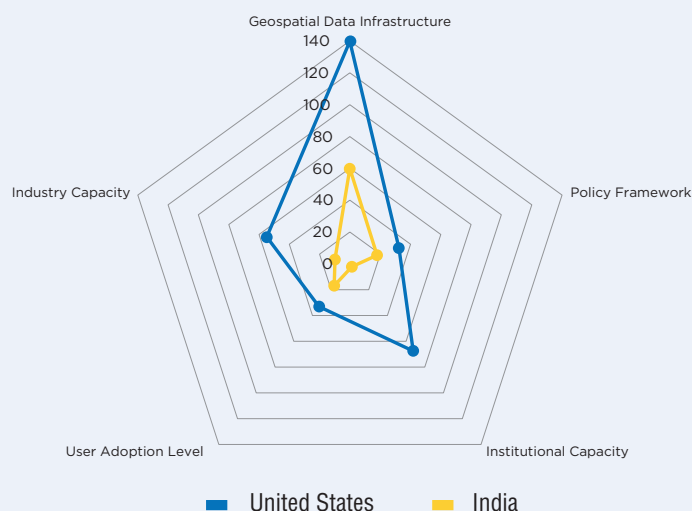
Country	Geospatial readiness rank	UNDP Human development index 2016	WEF Global Competitiveness Index 2017-18	UN e-government survey 2016
US	1	10	2	12
UK	2	16	8	1
Germany	3	4	5	15
Singapore	4	5	3	4
The Netherlands	5	7	4	7
China	6	90	27	63
Canada	7	10	14	14
Denmark	8	5	12	9
Switzerland	9	3	1	28
France	10	21	22	10
<b>India</b>	<b>26/50</b>	<b>131/188</b>	<b>40/137</b>	<b>107/193</b>

\*UNDP's HDI index ranks 188 countries. UN e-Government Survey is among 193 countries. GMC's CGRI is an index of 50 countries selected on the basis of their GDP, population and geographical spread.



## INDIA GEOSPATIAL READINESS: AT A GLANCE

- India ranks **26th** among 50 countries of CGRI-2018
- India's rank on pillars:
  - a. **28th** on Policy Framework
  - b. **27th** on Geospatial Data Infra
  - c. **25th** on User Adoption
  - d. **17th** on Institutional Capacity
  - e. **16th** on Industry Fabric



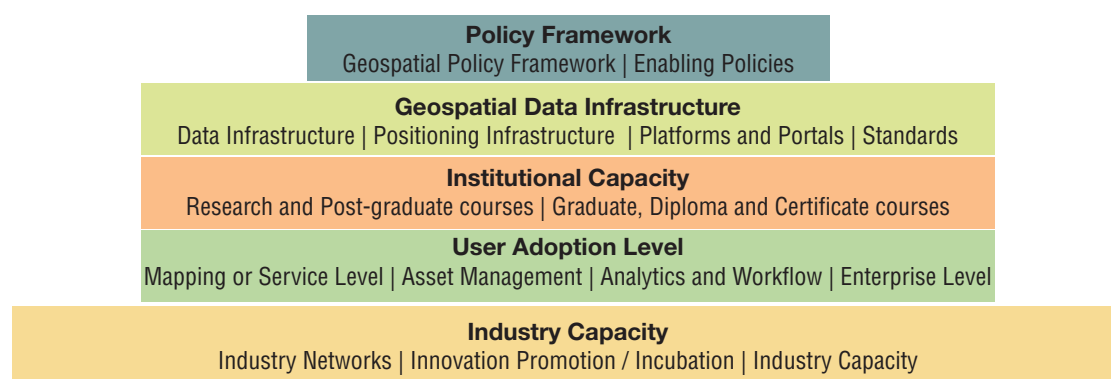
Source: GeoBuiz-18 Report

**India's dismal performance is visible in the UNDP HDI where it ranks 131st among 188 countries, improving only 4 ranks since 1990, i.e. last 28 years.**

### Value of enabling geospatial data infrastructure and policy framework

For an efficient geospatial strategy, geospatial information infrastructure and policy framework is the key enabling platform, facilitating socio-economic development in the digital age.

### WHAT ARE THE PILLARS OF GEOSPATIAL READINESS?



An efficient geospatial infrastructure facilitates access, distribution and use of geospatial information in a country. The governing structure, that is the institutions responsible for enhancing the integration of geospatial datasets, are primarily the national mapping agencies and space agencies. These agencies are primarily responsible for facilitating other core geospatial infrastructure components in the country such as **geospatial data infrastructure; positioning infrastructure; platforms and portals for dissemination of geospatial data; and guidelines on standards.**

A facilitative policy framework provides the necessary environment and reference guidelines for holistic development of the geospatial ecosystem and adoption of geospatial information and technologies in a country. It is, therefore, imperative to have policy framework for all areas associated with geo data such as **core geospatial policy and regulations; Open data policy; space & EO, GNSS and UAV policies; and finally enabling policies such as those for science and technology, innovation or ICT.**

## Potential of geospatial knowledge in the New India story









India is the world's seventh largest economy by nominal GDP and the third largest economy of the world by purchasing power parity. The India growth story revolves around inclusive and equitable growth, poverty eradication and gender justice.

The Government of India has adopted the mantra of **“Development as a Mass Movement”** keeping a timeline of 2017-2022 towards achieving a **“Swachh, Swastha, Shikshit, Sampann, Saksham and Surakshit” Bharat** (Clean, Healthy, Educated, Complete, Able and Secure India) by 2022.

In order to leverage its impressive achievements in the IT sector, the government has laid out plans for Digital India, Smart Cities, High Speed Rail, Irrigation, and Skill Development, aiming to create a sustainable base for continuing this development into the next decade. The recently tabled Union Budget 2018 also made a record allocation towards infrastructure, besides announcing special programs for artificial intelligence and machine learning.

Geospatial technology has a role to play in each of these programs as they require significant use of base spatial data at varying scales, skilled manpower to apply and integrate spatial information.

### AREAS WHERE GEOSPATIAL TECHNOLOGIES CAN PLAY A ROLE

	Infrastructure	<ul style="list-style-type: none"> <li>→ Roads: Bharatmala</li> <li>→ Railways: National Rail Plan</li> <li>→ Waterways: Sagarmala</li> <li>→ Airways: Udaan</li> </ul>
	Energy	<ul style="list-style-type: none"> <li>→ Electricity: UDAY, IPDS</li> <li>→ Oil and Gas</li> <li>→ Coal</li> <li>→ Renewables: ISA</li> </ul>
	Housing and Urban Affairs	<ul style="list-style-type: none"> <li>→ Smart Cities</li> <li>→ RURBAN</li> <li>→ AMRUT</li> </ul>
	Natural Resource Management	<ul style="list-style-type: none"> <li>→ Mining</li> <li>→ National Hydrology project</li> <li>→ National ground water management project</li> <li>→ Environment monitoring and Disaster management</li> <li>→ Forest management, Tribal livelihood strengthening</li> </ul>
	Defence and Internal Security	<ul style="list-style-type: none"> <li>→ Regional and global Geo-political management</li> <li>→ Modernisation of police forces</li> <li>→ Focus areas development for insurgency control</li> </ul>
	Digital India	<ul style="list-style-type: none"> <li>→ E-Kranti : 44 mission mode projects including e-governance, Digital India Land Records Management Program (DIMRMP), National GIS etc.</li> </ul>
	Banking and Finance	<ul style="list-style-type: none"> <li>→ Financial inclusion: linking Jan Dhan accounts, Mobile numbers and Aadhar cards</li> <li>→ Insurance covers to citizens</li> <li>→ Banking sector reforms/ new licenses</li> </ul>
	Agriculture	<ul style="list-style-type: none"> <li>→ Integrated initiatives to reduce input costs/risks and increase market realisation aimed to Double farm income</li> </ul>

As can be seen, the central government has already laid out a well thought out growth trajectory. It is now the responsibility of the country to take the right steps to fuel its developmental agenda with the right policy, infrastructure and industrial and institutional capacities for the geospatial sector to create a solid foundation for national development and governance.

### India in a Geospatial Age

The geospatial data usage in India is supported to a large extent by initiatives set out by the central government through its ministries and various departments, especially **in 160+ projects, wherein the departments concerned are asked to work closely with ISRO and its data centre, NRSC**. These initiatives, along with state and local level initiatives, have the potential to motivate a much stronger internal capacity for Indian geospatial technologies.

Geospatial technology and information has great potential to be a public commodity and enabler to the larger challenges facing global economic and social well-being. However, this requires the right policy framework, such as the promotion of other technologies, including telecommunication, broadband and the Internet, to unlock its true potential.

However, **absence of a comprehensive policy** on the use of geospatial data and technologies had been the biggest issue for the country, more so with a number of old obsolete policies — restrictive and overrun by security concerns — hindering the efforts.

**There are a total of 14 national level policies and rules, out of which 3 are in draft stage, under as many as 6 ministries/departments.**

#### GEOSPATIAL-RELATED NATIONAL LEVEL POLICIES

##### Ministry of Defense:

- 1 Restriction of Sale, Publication and Distribution of Maps 2017
- 2 Policy on Digital Data of Topographic Maps 1967
- 3 Policy of Aerial Photographic Survey Aircraft Borne Remote sensing 2006

##### Department of revenue, Ministry of Finance:

- 4 Rules Prohibiting Export of all Maps of 1:250K and Larger Scales 2005
- 5 Courier Imports and Exports (Clearance) Amendment Regulations 2010

##### Ministry of Science & Technology:

- 6 National Map Policy 2005
- 7 National Data Sharing & Accessibility Policy 2012
- 8 National Geospatial Policy (Draft) 2016

##### Department of Space:

- 9 Remote Sensing Data Policy 2011
- 10 Space Activities Bill (Draft) 2017

##### Ministry of Home Affairs:

- 11 The Criminal Law Amendments Act 1961, Act No. 23
- 12 Geospatial Information Regulations Bill (Draft) 2016

##### DGCA, Ministry of Civil Aviation:

- 13 Civil Aviation Requirement 2012,
- 14 Operations of UAVs-Air Transportation Circular 328 2016



## WHO IS DOING WHAT?

Department	Mandate
Department of Science and Technology (DST)	<ul style="list-style-type: none"> <li>→ Formulation of science and technology policies</li> <li>→ Entrepreneurship and innovation promotion</li> <li>→ Survey of India *</li> <li>→ National Atlas &amp; Thematic Mapping Organization (NATMO)</li> <li>→ National Spatial Data Infrastructure and promotion of GIS</li> </ul>
Survey Of India (Sol)*	<ul style="list-style-type: none"> <li>→ Geodetic control, surveys</li> <li>→ Topographical control, surveys and mapping</li> <li>→ Tide Tables</li> </ul>
Geological Survey of India (GSI)	<ul style="list-style-type: none"> <li>→ Geoscientific information and mineral resource assessment</li> <li>→ Multi-disciplinary, glaciology, seismotectonic studies and fundamental research</li> </ul>
Forest Survey of India (FSI)	<ul style="list-style-type: none"> <li>→ Spatial database on forest resources</li> <li>→ Research on applied forest survey techniques</li> <li>→ Assessment of forest cover and change monitoring</li> </ul>
National Remote Sensing Centre (NRSC)	<ul style="list-style-type: none"> <li>→ Providing Earth Observation (EO) Data</li> <li>→ Develop technologies &amp; applications for Natural Resources Management</li> <li>→ Support for disaster monitoring and management</li> <li>→ Capacity building for utilization of EO data</li> </ul>
DEITY-NIC	<ul style="list-style-type: none"> <li>→ ICT Infrastructure</li> <li>→ Implementation of e-Governance Projects</li> <li>→ Framework products and services</li> <li>→ Consultancy to the government departments</li> <li>→ Research and development</li> <li>→ Capacity building</li> </ul>
State DoIT&C	<ul style="list-style-type: none"> <li>→ State IT Policy</li> <li>→ NeGP projects in the State</li> <li>→ Standardization and Security Aspects</li> <li>→ Capacity Building</li> <li>→ End-to-end service delivery of (G2C) (B2C) and (G2G) services</li> </ul>

At present, there are **no clear-cut guidelines on data sharing or standards**. Along with Survey of India, organizations like NRSC, NIC, FSI, GSI, UIDAI are playing an important role in generation as well as use of geospatial data in solving real-life problems. Other than organizational data lying in silos, there are also multiple missions duplicating efforts such as the NSDI, National GIS and Bhuvan.

The other major hindering factor is the **limitations of our existing capacities** – both industrial abilities and trained human resources – leading to slowing down of projects. While restrictive laws and lack of tax incentives have been impeding the growth of the industry, little focus on coordinated geospatial education and lack of institutional development have hampered capacity development in this field.

An overview of the 29 states and 7 UTs for explicit GIS policy/strategy document and analysis of their ICT (or IT & ITeS) policy for geospatial information and technology adoption found **only 3 states with some sort of GIS policy/strategy document**. Further, 11 states and 3 UTs were found to be having ICT policies mentioning geographical information, GIS and remote sensing.

#### COMPARATIVE POSITIONING OF DIFFERENT STATES

	No.	States	Policy			Geo Portal**			State Remote Sensing Centre	GIS Based Schemes		
			GIS	ICT		State GIS	State Spatial Data Infrastructure(SSDI)*			>10	5-9	0-4
				With GIS	Without GIS		Functional/ under development	Proposed				
STATES	1	Rajasthan		✓		✓			✓		✓	
	2	Haryana		✓			✓		✓			✓
	3	Uttarakhand			✓	✓	✓					✓
	4	Madhya Pradesh		✓		✓	✓		✓	✓		
	5	Karnataka	✓		✓	✓	✓		✓	✓		
	6	Andhra Pradesh	✓		✓	✓				✓		
	7	Tamil Nadu	✓	✓		✓		✓	✓		✓	
	8	Goa			✓							✓
	9	Maharashtra		✓		✓			✓		✓	
	10	West Bengal			✓		✓					✓
	11	Bihar		✓		✓	✓					✓
	12	Punjab			✓	✓			✓			✓
	13	Odisha		✓		✓	✓		✓		✓	
	14	Jharkhand			✓	✓			✓		✓	
	15	Chhattisgarh			✓	✓			✓			✓
	16	Kerala		✓		✓			✓	✓		
	17	Assam		✓		✓			✓			✓
	18	Uttar Pradesh			✓	✓			✓		✓	
	19	Himachal Pradesh			✓				✓			✓
	20	Gujarat			✓	✓			✓		✓	
	21	Telangana			✓	✓			✓		✓	
	22	Mizoram		✓				✓	✓			✓
	23	Nagaland		✓				✓	✓			
	24	Jammu & Kashmir		✓			✓					✓
	25	Manipur		✓					✓			
	26	Meghalaya			✓							
	27	Tripura			✓				✓			
	28	Sikkim		✓					✓			✓
	29	Arunachal Pradesh				✓			✓			
UNION TERRITORIES	1	Chandigarh		✓								
	2	Puducherry		✓								✓
	3	Delhi		✓			✓			✓		
	4	Lakshadweep			✓	✓						
	5	Andaman and Nicobar Islands			✓							
	6	Dadra and Nagar Haveli										

## What is missing?

First and foremost, what India currently sorely lacks is a national-level **integrated geospatial strategy**, encompassing shared vision and values of public authorities, private sector enterprises, academic institutions and users. In addition to enforcing **open standards and open data** practices, the government also needs to work towards an adequate geodetic Infrastructure for ensuring **accuracy of maps**.

An integrated strategy and **participative ecosystem** will result in an innovative and entrepreneur-friendly environment for the industry, and an enterprise system for delivery and access of geospatial information to empower citizens.

### THE MISSING LINKS

- **Policy Framework**

- a. Integrated National Geospatial Policy
- b. National level geospatial sector coordination mechanism to enable integrated programs/strategy/guidelines
- c. Reference state geospatial policy and nodal implementation mechanisms i.e. department/division
- d. Eco-system development for geospatial industry, startup entrepreneurship and Innovation, R&D promotion
- e. National guidelines on data sharing and standards

- **User Adoption**

- a. Industry partnered geospatial technology use mandates in mission-mode programs
- b. Industry partnered Centre of Excellence in key mission areas like railways, smart city solutions.
- c. Incentive-reward programs
- d. Benchmarking reference examples

- **Institutional Capacity**

- a. GIS skill development: GIS certificate courses, optional courses available in every engineering college, undergraduate and postgraduate education institute for interdisciplinary development
- b. National Geospatial Education Policy

- **Geospatial Data Infrastructure**

- a. Base maps
- b. Modern geodetic references.
- c. Modern and precision Ground positioning infrastructure i.e. CORS network

- **Industry Fabric**

- a. Startup accelerator, incubation programs, innovation challenges
- b. National, regional or functional awards programs with industry-institute participation
- c. Geospatial equity investment/ debt funds
- d. MSME/Innovation cluster programs

The other major challenges that hinder adoption of geospatial technologies in India include lack of exposure to benchmark cases, inadequate capacities to design procurement guidelines along with lack of clarity in project/mandate guidelines and high cost of procurement, implementation and maintenance including human resource. There are other factors like political leaders not being convinced about the idea, minimal interactions with the geospatial industry at strategic level and last but not the least, the lack of service providers at project planning, designing and implementation levels make the situation worse.

### Global best examples

Indian geospatial industry has to learn from global best examples since it is an established fact that development and geospatial readiness go hand in hand. There is much to learn from initiatives such as the US government's Geospatial Data Act and EU's INSPIRE directive in:

- Defining the structure and scope of NSDI/data hub
- Codify the existing executive orders and other guidance documents
- Authorizing a single agency to make other agencies follow existing rules
- Require reporting that will allow governments to track progress on the NSDI and ensure funding is spent wisely
- Requiring Federal agencies to work in partnership with other Federal agencies, state and local governments, institutions of higher education, and the private sector to efficiently and cost-effectively collect, integrate, maintain, disseminate and preserve geospatial data

Taking a cue from the proposed Geospatial Commission of UK, the Indian government can also look at setting up a national geospatial, which can:

- Manage the National geospatial hub by collating data from all data-generating agencies
- Encourage involvement of the private sector enterprises to contribute to this efforts
- Develop quality geodetic infrastructure to augment positioning capabilities of GPS and IRNSS
- Enforce open data practices and oversee delivery of geospatial information to citizens
- Adopt and enforce international standards

Survey of India, being the nation's survey and mapping organization, needs to play a pivotal role in setting the agenda for the much-needed transformations. There is an urgent need for an integrated and enabling strategy wherein Sol provides basic infrastructure and policy framework and respective agencies can leverage the same while undertaking their work. The need of the hour for Sol is to:

- Adopt modern technologies to provide updated and accurate basemaps, which can facilitate better analysis of location for more informed decisions.
- Make data easily accessible and useable
- Adopt a 'what people need approach'
- Collaborate with the industry -- both geospatial and non-geospatial -- and foster this collaborative approach for others to adopt
- Promote innovation by helping the SMEs to use geospatial
- Create more awareness and encourage uptake of geospatial technologies