

**Geospatial Capacity Building Program: An Initiative by NGP
Division, DST**



**National Geospatial Program Division
Department of Science and Technology
Government of India
New Delhi**

National Geospatial Programme: Vision and Objectives

Vision: Catalysing the National Geospatial Ecosystem.

Mission: Promoting Geospatial Science and Technology, Policy, Solution, capacity building, entrepreneurship and international cooperation for sustainable socio-economic development at all levels of Governance.

Objectives:

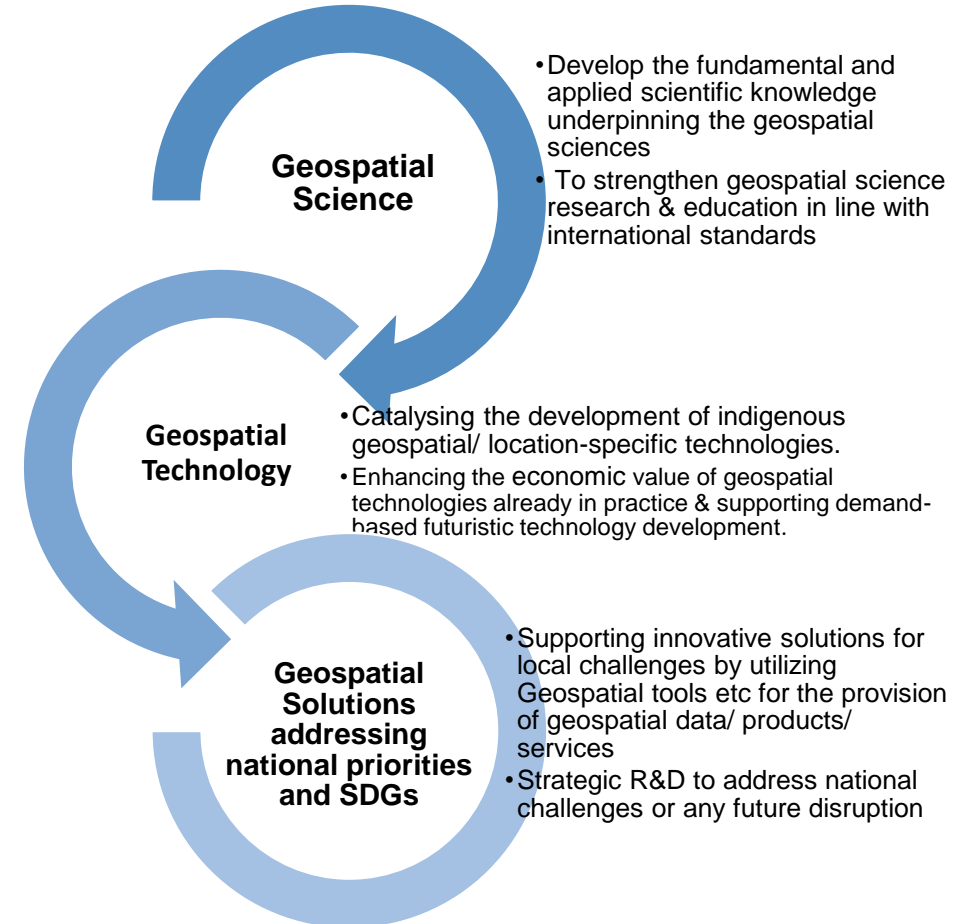
Promotion of R&D in emerging areas of Geospatial science and technology.

Development of geospatial solutions for sustainable socio-economic growth in alignment with Sustainable Development Goals (SDGs) and National Developmental Priorities up to panchayat and ward levels.

Build knowledge and adaptation capacity of geospatial technologies at various levels of governance in collaboration with academia and user agencies.

Stimulate the growth of Geospatial technology innovation.

Develop the national capacity for Geospatial science and technology development, acquisition and transfer through international cooperation.



Key Shift: From earlier NRDMS which has demonstrated utilities of Geospatial Technologies in decision making at pilots scale to **National Geospatial Programme Division (NGP)** to catalyse each vertical of the National Geospatial Ecosystem i.e Geospatial Science; Geospatial Technology & Solutions, **Geospatial Capacity building etc.**

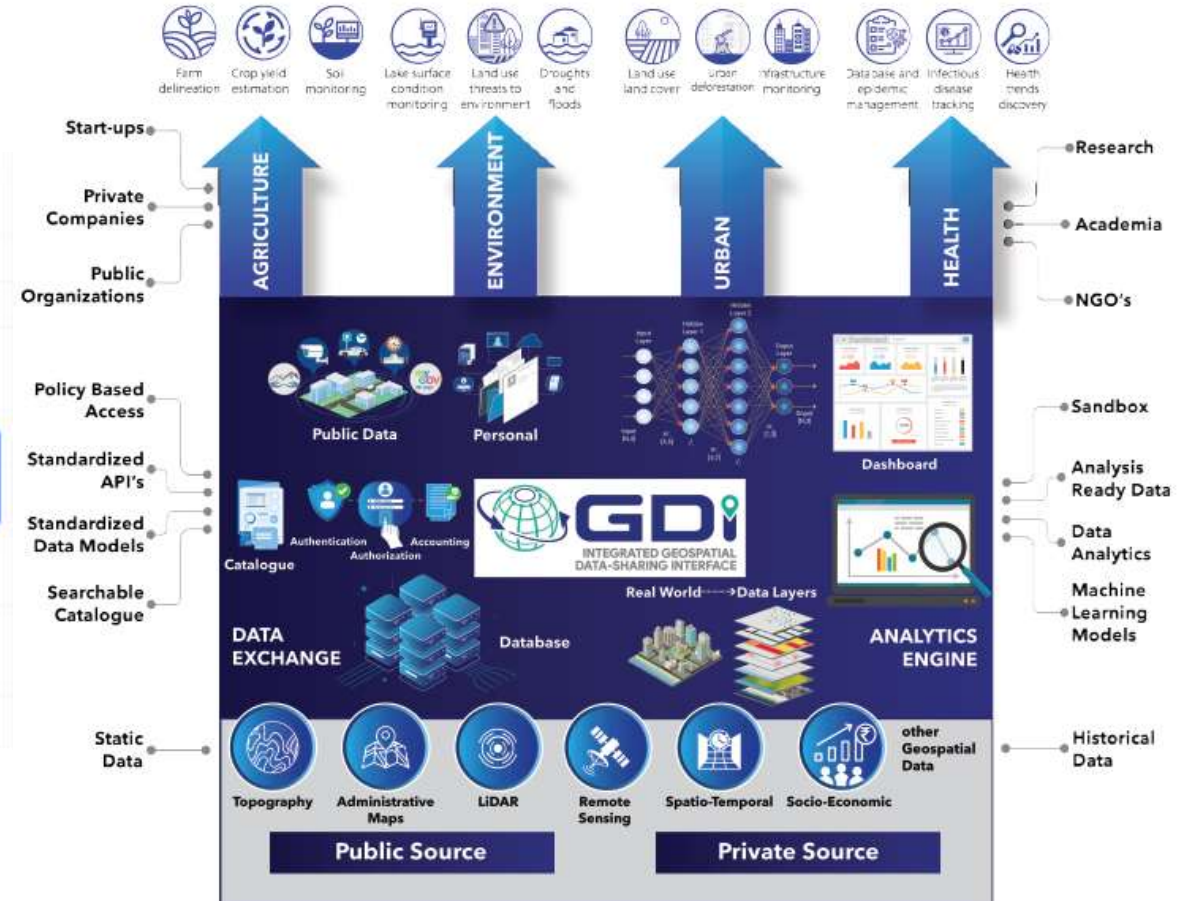
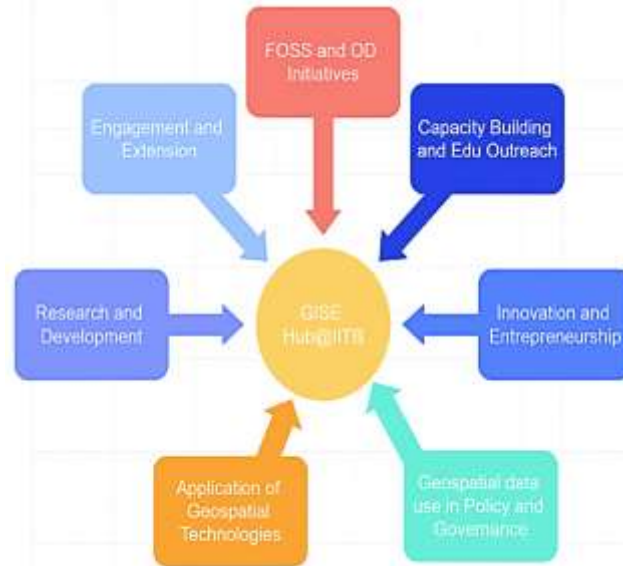
NCG at IIT Kanpur
&
RCGs at
IIT Bombay, IIST Trivandrum, IRS Anna University, IIT
(ISM) Dhanbad, MNNIT Allahabad and MANIT Bhopal

Addressing ecosystem level gaps specially in
Geospatial Science and Data sharing related

Pilot GDI at
IISc Bengaluru



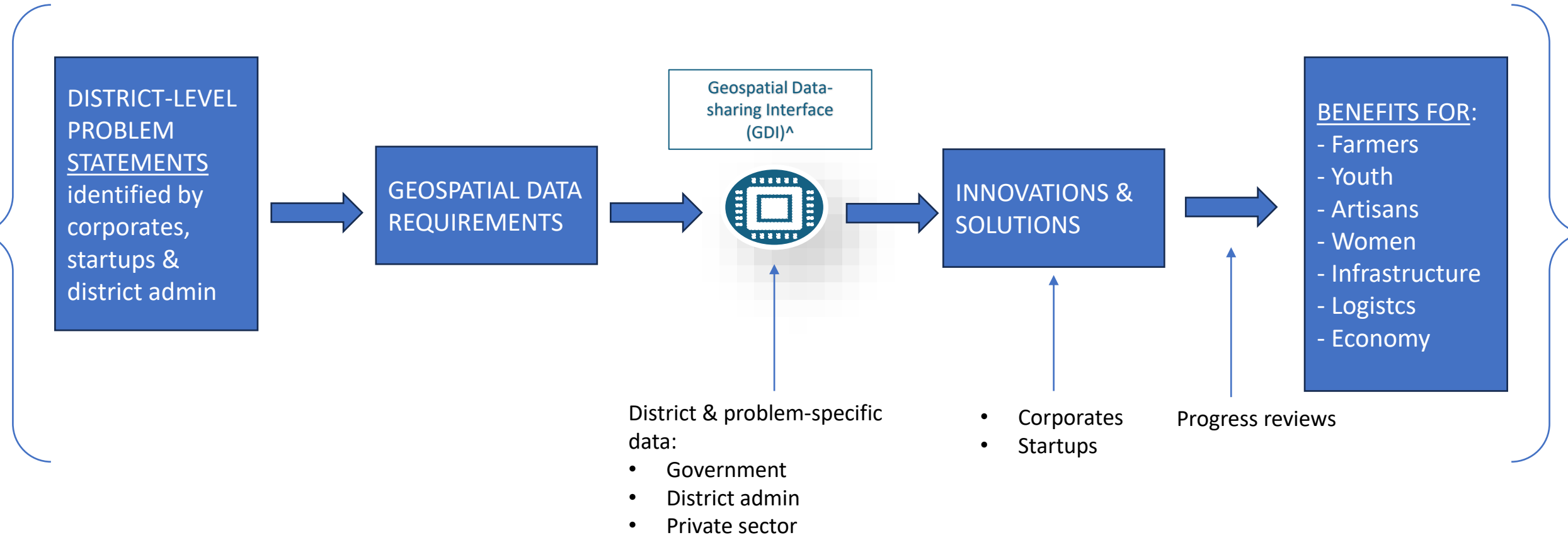
GISE Hub at IIT
Bombay



- Project Saptarshi**
Establishment of space geodetic techniques
- Indian National Geodetic Reference Frame**
Establishment of national geodetic infrastructure (horizontal, vertical, gravity and tidal datum)
- Calibration/Validation of NISAR Mission Data**
Corner reflectors co-located for calibration/validation and surface deformation monitoring
- DORIS**
Establishing DORIS station at IIT Kanpur
- Cartography**
Automatic creation of multi-scale maps

Scalable framework being piloted[^] in 6 districts

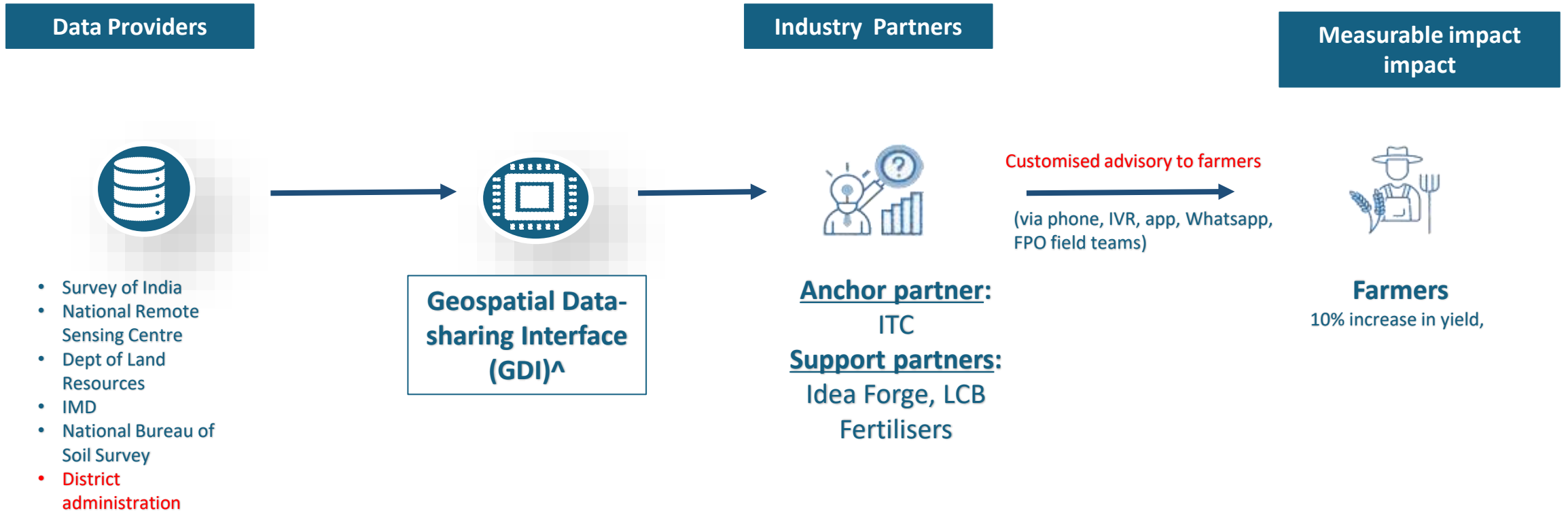
Tangible, measurable outcomes. Several PPP models being tested



District as basic unit. Scalable to multiple districts

Prototype version :GDI

Illustrative example: Agriculture, Varanasi district
User-centric approach. Piloted in Rabi season (wheat). Dec'24-Apr'25



26,000+ farmers benefited. Measurable 10%+ increase in yield

Key Outcomes of National Spatial Data Infrastructure

Development of Conceptual Data Models – Standards-based data models – vital to the development of structured databases – have been developed in domains like topography, geology, forestry, soils, and land resources to build interoperable geo-spatial databases for data sharing

Standards for Interoperability and Spatial Data Sharing – DCS geology, forestry, soils, and land resources developed and submitted to BIS for publication

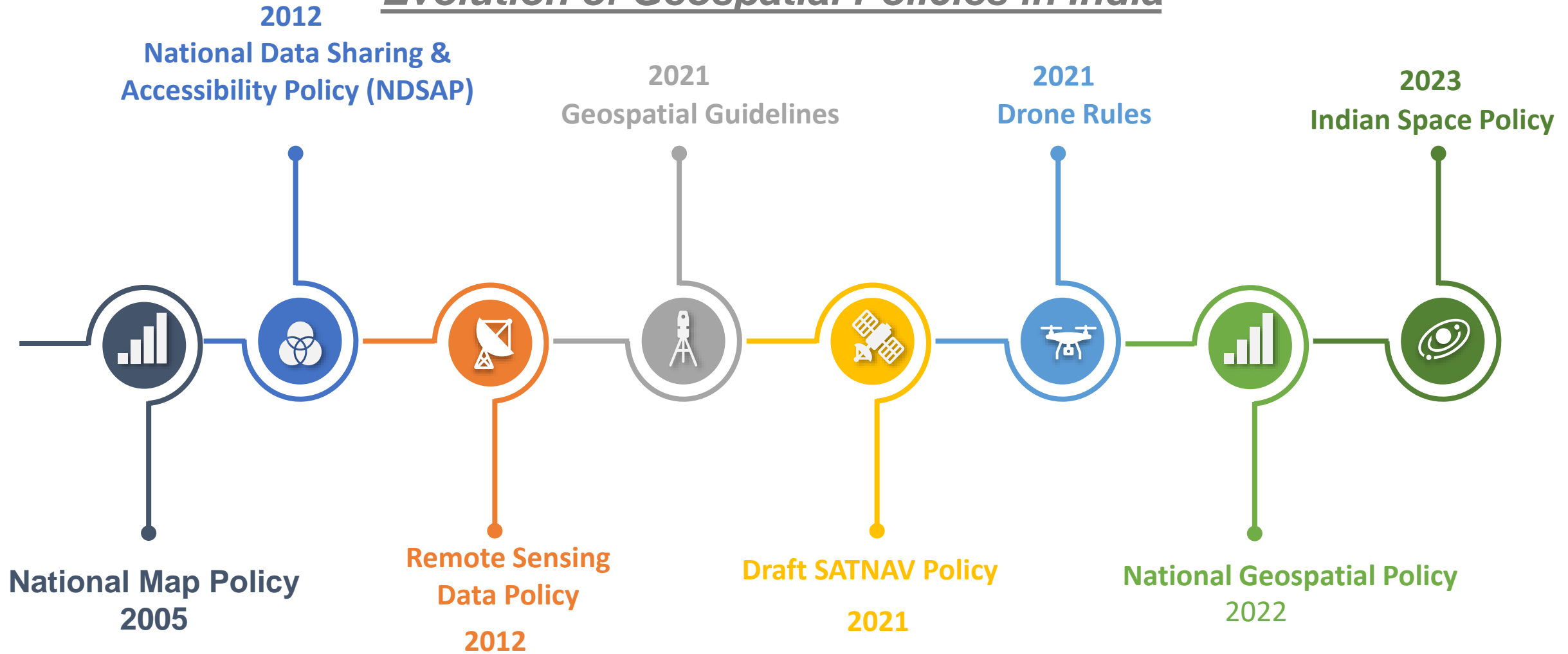
Development of National and State Geoportals – SDI and Geoportals established in 14 States

National Data Registry (NDR) – built over a set of open standards from OGC, ISO and BIS – 690 data sets approximately – Over 20 Central and State Governments sharing data sets

Geospatial Cloud Platform – proof-of-concept Geospatial Cloud-based Data Centre (NSDI-SOI private cloud) has been established at the Survey of India (Hyderabad campus) – management, sharing, and processing of high-resolution geospatial datasets

NATIONAL GEOSPATIAL POLICY (NGP), 2022

Evolution of Geospatial Policies in India



NATIONAL GEOSPATIAL POLICY (NGP), 2022

- The Geospatial Guidelines, 2021 deregulated the Geospatial sector and liberalized Geospatial data acquisition, production & access. NGP further builds upon The Geospatial Guidelines.
- Lays down an overarching framework for holistic development of the Geospatial ecosystem.
- Encourages Open Standards, Open Data and Platforms.
- Aims to unlock the economic value of Geospatial data

Vision: To make India a World Leader in Geospatial

Strengthening of Technology Infrastructure

Geo-ICT platform for easy access of Data, Geodetic Infra & Framework including CORS etc.

Development of Geospatial Capacity through **Education & Skill**

Strengthening of Data Infrastructure

Fundamental & Sectoral Data and Framework - including ORI, DEM, Topographical Data

Develop R&D & Innovation Ecosystem for the Country

07-01-2026
To have a **thriving Geospatial Industry** in the country involving **Private Enterprise**.

National Geospatial Policy (NGP): Capacity Development

National Geospatial Policy promotes long-term capacity development and education in integrated Geospatial information management, ensuring sustained value.

The policy also focuses on standardized Geospatial thinking education from school onwards, aligning with global best practices through certification of courses and skill sets.

National Geospatial Policy Document : Capacity Building mentioned in point 6, page 19

6. Geospatial Education and Skill Development

6.1.1. Geospatial education is imparted in around 200 universities/institutions at different levels in colleges, universities, Industrial Training Institutes and National Skill Training Institutes. However, there is lack of standardization of Geospatial curriculum. Geospatial education is not adequately integrated in the innovation system.

6.1.2. With the implementation of the Policy, the field of surveying and mapping is likely to see a sharp rise, creating job opportunities for various job-roles in Geospatial domain. To fill this resource gap, DST and SoI, together with experts from Industry and academia will work with the National Skill Development Council (NSDC) to create a Geospatial Skill Council. The Geospatial Skill Council will conduct skill gap studies, develop Qualification Packs, Occupational Standards as part of multi-level National Skill Qualification Framework (NSQF) for various job-roles/competencies in the Geospatial sector. Courses aligned to the NSQF will be run by various academic/ training institutions. Affiliation/ accreditation/ examination/ certification process will be standardised in accordance with NSQF as determined by the Ministry of Skill Development and Entrepreneurship mechanism for Vocational Training and Education or similar mechanisms of GoI.

National Geospatial Policy Document : *Capacity Building mentioned in point 6, page 20 cont...*

6.1.3. Development of international standard Geospatial Science education programs from the schools till the level of the universities will be encouraged. Cutting-edge research in Geospatial Science and Technology for indigenous capacity building and identification of new areas of application and solution will be promoted. Research in emerging technologies involving integration of Geospatial Technology with 4 th Industrial Revolution Technologies will be encouraged.

6.1.4. Geospatial science is interdisciplinary, combining various technologies and affecting diverse fields. There is a need for training Institute(s) for developing and nurturing of Geospatial professionals in all the diverse areas of Geospatial and allied technologies. National Institute for Geo-informatics Science and Technology (NIGST), Indian Institute of Remote Sensing (IIRS) and/or any suitable institute(s), public or private, will be developed into Centre(s) of Excellence - providing specialized courses in the domain of Geospatial Science & Technology.

6.1.5. Online courses will be made commonly available, including in collaboration with iGOT Karmayogi (Department of Personnel & Training, GoI) platform. A sustainable model for training will be developed through active and intrinsic industry participation. Strong industry linkages will be used, both for providing training inputs and placement activities, to complete the training lifecycle. Tie-ups with allied industries will be established to increase the placement spectrum of the trained youth.



GKI READINESS INDEX - 2022

LEADERS

Rank 2022	Country	Score (0-100)
1	USA	100.00
2	United Kingdom	83.89
3	Denmark	81.52
4	Netherlands	80.27
5	Germany	78.53
6	Switzerland	77.04
7	Canada	75.10
8	Singapore	74.82
9	Ireland	72.09
10	France	72.00
11	Australia	71.69
12	China	71.51
13	Sweden	71.19
14	Finland	70.55
15	Norway	70.21

CHALLENGERS

Rank 2022	Country	Score (0-100)
16	Spain	69.54
17	Japan	69.04
18	Belgium	66.84
19	Poland	65.97
20	Estonia	64.18
21	New Zealand	63.02
22	Italy	62.24
23	Austria	62.16
24	Portugal	60.17
25	South Korea	58.07
26	Russia	58.03
27	India	56.16



- GKI (Geospatial Knowledge Infrastructure) Readiness Index is released and produced by Geospatial World jointly with United Nations.
- Out of 50 countries **INDIA** is ranked at 27 and is in the Challengers category.

Efforts aligned with NGP milestones

And supported by Union Budget 2025-26

Hon'ble Finance Minister in her Budget speech of 2025-26

*"We will start **a National Geospatial Mission** to develop foundational geospatial infrastructure and data. Using PM Gati Shakti, this Mission will facilitate modernization of land records, urban planning, and design of infrastructure projects."*

Milestones (National Geospatial Policy 2022)

2025

- Modern National Geodetic Reference Framework
- High-accuracy Geoid

2030

- High-resolution topographic survey & maps
- High-accuracy Digital Elevation Model

2035

- Inland waters' bathymetric data & sea-surface topography
- Major cities & towns- Mapping of sub-surface infrastructure; digital twins



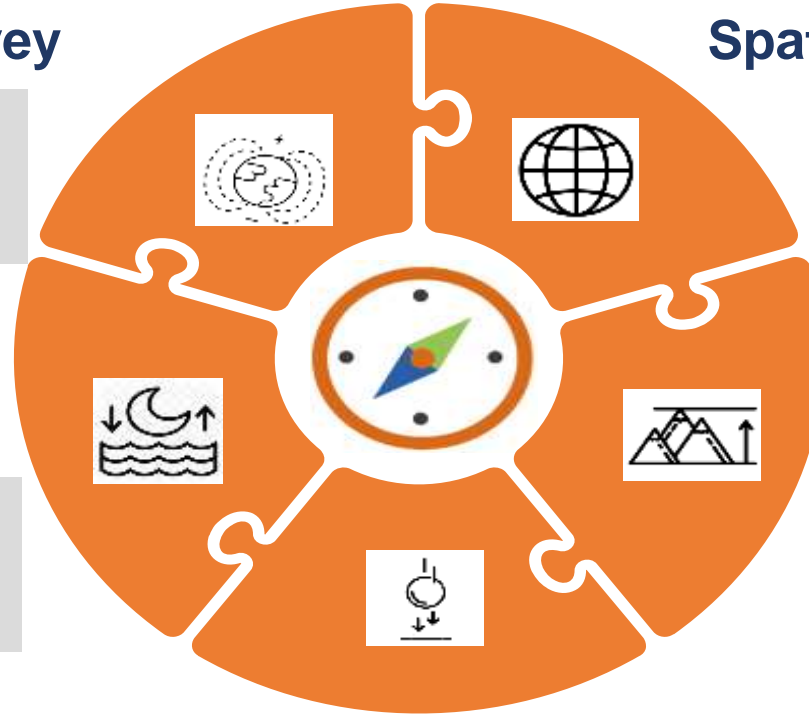
Modernization & Strengthening of Geodetic Infrastructure

Astronomical Observations & Geomagnetic Survey

Modernization of Geomagnetic
station.

Measurement & Strengthening of Tidal

Modernization & Strengthening of
Tidal infrastructure



National Horizontal Spatial Reference Frame

Establishment of 1042 CORS stations
Densification is under process

National Vertical Datum & Vertical Reference Frame

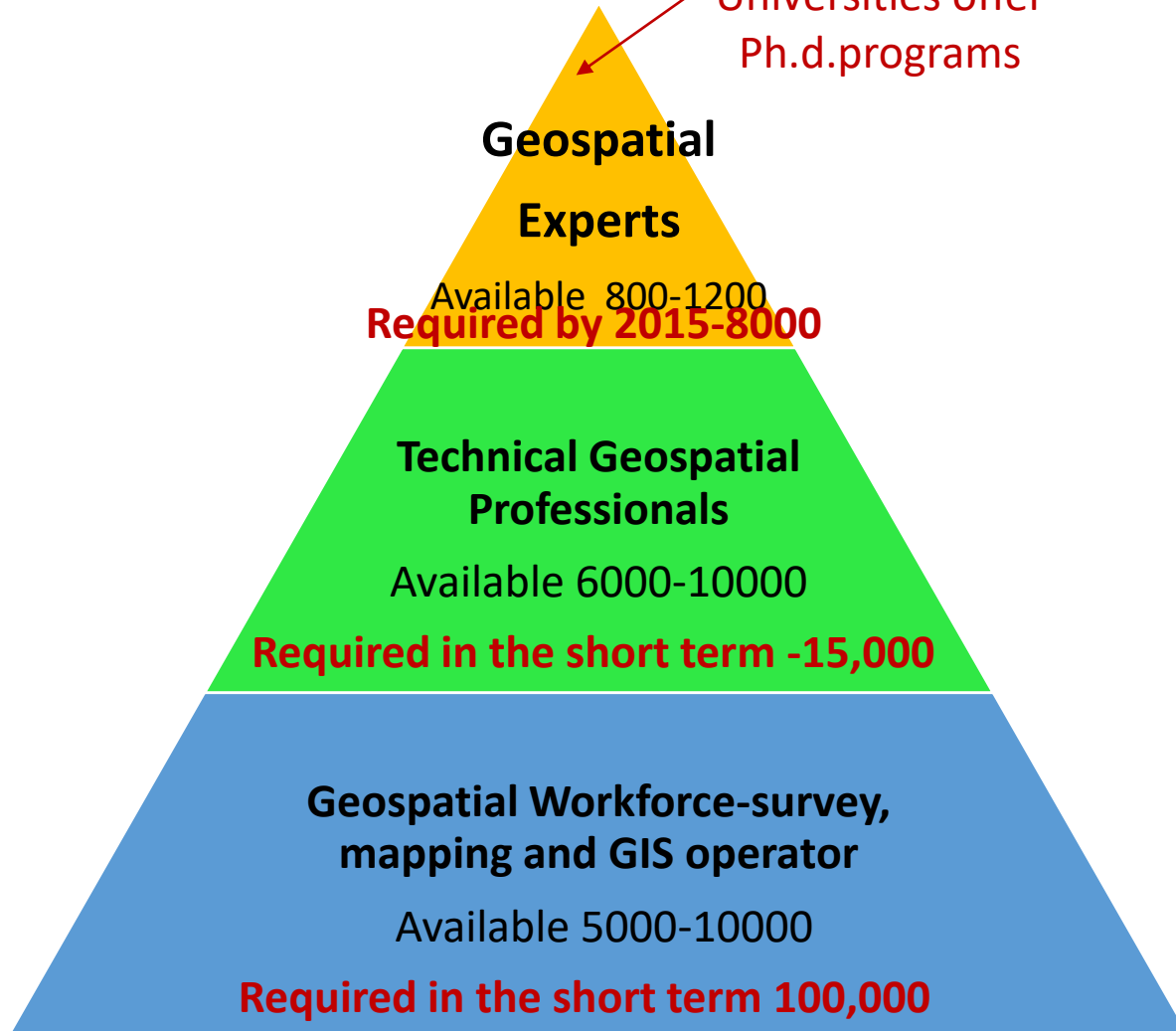
High Precision Levelling & Bench
Marks across the country

Gravity Measurement & Development of Geoid Model

High Precision Geoid Model and gravity network

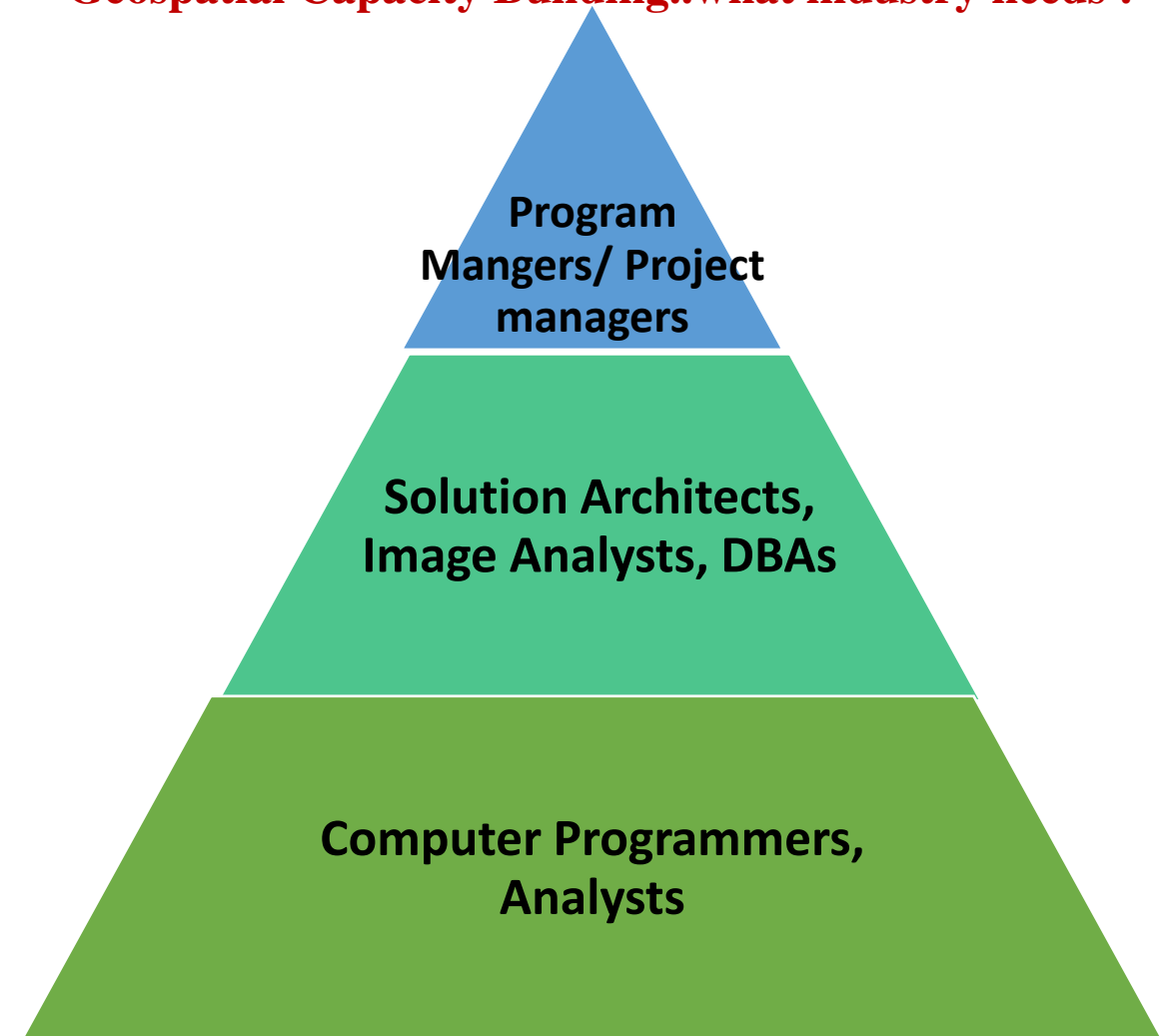
Rationale Behind Initiation of Geospatial Capacity Building Program at DST

22 % of Indian Universities offer Ph.d.programs



Source: Geospatial Task Force Report, 2013

Geospatial Capacity Building..what industry needs !



Source: Shri Rajesh Mathur, Geospatial Leadership Summit, 2022

Skill force requirement present scenario and upcoming

Geospatial Market Outlook (DST)

1.00

lakh crores INR

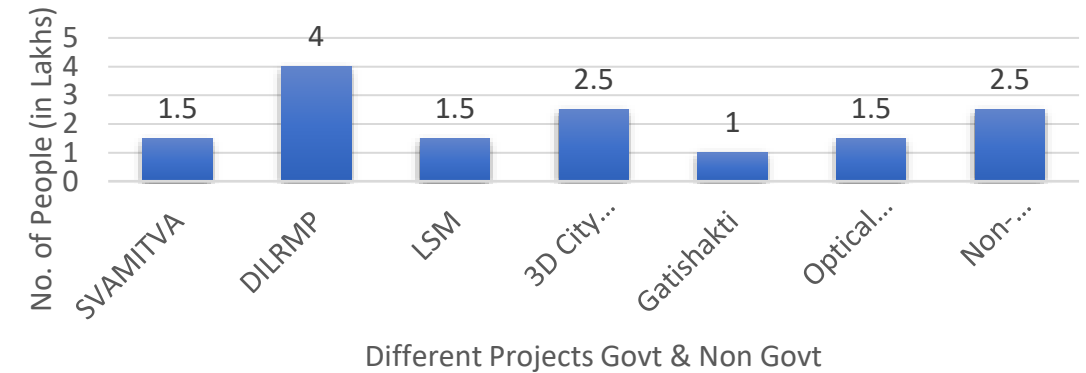
Indian domestic Geospatial market size forecasted by 2030

10

lakh jobs will be available in both Govt and private sectors in

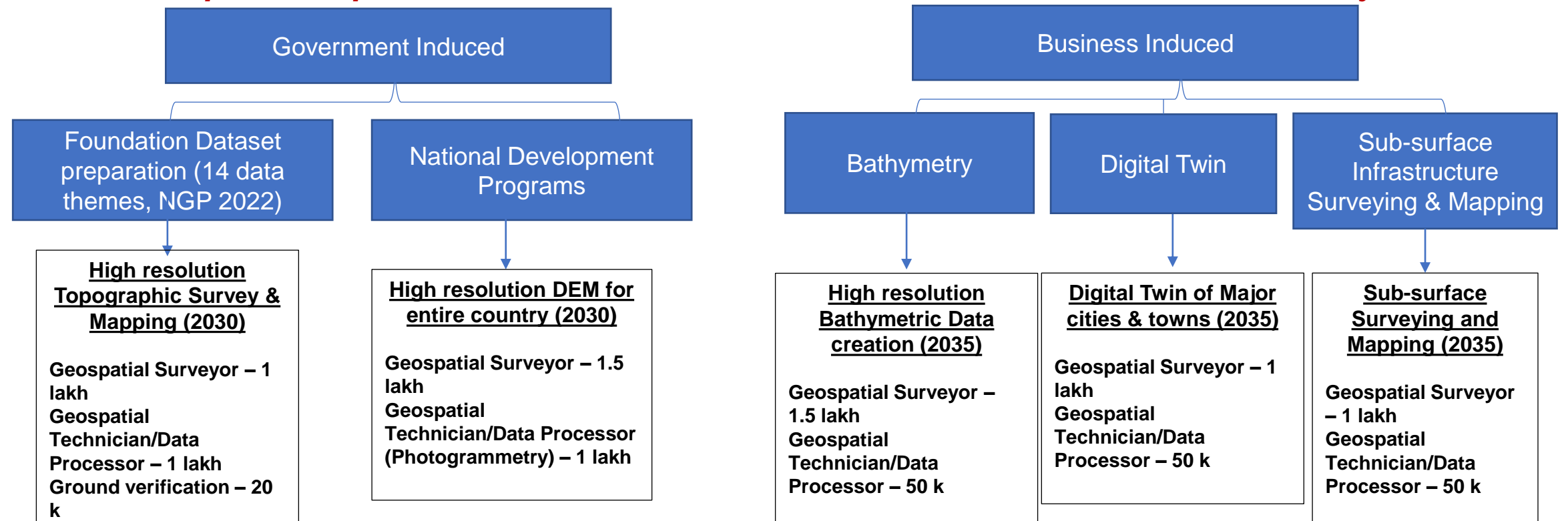
Indian domestic Geospatial market forecasted by 2030

PAX Projected in Different Geospatial Projects



Source: Geospatial Artha Report 2022

Potential Manpower Requirement Will Double With Market Growth Of 3 X to One Lakh Crore by 2030



Various Initiative Esri for Capacity Building

S.N.	Programme	Description	Objective
1	Young Scholar Program	Platform for undergraduate and postgraduate students to apply GIS in real-world scenarios.	<ul style="list-style-type: none"> - Mentorship from Esri India experts - Recognition for GIS innovation - Participation in the Esri User Conference, San Diego - Involves students from IITs, NITs, and other institutions
2	Master's Scholarships in GIS	Financial and technological support for M.Tech/MSc. students in Geoinformatics.	<ul style="list-style-type: none"> - Scholarships worth ₹10 lakhs annually - Aimed at fostering innovation and excellence in GIS
3	Master Mentors Geo-Enabling Indian Scholars (MMGEIS)	Free online program by Esri India and CKS for students from Class 8 to undergraduate level.	<ul style="list-style-type: none"> - Mentorship from prominent geospatial experts - Encourages research and IP filing - Promotes geospatial innovation at an early age
4	GIS Academia Council of India (GACI)	National platform to enhance GIS education and build industry-ready talent.	<ul style="list-style-type: none"> - Curriculum review for geospatial courses - Train the Trainer initiatives - Promotes GIS as a multidisciplinary subject - Collaborates with institutions and government bodies
5	MoUs with Key Institutions	Academic partnerships with institutions like Amrita Vishwa Vidyapeetham, IIT Tirupati, VNIT Nagpur.	<ul style="list-style-type: none"> - Capacity building through joint initiatives - Example: 'Mera Gaav Hamara Jaal' program for rural water sustainability
6	Bhu-Kaushal (भू-कौशल) Program	CSR initiative focused on GIS education for rural women.	<ul style="list-style-type: none"> - Massive e-learning GIS course - Focus on spatial thinking and 'The Science of Where' - Enhances problem-solving and decision-making - Job-readiness and tech skills for rural women - Over 10,000 women trained

SOI- NIGST – Upskilling courses

PHD Students can apply for the following courses and can upskill their capabilities in advance remote sensing technology and can apply for further job opportunities in the geospatial fields.

Type of Courses	Name of Courses	Duration
Short Term Courses	Geospatial related like Geodesy, Photogrammetry Drones Lidar remote sensing , GIS Analysis & Applications, 2D Feature Extraction , High precision Levelling, Multi-spectral remote sensing	2-4 Weeks
Refresher Courses	Field data updating using FDC, Street View Survey by 360degree camera, Drone Photogrammetry, LiDAR Remote Sensing, 2D Digitisation, Toponymy, GIS Analysis , Datum and reference Frame , Gravity and Geoid Modelling	5 days

NGP-DST's Geospatial Capacity Building Program

NGP Division have been supporting an exclusive training programs from more than a decade:

- **21-day Level 1 Summer/Winter School:** This is 3 weeks program focuses on introducing the participants to the basics of geospatial science and technology through a hands-on approach using open-source software.

- ❖ New initiative under level-1 : This new initiative introduced in 2023-26 cycle, which includes a special program for promoting **spatial thinking** among a wide cross section of participants including youth..

Geospatial thinking will be inculcated across the **value chain of geospatial knowledge generation**.

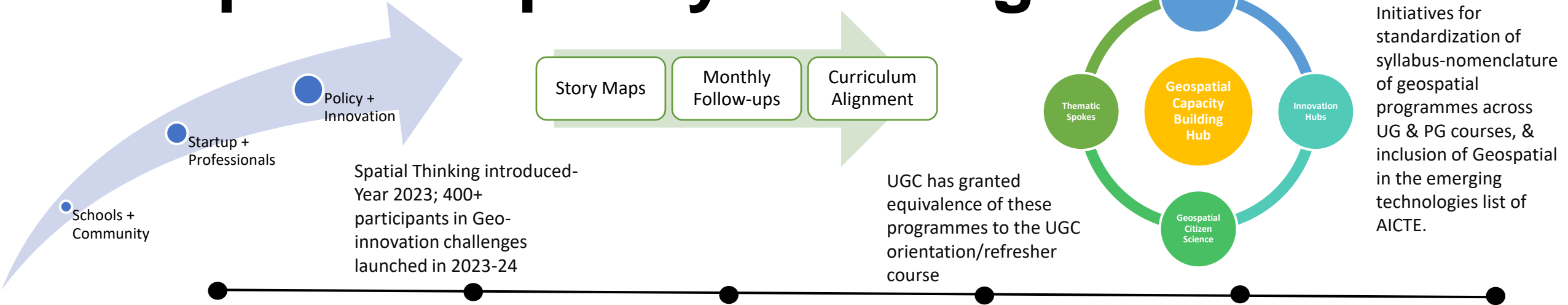
- **21-day Level 2 Summer/Winter School:** This advanced three weeks program focuses on building capacities among the participants by deepening their knowledge and competency about various specialized and advanced aspects of geospatial Science, data and technologies using open-source software.

- **Three days Geo-innovation Challenge:** The objective of this three-day Geo Innovation Challenge is to recognize, encourage and nurture innovation for national socio-economic developmental processes among the youth of our country (initiated in last cycle)

In current year (2023-26) the Geo-innovation Challenge Program will be conducted in two sessions.

- *The PI will conduct the first session as an online orientation (1 day) to the overall theme and the need for innovation in the proposed area. The participants need to submit their proposal for the Geo innovation Challenge Program within a month of the first session.*
- *The second session is a 3-day offline session involving presentations and interactions with the jury at the host institution of the PI.*

Geospatial Capacity Building

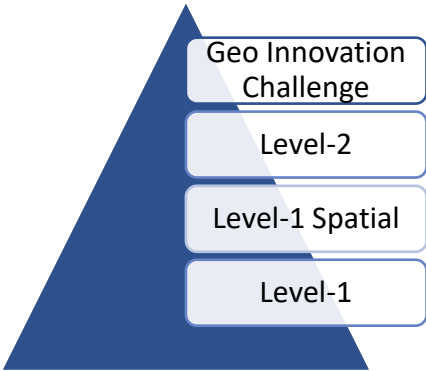


Initiatives for standardization of syllabus-nomenclature of geospatial programmes across UG & PG courses, & inclusion of Geospatial in the emerging technologies list of AICTE.

6000+ individuals trained through summer/winter schools.

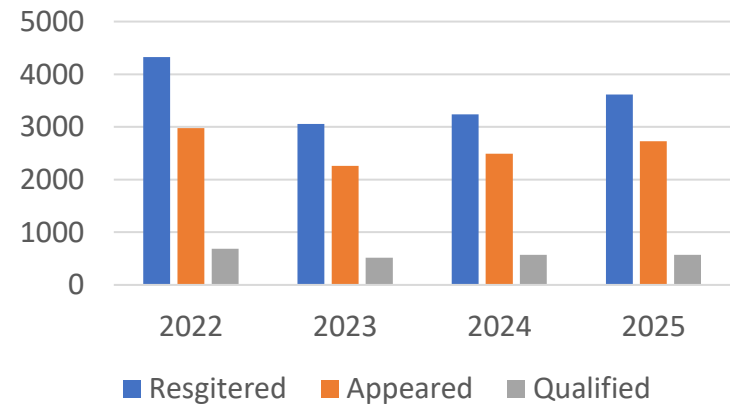
Spatial Thinking Orientation Workshops for Teachers/ Educators in 06 States w SCERTs training 180+ teachers & impacting 150 schools

Inclusion of **Geospatial in the Graduate Aptitude Test in Engineering (GATE) in 2022**—Initiatives for inclusion of Geospatial as a subject in CSIR/UGC-NET.



Key shift from merely awareness creating basic level programmes to specialized programs to address systemic gaps: **inculcation of spatial thinking** at schools/ teachers in coordination with SCERTs; alignment with UGC/ AICTE etc.

GATE-Geomatics Engineering



Ref: 2022: IIT Kharagpur , 2023: Kanpur , 2024: IISc Bengaluru , 2025: Roorkee

- **Awareness generation** through LinkedIn, Instagram, national events, teacher workshops.
- **Promoting spatial thinking** at school and community levels.
- **Geo-Innovation Challenge Programs** encouraging students, researchers, and professionals to develop startup ideas.
- **Capacity building of NGOs** for spatial solutions and applied projects.



- Standardized 21-day Summer/Winter Schools recognized by UGC.
- Integration of geospatial concepts in university and school curricula (NCERT/SCERT engagement).
- Advanced theme-based Summer/Winter Schools (**Level 2**).
- **Geo-Innovation Challenges** nurturing professional problem-solving.

NGP - DST's Geospatial Capacity Building Program Evolution



Initiation of DSTs Capacity Building Program

dst-iget portal developed
PI orientation initiated

Standardization of the syllabus
Seamless implementation through the dst-iget portal

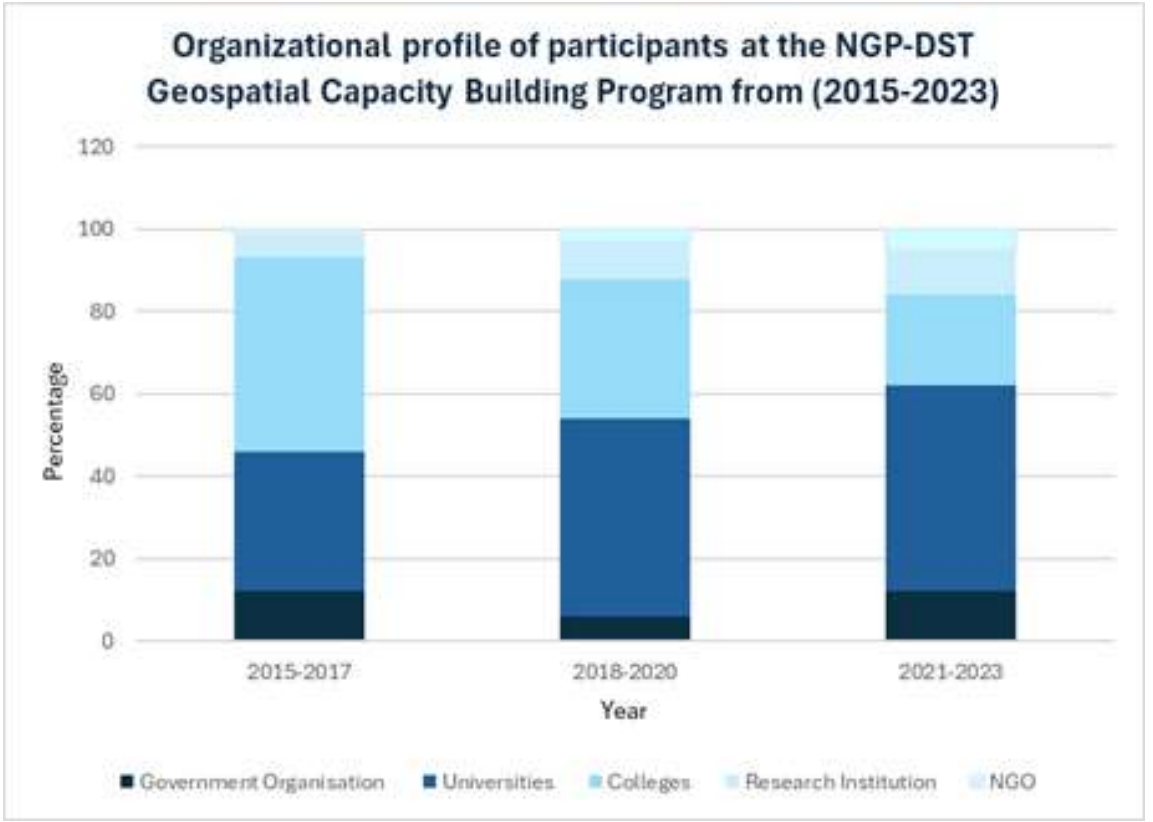
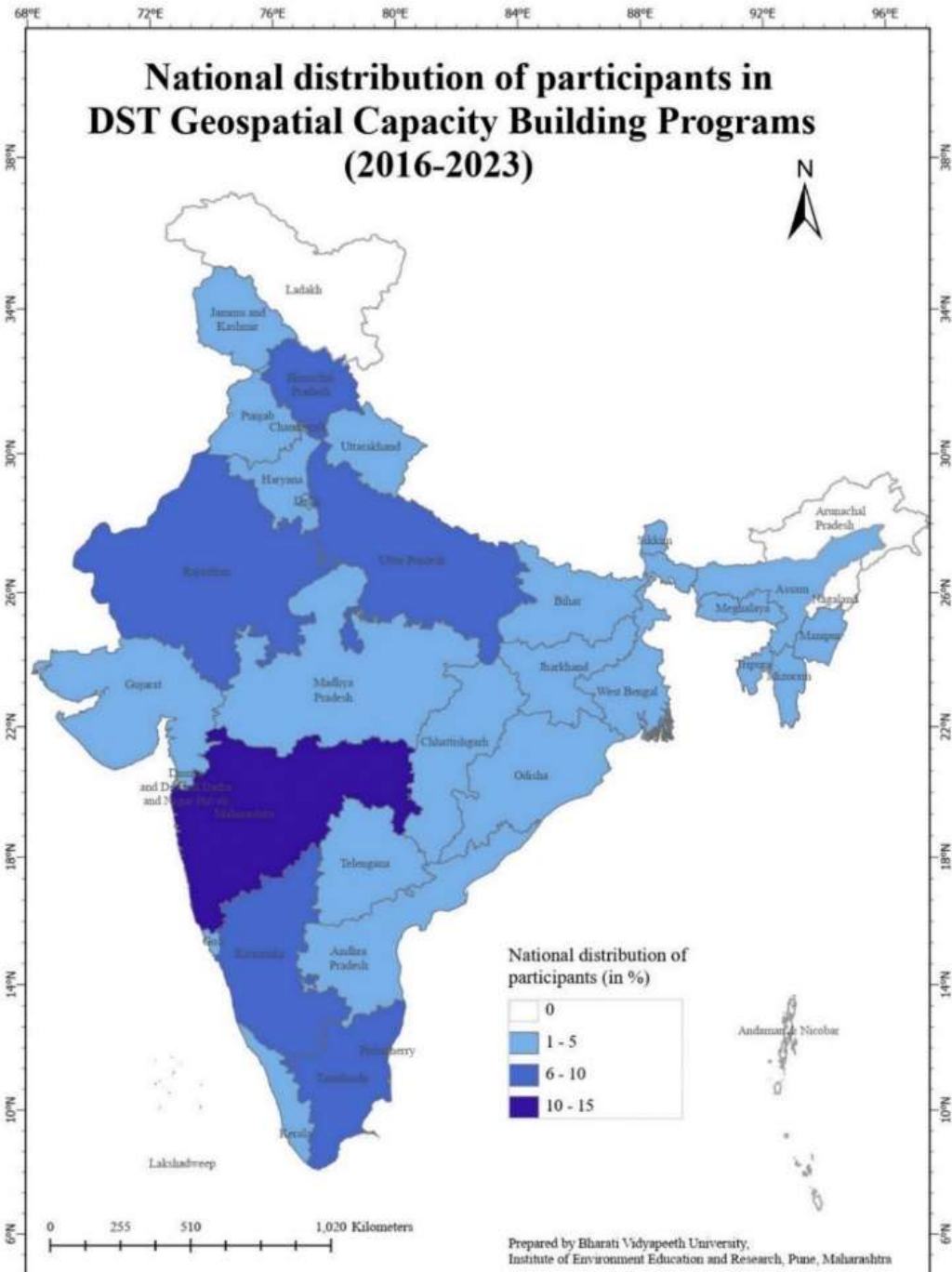
Advanced three weeks course initiated (L2)

Addition of Geo Innovation Program
Focus on involvement of youth
Alignment to the Sustainable Development Goals

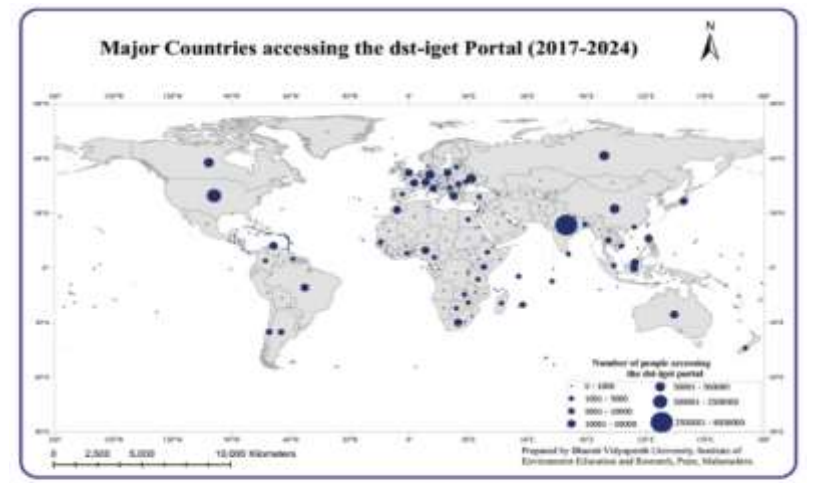
L2 focus on technology development
New program on spatial thinking initiated for diverse groups



- 5000 participants and growing
- Initiated special papers at their respective courses
- Increased use in their workflow



Institutional participation trends of participants at the geospatial capacity building programs sponsored by the National Geospatial Program, Department of Science and



13297+ PORTAL VIEWS
 518+ VISITORS
 2297+ TRAINED
 3297+ REACH

Ref: DST iGET portal for geospatial education (<https://dst-iget.in/>)



At the Second UNWGIC on 10 October 2022 in Hyderabad, India, 18 schools showcased spatial thinking for localizing SDGs.

National Geospatial Science Education Program

- Standardization of the curriculum
- Faculty Development
- Institutional and societal capacity building
- Quality Improvement

Fostering development

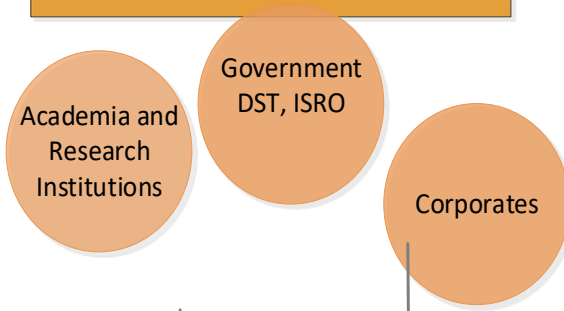
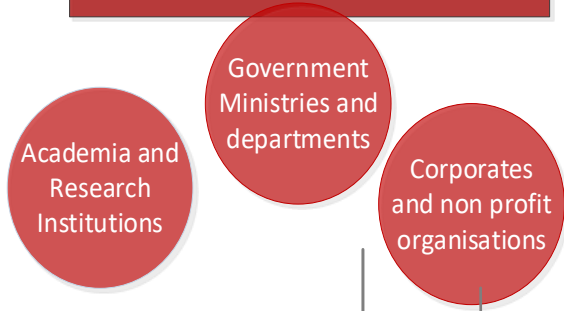
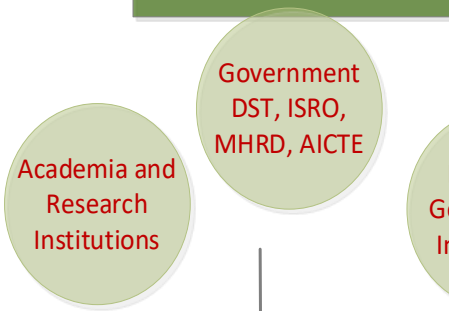
- Earth science analytics
- Positioning technologies
- Scanning technologies
- Indigenous/open source Software development

Fostering innovative applications

- Alignment with flagship programs of government
- Alignment with sustainable development goals

Supporting geospatial startups

- Establish geospatial incubators
- Define enabling frameworks
- Set up mentoring support



Setting up a Geospatial Training Accreditation Board under DST

Policy Support Framework

Financing

Fostering industry academia partnerships

Specific curriculum development in engineering colleges

Fostering industry academia partnerships

Capacity building for specific sectoral applications

Fostering industry academia partnerships

Fostering tripartate partnerships

Set up incubation hubs jointly with universities

Setting up specific courses/skill development programs

Incorporating geospatial technology into their work flow

Budget provisions for collaborative research into enabling technologies (sensors, nano satellites, mobiles, etc.)

Promote research for development of applications aligned to flagship programs/ SD goals