Geospatial Industry: Yesterday, Today, and Tomorrow

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Humans have long recognized the importance and value of maps in their lives. Indeed, the history of mapping can be traced back more than 5,000 years. Since then, the world has come a long way from the days of using paper maps for finding places, to adopting spatial intelligence in everyday decisions. The story of India is no different, although the adoption rate has been slower than desired.

Early adopters

As in other countries, in India as well, the early adopters of GIS were the national mapping agencies that built capacity to create geospatial data products; organizations like Survey of India, Geological Survey of India, National Atlas and Thematic Mapping Organization (NATMO), et al. Indian Space Research Organisation (ISRO), Regional Remote Sensing Centres (RRSCs), State Remote Sensing Centres, and National Informatics Centre implemented several GIS-based pilot projects across a range of domains like water resource management, forestry, urban planning, etc., to demonstrate the applications of GIS and remote sensing.

While a lot of good work was being done by the user community, the utilization of geospatial technologies was nowhere near the potential. The primary reason was lack of awareness of GIS, inadequate availability of technical manpower, spatial data availability, and limited access to solution providers who could support the users in implementing GIS.

In order to meet the growing needs of skilled geospatial manpower, several universities built GIS and remote sensing labs to create human resource capacity and also take up research projects. Soon, the availability of trained GIS manpower opened up the untapped opportunity to develop an international GIS services market for the Indian geospatial industry.

What started as low-end data development work has evolved into India becoming the preferred source for design, development and implementation of enterprise geospatial platforms for discerning global customers.

Technology evolution

Technological developments in GIS have kept pace with the emergence of new and emerging technologies in the IT space, like Internet of Things (IoT), artificial intelligence (AI), machine learning (ML), deep learning (DL), augmented reality (AR), virtual reality (VR), Big Data, Digital Twin, Web/Cloud, et al. GIS deployment on Web/Cloud enables organizations to build enterprise geo-platforms hosting data, applications, solution templates and open APIs (application programming interface) serving a variety of users.

The federated architecture based on open standards enables users to access content from multiple data servers and consume it as a service using any device, anytime and from anywhere. For instance, the geospatial infrastructure of a Smart City would enable various departments like property tax, healthcare, transportation, solid waste management, and education, among others, to share their data with other departments in a collaborative manner.

ESRI's GeoHub technology makes content available to external entities, including citizens, NGOs, academia, and start-ups that can build citizen-centric applications to leverage the data. Another example of geospatial infrastructure would be state GIS integrating data from various departments to become a single source of truth and geo-enable various state government processes and workflows.

> The geospatial ecosystem is poised for huge growth in the coming years, with the potential to be a Rs. 1 lakh crore industry by 2030. However, industry leaders, along with the government, research institutions and academia, need to remove the bottlenecks and facilitate hassle free adoption of geospatial technology.

Growth drivers

As per a survey conducted by Geospatial Media and Communications, India's geospatial economy was estimated to be Rs. 38,972 crores in 2021, employing approximately 470,000 people. It is expected to grow to Rs. 52,770 crores and provide employment to about 950,000 people by 2025. Several factors have contributed to the growth in the adoption of geospatial technologies in India. These include:

- Increased awareness of geospatial technologies among users, decision-makers and the political leadership

- Deployment of GIS in several mission critical projects of the government, like Smart Cities, Atal Mission For Rejuvenation And Urban Transformation (AMRUT), Restructured Accelerated Power Development and Reforms Programme (RAPDRP), Digital India Land Records Modernization Programme (DINLRMP), Survey of Villages and Mapping with Improvised Technology in Village Areas (SVAMITVA), to name a few.

- Technological advancements like geospatial infrastructure to expose geospatial information and services to a much larger user base.

- Integration of GIS with other enterprise platforms like Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), Supervisory Control and Data Acquisition (SCADA), et al.

- Proliferation of location intelligent devices leading to availability of real-time geospatial information.

- Easy integration of data from disparate sources.

- Geospatial data and mapping guidelines that will lead to democratization of geospatial content and unlocking of data available with various agencies.

The road ahead

- **Location enablement of digital transformation:** Disruptions caused by the pandemic have accelerated the pace of digital transformation in the past 24 months. This has made it necessary for enterprises to quickly reorganize existing business processes and workflows to adapt to the new normal. Location information is an integral part of most business processes across industries now.

- **India Geospatial Stack:** Under the Digital India Program, the Ministry of Electronics and Information Technology (MeitY) has implemented several advanced enterprise platforms like Unique Identification Authority of India (UIDAI), Direct Benefits Transfer (DBT), Unified Payments Interface (UPI), among others, often termed India Stack. Several domain specific platforms, focused on healthcare, urban development, etc., are in the process of being implemented. Location information is a critical parameter in most of these systems. Hence, it would be prudent to establish a comprehensive enterprise GIS platform that can serve the constituents of India Stack and enables them to embed location information into the system.

- **Location Intelligence for Business Analytics:** It is said that 80% of business decisions have a location dimension. Hence, commercial enterprises – manufacturing, retail, BFSI (banking, financial services and insurance sector), travel and logistics – are major users of geospatial technologies. In India, the adoption has been low

because of lack of granular demographic data. However, the Geospatial Data Guidelines 2021 should lead to significant investments in data creation, resulting in increased adoption of GIS in the commercial segment.

- **GIS for sustainable development:** India is committed to achieving the 17 SDGs (Sustainable Development Goals) identified by the member states of the United Nations. Geospatial data is one of the key components of the information needed to capture, monitor and report data on various parameters. GIS also helps in building the strategy to achieve many of the 17 SDG goals.

- **Moving up the value chain in GIS services:** Indian geospatial services companies will continue to enhance their customer engagement as they move up the value chain in service delivery. Integration of GIS with other business processes, Web/Cloud based services, managed services, would be just some of the engagement models.

- **Skill development:** While several Indian universities are offering GIS and remote sensing courses, there is a need to align them to the industry needs and also adopt current technological developments in the curriculum. There is also a need to focus on the top half of the skill pyramid like program managers, project managers, solution architects, etc.

Conclusion

The geospatial ecosystem is poised for huge growth in the coming years, with the potential to be a Rs. 1 lakh crore industry by 2030. However, industry leaders, along with the government, research institutions and academia, need to remove the bottlenecks and facilitate hassle free adoption of geospatial technology.

The government needs to establish geospatial infrastructure to host content, solution templates, applications and open APIs in order to accelerate technology adoption. The industry has to invest in data creation, application and solution template development. It also needs to support universities in the development of high caliber manpower.

A lot has been achieved with the use of GIS; however, a lot remains to be done.